Vol. 16, No. 9 September 1997

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'Not in My Back Yard'

How to Combat, Identify, and Disguise Those Ugly Cellular Towers

- Answers to TrunkTracker Questions
- More Anti-Scanner Legislation
- Al Gross: Today's Radio Pioneer
- Grundig's Surprising New Receiver

Toyz for Test

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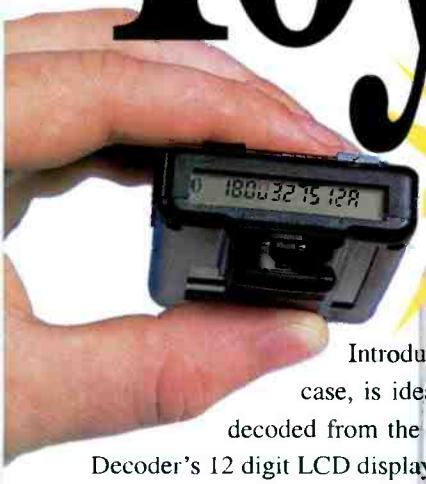

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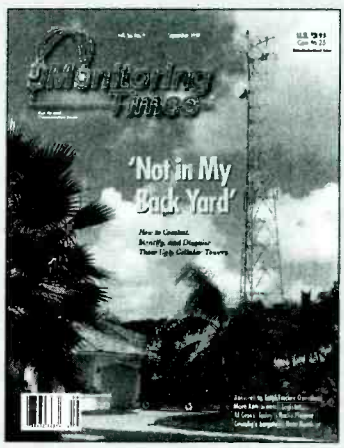

Cover Story

Those "Terrible Towers"

By B.W. Battin

Communications companies are in a frenzy to get new digital systems up and running ahead of their competitors and to meet deadlines set by Congress. That means that within the next five to ten years, there may be a *500 percent increase* in the number of cellular towers now existing in the U.S.

Local communities, angry at the erection of such "monstrosities," are balking at being brushed aside in the process and are racing to formulate local ordinances governing site requests. Congress has said communities may not ban cell towers, but they can require the towers to be made less objectionable.

One option is to disguise the antenna, and we interviewed one company who has made that their specialty—Specialty Teleconstructors, Inc. Story on page 8. Cover photo by Robert Wyman.

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trunkcom	For discussion about the new TrunkTracker scanners
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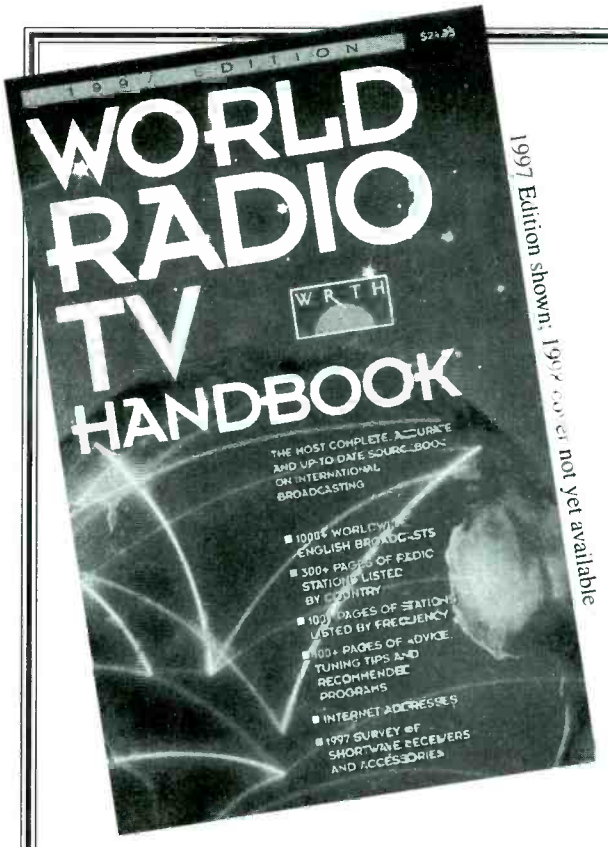

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LETTERS

Radio — a Real Education

The primary purpose for nearly every publication is to educate. While *Monitoring Times* does its best, within space limitations, to inform readers on the radio hobby, it's up to you to remind others what a great information tool radio truly is. Here are a couple of ways you can get involved.

Classroom Opportunities

Neil Carleton is an inspired and inspiring teacher in Ontario who leads a Shortwave Listening Club for 5th and 6th graders. He also publishes a newsletter called *The Shortwave Classroom* through which teachers around the world share tips, projects, and ideas on using radio as a teaching tool for a variety of subjects. Neil could use help in two areas.

"Teachers around the world are invited to take part in a "Mystery Mail" project with their class or shortwave listening club. The purpose of the project is to assemble a mystery box, of locally available objects, and exchange it through the mail with the Shortwave Listening Club at G.L. Comba Public School, in Canada, and other participating classrooms around the world. Only the participating teachers will know where the boxes come from. Students become sleuths as they study the objects and clues to identify the mystery location. The 1997-98 case of the mystery mail will take place from September 1997 to June 1998."

"To join in, contact me to confirm your participation. If there is sufficient interest, I'll also match you up with another teacher in a different part of the world. Your class or club will then be responsible for preparing two mystery boxes." Included in the newsletter is a check list of the categories of items to be sent. For more information, contact Neil Carleton, The Shortwave Classroom Newsletter, G.L. Comba Public School, P.O. Box 580, Almonte, Ontario, K0A 1A0 Canada, (613) 256-2735 or fax 256-3107; email, as167@freenet.carleton.ca

A few members of last year's Shortwave Listening Club at Glen Tay Public School. Inset: Neil Carleton unpacks a few things for the Shortwave Listening Club in his new classroom. All he lacks are a few more receivers and some other teachers whose students would help create an "interactive" geography lesson—The Case of the Mystery Mail.

Secondly, Neil writes that "While I was setting up my new classroom, a parent stopped by to say that her son and other students at Comba are really looking forward to joining the Shortwave Listening Club. Although classes don't start for two months, I have a full club already!" To accommodate more children Neil needs more radios; he's looking for donations of shortwave receivers, or receiver/cassette recorder combinations. Contact him at the address above.

His other classes will also be experimenting with in-school broadcasts using a mini-FM transmitter, monitoring various space shuttle missions, and receiving weather satellite images via RTTY broadcasts. "Although our school does not yet have internet access, we can reach out across the world, and out into space, by world band radio."

If your small-town school is in the same situation, *educate* your local teachers about the wonderful tool of radio, ask where it might tie into their lesson plan, and volunteer to help with a radio project.

A Lesson Too Late for the Learnin'?

When it comes to scanner and utility listeners, Congress just doesn't "get it." *Right to Privacy* is the drum beat they are marching to these days. Stacked up against the radio hobbyist is the cellular industry, Congress (which doesn't like being overheard), some law enforcement agencies, and, in some cases, the public.

Neither the issues nor the technology at stake here are as simplistic as congressional rhetoric would make them appear. Although moral outrage plays very well in Congress and with the voters, it is urgent that our legislators are presented with all sides of this issue and understand everything that is at stake. Read Rich Barnett's "Scanning Report" column for both the issues and the arguments.

Though Markey's HR1964 resolution (see Aug "Closing Comments") will likely not make it to the House floor, even more restrictive legislation is being proposed by House Subcommittee Chairman Billy Tauzin himself. If his bill is left unaltered, the only radio transmissions legal to monitor will be AM/FM/TV broadcasts, amateur radio, and citizens band radio! Unless he can claim the infamous February hearing in which Bob Grove participated as being relevant to this bill, hearings are expected to be held this fall.

Make sure your legislators hear another side to the story, and make sure your friends and neighbors do, too. As seen in our cover story on towers, people may not be able to stop the spread of technology, but they can stop a rampage and force a compromise. It's a matter of education. We have a big public relations job to do, and the time to do it is now!

Educate Your Kids' Kids

"I am purchasing a Sony 2010 and hope to interest my granddaughter in shortwave," says James Snow of Murray, Kentucky. "She is hoping to get a Masters degree in Social Studies. She has studied Spanish sign language and is proficient in understanding the same, so, [before she realizes it], she will learn of the 2010's ability to receive Spanish stations, etc."

"My interest in shortwave goes back many years (to 1937). The thrill of hearing Panama and Colombia late at night with a Truetone console with a 'Magic Eye' tube had made a convert out of me."

REACTion

Bob Leef, KB6DON/KAB5295, of Mission Viejo, California, responded to the June review of a Family Radio Service radio, in which the author stated that fears of FRS interference on General Mobile Radio Service (GMRS) repeaters have proven groundless.

(Continued on page 102)

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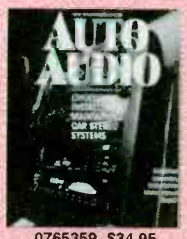

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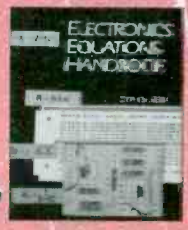

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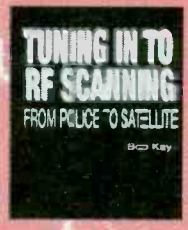

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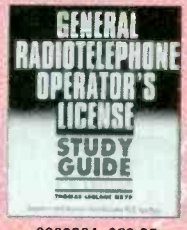

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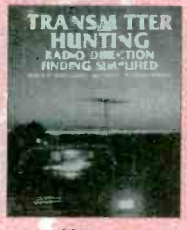

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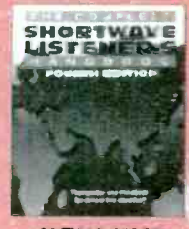

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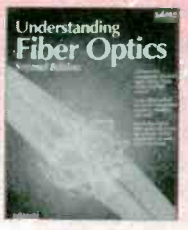

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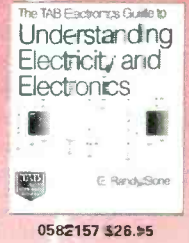

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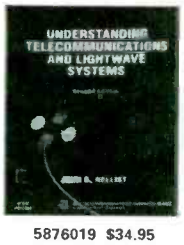

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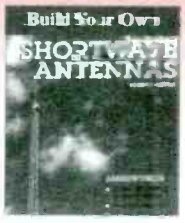

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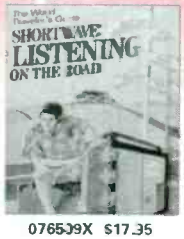

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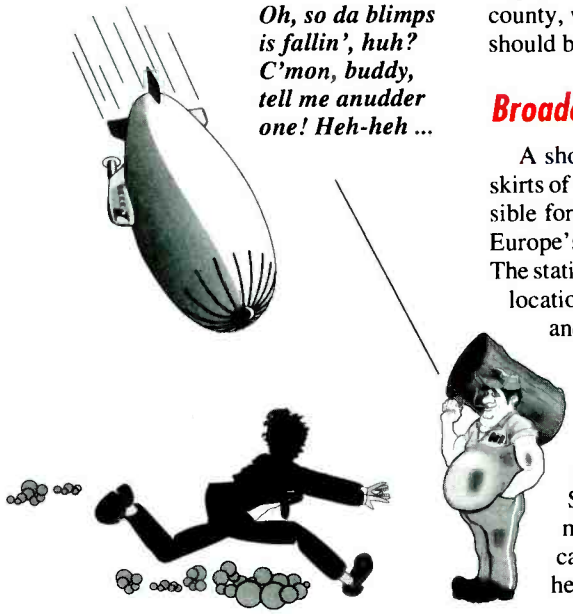
Run! Blimp!

Last month we told you about an unusual plan for a network of high-altitude blimps designed to be a low-cost alternative to satellite communications. We now have the frequencies for you: 47.2 - 47.5 GHz for the downlink and 47.9 - 48.2 GHz for the uplink.

The FCC quickly allocated spectrum space for the project, called Sky Station International, which is owned by former Secretary of State Alexander Haig and his son, Alex.

Incidentally, Motorola has expressed concern about Sky Station International to the FCC. The balloons, they say, are 150 wide and 450 foot long and weight 15 tons. In the event of a puncture, they will fall, straight down, from their position 13 miles above the country's population centers. That, Motorola worries, could be a real problem— you hear a whistle, look up only to see the sky instantly blacken and then, wham! like in a Roadrunner cartoon — death from above.

Of course, Motorola's concern is not entirely altruistic, though it certainly is appreciated. Big Mo has a competing scheme utilizing low-earth orbiting satellites called Iridium.



Oh, so da blimps is fallin', huh? C'mon, buddy, tell me anudder one! Heh-heh ...

System Down

Kansas City, Missouri, finally brought in a consultant to test its $18 million Ericsson 800 MHz trunked radio system. The results aren't in from the consultant but the Fire Department is making its opinion public — the system doesn't work correctly.

Fire chief Rick Brisbin told the *Kansas City Star* that "It's the never-ending saga of the faulty radio system." At one recent fire, the radios went haywire. Some units would not transmit and others refused to stay on the fireground channel. "A fire captain took a hose line inside a burning structure and tried to radio directions to other firefighters," he said. "His radio wouldn't transmit."

Maj. Dean Kelly, commander of operations support division of the fire department, though more diplomatic, confirms the report: "We found a lot of degradation of the system."

911 Tax Revolt

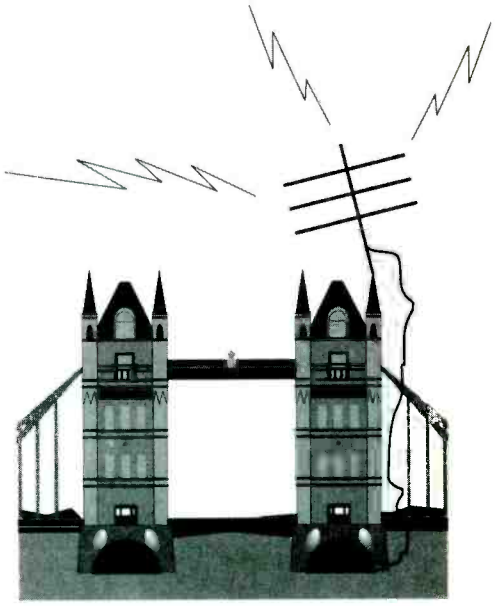
In Northampton County, Pennsylvania, there's a 911 revolt going on. Over 20 percent of the telephone subscribers have not paid their 911 surcharge during the past seven months. Over 244 letters were received in which customers protested the charge. In order to increase the amount of money collected, 911 surcharges are often calculated retroactively and residents of the depressed "slate belt" were not impressed with either the amount of the charge or the plan to phase out their own local dispatch center in favor of the new 911 facility. The phone company allows its subscribers to write a letter refusing to pay. The letter is then turned over to the county, who decides how, and if, the money should be collected.

Broadcast was a Bomb

A shortwave pirate operating on the outskirts of London was unintentionally responsible for a bomb alert that shut down one of Europe's busiest motorways for two hours. The station, RFL, was operating from a secret location in the woods beside the highway and was drawing its power from an electrical junction box on the edge of the motorway.

Over the past few weeks, the IRA has targeted the UK's highway network with bombs and bomb scares. So when a transportation department maintenance worker discovered the cables connected to the roadside box, he contacted authorities who traced the wires into the woods. The roadway was closed while investigators determined that the equipment was a transmitter and not a bomb.

"This is Radio Free London, coming to you from our top-secret location ..."



RFL staff said that the government seized two shortwave transmitters, one cassette player, two aerials, a ground rod, and cable.

RFL says that they will return to the air. It's not known what action the government, obviously relieved, will take against the station.

Going to Hell

Atlanta's 96Rock is making waves with a contest that asks listeners to predict the year, month, day, and time when convicted Oklahoma City bomber Timothy McVeigh will be executed. The winner gets a free trip to cover the event.

WKLS— 96Rock — runs a promo in which the announcer, talking over the sounds of AC/DCs "Highway to Hell," says, "Timothy McVeigh. Convicted mass-murderer. An evil man with a bad haircut who blew up a building and killed 168 people. Guilty. Now he's going to hell. And to celebrate..."

Listeners are then invited to call in their guesses. Station officials say that they're "playing on the sentiment of the majority of the population" but admit that most of the calls to the station about the contest have been negative. In any case, the winner of the contest will probably have to wait for a while to collect the prize. The average wait on death row is six years, six months.

Mr. Hundt Leaves Washington

Reed Hundt, chairman of the FCC, says that he is resigning. Hundt, a democrat and old prep-school pal of vice president Al Gore, brought a mix of liberal idealism and a desire to do the will of the republican congress to the job, says Frank James of the *Chicago Tribune*.

Hundt's reviews, not surprisingly, have been mixed. Sen John McCain of Arizona called him "a man of integrity." John Malone, chief executive of Tele-Communications, Inc., said that he should be shot. Hundt said he is leaving to spend more time with his family. His resignation leaves only one FCC commissioner who plans to stay on.

Unfinished Business

According to the *Wall Street Journal*, hundreds of licenses for contested FM radio stations lie in limbo at the FCC. The agency, says reporter John R. Wilke, hasn't decided a contested radio license since 1994 when a court threw out its old rules and ordered new ones." The backlog is now 873 undecided applications for 212 new stations. Stay tuned.

Auction Choice: War or Wireless

The National Security Council has checked in with its opinion of the continuing spectrum auctions. They say that turning over certain airwaves to commercial use could hinder U.S. military operations. In a report to Congress, the General Accounting Office warned that radio spectrum auctioned off for new wireless services could hurt the military's ability to conduct large-scale operations like Desert Storm.

The GAO report focuses on an unnamed 50 MHz chunk of frequencies that the navy had planned to use for a new system that lets ships and planes share their locations and other information during battle.

Spectrum auctions are coming under increase criticism from other areas, as well. Companies that made earlier, multi-billion dollar bids, are now going bankrupt and asking for a government bailout. More recent auctions have brought as little as $1 per license. A proposal to establish minimum bids is expected.

Extra Low Frequencies Harmless?

A 13 year study on the impact of a controversial submarine communications system in Michigan says that the ELF radiation does not produce any significant, widespread adverse effects on plants and animals. It does say that there is an apparent increase in chlorophyll in aquatic plants, a rise in the death rate of wintering bees, accelerated growth of moss near the communications site, and newborn mice who open their eyes earlier than normal — none of which seems to alarm anyone other than mother mice.

Installed in northern Wisconsin and the Upper Peninsula of Michigan in the early 1970s, the system has been the target of continual protest from residents who fear the health problems associated with the site as well as the possibility of becoming a Russian nuclear target.

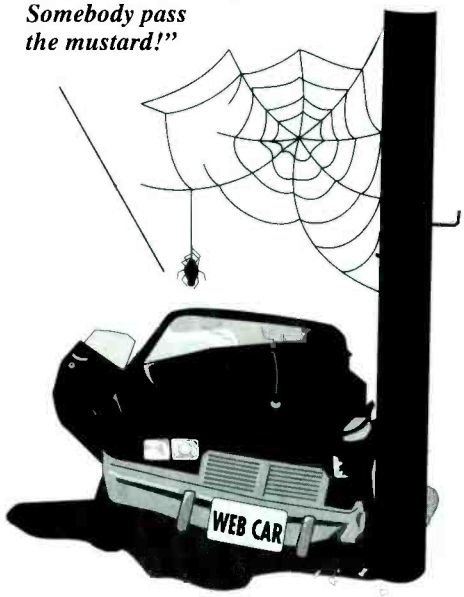
Now We Have 'Web Cars' — This is an Improvement?

The government of Great Britain says that it will consider banning the use of cell phones in moving cars. Drivers can already be fined for driving "without due care and attention," but there is no specific law against using a cell phone.

All of this came to the attention of the British public after Peter Mills, 34, was sentenced to six months in prison for causing the death of motorist Geoffrey Murray, 54. Mills had been listening to his message service as he crossed to the wrong side of the street and collided head-on with Murray's van.

Interestingly, Daimler-Benz has introduced a Mercedes E420 prototype that they call the "web car." The recently unveiled vehicle features dashboard internet access. It will work on voice-driven commands. The driver will, of course, then pull over to the side of the road to view the web site.

Aptly named, I'd say... Somebody pass the mustard!"



"Communications" is compiled by Larry Miller with editorial assistance from Rachel Baughn and the *MT* art department. We also receive help from the loyal members of our "Communications" monitoring team who clip out and send in interesting items about communications, the absurd, and the world at large. Anonymous, Albany, NY; Jeff Bell, Riverdale, Western Australia; Maryanne Kehoe, Atlanta, GA; Mr. and Mrs. Kevin Klein, Kimberly, WI; Jack McCartan, Newark, DE; Doug Robertson, Oxnard, CA: Brian Rogers, Allen Park, MI; Ed Schwartz, Chicago, IL; Richard Sklar, Seattle, WA; Daryl Symington, Holland, OH; Larry Van Horn, Brasstown, NC; and George Zeller, Cleveland, OH. We also consulted the following publications and list their names in appreciation. *Channel, Dispatch Monthly, National Scanning, Radio World, Satellite Times, Wall Street Journal* and the *W5YI Report*. **Please note my new e-mail address: *larrymiller@chesco.com***

THOSE 'TERRIBLE TOWERS'

Or ... How do You Hide a 150-foot Cellular Eyesore?

Cellular phone towers are popping up just about everywhere. Many people consider the massive steel structures eyesores. So, what are the options? Inset shows how cellular antennas have been affixed to a water tower's railing.

By B. W. Battin

You've just installed the tower of your dreams. There it stands, higher than the power lines, higher than anything else in the neighborhood. It rises skyward, bedecked with high gain antennas, a monument to communications technology, ready to tap signals from places that until now you've only dreamed of pulling in.

Your tropo bone is starting to throb. Ducts are forming. You know it. That feeling in your bones is never wrong.

All you have to do is rush inside and hook up the coax. You head for the door, tingling with anticipation. Will my new antenna system pull in signals from a few hundred miles away, a few thousand? Breathless, you reach the door, and—

There stands your neighbor, looking very unhappy, muttering about the covenants that specifically prohibit antenna towers. And then the next day, a zoning enforcement officer knocks on your door, gives you ten days to tear down your marvelous signal-grabbing contraption or face the consequences.

If only there were a way to disguise the tower, you think miserably, make it look like something else. A tree maybe. But you shake your head, knowing that's impossible.

And you think *we* have problems...

It may sound like a nightmare, but for many radio hobbyists it has been an all too stark reality. And if we monitoring aficionados have it bad, consider what the cellular phone industry has to put up with. For cell phones to work properly they have to be within range of a tower, and that means towers...well, just about everywhere. And these are not hobbyists' towers; these are immense, usually self-supporting constructions that rise a hundred-fifty feet or more, Goliaths astride massive cement pads, brandishing antennas like weapons.

And people absolutely hate them.

Angered constituents go before their city councils and county commissions, using terms like "eyesore" and "monstrosity." They complain that the towers ruin the rural atmosphere. Or they block the view. Or they're just plain ugly. And the elected officials respond with laws that restrict the construction of cell phone towers. (Check out the sidebar entitled "Nope, Not In My Backyard.")

Call in a professional tower hider

All this causes major problems for the cell phone companies, for without towers, there are no cell phone signals. Is there a solution? A firm in New Mexico has one. It's the same one the beleaguered radio hobbyist above came up with—except that the cell phone companies have the wherewithal to actually do it.

Make the tower look like something else.

The firm, Specialty Teleconstructors, Inc., is headquartered in Cedar Crest, a community east of Albuquerque in the Sandia Mountains. The rapidly expanding company has more than 200 employees and offices in Columbus, Ohio; St. Louis; Chicago; Birmingham, Alabama; Orlando; Irvine, California; Phoenix; Raleigh, North Carolina; and Columbia, South Carolina. It's in the business of building towers for wireless telecommunications companies.

And a growing part of that business is disguising them so they don't look like antenna towers. "Disguising (towers) is becoming much more prevalent," said Michael Budagher, the firm's president. "It has the potential to become a significant part of our business."

Look, Mom, no tower

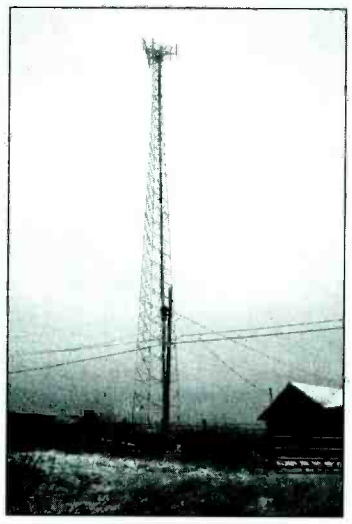
He estimated that his company constructed between 50 and 100 disguised antennas in a recent nine-month period. Sometimes disguising an antenna is as simple as putting it on

Nope, Not in My Backyard

By B. W. Battin

If a cell phone tower hasn't popped up in your neighborhood yet, there's a good chance one will appear soon. One in every seven people in the United States has a cellular phone—more that a fivefold increase in five years. And the ranks of cell phone users continue to swell. The Cellular Telephone Industry Association estimates a new customer is added every three seconds.

The industry is poised to move beyond simple voice transmission. New services will include fax, e-mail, and news headlines—and eventually even video transmissions. The signals that carry these new features don't travel as far as conventional cellular transmissions, which means more towers closer together. In late 1996, the Cellular Telephone Industry Association put the number of U.S. cell phone towers at 25,000. The group estimates 125,000 of them will be needed by 2005. That's the deadline for licensees of the new PCS frequencies to have two-thirds of their systems fully functional.

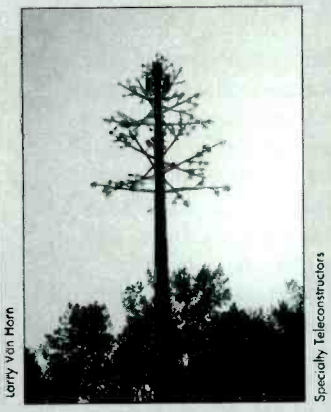


People living in the Sandia Mountains east of Albuquerque are upset about this 185-foot cell phone tower. It stands five miles from Specialty Teleconstructors, a New Mexico company that disguises antenna towers so they will be less objectionable to people living near them.

Communication towers seem to rank right up there with topless dancing establishments for things people are not overjoyed to find in their neighborhoods. The primary concern seems to be visual pollution. In addition, some alarmed residents fear that high-frequency radio waves may pose a health threat. Spurred by constituent complaints, at least 170 local governments have declared moratoria on construction and are moving to restrict the proliferation of towers.

- Among the first to act were the Chicago suburbs of Wheaton and Wilemette, both of which declared moratoriums on cell-phone towers while they determined how to deal with the situation.
- In New York, the Saratoga County Planning commission approved a model law aimed at controlling the proliferation of cell phone towers. The measure encouraged cellular phone companies to explore creative alternatives to free-standing towers.
- In DeKalb County, Georgia, neighbors have filed suit to stop construction of a 100-foot communications tower disguised as a pine tree. The suit contends the disguised antenna is an attempt to sidestep legal requirements for the tower and seeks $10 million in punitive damages.
- Three cities in Clark County, Washington, imposed temporary bans on the construction of cell phone towers. Among other things, the communities were looking into whether they could require cell phone companies to share towers.
- "I'm committed to taking that tower down if it's the last thing I do," says a county commissioner for the district protesting a 185-foot cellular tower in the Sandia Mountains east of Albuquerque.
- "Where does it stop?" a Ventura County, California, planning commissioner asked in a published report. "You get one or two requests for these (towers,) and pretty soon it turns into 16."
- Next to a 92-foot tower in Niles, Illinois, mayor Nick Blase erected a huge sign and arrow with the text, "You can thank AT&T for that ugly tower and barbed wire—Nicholas B. Blase, Mayor of Niles"
- "I'm not about to sit by and let Malta [New York] become a picket fence...We're going to propose something unique and something radical," says Supervisor David R. Meager.

Going Incognito ...

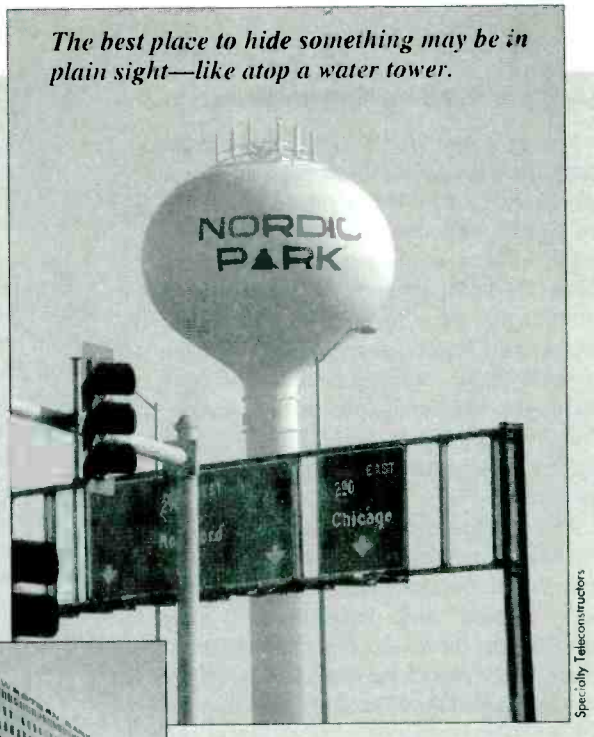


Larry Van Horn

Specialty Teleconstructors

Two variations on how to disguise a cellular phone tower as a pine tree. The version at left was spotted near Castle Rock, CO, by Larry Van Horn. "Tree" at right is located in a suburb of Raleigh, NC.

The best place to hide something may be in plain sight—like atop a water tower.



Specialty Teleconstructors

B. W. Bartin

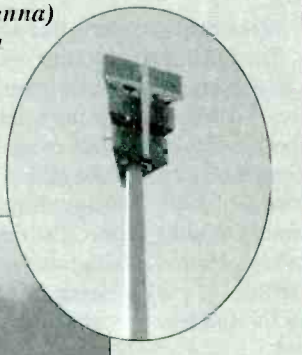
Can you spot the microwave antenna on the Albuquerque office building at left? Give up? It's on the penthouse floor, inside the building, hidden from the view by a material which does not interfere with high-frequency radio signals.

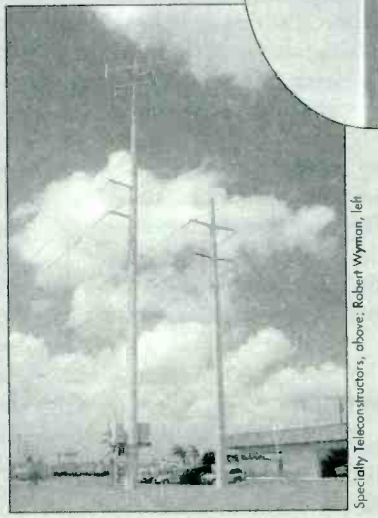
Main photo: Specialty Teleconstructors; Inset: Harry Roughn

Inset: a cellular antenna is perched on an old factory mill smokestack in North Chelmsford, Mass. The factory itself has been recycled into shops and stores.

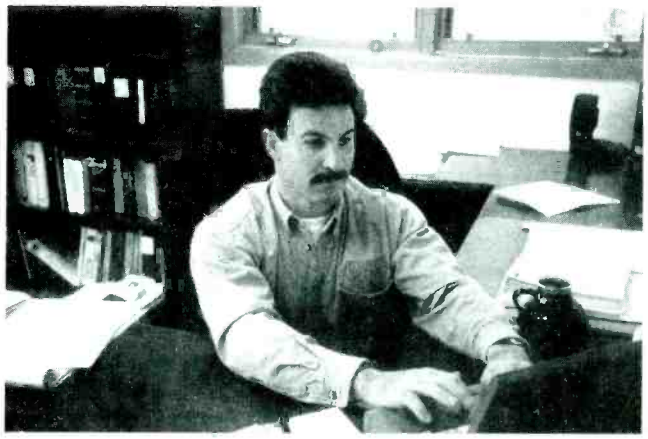
When is a smokestack not a smokestack? When it's a cellular phone tower.

At right, the tall object with the cross (a disguised cell antenna) does double duty at a cemetery. Below, a cellular array sits atop a high-voltage electrical tower (below)





Specialty Teleconstructors, above; Robert Wyman, left



B. W. Bolin

Michael Budagher, president of Specialty Teleconstructors in Cedar Crest, NM, says that disguising cellular phone towers has the potential to become a major part of his business. A four-color process flier (right) promotes the company's "transformation" efforts.

top of an existing structure. Water towers are good for this. The antennas on top are dwarfed by the mass of the tank to which they're attached. And the tank was there all along. People are used to seeing it.

But some disguises are quite imaginative. Take the clock tower Specialty Tele-constructors built from scratch. "We went ahead and enclosed the entire thing so it looked like a steeple," Budagher explained. "And we put four functioning clocks on top." (As of this writing, the clock tower remains in a warehouse, waiting for site-location problems to be resolved.)

Budagher's company has also made towers look like palm trees and pine trees, complete with bark, branches, fronds, or needles—whatever an antenna needs to pass for a tree. In the case of one California installation, Budagher said, "We planted as many as six (real) palms around (the fake one) to help disguise it."

One antenna was made to look like a smokestack. Another looked like the vertical supports of a water tower railing.

It ain't cheap

Budagher said he has never found a disguising job he couldn't do. "Our motto is, 'The difficult we do; the impossible costs more.'"

He estimated the average telecommunications tower costs between $120,000 and $150,000. A disguised tower can cost as much as $200,000.

The disguising does not affect performance, according to Budagher. "Pine trees" and "clock towers" propagate signals as well as their conventional-looking counterparts.

Got electronics, construction, and water-quality skills?

If so, send a résumé to Michael Budagher, 12001 State Highway 14 North, Cedar Crest, NM 87008. "Finding skilled craftsmen is one of the most difficult problems in this indus-

try," Budagher explained. The list of needed skills involves a variety of trades and disciplines. The ideal candidate should know about antennas, have general construction experience, and possess solid computer skills. Sound about right? Well, toss in knowledge of water tanks. A lot of Budagher's antennas go on top of them.

"Welding (on the outside of the tank) can burn off paint on the interior," Budagher said. "And then you have to disinfect the inside area."

Should we rush out and buy stock in antenna disguising firms?

It might not be a bad idea. Five miles down the road from Specialty Teleconstructors stands a 185-foot steel communications tower. People living near it hate it. They showed up at a meeting to complain. They used terms like "visual pollution." The county commissioner in whose district the tower stands has pledged to get rid of it.

And every day the number of cell phone customers in the world increases. And more cell phone companies compete for their business. This means more cell phone towers. And people will hate them.

Unless, perhaps, they look like pine trees.

"With local opposition mounting [to towers], some PCS license holders are having trouble getting financing to build their networks. So ... the FCC suspended its March 31 deadline for the latest installment of PCS license fees.

"All of which suggests that an unseemly alliance has been forged between the FCC and an industry it is supposed to regulate. The real question: Can the FCC serve the public while promoting an industry that's producing billions for the U.S. government?"

—Norm Alster,
Investor's Business Daily

Who's Right?

By Rachel Baughn, Editor

Local anger has not only been directed at the structures, but at the attitude of the cell-phone companies themselves—"the arrogance of the phone companies," as Faria Beach, California, resident Bill Stratton put it. City councils resent being "steamrollered" and bristle at the assumption by telecommunications companies that towers are regulated at the federal, not the local, level, and that in a lawsuit Congress will back them up.

In response to an appeal by cell industry lobbyists, Congress already stepped into the dispute by limiting the ability of local governments to block cellular towers in the Telecommunications Act of 1996. Cellular companies are to be treated as utilities, and therefore, towns can't zone out towers or withhold approval from reasonable requests. But they do have the right to declare a limited moratorium on construction to allow time to develop local ordinances if none were previously in place. These ordinances may require cellular and PCS companies to place their antennas in discreet ways or double-and triple-up with competitors on new towers or existing structures. The industry is appealing—see FCC Public Notice 97-264.

Several ordinances already hammered out by communities such as Saratoga County, New York, and Vancouver, Washington, are serving as models for other communities just beginning to face the dilemma. Forced to work together to make the inevitable more palatable to the public, cell companies and local administrators are proving that creative solutions are possible ... (Something Congress never forced the cellular industry to do when it came to building privacy into their technology!)

Still, when there's big money to be made, everyone is susceptible. Congress and the FCC, who are counting on the auctioning of spectrum to bring in big bucks, have a vested interest in removing any roadblocks to the speedy construction of cellular and PCS systems. That includes keeping cellular customers happy by making sure they get a seamless network (via tower construction) and by guaranteeing their privacy (by banning equipment which can receive their frequencies).

City landlords have discovered rooftops can be worth as much as two million dollars per year in rent. Churches and municipalities have discovered there is money to be made in renting out bell towers and steeples, watertowers, tall billboards, and lampposts. Unfortunately, in the rush to cash in, they sometimes forget to consult those whom they serve. A public park in DeKalb County, Georgia, and a Catholic archdiocese in California, which approved tower construction at a school, will have to look to alternative fund-raising methods following public indignation at using these locations as tower sites.

One location you may want to watch particularly is your local Post Office. In a plan which he suggested could help avoid the necessity of raising the price of a first-class stamp, postmaster general Marvin Runyon (at one time head of the FCC) proposed to lease post office property for the construction of communications towers. However, two states have accused postal officials of attempting to use their federal charter to skirt local zoning and safety rules, according to *The Washington Post*. Half Moon Bay, California, succeeded in overriding the planned 150-foot tower in their community, but Schaumburg, Illinois, hasn't been so fortunate.

Jack M. Siegel, the attorney who filed a lawsuit on behalf of Schaumburg, Illinois, says that "a guy came in from Washington and said that we can do anything we want with postal property." However, the town maintains that the 1996 Telecommunications Act and an Executive Order by President Clinton make it clear that any commercial antenna must "be done in accordance with federal, state, local laws and regulations."

The construction of new towers — whether for PCS, cellular, digital wireless data services, high definition TV, or whatever new technology not yet named — is nationwide and not restricted any area, urban or otherwise. To give you an indication of the geographical spread, here are just a few of the folks who contributed newsclippings from their local newspapers on this subject: anonymous, Albany, NY; Richard Ashley, Oakdale, LA; Gary Deavis, Ft. Belvoir, VA; Patrick Griffith, Federal Heights, CO; Maryanne Kehoe, Atlanta, GA; Bob Mills, San Diego, CA; Doug Robertson, Oxnard, CA; Edward Schwartz, Chicago, IL; Phil Yasson, Vancouver, WA.

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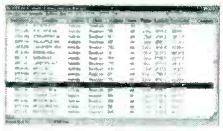

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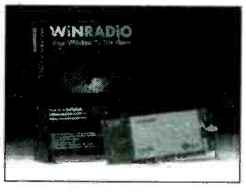
- Programmer's information is supplied for special applications development.
- Specially developed shielding materials and innovative design methods prevent PC-generated interference from entering the receiver.



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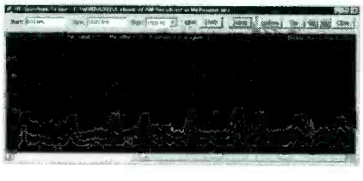

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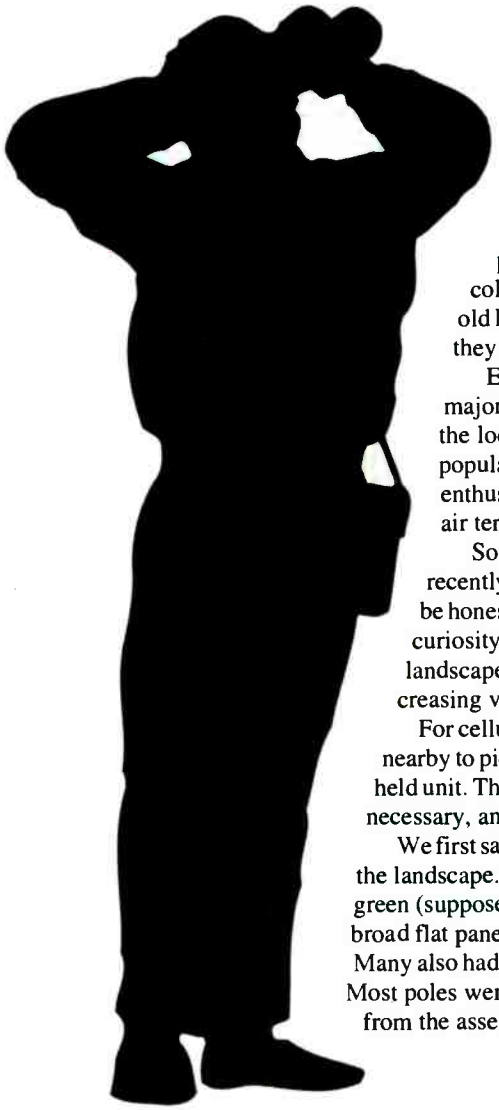
Confessions of a Chronic Cell Site Spotter

"Holy cow—my very first bevel-decked, dual polarized array with orthogonal 45-degree slant radiators mounted in a cylindrical radome!"



By Michael Scofield
Photos by Gene Hughes

Cell Sites? A hobby?! Yes, it is an unusual hobby, to be sure, though perhaps not worthy of psychiatric treatment. There are people who collect a variety of things—baseball cards, or old license plates. People log what kind of birds they have seen in the wild.

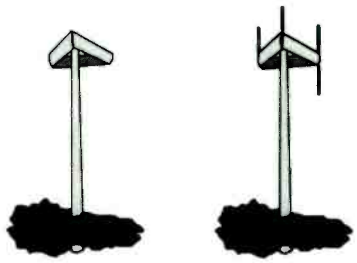
England is full of enthusiasts who sit beside major railroad lines and take down the numbers of the locomotives. This has evolved to an equally popular sport in Britain—planespotting, where enthusiasts bring their binoculars to the roofs of air terminals and write down tail numbers.

So anything is fair game for a hobby. Mine, recently, is spotting cellular telephone towers. And be honest: can't you admit to the slightest amount of curiosity about these odd-looking additions to our landscape, and why they are appearing in ever-increasing variety?

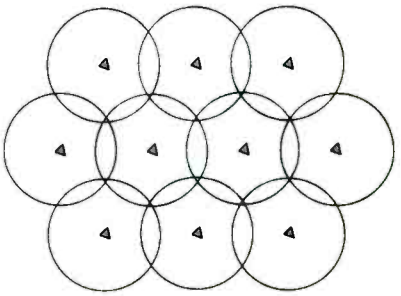
For cellular telephones to work, there must be a site nearby to pick up the radio signal from the auto or hand-held unit. The more "cell phonese" in use, the more sites necessary, and the more precise their coverage.

We first saw them about 14 years ago, scattered around the landscape. They were tall, and generally painted pale green (supposedly so not to stick out), and tended to have broad flat panels on each side.

Many also had tall poles at the corners of the top assembly. Most poles were pointed up, but some were pointed down from the assembly.

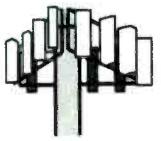


Those poles are obviously omni-directional antennas. The radiation and coverage pattern around the tower are uniform in all directions. That fit into a pattern of omni-directional coverage of towers. Over flat terrain, with even usage, they could be spaced in a hexagonal pattern as shown.

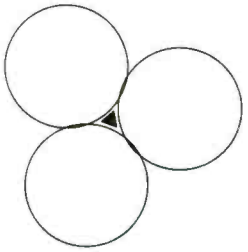


But the expense of putting up a tower (with the power supply, the electronics cabinet at the base, etc.) could be lowered if each tower could cover three cells, in various directions.

So after a while, the towers started appearing without the broad panels on them. And what was revealed was an array of directional antenna elements.

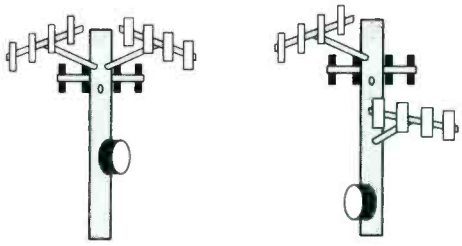


This, of course, results in a pattern of smaller coverage areas, three clustered around each tower.



But even these were not all uniform. The desired coverage area may be longer on one side than on another.

On the Air Touch site in the next figure (distinguished by the four elements on a cross-bar, and the microwave dish pointing towards a hub site), all the elements are at the same

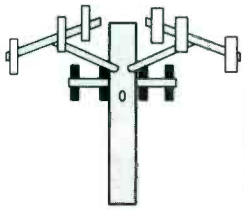


height. On the right-hand figure, however, one side needs to be lower so as to cover a shorter distance (with another site nearer in that direction).

Telling the Systems Apart

The two original players in the Los Angeles market (the counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura) were Pac Tel Cellular (later renamed AirTouch) and LA Cellular. After considerable study and looking for telltale documentation on sites under construction, I learned to tell the difference.

The first is the pattern of the antennae. If there are three elements on a sidebar (as shown at right), it is almost sure to be an LA Cellular site. This is a "missing element" formation, which is seen so often.

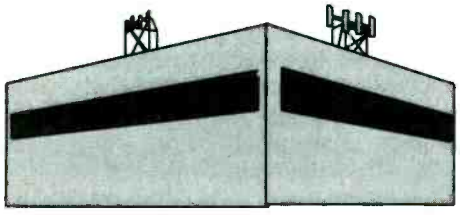


If, on the other hand, there are four elements on a tower and a microwave dish, it is almost guaranteed to be an AirTouch site (as shown previously).

There are some exceptions; a very few LA Cellular sites have microwave links to other sites (not many), and a few LA Cellular sites also sport four elements on a crossbar rather than three. So the rule of thumb is not 100 percent reliable, but it will be close.

Hiding Them on Buildings

Not always do the cellular companies set up those little green towers. If an office building is handy, and the owners are willing, a site will often be placed on the roof. The most obvious look like the sketch below.



(Continued on page 17)

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...with Grove's signal enhancement package. Order your TrunkTracker between August 1 and September 30, 1997 and get the acclaimed twelve-inch Austin Condor flex antenna ($29.95 value) absolutely **FREE**. The Uniden BC235XLT normally sells for $299.95 by itself, but now you can order the TrunkTracker with one of the best multiband flex antenna on the market for only **$299.95 FOR BOTH** (plus shipping; and you still get the standard Uniden factory antenna and other pre-packaged accessories!). Because you are ordering from Grove, you get premium second-day-air delivery for the cost of regular shipping (Compare our charges with others; some dealers charge close to $20 for slower service!)

Unquestionably the most exciting scanner product in two decades—Uniden's new BC-235 XLT will follow those elusive 800 MHz trunking signals! Now you can listen and follow conversations on your local 800 MHz trunking system from law enforcement dispatch and tactical channels, fire and rescue calls, ambulances, federal government agencies, and many other services that use Motorola's trunking technology. You can also listen to conventional scanner communications in the 29-54, 108-174, 406-512 MHz bands (less cellular).

The BC-235XLT is designed to track Motorola Type I, II, IIi, Hybrid, Smartnet and Privacy Plus analog trunking conventions, which are extensively used in 800 MHz communications systems. (Note: trunking frequencies must be entered before they can be monitored.) Conventional scanner mode operation is similiar to the BC-230XLT.

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— Larry Van Horn,
Assistant Editor, Monitoring Times

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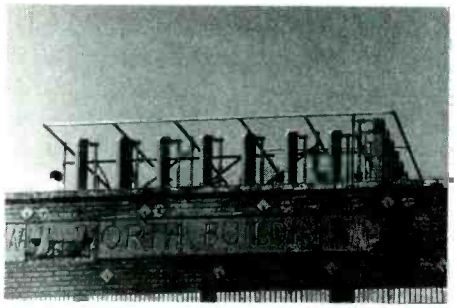
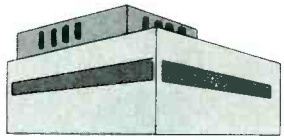
Check the Grove website for a review by Bob Parnass and updates on specifications, price and availability.

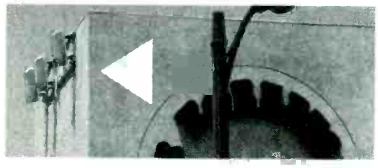
Another example is shown in this photo:



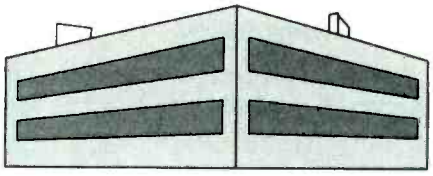
To make them less conspicuous, they are often mounted flush on the top part of office buildings. They often paint the pans to match the wall on which they are mounted, but the shadows and texture still give them away.

If they cannot put them flush on the side of a vertical panel on the building



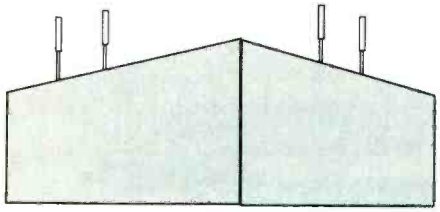


(such as the top elevator housing), then they have to be mounted above the roof (as first shown). However, some effort is sometimes made to hide the antennae array and scaffolding by putting a flat (usually white) shield around them.



These housings are probably made of fiberglass or a durable plastic which won't hinder the radio signal. The irregularity of the panels tend to give away their purpose, especially if the entire array is pointed in the desired direction—not necessarily at right angles with the building.

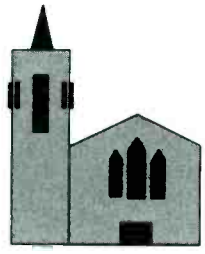
Here is a Nextel site on the top of a commercial building.



Generally, zoning laws preclude towers from being located in residential areas. So one tends to find them in commercial and industrial areas as much as possible. But sometimes, the spacing requires a site where no commercial facilities are available.

One aesthetic solution is to position them among the other ugly light towers in a high school athletic field, and indeed, there are many examples of this positioning.

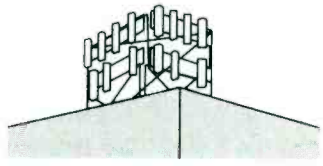
Another is to attach them as inconspicuously as possible on church steeples (a tolerated non-residential facility in a residential area).



Indeed, some churches have gotten totally new, original towers (in the gothic arch style shown at left) simply for the cell site, thus insuring a steady rental income for the church.

While two major companies may not share towers, they are sometimes forced to share roof-tops. There are a few sites along the Los Angeles freeway system which demonstrate this.

Such sites should be obvious because you can often see both kinds of element spacing on one scaffolding.



Support Facilities

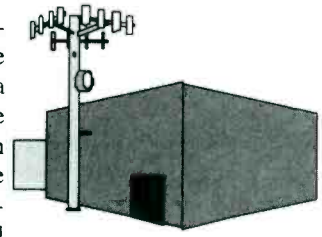
When cell sites are mounted on rented space at the top of commercial or office buildings, there generally is sufficient floor space somewhere inside the building (perhaps even in a basement) to accommodate the racks of electronics and possibly an emergency generator or batteries to support the site.

However, most free-standing towers have a building or a bunker at their base containing the electronic racks and switching equipment, and usually surrounded by a sturdy chain link fence.

Some sites have the electronics placed in a bunker under ground level. The only clue to where it is might be some heavy doors flush with the pavement.

Other sites use rented space in existing buildings, but still put the antennae on the typical pole.

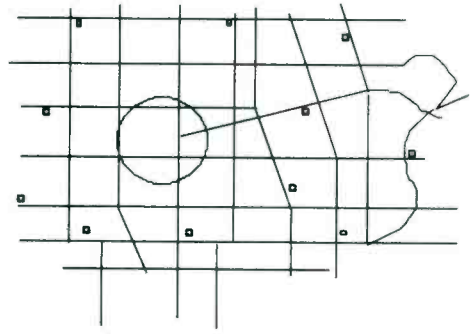
In such instances, there may be a bridge for the coax to run from the pole into the building, often well above ground level. The above configuration is at the back of a supermarket. Note that the microwave dish remains above the supermarket roof, pointing north.



Filling in the Gaps

One pleasure of tracking sites and plotting them on a map, is noting where the gaps are and predicting where a new site may be set up. Follow through by searching the likely area (on bike, for instance), and actually locate the site you predicted would be there.

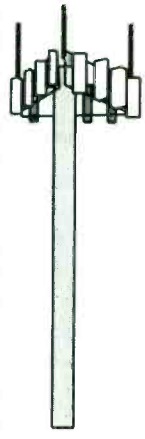
For example, if you surveyed a part of a county and found the following sites, it should be obvious there is a big gap. (We circled it for you.)



The new site may be at the center of the circle. Or, you may realize that given the regular distance between adjacent sites around the area, you may be looking for *two* sites, perhaps each on the edge of the circle, rather than just one site in the middle of the circle.

Super-Sites

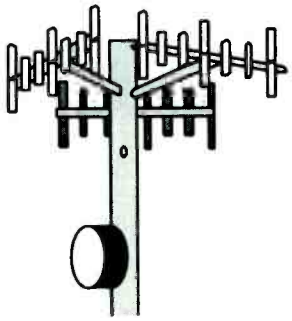
In about 1995, we began to see additional elements on some of the AirTouch sites. In addition to the regular directional arrays on the side panels, omni-directional poles appeared on the corners as shown art right.



AirTouch appears to be running two systems from this tower, the new one (probably digital) beginning with a large cell using omni-directional antennae.

As the second system needs more cells, they modify the

tower to have 10 elements on a side, something like shown below.

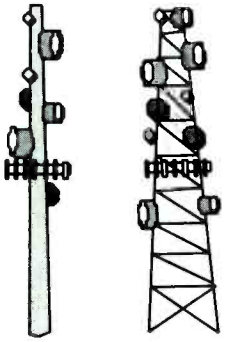


Towers with four elements on a side slowly evolve to the style shown above.

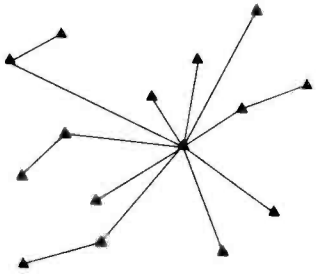
■ Hubs and Networks

Nearly all of the AirTouch sites are connected together in a star-type network of microwave links, ultimately collected into the ultimate network switching hub in East Los Angeles.

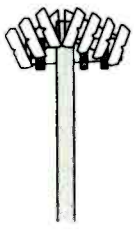
Pictured at right are two kinds of hub towers. Sometimes an original "tall green tower" becomes a small hub, as microwave links are added to it pointing to nearby sites. This type is shown on the left in the figure.



The tower on the right is quite typical, and may have as many as 20 links to nearby sites. A typical collector network might operate as shown below. Note that some sites "relay" the signal for other sites further out.

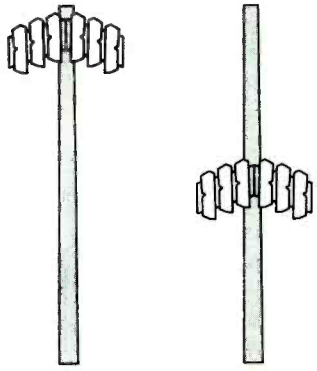


■ Cutting Down the Size of the Cell



As more sites are added, the size of the coverage between the sites needs to be reduced. That can be done a number of ways. One way is to point the elements down an angle below the horizon (left).

Another way is to bring the array closer to the ground. After a few years, this Los Angeles cellular site was lowered (below) as the surrounding cells needed to be reduced, but the top of the tower was left intact.



■ A Third and Fourth System

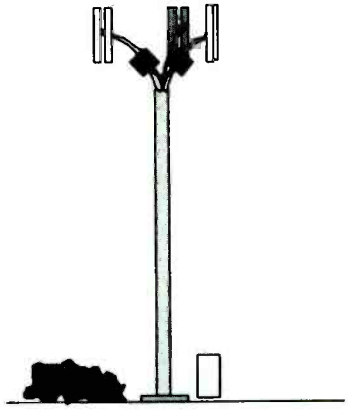
About 1992, there began to appear around southern California a new shape of cellular tower. It had only two tall pan-type elements on each crossbar. The poles were initially very tall, and were located with remarkable regularity in a triangular pattern, evenly spaced across the city.

It was while working at the Red Cross headquarters in Los Angeles after the Northridge earthquake that I discovered these to be in the new Nextel system.

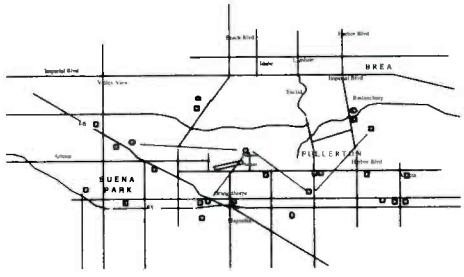
When talking with the technical field representative from Nextel, I was shown a map of their sites, and I noted that one site I was familiar with was actually a mile west of where it was shown on the map.

But then, I started realized there was a fourth system. How? Because I have seen locations with four different types of antenna array located close by each other. An example of this is where Imperial Highway crosses the Santa Ana River in northeastern Orange County (below). On the north bank of the river may be seen four towers next to some industrial buildings. One has the microwave dish pointed towards Sierra Peak (thus indicating that it is the AirTouch tower).

The fourth system has popped up with a new style of tower. The graceful curve on the arms give it a very distinct shape. (F-28) Many have a label on the box at the base: "Pacific Bell Mobile." It certainly is not part of AirTouch.



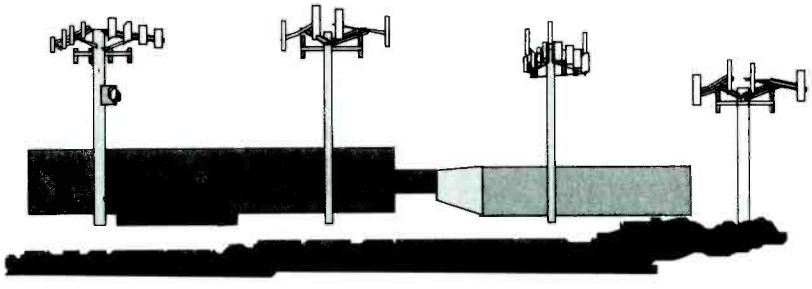
Plotting this kind of tower on a map, we can establish a loose network of such sites.



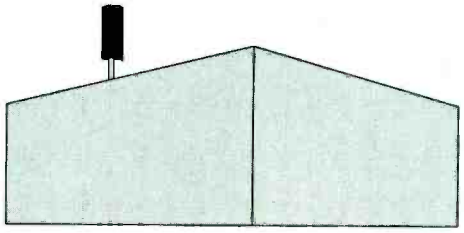
■ Odd Antenna Shapes.

Not all sites have antennae fitting what has been described so far. Some sites look very much like a free-standing telephone pole without any crossbars on it, and absolutely no wires extending from it (right).

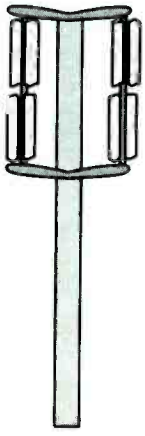
The giveaway is the silver band around the middle, which leaves a 5-6 foot high top module which probably contains antennae and passes the signal through its surface material. It is



probably omni-directional. The label on the power box at the base indicates Pac Tel Mobile, and is identical to that on boxes at the base of the style shown previously. This same style of antenna can be seen isolated on some buildings (below), but these are being replaced by more complex arrays.

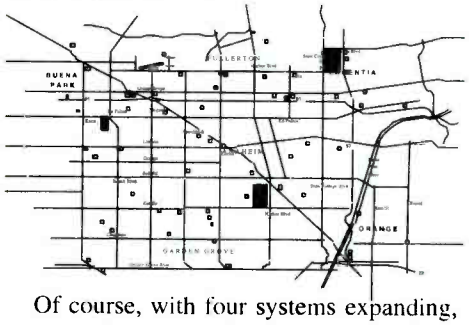


In some areas outside of Los Angeles, we see even more interesting tower antenna configurations, such as the one below. These can be seen in the San Jose and Phoenix metropolitan areas. They work in the same way as the more common styles shown in this essay.

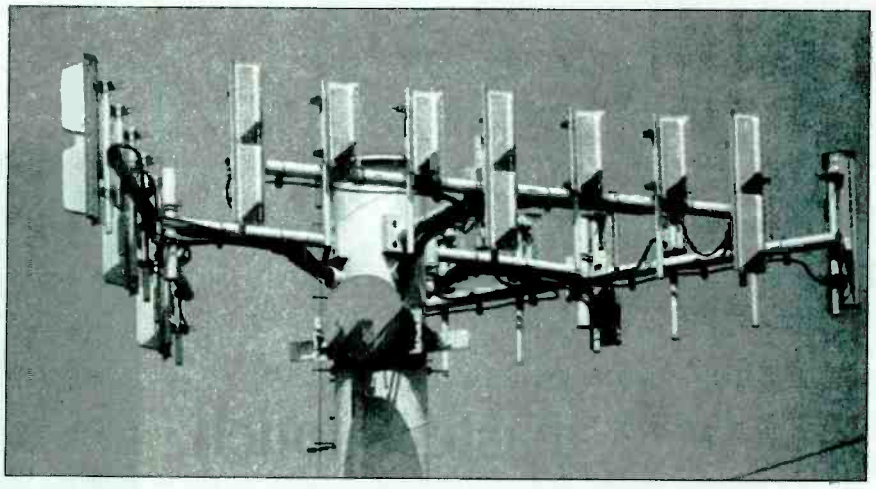


Finding New Sites

It is no longer difficult, they are proliferating so quickly. In my own neighborhood of Anaheim and Fullerton, there is an average of one per square mile.



Of course, with four systems expanding, you are going to see quite a few new ones from now on. As of this date, I have logged 1,024 sites. Perhaps there is some kind of clinical treatment needed for this, after all ...



Gene Hughes: Cell-Site Spotter Extraordinaire

Do you secretly log the location and type of cellular sites (even if only mentally)? You're in good company; Gene Hughes, founder of *Police Call*, says, "Almost every day I see a new array on a building and wonder if it is really new or if I just hadn't noticed it before." Gene photographed a number of different sites within two miles of his Los Angeles-area home.

He confirms what our author figured out from observation: "The arrays with three antennas per side are LA Cellular, the non-wireline carrier. They use the two regular receiving antennas for the locator receiver.

"The arrays with four antennas per side are AirTouch, the wireline carrier. The fourth antenna is for the locator receiver.

"A new type of array is starting to go up: it has seven antennas per side. These are also AirTouch, and combine regular analog transceivers with the new Code Division Multiple Access (CDMA) digital system."

Gene observes that sites located on existing buildings outnumber free-standing towers five- or ten-to-one.

Somewhat abashed, Gene admits it's "amazing what one will do with time when semi-retired." But that's what retirement is for, Gene—to have time for hobbies!

But, *you* don't have to wait until retirement: While you're stuck in that workaday traffic jam, start looking around you and see how many cellular antenna sites you can spot before the line gets moving again!

Al Gross

A master's touch, a president's miracle

In America's war against Hitler, President Franklin D. Roosevelt, with his intelligence team already stretched to its limit, ordered the seemingly impossible — more, better, faster information from behind enemy lines. An Ohio ham radio operator responded with ingenuity that met the challenge, stumped the Gestapo, and sent the world headlong into a new era of radio.

By Wayne Mishler

On a chilly February morning in an obscure shop in Youngstown, Ohio, a tiny radio was coming into the world. Not just any radio. This was a radio beyond the technology of 1945, with capabilities unknown to anyone but the master who had designed it: a radio destined for high drama behind enemy lines in embattled Germany.

The birth process took three and a half hours. The master's fingers worked precisely, soldering components into a metal box the size of a man's hand. When finished, he connected the radio to a small battery pack. Four tiny vacuum tubes responded with a friendly glow. Then came alignment and tuning, and the radio was packed for shipping. Destination: top secret.

Editor's note: Details of this article were taken from top-secret documents declassified in 1976. To bring the story to life, the events were recreated as they might have happened a half century ago. Agent code names and the exact words of their reports are quoted from a July 6, 1945, secret memorandum signed by Charles S. Cheston, acting director of the U. S. Office of Strategic Services (OSS), forerunner of today's Central Intelligence Agency. The documents are from the files of Mr. Al Gross, whose technical genius surpassed the keenest minds of his day, including the German engineers of World War II. By achieving circuit stability at ultra-high frequencies, which the Germans could not do (nor could anyone else), and by packing his vacuum tube technology into a fistful of radio that OSS agents could carry unseen behind enemy lines, Gross contributed immeasurably to the defeat of Hitler's dreaded Nazis in the closing months of the war, and is accredited with inventing and developing portable two-way radio communication as we know it today. He has been honored on numerous occasions as the pioneer of modern Personal Communications Systems. At our request, Gross opened his files and allowed us to write this untold portion of his story.

Behind enemy lines

On the other side of the world, behind enemy lines in Munich, Germany, Freddie took a last puff on an American cigarette. Freddie was his code name of course. He was in his 30's. Skinny. And gutsy, to the point of being cocky. Maybe too cocky for his own good. Maybe that's why he was here in Hitler's world of terror instead of being with his wife and baby back in the states. The thought of it sometimes hurt. Late at night especially, when Freddie was trying to sleep, he wept in secret. Tears were not becoming to a spy.

Freddie flipped the half-burned cigarette onto the ground, stepped on it, and exhaled a cloud of white smoke and breath into the freezing afternoon air. Not smart, leaving evidence on the ground for the Gestapo to find. Freddie knew that of course. It was his way of adding risk to the game. He was good at it. Too good to get caught. Or so he thought.

He casually walked out of the crowd at Pasing station, a railroad depot in Munich, and ducked into a nearby bombed-out ruin with no roof. Beneath his knee-length coat was a small battery pack and a top-secret radio so advanced even by 1945 standards that few men had ever seen it. Fewer still had used it in the war. Some said the prototype had been ordered into production by Roosevelt himself, and that it was being manufactured secretly by an inventor somewhere back in the states. Not even the secret agents knew who or where. It was a matter of national security.

Inside the ruin, Freddie climbed over debris and filth to a spot where he could sit. The walls had been blackened by fire. A charred shoe lay in the corner. Freddie wondered if there was a foot in it, but he didn't look. He checked his watch. It was time. He took the two-way radio from beneath his coat, connected it to the battery pack, and the radio's four tiny vacuum tubes warmed to operating temperature. The radio looked deceptively simple: a plain black rectangular metal box scarcely bigger than a man's hand. Two knobs controlled its operation. Its tiny antenna, Freddie was told, would send a narrow half-watt signal straight up to aircraft passing overhead.

"Where the hell are they?" he wondered.

He did not want to linger in the ruin. Detection would be hard to explain. Especially with an American accent. Although he had been assured otherwise, Freddie wondered if the Germans would hear his transmission. The Gestapo's direction-finding ability was feared even within the Reich itself. But the U. S. Office of Strategic Services had said the Germans could not tune their receivers to 250

The wooden British Mosquito bomber.

MHz, the frequency at which the radio operated. In Freddie's mind, the possibility that the experts could be wrong added intrigue to the game. For Freddie, intrigue was strangely enjoyable. He wondered if Bobby had felt the same thrill of adrenaline.

Bobby was the code name of an agent who had parachuted into Holland the previous November with a radio like Freddie's to set up an underground railroad for sneaking OSS agents into Germany. The Gestapo captured Bobby. It happened just days ago. According to official reports, the enemy had not detected Bobby's radio signal. Apparently they had stumbled onto him by accident. But the end result was the same. They had Bobby. And they had his radio.

Sounds carry well in cold, calm air. And in the heavy silence of the ruin, Freddie heard an approaching aircraft. The plane was high. The droning of its engines grew louder. In minutes the plane was overhead, a dot barely discernable through the milky atmospheric haze. Even though it was late, Freddie knew this was his rendezvous. He had been told to expect a British Mosquito twin-engine bomber flying at 30,000 feet, above the reach of German guns. Freddie brought the tiny radio to his face, took a breath, thought of Bobby, and pressed the transmit button.

"Hello Vic. This is Freddie calling."

"Roger. What you got?"

"Vic, the Weilheim railway junction has from forty to fifty trains passing through all night. In Weilmheim proper there are two airplane factories. Number 1 is the Dornier works and the second is a factory making spare parts for planes.

"Peissenberg is nearby. It is the last coal mine out of which the Germans are now obtaining coal within the Reich to send to Berchtesgaden. The spare airplane parts from the Dornier plant are shipped by rail to Garmisch in the Mountains.

"You must absolutely knock out the railway line as soon as possible. This line must be knocked out.

"I have something else to say to you. You must not bomb Raisting under any circumstances. The people there are ninety percent on our side and so is the entire Volkssturm. Raisting, Raisting, do not bomb it, please."

"Roger."

Death from the sky

As a precaution, in case the Germans were listening on Bobby's radio, Freddie intentionally had not mentioned his location. He rose on feet that were numb from the cold, walked painfully out of the ruin, and disappeared into the crowd at Pasing station.

Six miles overhead, a radio operator sitting cramped in the tail section of a Mosquito bomber was playing back a recording of Freddie's transmission, and relaying the information to Air Force headquarters in London. The orders came back quickly, a man's voice crackling in the operator's headphones: "Bomb the Weilheim target. And bomb the Pasing railway station."

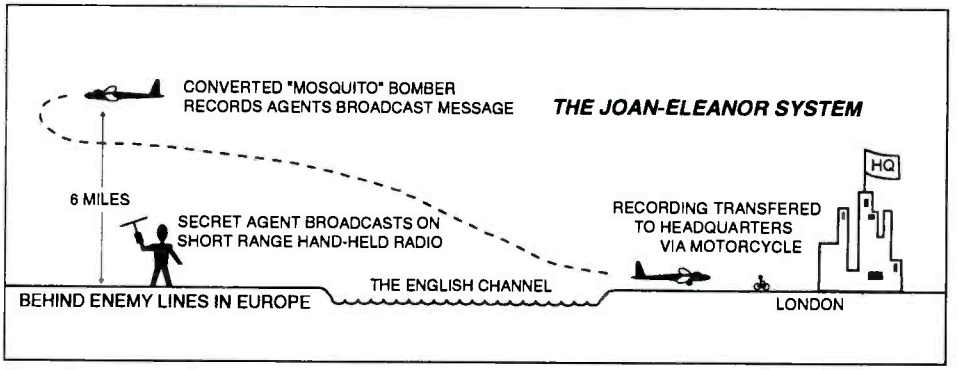
"Roger. Out."

The Mosquito released its bombs into the crowd where Freddie walked incognito, thinking about Bobby, home, wife, and baby.

The business of war

The next morning in Washington an OSS official, unaware of Freddie's fate, presented a transcript of the recording to Roosevelt. The president grinned. "Get Churchill on the line. Tell him I've got news."

As Roosevelt spoke with the prime minis-



Drawing copied from a top-secret OSS wartime document of 1944.

ter, the creator of the mysterious radio that had delivered the vital intelligence was arriving for work as usual at his unlikely shop in Youngstown. The day's agenda: produce more radios for the OSS.

The creator was an unpretentious man, even though in his own subtle way he was affecting the outcome of the war. Al Gross was exemplary of amateur radio operators of the day: in love with electronics, curious about how circuits behaved, and energetic. He believed in the premise that amateur radio had been sanctioned by the government to produce a pool of trained radio operators. He was one of the institution's most prolific members.

More than a hobbyist, he was an experimenter. He began exploring radio at age nine, in 1927. Gross got his amateur radio license while in junior high school, and quickly moved out on the cutting edge to experiment with frequencies of 100 MHz and higher. Making circuits stable at such high frequencies was not easy with the vacuum tube and paper capacitor technology of the 1940s. But Gross was soon building hand-held transceivers that operated at 300 MHz.

■ Call to duty

Word of Al Gross' work in UHF soon found its way through the amateur radio grapevine to William Donovan, chief of the OSS, who at the time was being pressured by Roosevelt to produce more, better, and faster intelligence. "I want to get battlefield information before anyone else," Roosevelt told Donovan. "Find a way to get it."

It was asking for a miracle. The OSS already had agents operating behind enemy lines, struggling with limited technology. Telegraphy was their only way to transmit information. Morse code was slow. The equipment was not easy to move or conceal. And the HF transmissions were vulnerable to detection. Donovan needed smaller radios with two-way voice capability that the enemy could not detect, and he thought of Al Gross .

At Donovan's invitation, Gross flew over the war zone on a B-17 bomber equipped with radio detection equipment, and discovered that no one was using frequencies above 180 MHz. He suggested the use of hand-held UHF radios, similar to those he had created.

■ The plan comes together

Donovan took it from there. The OSS would set up a shop where Gross could manufacture his radios in secret. Agents would carry the radios behind enemy lines. Aircraft would fly from London to rendezvous points over Hitler's Germany and agents would radio war intelligence to the aircraft. The messages would be recorded and flown to a London airfield. Couriers on motorcycles would shuttle the recordings from the airfield to headquarters where they would be transcribed and transmitted to Washington. The project would be called the "Joan/Eleanor" (J/E) operation.

The search began for suitable aircraft. A metal fuselage would attenuate radio signals, but there was a wooden British aircraft that just might work—the Mosquito bomber. Powered by two 1,480 horsepower Rolls-Royce (Packard) Merlin 33 V-12 engines, the Mosquito was so fast that it presumably did not need defensive armament. It could fly 369 miles per hour at altitudes exceeding six miles while carrying the bomb-load of a B-17. For the J/E project, three Mosquitoes were requisitioned and their tail sections modified to carry oxygen, wire recorders, J/E radios, and radio operators.

■ The master's secret

Gross wanted to set up shop in his home town of Cleveland, but government regulations would not allow it, for security reasons. Instead the OSS purchased a machine shop in Youngstown which was already making BNC connectors for the government. The shop was equipped to make the J/E radio housings. A nearby wood frame house was included in the acquisition. Antennas were installed in the attic for testing the radios. The shop and house were connected by a tunnel, so materials could be shuttled back and forth underground between the two structures without arousing curiosity in the neighborhood. A small work force of local civilians were hired to help assemble the radios. The workers knew only that they were assembling radios; they were not told why. Nor were they told of the secret technology in the radios which enabled them to achieve frequency stability in the UHF spectrum.

Actually there were several reasons for the radio's stability. One was its unique front-end design and mechanical method for switching between transmit and receive. "The radio used a modified Armstrong circuit to provide receive in one position and transmit in another," Gross says. Another reason for the stability — and perhaps the most important — was the way the tubes and supportive components were mounted inside the radio. They were physically attached to a ceramic plate, and their leads were soldered to metallic traces printed on the plate (Gross' own 1945 version of today's printed circuits.) This kept the RF leads short and rigid. "The rigidity offered by this arrangement tremendously increased the frequency stability," Gross explains.

Powered by a small pack of two 65-volt "B" batteries in series and two 1.5-volt "D" cells, the tiny transceiver sent two watts of voice-modulated signal via a vertical quarter-wave feed to a horizontal half-wave dipole. After losses, the antenna, which resembled a "T" when attached to the top of the radio, radiated a directional half-watt signal upward toward overhead aircraft.

"Yes, the antenna was directional, as all dipoles are when used horizontally," Gross says. "A half-watt output was the best I could get with 135 volts at .015 ma, considering the inherent coupling and transmission line losses. The battery life was good for about eight to ten days of intermittent operation."

The radio was plain to look at. Gross had designed it with simplicity and dependability in mind. It's dark metal housing was about the size and shape of a brick, slightly thinner, and of course much lighter in weight. On the upper portion of its face was a metal tag with model and serial numbers. In the center there were two knobs, and beneath them a circular perforated plate through which voice passed to a microphone. The knobs were the radio's only controls. "One control was for tuning. The other was for low frequency injection to control sensitivity and volume," Gross says. Earphones and the battery pack were connected to the radio through jacks in the bottom.

The PC-like construction process made the radios relatively easy and fast to assemble. Gross and his crew were turning them out at the rate of one every three and a half hours on the morning that Roosevelt received Freddie's report from Munich.

■ Death denied

At lunchtime in Ohio that day, darkness was spreading over Germany, and a radio operator riding in the tail of a Mosquito bomber was putting on his earphones. An aircrewman signaled to him that they were over Munich. And there, booming in the circuitry designed by Al Gross, was the voice of secret agent Freddie.

"I want to thank you for almost killing me yesterday," he said. "I was at the Pasing station when you bombed it.

"Now, I have an up-close and very personal eye witness damage report for you. The station was hit directly. Railroad traffic in the direction of the mountains and Garmisch was halted, and is paralyzed. All tracks are destroyed. Raisting was untouched."

More good news for the president, whose miracle at that moment was producing another secret radio, in an obscure shop, in an unsuspecting neighborhood, in the vast American mid-west: a speck on a map. There was no applause. None was expected. This was duty. This was patriotism.

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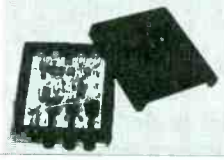

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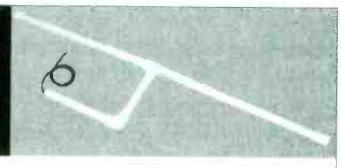
FM-100 Super Pro FM Stereo Radio Transmitter Kit.....$299.95

Tru-Match FM Broadcast Antenna



The true match antenna really is a true match to your transmitter, getting the maximum range. It is an electrical impedance match..If the proper impedances are not maintained between transmitter and antenna, power is reflected back away from the antenna and back into the transmitter and back into the transmitter, causing the final amplifier stage to be damaged! Our antenna kit consists of rugged precut PVC pipe, antenna radiating elements and of course the proper matching assembly and is fully water resistant when assembled. It is easily mounted to any standard TV antenna mast like you can find at Radio Shack or K-Mart. A standard 'F' style coax connector issued, so that readily available, low cost RG-59 TV coaxial cable can be used for connection. We even supply and RCA phone to F Male adapter for easy connection to any transmitter antenna jack. Total length is about five feet, and it is easily mounted horizontally or vertically polarized, and we even explain in the manual the pluses and minuses for each. Maximum input power is ONE watt.

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Al Gross Profile

Pioneer of Radio and PCS Looks at its Past and Future

By Wayne Mishler

The man who pioneered today's telecommunications revolution may be one of America's greatest unsung heroes.

Al Gross, amateur radio W8PAL, inventor, electrical engineer, visionary, industry statesman, is the kind of man you would expect to find sitting in robes on the peak of a mystic mountain, speaking pearls of wisdom.

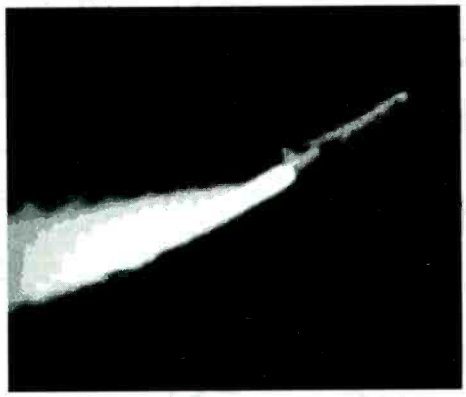
When he speaks, people listen. And things happen. He has been the spark and the inspiration for two-way radio, personal pagers, cordless and cellular telephones, satellite telecommunications, military weaponry, and more. For most of his life, Al Gross has been so far out on the leading edge of technology that he has not been privileged to talk about his achievements. To do so would risk compromise of patents or military intelligence — intelligence as in the cloak and dagger spy game. Yes, there is a clandestine side of Al Gross.

There is an old axiom that says the "squeaky wheel" gets the grease. Al Gross has never been a "squeaky wheel." It is not his nature. He's a doer and not a talker. And perhaps because of this, although you'll never hear it from Gross, America has never paid — nor could it ever pay — the debt it owes him.

"My wife was reminding me just the other day how much money we might have if my patents were still in force," he says. "They expired long ago." And then he laughs. "Oh well, I'm happy picking oranges in my back yard."

A native of Cleveland, Ohio, Gross today lives a modest life in sunny Arizona, where he continues his work in electronics as a senior staff electrical engineer with the Orbital Sciences Corporation. At age 79, he is active in developing space systems, launch vehicles, satellites and space sensors for a world-wide market. Some of the products with which he is involved include the delta-winged Pegasus launch vehicle, the medium payload Taurus launch vehicle, smaller suborbital rockets, and the next generation X-34 reusable launch vehicle.

"With the creativity of more than 3,000 of the top engineers, scientists, technicians and other professionals in the space and information industries," says Orbital president and CEO David W. Thompson, "Orbital is opening the doors to space for an increasing number of commercial, scientific and defense customers in both domestic and international markets." That lineup of course includes Al Gross, who characteristically is not privileged to discuss the details of his work.



Pegasus air-launched space vehicle.

"My current work in satellite launching systems mandates keeping out of the limelight," Gross says. He's been saying things like that since World War II, with good reason.

Gross worked in secret to produce technology that helped America and its allies win the war. And when the war ended, the obscure shop in Youngstown, Ohio, where he produced his J/E "spy" radios for the OSS (the forerunner of today's Central Intelligence Agency) was torn down, probably for security reasons. His work with the spy radios was reduced to papers in top secret government files.

"We used to joke that OSS stood for Oh So Secret," he says. "Not long after the war there was a spy movie with Alan Ladd playing the main part."

The end of the war, however, was just the beginning of this inventor's career, and of his contributions to civilian and military communications and weapons technology. Over the

years Gross has become well known, if not famous, for those contributions, and especially for his role in pioneering the technology of today's personal communications systems.

"My archives fill a room 30 feet long," he says. "Someday I'll donate them to a museum. Maybe I'll write my memoirs." Then he laughs.

Even Al Gross isn't sure of how many patents he has filed away in those archives. He presented *Monitoring Times* with copies of four different patents on the J/E radio alone. "I have some 95 World War Two bomb fuse patents in my files," he says. Some of those are from the work he did to develop devices to control the detonation of bombs, missiles, mortar shells, and similar weapons for the military.

He has video tape of a WWII newsreel showing the fuses in action. These were ingenious devices which delayed the arming of warheads until they were well on their way to targets, and then determined where they would explode with respect to their targets. They were forerunners of today's "smart" bombs which proved to be so effective in the Persian Gulf war. When a warhead explodes on impact with the ground, its shrapnel passes over personnel in foxholes and equipment behind sandbags. So the military developed fuses that internally generated a radio frequency field. When this field came in proximity to ground or water, it detonated the warhead in the air, prior to impact, blasting shrapnel into fox holes and behind protective barriers. "Maybe we'll do an article on that one of these days," Gross says.

The Federal Communications Commission learned of Gross' innovations and wanted to know more because they were responsible for detecting electronic "bugs" and similar devices. Gross briefed the FCC on his J/E radios, in February 1945, and (then) Commissioner E.K. Jett was so inspired that he wrote an in-depth article for the *Saturday Evening Post*, entitled "Phone Me By Air." The Post published his article which portrayed to the American public a vision of life transformed by radio links at home and in business. It was Jett's words, but it was Gross' vision.

After the war, Gross formed his own company, Citizens Radio Corporation, to manufacture hand-held two-way radios for civilian use. These radios were similar to those he had manufactured for the OSS, except they operated at 224 MHz to conform to FCC requirements, and were marketed under the brand name "Airline", mostly to farmers.

The small radios caught the eye of cartoonist Chester Gould, creator of the Dick Tracy comic strip. He visited Gross, developed the idea of a miniature wrist radio for his star

One of Gross's many patents

cartoon character, and published the first episode with Tracy wearing the wrist radio, in October, 1948, inspired of course by the vision of Al Gross.

In response to a suggestion by a hospital patient, Gross in 1949 developed a prototype of a modern pager for the medical industry. In 1952, Gross received FCC certification for a one-way signaling system for hospitals. He sold the rights to the pager and to his two-way radio that year to Motorola. It was time to move on to other milestones. To name a few:

- The Pioneer Award for "landmark contributions to the wireless industry," presented by the Personal Communications Industry Association.
- The Marconi Memorial Gold Medal of Achievement, awarded by the Veterans Wireless Operators Association.
- Special honors from the Institute of Technology and Higher Education Amateur Radio Club at its annual symposium in Monterrey, Mexico, at which Gross spoke on the history of the walkie-talkie, cordless telephone, cellular phone, and radio paging.
- Honorary membership in the International Telecommunications Union at the 9th Personal Radio Congress, Geneva, Switzerland, in 1995.

Gross refers to the ITU event as "my super trip to Geneva. It was a 'show and tell' for some 250 attendees representing about 30 countries. They gave an evening party for me. I was not told what was going to happen. They gave me the 1995 ITU Anniversary Special Recognition Award ... permanent honorary membership in ITU for pioneering and contributing to mobile and personal wireless telecommunications now in use worldwide."

1948 Cleveland Plain Dealer cartoon, inspired by Gross.

Worldwide! Gross beams when he tells about it. "This was a keystone of my 65 years in radio," he says.

Today, as an electrical engineer with Orbital Sciences Corporation, and statesman in the worldwide telecommunications industry, Gross is in a position to foresee the future of space development, space-borne telecommunications, and personal communications systems. "It's a great pleasure to have an 'ear' to what is going on in the industry," he says.

Still a ham radio operator at heart, Gross also has insights of where the changing radio hobby is headed.

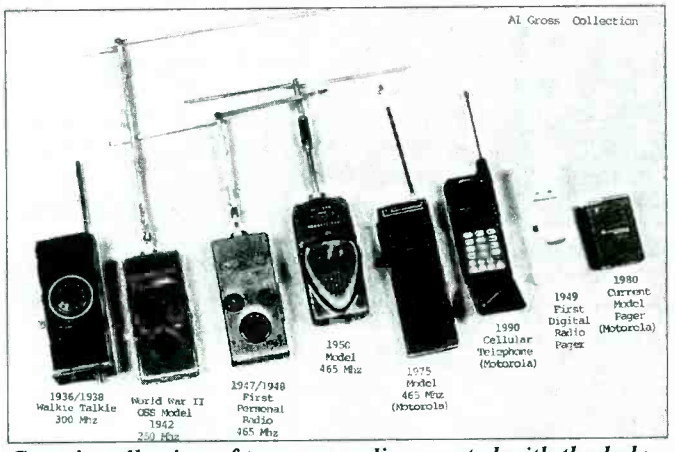
"The changes may seem like runaway technology today, but I assure you they are no different than when I was a kid in ham radio. I thought learning 13 words a minute to pass the code test for my ham ticket was high technology, not to mention drawing (an electronic diagram) and explaining it.

"Radio is going through a face change, with the introduction of the computer, cellular, cordless, radio-paging, packet-radio, e-mail, small dish satellite and cable TV, the Internet, and more yet to come. Ham radio and scanners will keep up. I observe that Radio Shack sales of ham and scanner gear has not declined. Perhaps that's a good barometer."

Then he mentions the recent controversy that seemingly threatens the very existence of scanners: the Florida couple who intercepted and made public a cellular phone conversation between House Speaker Newt Gingrich and his colleagues. "I've got an easy solution for that," he says. "It's laying right here on my desk: a simple way to keep scanners from intercepting cellular calls. There's no need for talk of banning them. There's no need for encryption. My solution will make it impossible for anyone to modify a scanner without destroying its circuitry. I doubt that I'll market it. I won't tell you what it is. But maybe..."

He didn't finish the sentence. You could tell it was intentional. That's the enigmatic side of Al Gross, who still carries a flame for mystery, intrigue, the unknown. Just don't be surprised if you hear about a new breakthrough in scanner technology in the news tomorrow.

A chronology of Al Gross's contributions to modern day communications



Gross's collection of two-way radios created with the help of his design ingenuity. The radios date back to a 1936 walkie-talkie and include late model cellular phones and pagers.

1934-41 - Designed, developed and invented hand-held "walkie-talkies" and circuits operating at frequencies above 200 MHz.

1942-45 - Commissioned by the Office of Strategic Services to design, develop and manufacture a complete two-way radio system for clandestine communications between high flying aircraft and an operative on the ground. This system, code named "Joan/Eleanor" was successfully used behind enemy lines in Europe and the far east.

1944-47 - At the request of the Federal Communications Commission, supplied technology needed for the promulgation of rules and regulations for the proposed Personal Radio Service and radio frequency spectrum allocations.

1948 - At the Institute of Radio Engineers convention, received FCC approval for hand-held walkie-talkies for personal use by the public.

1949 - Completed a contract with the U.S. Coast Guard for the hand-held two-way transceivers designated model USCG TRC-156.

1950 - Proposed a design for helmet-mounted two-way radio transceivers for the U. S. Navy and U. S. Army.

1950 - Invented the first digital one-way radio paging system (the "beeper").

1952-54 - Received several patents for the hand-held walkie-talkie, radio frequency oscillators, radio tuning apparatus, and associated circuits, components and antennas.

1954 - Recognized by the National Bureau of Standards for the first use of printed circuits in transmitters and receivers, and for the use of surface-mount technology.

1954 - Testified before the U. S. Senate, subcommittee on Interstate and Foreign Commerce, on pending legislation for a Senate bill affecting the FCC.

1955 - Prevailed in a legal battle with RCA for patent rights to manufacture and sell walkie-talkies.

1958 - Designed, developed, and manufactured the first battery-operated solid-state hand-held calculator.

1958-59 - Designed, developed, and manufactured warhead proximity fuses for the U.S. Army. These fuses were immune to electromagnetic countermeasures.

1962 - Published "Military Standards for Printed Circuits" with approval of the U. S. Army Material Command.

1963 - The U. S. Department of the Army, Harry Diamond Laboratories, successfully launched a series of high altitude missiles equipped with special electric field sensors, designed and built by Gross, to verify anti-missile capability of systems at the White Sands Missile Range.

1963 - Awarded a contract jointly by the Army, Air Force, and Advanced Research Project Agency to measure electric fields on large ICBM missiles, reentry vehicles, and deep space probes.

1969 - Published the final report, classified "Secret," entitled Electric Field Measurements On Missiles and Reentry Vehicles.

1969 - Recognized by the Department of Defense for significant discoveries of important space phenomena.

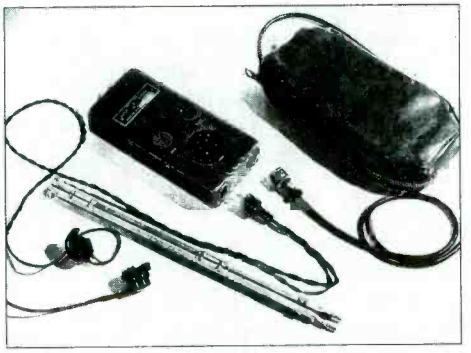
1976 - Disclosure of the genesis of personal two-way radio, Gross' patents, and his contributions to personal radio communications, by the *Cleveland Plain Dealer*.

1977 - Front-page reviews of two-way radio in the *Chicago Tribune, Washington Star, Baltimore Sun, Atlanta Journal, Buffalo News*, and others, including overseas newspapers.

1981 - Recognized by President Ronald Reagan for "affirmative contributions in telecommunications having a major and positive impact on American life."

1981 - Invited to meet with and advise Irish officials on regulations leading to a Personal Radio Service in Ireland.

1986-87 - Designed and developed nuclear electromagnetic transient pulse suppression systems for shipboard use by the U. S. Navy Sea Systems Command.



World War II OSS model transceiver.

1991 - Recognized by the Vehicular Technology Society for pioneering and continuing development of new technology in vehicular communications and electronics.

Currently listed in *Who's Who in America*, and in *Who's Who in Technology Today*.

Currently a member of the American Institute of Physics, Electromagnetic Compatibility Society, Vehicular Technology Society, Microwave Theory and Techniques Society, Components Hybrids and Manufacturing Society, Electron Devices society, and Communications Society.

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Frequency Coverage: 25.000-549.995 MHz., 760.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-1,300.000 MHz.

The Bearcat 9000XLT is superb for intercepting communications transmissions with features like TurboSearch™ to search VHF channels at 300 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include ***Auto Store*** - Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** - This feature lets you record channel activity from the scanner onto a tape recorder. **Hi-Cut filter** to help eliminate unwanted static noise. You can even get an optional ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, 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's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **BC005** CTCSS Tone Board $54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty.

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Dan Veeneman
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Stationary Wireless Devices

Cellular and PCS subscribers are high-mobility consumers. Users expect, and pay for, the ability to communicate anytime, anywhere. This is the major market for wireless communications, but another type of consumer is beginning to reap the benefits of a fast-moving wireless industry.

Some people want an inexpensive wireless communications link for use in their home, office, or public locations such as shopping malls and grocery stores. These low-mobility applications demand low cost, reliable solutions that can provide adequate service in specific locations. Currently these solutions involve cordless telephones, but future developments in the PCS bands may bring about inexpensive wireless voice and data connections for the average consumer.

Cordless Telephones

The first generation of cordless phones operate in the 46-49 MHz frequency band, somewhat below commercial FM radio (88 MHz to 108 MHz). These units are still being sold in many places, often at a significant discount, but must share the crowded band with other devices, such as baby monitors, low-power walkie-talkies, remote stereo headphones, and the like. These other devices also make it clear that there is no privacy on these phones, since it is very simple to use one and accidentally overhear other people's phone conversations. Some phones offer "voice security" or "voice privacy," but the schemes to protect these signals are often easy to defeat.

The second generation of cordless phones operate up in the 902 - 928 MHz band and are often referred to as "900 MHz phones." This band is far less crowded than the 46-49 MHz band, and the FCC allows devices here to use more power. This has also become the home of "digital" phones, a term which has quickly become a marketing tool.

TABLE 1: 49 MHz cordless telephone frequencies

Channel	Base Tx	Handset Tx
1	43.720	48.760
2	43.740	48.840
3	43.820	48.860
4	43.840	48.920
5	43.920	49.020
6	43.960	49.080
7	44.120	49.100
8	44.160	49.160
9	44.180	49.200
10	44.200	49.240
11	44.320	49.280
12	44.360	49.360
13	44.400	49.400
14	44.460	49.460
15	44.480	49.500
16	46.610	49.670
17 (B)	46.630	49.845
18 (C)	46.670	49.860
19	46.710	49.770
20 (D)	46.730	49.875
21 (A)	46.770	49.830
22 (E)	46.830	49.890
23	46.870	49.930
24	46.930	49.990
25	46.970	49.970

The word digital has at least three different meanings in the world of cordless telephones, and not all "digital" cordless phones are alike. Almost all cordless phones now have a digital security code, which is a simple combination code shared by the handset and the base to prevent other handsets on the same frequency from fraudulently using the telephone line.

A "traditional" digital phone transmits audio information between the base and the handset as a stream of digital bits instead of a continuous analog signal. Since the digital signals have a fixed format and usually make use of error correction, they are less susceptible to interference since they can be reconstructed at the receiving end. It also makes eavesdropping much more difficult, as baby monitors and other retail devices can't readily decode the digital information.

A "spread spectrum" digital phone not only sends digital bits instead of an analog signal, but those bits are "spread" during transmission using one of two methods. Frequency hopping spread spectrum phones rapidly switch between a number of different channels during a conversation, spending very little time on any one channel. The pattern of channel hopping is shared between the base and the handset, but if an eavesdropper doesn't know the pattern the conversation will be very difficult to intercept. In addition, any interference will probably be localized to just a few channels, so a majority of the data will be received without difficulty.

Direct sequence spread spectrum phones "spread" the signal across a wide bandwidth during transmission. This spreading is done according to a pseudo-random noise code (PN code), which is used by the receiver to "despread" the signal and recover the digital bits. Again, an eavesdropper without the PN code will have an extremely hard time intercepting the conversation. More details on direct sequence, also known as Code Division Multiple Access (CDMA), are available in the February 1997 *PCS Front Line* column.

Spread spectrum systems have an additional advantage. Because they use the available spectrum more efficiently, the FCC allows these devices to transmit at up to one watt of power, giving some phones a range of half a mile or more. Non-spread phones in the 900 MHz are limited to about a milliwatt, and phones in the 46-49 MHz band even less, giving them a correspondingly shorter range.

Hands On

I have owned a V-Tech 900 MHz phone for a few years now. The Tropez 900DX uses twenty channels in the 902 - 928 MHz band, each spaced 100 kHz apart. The base transmits on the lower frequency and the handset transmits on the higher frequency. To test V-Tech's claims of digital security and resistance to casual eavesdropping, I used an Optoelectronics Scout to read the frequency output of the base at 905.81 MHz and the handset at 925.81 (channel 3) while the phone was in operation. A scanner tuned to either frequency revealed nothing but digital "hash," and no audio signal was discernible.

FIGURE 1: UNLICENSED PCS (U-PCS)

TABLE 2: Frequencies for V-Tech Tropez 900DX

Channel	Base Tx	Handset Tx
1	905.600	925.500
2	905.700	925.600
3	905.800	925.700
4	905.900	925.800
5	906.000	925.900
6	906.100	926.000
7	906.200	926.100
8	906.300	926.200
9	906.400	926.300
10	906.500	926.400
11	906.600	926.500
12	906.700	926.600
13	906.800	926.700
14	906.900	926.800
15	907.000	926.900
16	907.100	927.000
17	907.200	927.100
18	907.300	927.200
19	907.400	927.300
20	907.500	927.400

Unlicensed PCS

In the Report and Order that created Personal Communications Services, the FCC allocated 20 MHz of spectrum between 1,910 and 1,930 MHz (see *PCS Front Line*, October 1996) for use by unlicensed, low power devices. Spelled out in technical detail in Title 47 of the Code of Federal Regulations, Part 15 subpart D, devices that transmit in these frequencies must follow an "etiquette" intended to allow a wide variety of equipment to share the same spectrum.

Each device must follow three basic rules, very similar to the rules children learn in kindergarten: listen before talking, talk for a short amount of time so others have a turn, and don't shout.

An unlicensed PCS (U-PCS) device is required to listen to the "channel" it wants to use before transmitting. If the channel is being used, the device must either wait for it to become idle, or select another channel.

Devices must not monopolize the channel. The transmission should be limited to only the amount of time needed to send the message, and the device must stop transmitting at specific intervals in order to give other devices the opportunity to use the channel.

Each transmitter is also limited to fairly low power, again to avoid interference with other devices. Power limits are determined primarily by power spectral density, and the rules are available in Part 15 for anyone who wants the nitty-gritty details.

The unlicensed PCS band is divided into two 10 MHz bands. The space from 1,910 to 1,920 MHz is referred to as the *Asynchronous* band, and is intended primarily for data applications, such as wireless local area networks (LANs) and wireless data exchange. Devices operating in this band will typically send high-speed bursts of data whenever necessary, and will not follow a regular pattern of transmission. Most bursts will be one-way, and may or may not generate a response from the receiver. The minimum bandwidth for a burst is 500 kHz.

The space between 1,920 MHz and 1,930 MHz is called the *Isochronous* band. Devices operating in this band are expected to transmit information at regular intervals and carry on a two-way "conversation" with another device, such as would be needed for a cordless telephone. This band is subdivided into eight "channels," each of which is 1.25 MHz wide. The minimum emission bandwidth is 50 kHz, and it must fit entirely within one of these eight channels. Isochronous devices may further subdivide the channel for their own uses, but each channel must be at least 50 kHz wide.

Northern Telecom was the first company to receive FCC approval for a U-PCS device, and began marketing their wireless voice system to businesses. Similar systems are now available from other suppliers, and allow workers to place and receive calls anywhere inside their office building or warehouse.

PCS frequencies were formerly licensed to the fixed microwave service by the FCC. Part of the PCS rules require that these microwave operators relocate to other parts of the spectrum, and that operations in the PCS bands be coordinated by a third party. For U-PCS, UTAM Inc. is designated to coordinate the microwave relocation, negotiate costs and payments, ensure that adequate facilities are available, and resolve any interference disputes. UTAM and the relocation effort will be funded, in part, by fees gathered from the sale of U-PCS devices.

Iridium Update

On July 9 a McDonnell-Douglas Delta II rocket carried five more Iridium satellites aloft from Vandenberg Air Force Base in California, bringing the total number of Iridium satellites in orbit to 17. The first Iridium launch on May 5 brought five space vehicles into orbit, and a June 18 launch from the Baikonur Cosmodrome in Kazakstan using a Proton rocket added seven to the constellation.

These satellites will be moved to the proper location in their respective orbital planes and undergo systems testing. Voice uplink and downlink frequencies are between 1,616 and 1,626.5 MHz with a TDMA/FDMA access scheme, so if you're monitoring in that band and detect some new digital signals from overhead, it may be an Iridium bird.

That's all for this month, and as usual more information is available at **http://www.grove.net/~dan**. *PCS Front Line* is now a year old, and I welcome questions, comments, and suggestions on what you've seen and what you'd like to see in this column. I am reachable via electronic mail at *dan@decode.com*, and look forward to hearing from you. Until next month, happy monitoring!

Richard Barnett
ScanMaster@aol.com

Legislating Away our Freedom

H.R.1964. section 104 ...

...and the proposed Tauzin "Wireless Privacy Enhancement Act of 1997" (not yet numbered) both make major changes to the Communications Act of 1934. They make it illegal to modify scanners to receiver cellular frequencies, illegal to manufacture scanners which can receive the commercial mobile radio service, and illegal to convert digital commercial mobile service transmissions to analog audio. A rough draft of Tauzin's proposed legislation goes even further and makes the interception of *any* non-broadcast communication not intended for the general public *illegal*. We'll post the bill number at **www.grove.net** as soon as we know it.

Just what is the Commercial Mobile Radio Service? We're glad you asked, because it's not just trunked systems, pagers, and cell comms. Here is the breakdown, according to Larry Van Horn's research, using Bennett Kobb's *Spectrum Guide*.

1) Private Paging Services
   Private carrier paging system (PCPS): 929-930/931-932 MHz
2) Business Radio Services
   VHF low band: 30.76-31.24 (9 discrete freqs) /33.14-33.16/33.40/35.02-35.14/35.18/35.7-35.72/35.88-35.98/42.96-43.00 MHz
   VHF Hi-band: 151.625-151.955/154.570-154.600 MHz
   UHF band: 457.525-457.600 / 460.650-462.1875 / 465.650-467.1875 / 462.750-462.925/467.750-467.925/463.200-465.000/468.200-470.000 MHz
   There are also a number of chunks of the 470-512 MHz that will be removed.
3) Specialized Mobile Radio (SMR) Services
   851-866 (806-821 MHz)/ 935-940 (896-901 MHz)
   (home to many public safety agencies for whom there wasn't room in the 866-869 MHz portion)
4) Land Mobile Services in the 220-222 MHz region (recent reg changes have turned this over to the CMRS)
5) Public Mobile Services
   A) Paging and Radiotelephone Services
   35.2-35.66 / 43.2-43.66 MHz / 152.030-152.240 / 152.480-152.840 MHz
   154.625 / 157.740-158.100 / 158.460-159.700 MHz
   B) Cellular Radiotelephone Service
   869-894 MHz (824-849 MHz mobiles)
   C) 454 MHz Air-Ground Radiotelephone Service
   454-455 MHz (459-460 MHz mobiles)
   D) 800 MHz Air-Ground Radiotelephone Service
   894-896 MHz (849-851 MHz mobiles)
6) Offshore Radiotelephone Services
7) Satellite Mobile Services
   137-138 MHz NVNG (148-150.050 uplinks) / 399.9-400.050 / 1525-1559 / 1610-1660.5 MHz
8) Personal Communication Services (PCS)
   901-902/930-931/940-941/1850-1990 MHz

House Resolution 1964, recently proposed by Congressman Ed Markey (a legislator from my home state of Massachusetts, I'm not proud to say), demonstrates once again how an uninformed government works to create an uninformed populace. What do I mean? Well, let's try to follow the logic of the "Telecommunications Privacy and Consumer Empowerment Act," (otherwise known by this author as the "Telecommunications Piracy and Citizen's Emasculation Act," or perhaps better yet, "The Markey Malarkey Act of 1997)."

I'm hopeful that by the time you read this article the bill's abhorrent language regarding scanners will be stricken, pronounced dead, and forever buried....and not just buried in some other bill. We must make these legislators understand today the implications of their proposals so that we aren't forced to fight against similar language with each new Congress.

Markey's Act addresses Internet security and other hot-button issues, and the scanner-related language actually appears relatively minor and innocuous at first glance. A studied reading of the language regarding scanners shows that these legislators may be too uninformed themselves to be aware that the current wording—which requires removal of all business frequencies from scanners—would almost certainly shut down the industry. (At least, we would like to believe it's just a matter of being uninformed.)

To cut out these particular bands would simply make it too difficult and costly for the manufacturers to continue making scanners. The frequencies destined to be eliminated are scattered throughout the radio spectrum and are not located in one distinct band segment, as is cellular. Markey's Malarkey will legislate, if not an outright scanner ban, then a virtual one.

The scanner market has declined over the past couple of years, as indeed all radio hobbies have diminished in market size in the face of the Internet's growing popularity and communications technologies such as trunking and digital which made radio traffic difficult or impossible to monitor. It's likely the scanner manufacturers would take passage of the Act as their cue to exit, stage left.

Even if they were to spend the money to engineer and design a scanner without the business frequencies, they would still face the daunting task of certifying that no hacker could find a way around their frequency elimination scheme. And how many folks would want to buy a scanner without business bands? Hundreds of thousands of scanners are sold to race fans who scan their favorite driver at NASCAR, Indycar, and other racing events. All race teams use business-band frequencies.

Who else would be harmed by the legislation? Perhaps the most notable group would be public safety agencies themselves. Here in Massachusetts almost every State Police patrol car has a scanner installed directly in the center communications console. Troopers have to stay abreast of the law enforcement activity in the communities through which they're patrolling. A scanner provides the perfect medium for presenting a variety of police frequencies to an officer.

This editor went for a ride-along with the Massachusetts State Police in Boston recently. The two officers with whom I traveled were glued to their scanner as it monitored the transmissions of the Boston Police and they responded as backup on a number of BPD incidents.

Yes, some police communications should be scrambled or made digital, and the radio gear to achieve that is available today. However, most police operations can and should remain in the clear, for the benefit of neighboring law enforcement agencies and for the benefit of the public at large.

Community Watch or Crime Watch groups utilize scanners to stay informed about criminal activity in their neighborhood and to report sightings of stolen cars and suspects which are broadcast over the police frequencies. How is it empowering to citizens trying to improve the security of their homes and neighborhood if their ability to scan and perform crime watch functions is curtailed?

The President, as he should be, has been advocating volunteer service. Volunteer, call, and off-duty firefighters rely on both pagers and scanners to alert them to respond to a fire or an emergency medical service call. A scanner ban will therefore directly and immediately harm public safety. But, in addition to that, the scanner ban will be a detriment to public safety in the much longer run. Thousands of young people acquired their interest in law enforcement, fire fighting, and the emergency medical services through first listening to these public servants perform their duty over-the-air. I would surmise that at least 10% of today's public safety officials became interested, or had their interests furthered, by scanning when they were just teenagers.

Markey and his supporters may suggest that they are not trying to take away the right of public safety officials to monitor adjacent communities with a radio. They may need to have it pointed out to them that these agencies now use scanners to do this work because neither Motorola, Ericsson, Johnson, nor any other two-way manufacturer sells a commercial grade multi-band scanner (that we know of). If they were to manufacture one, do you really think it would sell for $200 to $400 dollars—the price a city, town, county, state or federal agency currently pays for a scanner? Maybe ten times that price. You know who ultimately would foot that bill: we taxpayers.

The news media utilizes scanners to get their stories and keep the public informed. A scanner is essential for this task. (Individual two-way radios would be out of the question, as too many communities need to be monitored at one time.) Take away the news media's right to scan and you've eliminated not only press freedom, but you've given the government an enhanced ability to control the release of information.

Congress has already eliminated the cellular bands from scanners, and now cellular images are becoming impossible to monitor, as manufacturers greatly improve their image rejection specifications — we all cheer that. Right before the Malarkey Act, this author was beginning to feel that the intercepted Newt Gingrich cell phone call was perhaps one of the best things to happen to the hobby. The results we were seeing from the congressional hearings and FCC action was that new scanning receivers were going to be required to be triple conversion and/or have superior image-rejection specs. This might make a scanner more expensive, but with the burgeoning growth of new telecommunications technologies and RF transmitting equipment, a scanner with a wide-open front end is becoming useless anyway.

I think we can live with the cellular bands being eliminated, if that is what it takes to keep scanner manufacturers producing new models. Yes, we all feel that we should be free to intercept any radio signal as long as we don't use it for personal gain, but a little give and take is what democracy is all about. However, the new Markey malarkey is completely senseless. All the new technologies are digital—typically CDMA or TDMA, and perhaps, one day, GSM. Unless you're using supercomputers and working with a team of Doctorates at Berkeley and MIT, you're not going to crack these systems.

Markey and his supporters are actually trying to squash our rights, impinge on public safety and public awareness, cost all the taxpayers more money, and it's all in the name of protecting privacy which was never under any serious threat because phones are now at such a sophisticated digital level. The head of the PCS industry stated this fact in front of Markey and the congressional subcommittee.

Furthermore, anyone who wants to monitor and make use of some non-digital private call will still be able to acquire one of the millions of scanners that have been sold over the past 30 years to do so. The only thing that will stop someone who really wants to break the law is the conversion to digital, which is the current trend.

Finally, anyone who still does use an analog cellular phone or telephone interconnect on amateur or business band frequencies (myself included), must know from the labeling on the phone or radio, the owner's manual, from myriad press reports about Newt and Lady Di, from advertisements for digital gear, and, (hopefully) from the salesperson who originally sold him the phone, that analog devices can be monitored. He should know to be careful about what he says. If you broadcast something into the airwaves—just as if you're talking loudly on a park bench or in a bus—you must know you can be overheard.

What's amazing is that many of the companies for whom Markey apparently seeks to provide protection—and which bid hundreds of millions of dollors to purchase chunks of public spectrum—were going digital anyway. But, get this, many are now facing bankruptcy and are seeking relief from the government for their over-bidding. Does this make any sense to you?

To me this can only lead to a series of unavoidable questions. Is the Markey Malarkey Act a piece of legislation proposed to placate special interests in the telecommunications industry who still cling to analog technology? Is it proposed so he can prove to voters he's earning his keep by offering legislation promoting their privacy, looking toward his next bid for reelection?

Is it proposed to punish those who have monitored cellular in the past? Or is it simply proposed because of ignorance? Has Markey drafted this himself, or is he listening to whispers in his ear, without any knowledge or understanding of the implications of his Act? Let's hope it's this last one. Congressman Markey is an intelligent man and perhaps he means well and is just uninformed. By writing him and other legislators we can, hopefully, make them all understand how terrifying, how 1984-like, how emasculating and de-powering, and how totally *unnecessary* this Act can and will be.

We've had the right to monitor, the right to scan, the right to listen to our taxpayer-funded public servants as they transmit signals over

public airwaves through our private property, ever since the first public service radio system went on the air. The language of our laws and our forefathers has always encouraged us to participate, understand, assist, and criticize our government, as the situations and our opinions warrant. Scanning our public servants has given us an easy, unique opportunity to make this manifest.

By keeping the airwaves free, as the well-reasoned Communications Act of 1934 provided, we've had the right and the ability to stay informed, to be aware, and to participate. The Markey Malarkey Act [and now Tauzin's Wireless Privacy bill as well] proposes to flush our long-held rights away. We must take action now. We must not let this happen. Please make this the one time that you call, write, and e-mail your congressman. Stand up in your community and discuss this issue with firefighters, police officers, and your local news media. Act now to put an end to this poisonous legislation once and for all. Act now before another one of our freedoms is gnawed away.

California Trunkin'

The following reports were recently posted on the web site **www.trunktracker.com**:

Alameda County (ALCO) Trunked Radio System (Updated 7/12/97)

Frequencies:

866.150, 866.425 (Wide Area), 866.800, 866.9375 (Wide Area), 867.150, 867.250, 867.400 (Wide Area), 867.675, 867.925 (Wide Area), 868.0875 (Data Channel & Wide Area), 868.275, 868.4375, 868.650, 868.7625 (Data Channel & Wide Area), 868.925

ID	Confirmed User	Possible User or Channel #	Comments or Channel Name
16016	ALCO SHER	A1	DISPW
16048	ALCO SHER	A1	DISPE
16080	ALCO SHER		PERALTA COLLEGE
16112	ALCO SHER	A2	SERVICE1 W
16144	ALCO SHER	A7	TAC7
16176	ALCO SHER	A8	TAC8
16208	ALCO SHER	A10	
16240	ALCO SHER	A2	SERVICE1 E
16304	HOSPITAL SEC		HIGHLAND HOSP
16496	ANIMAL CONT	A1	F SERV W
16528	CORNER	A1	
16592	ALCO SHERIFF		JAIL TRANSPORT
16912	ANIMAL CONT.	A1	F SERV E
17200	MUTUAL AID		
17616	ALCOFIRE	A1	DISPW
17648	ALCOFIRE	A2	TAC2
17680	ALCOFIRE	A3	TAC3
17712	ALCOFIRE	A4	TAC4
17744	ALCOFIRE	A5	TAC5
17776	ALCOFIRE	A6	TAC6
17808	ALCOFIRE	A7	TAC7
17840	ALCOFIRE	A8	COMM8
17872	ALCOFIRE	A9	COMM9
18224	ALCOFIRE	A1	DISPE
19216	ALCOROADS	A1	STOP LIGHTS
19248	ALCOROADS	A2	SWEEPER TRUCKS
19280	ALCOROADS	A3	HAYWARD CLEAR
19312	ALCOROADS	A4	
19344	ALCOROADS	A5	
19376	ALCOROADS	A6	
19408	ALCOROADS	A7	COUNTYRDS
20816	ALCOMED	A1	RINGDOWN
20848	ALCOMED	A2	MED2LCL
20880	ALCOMED	A3	MED3LCL
20912	ALCOMED	A4	MED4LCL
20944	ALCOMED	A5	MED5WDE
20976	ALCOMED	A6	MED6WDE
21008	ALCOMED	A7	BASE
21040	ALCOMED	A8	TAC8LCL
21072	ALCOMED	A9	TAC9LCL
21104	ALCOMED	A10	TAC10LCL
21136	ALCOMED	A11	TAC11LCL
21168	ALCOMED	A12	TAC12WDE
21200	ALCOMED	A13	TAC13WDE
21232	ALCOMED	A14	TAC14WDE
21264	ALCOMED	A15	TAC15WDE
21296	ALCOMED	A16	IA EMS
21360	AMR	B1	NORTH DISP
21392	AMR	B2	SOUTH DISP
21424	AMR	B3	GREEN ALT DISP
21456	AMR	B4	TAC1LCL
21488	AMR	B5	TAC2LCL
21520	AMR	B6	TAC3WDE
21552	AMR	B7	TAC4WDE
21584	AMR	B8	OPSWDE
21616	AMR	B9	TRNGWDE
22000	IA EMS/IA Fire		AMR TO ALCO FIRE
22672	SALVAGE		
22736	NORTH CTY BASE		
25616	DISTRICT ATTORNEY	DA1	
27248	JUVENILE HALL	A2	
27280	JUVENILE HALL	A3	TRANSPORT
27312	JUVENILE HALL	A4	
27344	JUVENILE HALL	A5	
30416	ANIMAL CONTROL		SOUTHERN COUNTY
30480	ANIMAL CONTROL		
30512	ANIMAL CONTROL		
32016	SAN LEANDRO PD	A1	CHANNEL 1
32048	SLPD	A2	TAC2
32080	SLPD	A3	TAC3
32112	SLPD	A4	TAC4
32144	SLPD	A5	TAC5WDE
32176	SLPD	A6	
32208	SLPD	A7	
32240	SLPD	A8	TRAFFIC
32272	SLPD	A9	ADMIN
32304	SLPD	A10	CTYWDE
32496	BUILDING ADM.		
32528	BUILDING ADM.		
33616	BUSES		DSPTCH WEST CTY
33680	BUSES		DSPTCH EAST CTY
35216	FREMONT FIRE		
35248	FREMONT FIRE		
35280	FREMONT FIRE		
35312	FREMONT FIRE		
35344	FREMONT FIRE		
36816	PUBLIC WORKS		SL AREA

Sacramento County

(courtesy of Ben & Lee Ann; updated 6/17/97)

ID	Confirmed User	Possible User or Channel #	Comments or Channel Name
2577	CO FIRE	A-	
2608	CO FIRE		ALARM COMM
2640	CO FIRE	A-2	
2768	CO FIRE	A-6	
2800	CO FIRE	A-	
2928	CO FIRE	A-11	
3120	CITY FIRE		ALARM COMM
3152	CITY FIRE		FIRE COMM
3280	CITY FIRE	B-6	
3440	CITY FIRE	B-11	
4816	CO FIRE		TRAINING ARFD
5232	MEDCOM800		KAISER
5296	MEDCOM800		KAISER SOUTH
5328	MEDCOM800		AMER RIVER
5360	MEDCOM800		MERCY GENERAL
5392	MEDCOM800		MERCY FOLSOM
5424	MEDCOM800		METHODIST
5456	MEDCOM800		
5520	MEDCOM800		SUTTER
5584	MEDCOM800		UCDMC
5616	MEDCOM800		UCDMC
8204	S.O.		DIST 1,4
8240	S.O.		DIST 2,3
8272	S.O.		DIST 5,6,7
8304	S.O.		
8336	S.O.		AIRPORT
8496	S.O.		RECORDS
8544	S.O.		
9136	S.O.		OPS
9168	S.O.		OPS-4
9232	S.O.		M-16
9232	S.O.		OPS
9264	S.O.		TAC-1
9360	S.O.		M-16 DIST 6
9392	S.O.		M-16 DIST 5
12336	FOLSOM		PD MAIN 01
12464	FOLSOM		PD CAR/CAR 03
17488	PARK DIST		RANGERS
21040	COUNTY		ANIMAL CNTRL
23152	JAIL		JAIL
24784	COUNTY		MAINT
11316	TRANSIT		
11312	TRANSIT		

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Global Station Makes Final Transmission

Utility monitors who regularly tune in the U.S. Air Force Global High Frequency System (GHFS) are quite familiar with Albrook Global, Panama. They have handled Central and South American military traffic on the GHFS frequencies for over 28 years.

On July 16, 1997, without any prior notice, Albrook Global closed its doors forever. The final transmission made by Albrook Global at 0001 UTC was widely heard and reported by many regular GHFS monitors. The voice transmission consisted of the following:

> "Attention all stations, Attention all stations. This is Albrook Air Force Base providing service from 5 April 1969 through 15 July 1997. This is Albrook, signing out."

With the closure of Albrook, this makes logging Panama on HF utility frequencies real tough unless you are proficient in Morse code and regularly monitor maritime coastal stations.

As we go to press, it would appear that Albrook Global was the last clear voice station being heard from Panama on a regular basis on shortwave. We have not seen any of the old U.S. Military Attache Group (USMAG) stations reported in quite some time and must assume that the USMAG network has been moved off HF or shut down.

To all the operators and technicians at Albrook, your strong and steady signals will be missed on the GHFS frequencies by radio monitors and military men and women worldwide. Fair winds and following seas.

Here's a footnote to the Albrook closing: ute monitors should log and verify Andersen GHFS, Guam, as soon as possible. We have been told privately that this global station will soon be shutting also. Get them logged and verified while you can.

Where do they get those tones?!

I have seen several questions recently regarding the tones being transmitted by various stations in the Global HF System. A regular reporter to the Milcom Radio Forum, Clay Mayrose, passes along the following information about the keying tones transmitted by GHFS stations.

> "In the past I have seen several posts to the Milcom group which talked about the DTMF tones that are heard when global stations key and unkey their radios. Hopefully this email message will clear up some questions by radio monitors.
>
> "The global stations are configured so that each station (except Incirlik) can be remotely controlled via the net control station (NCS) or the alternate NCS (ANCS) of the global system. Offutt is the primary NCS for the Global system. Andrews and McClellan are the ANCS's. This control is accomplished by dual-tone multiple frequency (DTMF) pad.
>
> "There are many control signals that occur within each station that are not heard during actual on the air transmissions. The two tones that are heard by radio monitors are the ***0** (to key up the system) and ***9** (to unkey the system).
>
> "Each operator console can key and unkey the radios from the DTMF pad on the console or from a foot pedal. One will sound like a manual key and the other will be quick and will sound automatic. If an operator steps on the pedal while a transmission is in progress, multiple DTMF tones will be heard.
>
> "Another function of the ***0** and ***9** DTMF tones is to mute the system receivers during station transmissions. In all GHFS stations the transmitter and receive sites are separated by several miles. At Offutt, the receive site is 38 miles northeast of the control/transmitter site.
>
> "The NCS and ANCS stations can seize all seven Scope Signal III (SSIII) transmitters and transmit high priority traffic simultaneously through those stations. For those of you that only hear Offutt when they are transmitting an EAM, you are probably receiving the signal from an SSIII transmitter near you.
>
> "In conclusion, the DTMF tones will be gradually going away. The newest system, tagged *Scope Command*, will be coming online soon. With each GHFS station's conversion to *Scope Command*, the controls for the transmitter/receivers will be going digital."

Thanks, Clay, on behalf of all our *Ute World* readers for clearing up the GHFS DTMF tones mystery.

USSTRATCOM Frequencies

As most of our regular readers are aware, *MT* was the first publication — electronic or print — to break the story about the new Zulu designators being used by units of the U.S. Strategic Command (USSTRATCOM) airborne command post.

Since that August 1996 column we have provided updates to our readers several times. Table 1 is the latest list of Stratcom Zulu designators and frequencies available.

Mystic Star Update

It has also been quite some time since our last Mystic Star System update. Mystic Star is the HF radio system used by U.S. military VIP aircraft for secondary communications capability. This is the domain of Air Force 1/2, Special Air Mission aircraft, and Andrews AFB, Maryland.

Table 2 is the latest Ute World Mystic Star list. I would like to thank *Ute World* regular Jeff Jones for his assistance in putting the list together.

Now it is time to see what you have been monitoring this month in the utility world (see pp 36-37).

TABLE 1: USSTRATCOM Zulu Designators

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

TABLE 2: Mystic Star Frequency/Designator List

Frequency	Designator
8036.0	F003
9120.0	F005
4850.0	F007
17972.0	F009
16117.0	F020
15962.0	F033
10881.0	F039
13823.0	F046
8058.0	F054
4742.0	F058
23265.0	F061
14870.0	F063
11214.0	F064
15036.0	F066
18532.0	F078
15677.0	F080
13205.5	F084
9461.0	F086
13204.0	F089
6716.0	F090
9017.0	F094
14585.0	F098
13247.0	F099
12106.0	F101
11118.0	F102
11488.0	F103
7316.0	F108
6986.0	F114
6993.0	F117
11217.0	F124
22242.0	F128
4941.5	F134
5429.5	F136
9027.0	F146
8063.0	F153
14420.5	F173
3078.0	F182
10648.0	F184
3046.0	F186
13825.0	F194
20631.0	F195
4982.0	F197
16014.0	F202
12057.0	F204
11056.0	F211
5435.5	F226
7735.0	F228
15041.0	F236
18590.0	F243
5398.0	F248
4731.0	F249
15091.0	F250
13217.0	F251
10717.0	F262
7693.0	F264
15733.0	F265
7997.0	F266
6730.0	F267
7325.0	F268
18320.0	F271
11153.0	F277
11226.0	F287
8026.0	F290
13960.0	F291
9414.5	F292
11460.0	F295
15707.0	F300
7505.5	F301
11220.0	F311
14864.0	F326
18716.0	F327
18761.0	F337
5043.0	F350
11053.0	F354
7827.0	F356
7919.5	F360
15018.0	F363
11059.0	F365
20397.0	F369
17177.0	F370
16123.0	F372
3144.0	F380
15094.0	F382
9057.0	F395
6728.0	F400
7690.0	F404
6972.0	F405
18393.0	F406
4992.0	F417
11407.0	F419
7933.0	F420
6731.0	F432
20972.0	F433
3821.0	F435
5684.0	F437
17440.0	F441
19267.0	F444
13248.0	F451
5026.0	F452
19063.0	F453
13211.0	F461
4610.0	F463
16157.0	F464
8040.0	F465
14864.5	F466
9023.0	F467
7605.0	F481
18626.0	F483
5152.0	F486
24483.0	F487
5437.0	F489
11059.5	F496
5411.0	F497
8032.0	F498
4442.0	F499
8989.0	F500
9006.0	F505
4645.0	F516
9270.0	F517
11484.0	F521
11232.0	F522
9215.0	F523
8077.0	F529
23325.0	F530
18003.0	F532
18675.0	F533
5404.5	F540
5431.0	F542
10580.0	F545
18400.0	F548
18331.0	F551
4894.0	F555
11052.0	F561
13565.0	F567
18387.0	F569
11413.0	F574
10427.0	F575
11153.5	F576
10544.0	F577
10877.0	F595
13878.0	F600
14863.0	F611
4448.0	F614
9320.0	F616
5817.0	F622
18317.0	F623
13241.0	F624
19343 .0	F626
7910.0	F627
18755.0	F631
18290.0	F633
7469.0	F639
18218.0	F642
15821.0	F644
13440.0	F646
8053.0	F649
15048.0	F662
6817.0	F667
3064.0	F673
3032.0	F690
4490.0	F700
11058.0	F701
9323.0	F702
9991.5	F703
8057.0	F706
10589.0	F707
23337.0	F708
9317.0	F709
4458.0	F710
16246.0	F713
10883.0	F717
12270.0	F722
18323.0	F723
11236.0	F728
6683.0	F731
15011.0	F732
4757.0	F734
11494.0	F736
7873.0	F741
6756.0	F748
8047.0	F752
11627.0	F754
3113.0	F777
18023.0	F778
9043.0	F784
15687.0	F785
8967.0	F789
16323.0	F790
5078.0	F803
12103.0	F807
5700.0	F809
6989.0	F814
11229.0	F823
19047.0	F825
18267.0	F832
13822.0	F846
16008.0	F864
6830.0	F867
9218.0	F868
16090	F869
13246.0	F874
6717.0	F875
4721.0	F877
11053.5	F891
5710.0	F895
10202.0	F904
4524.0	F906
7687.0	F909
19671.0	F910
7330.0	F912
12107.0	F915
10205.0	F917
13482.0	F918
11159.0	F919
7927.0	F920
16317.0	F924
11445.0	F940
19002.0	F943
15038.0	F948
8029.0	F953
6761.0	F957
11466.0	F965
10586.0	F974
15724.0	F980
10583.0	F987
4763.0	F988
15667.0	F997

Other known Mystic Star frequencies: 2015, 2530, 3053, 3057, 3060, 3071, 3074, 3116, 4441, 4452, 4484, 4745, 4850, 4935.5, 5020, 5234, 5337, 5343, 5414, 5417, 5711, 5739, 5823, 5834, 5840, 6684.5, 6715, 6793, 7305, 7494.5, 7500.5, 7805, 7925.5, 7961, 8042, 8055, 8083, 8260, 9016, 9025, 9212, 9955, 9961, 10684.5, 10723, 10935, 11055, 11156, 11181, 11209, 11271, 11451, 11530, 11577, 11583, 11634, 11647, 12058, 12063, 12087, 12093, 12109, 13242, 13993, 14412, 14414.5, 14569.5, 14575.5, 14576, 14615, 14635, 14670, 14763, 14769, 14829, 15018.5, 15043, 15087, 15661, 16077, 16083, 16124.0, 16163, 16186, 17433, 17457, 17458.5, 17463, 17477, 17480, 17483, 17496, 17973, 17992, 17999, 18019, 18057, 18063, 18397.4, 18403.4, 18460, 18632, 18801, 18909, 19008, 19050.5, 19089.5, 19095.5, 19157, 19163, 19273, 19320, 19337, 19460, 19513, 19650, 19656, 19665, 20054.5, 20121, 20127, 20147, 20153, 20155.5, 20318, 20324, 20403, 20422, 20428, 20452, 20650, 20758, 20953, 22913, 22940, 23343.5, 23397, 23433, 23643, 23687, 23703, 24274, 25443

Utility Loggings

UTILITY WORLD

Larry Van Horn

Abbreviations used in this column

AFB	Air Force Base	GHFS	Global HF System
ALE	Automatic Link Establishment	HF	High Frequency
AM	Amplitude Modulation	NASA	National Aeronautics and Space Administration
ANDVT	Advanced Narrowband Digital Voice Terminal	Ops	Operations
ARQ	Synchronous transmission and automatic repetition teleprinter system	RTTY	Radioteletype
		SAM	Special Air Mission
		SITOR	Simplex teleprinting over radio system
ARQ-E	Single channel ARQ teleprinter system	SITOR-A	Simplex teleprinting over radio system, mode A
ARQ-E3	Single channel ARQ ITA3 teleprinter system	SITOR-B	Simplex teleprinting over radio system, mode B
CFL	Confidential Frequency List (Ferrell Ute Guide)	Tacamo	Take Charge and Move Out
		Unid	Unidentified
COMSTA	Communications Station	U.S.	United States
CW	Continuous Wave (Morse code)	USB	Upper Sideband
		USCG	U.S. Coast Guard
DSN	Defense	USN	U.S. Navy
EAM	Emergency Action Message	VFT	Voice Frequency Telegraphy

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

3118.0 Dead Ball calling Nightwatch 01 on self identified Zulu 105 at 091, no joy. (Anonymous-MO) *Probably didn't hear NW01 because he was on the wrong frequency. He should have been on 3116-Larry.*

4629.0 Alma Radio (Bell Canada station) in the remote areas of Quebec with what sounded like phone calls at 0025. (Jacques d'Avignon-Kingston, ON, Canada) *Welcome aboard, Jacques. Glad to see you in the pages of Ute World-Larry.*

4724.0 Andrews as lead GHFS station with a 126-character (+/-) EAM (BCC2QA..), another string with a distinctive 23/14 group completion involving 4(5) same-character groups heading the 23/14 blocks of text at 0652. (Haverlah-TX)

4745.0 Nightwatch 02 working Nightwatch 01 at 0203 At 0207 NW01 requested that NW02 "come up on hotline." At 0211 NW02 responds to NW01's calls and is told to "relay on hotline." At 0214 NW02 worked NW01 regarding lack of contact on hotline. At 0413 Nightwatch attempted to work Desicant and moved to Z150. (Haverlah-TX)

4780.0 KPA26L53-Abnormal Mossad callsign heard. Israeli Mossad number station at 1720 in faint USB. On another day the usual KPA2 was heard at 1717. (Takashi Yamaguchi-Nagasaki, Japan)

5320.0 MIW2-Israeli Mossad number station at 2116. Also noted on 7445 and 8641 kHz. (Yamaguchi-Japan)

5439.0 Unid station L9CC repeating "V CP17 de L9CC" in CW at 1502. On another day heard the same transmission on 5438.5 kHz. (Yamaguchi-Japan)

5483.5 Unid station R5SA repeating "V PV2S de R5SA" in CW at 1050. (Yamaguchi-Japan)

5547.0 Canadian 133 working San Francisco Aeradio, CA, at 0445. (Levine-CA)

5629.0 SYN2-Israeli Mossad number station at 1546. Also noted on 6745 kHz. (Yamaguchi-Japan)

5705.0 Mandatory with a 26-character EAM (EH7UE4..) followed by confirmation communications with Nightwatch and Palamino at 1453. Nightwatch 01 passed an EAM (missed it), called and worked Mandatory and Palamino. At 1533 Mandatory broadcast a 42-character EAM (SYFFPW..) Very unusual to hear this series (SY..) on these HF nets. (Haverlah-TX)

5715.0 Korean female 3/2-digit number station at 1407. Very powerful. (Yamaguchi-Japan)

5800.0 Spanish female 5-digit numbers transmission at 0259. At 0414 Desicant called Nightwatch 01. (Haverlah-TX)

5820.0 YHF-Israeli Mossad number station at 1746. Also noted on 7918 and 9402 kHz. (Yamaguchi-Japan)

6251.6 Unid station at 1021 with VFT 100/170 idling signal. (Eddie Waters-Australia)

6337.6 Unid station at 1021 with 75/170 encrypted RTTY. (Waters-Australia)

6339.0 Unid station at 1202 with 75/850 encrypted RTTY. (Waters-Australia)

6380.5 Unid station at 1158 with 200/425 encrypted RTTY. (Waters-Australia)

6389.0 CTP-NATO Lisbon with CW marker at 0405. (Levine-CA)

6393.5 Unid station at 1157 with 100/170 VFT. (Waters-Australia)

6462.0 FUM-French Naval Radio Papeete, Tahiti, at 1141 with 75/850 RTTY broadcast "RY DE FUM FUM." (Waters-Australia)

6481.0 Unid stationn at 1131 with 50/850 encrypted RTTY. (Waters-Australia)

6586.0 Iberia 6102 working New York Aeradio, NY, at 0522. (Levine-CA)

6628.0 Sierra Papa Papa 9907 (who?) working New York Aeradio at 0521. (Levine-CA)

6658.0 CIO2-Israeli Mossad number station at 1546. (Yamaguchi-Japan)

6673.0 Canadian 134 working San Francisco Aeradio, CA, at 1352. (Levine-CA)

6715.0 Nightwatch 01 working WAR 46 at 0302. (Haverlah-TX)

6728.0 Unid station LNC9 repeating "V Q8HB de LNC9" in powerful CW. (Yamaguchi-Japan)

6730.0 SAM 27000 (maybe on ground in LAX) worked Andrews with phone patch for weather information for (missed location) at 1424. (Haverlah-TX)

6739.0 Hickam Global at 0438 preceeding Offutt's NCS transmission, with a 20-character EAM string as part of a 20/20/26 character EAM set, followed by Offutt's broadcast of same at 0440. Second 20-character string at 0442 (Hickam again preceeding Offutt) followed immediately with a Foxtrot EAM from Hickam (Z4H 42 PD), also picked up by Offutt (originating probably non-CONUS station not heard here). Offutt did not participate in the 0449 4FJ 49 CX set also heard from Hickam. Completing 26-character string at 0453. At 1621 Mandatory broadcast a 26-character EAM (EHMBHW..) simulcast on 11244.0 (no other frequencies found), and picked up by Offutt on the GHFS at 1624. (Haverlah-TX)

6745.0 SYN2-Israeli Mossad number station at 1546. Also noted on 5629 kHz. (Yamaguchi-Japan)

6756.0 I picked up what I believe to be a Volmet station on this frequency. I first picked it up at about 0226. The transmission ran until about 0233. This is not the first time I've picked up this station. It actually comes in very strong most nights to my location. The weather forecasts are mostly for Canadian cities such as Edmonton, Winnipeg, Toronto, et al. Trenton, NJ, is also mentioned. What is this station and where is it located? (Rich Barnes-Springfield, IL) *Richard, you have picked up the Canadian Forces station at Trenton, Ontario, Canada. They broadcast aviation weather during the time frame you have indicated-Larry.*

6757.0 Jaildoor called Nightwatch 01 at 0248. (Haverlah-TX)

6761.0 Astra 40 working unid station at 0246. (Haverlah-TX)

6840.0 EZI2-Israeli Mossad number station at 1700 with heavy interference from Chinese broadcaster on the same frequency. (Yamaguchi-Japan)

6842.6 Unid station at 1129 with 100/850 encrypted RTTY. (Waters-Australia)

6993.0 Nightwatch 02 and SAM 29000 working Andrews AFB at various times. (Anonymous-MO)

7437.0 Unid station at 1011 with 75/170 encrypted RTTY. (Waters-Australia)

7445.0 MIW2-Israeli Mossad number station at 2116. Also noted on 5320, 8641 kHz, and others. (Yamaguchi-Japan)

7486.3 Unid station at 1115 with RTTY 72/170 idling. Was not an ARQ-E or ARQ-E3 mode transmission.(Waters-Australia)

7560.5 Unid station at 1117 with 50/425 RTTY. Four letter groups and no ID. (Waters-Australia)

7593.0 Unid station at 1021 with 75/850 encrypted RTTY. (Waters-Australia)

7734.0 Unid station at 1010 with 75/850 encrypted RTTY. (Waters-Australia)

7763.1 D6Z-ASECNA Moroni, Comores Islands, at 1233 with ARQ-E3 48/850 weather information. (Waters-Australia)

7825.0 Unid station at 0957 with 200/425 encrypted RTTY. (Waters-Australia)

7887.0 Manila Aeradio working various aircraft in English and possibly Tagalog at 1100. Not listed in Klingenfuss or CFL. (Yamaguchi-Japan)

7896.7 RFLI-French Forces Fort de France, Martinique, at 1012 with ARQ-E3 96/425 idling. (Waters-Australia)

7918.0 YHF-Israeli Mossad number station at 1746. Also noted on 5820 and 9402 kHz. (Yamaguchi-Japan)

7940.0 Unid station at 1011 with 200/425 encrypted RTTY. (Waters-Australia)

7985.0 Unid station at 1023 with 50/850 encrypted RTTY. (Waters-Australia)

7987.0 Unid station at 1006 with 75/850 encrypted RTTY. (Waters-Australia)

7992.2 Unid station at 1005 with VFT 75/85. All channels encrypted. (Waters-Australia)

8040.0 Unid station at 1207 with 50/425 RTTY sending 4-letter groups. (Waters-Australia)

8053.0 SAM 86971 with a phone patch to Ramstein via Andrews AFB on F649 at 0656. (Anonymous-MO)

8142.0 OLX-Prague, Czech Republic, with V CW marker at 1455. Also noted on 14977 kHz. (Yamaguchi-Japan)

8310.0 Unid station at 0910 with 100/170 SITOR-A. Seems to idle here for hours and never any traffic. (Waters-Australia)

8320.0 English female 5-digit Cherry Ripe number station at 1220 in USB. Also noted on 13866 kHz. (Yamaguchi-Japan)

8341.7 RFVI-French Forces Le Port, Reunion, at 1124 with ARQ-E3 100/425 idling transmission. (Waters-Australia)

8375.0 New Star Broadcast was heard at 1435 in AM. Chinese female speaking 4-digit number groups, each sent twice. Similiar, but not parallel transmissions were heard simultaneously on 8300, 9275, 11430, 13750, and 15388 kHz. (Yamaguchi-Japan)

8420.5 9VG-Singapore Radio, Singapore, at 0850 with 100/170 SITOR-B traffic list. (Waters-Australia)

8421.5 JCS-Choshi Radio, Japan, at 0837 with 100/170 SITOR-A message to ship UGKP. (Waters-Australia)

8423.0 UFL-Vladivostok Radio, Russia, at 0827 with CW marker. (Waters-Australia)

8426.0 NMC-USCG COMSTA Point Reyes, CA, at 0825 with CW marker. (Waters-Australia)

8428.5 VAI-Vancouver Radio, BC, Canada, at 0815 with a 100/170 SITOR-B weather forecast for the Aleutian Islands. (Waters-Australia)

8453.2 HWN-French Naval Radio Paris, France, at 0734 with a 75/850 RTTY marker. (Waters-Australia)

8465.3 Unid station at 0732 with 100/850 encrypted RTTY. (Waters-Australia)

8478.8 FUF-French Forces Radio in Fort de France, Martinique, at 0730 with 75/850 RTTY transmission marker. (Waters-Australia)

8486.0 Unid station at 0727 with 100/850 encrypted RTTY transmission. (Waters-Australia)

8492.9 Unid station at 0715 with 100/170 encrypted RTTY sending RYs between messages. (Waters-Australia)

8515.0 5AT-Tripoli Radio, Libya, with CW DE marker at 0712. (Waters-Australia)

8528.0 6WW-French Naval Radio Dakar, Senegal, with 75/850 RTTY RY test tape at 0709. (Waters-Australia)

8552.0 Unid encrypted 150/850 RTTY station at 0700 noted here. (Waters-Australia)

8568.5 XFM-Manzanillo Radio, Mexico, with a DE CW marker at 0754. (Waters-Australia)

8641.0 MIW2-Israeli Mossad number station at 2116. Also noted on 5230 and 7445 kHz. (Yamaguchi-Japan)

8942.0 Singapore Aeradio, Singapore, working Brunei 876 at 1243 with a position report. (Waters-Australia)

8951.0 Tokyo Aeradio, Japan, at 1241 working Cathay 828 with a position report. (Waters-Australia)

8992.0 Japan Navy 65 worked MacDill Global with a phone patch to DSN 312-735-0049; MacDill moved him to 15016.0 at 1859. (Haverlah-TX)

9014.0 Chalice Bravo (sounds like) called Raymond 07 "with request" with no response at 2015. (Haverlah-TX)

9016.0 Mandatory called McClellan at 1406. At 1408 Mandatory worked Palamino (sounds like) with comment "...TDM via this station or via Whiskey Bravo." At 1413 Palamino worked Mandatory (very strong here). (Haverlah-TX)

9025.0 Brief activity over a few minutes of someone briefly keying a microphone at 1350. (Haverlah-TX)

9030.0 Unid station with encrypted 75/850 RTTY at 1044. (Waters-Australia)

9071.0 Unid station with encrypted 75/850 RTTY at 1044. (Waters-Australia)

9197.0 A9M41-Manama News Agency Bahrain, at 1330 with 75/425 RTTY news bulletin in Arabic. (Waters-Australia)

9263.0 Cherry Ripe numbers station noted here at 1123. (Waters-Australia)

9328.0 Vietnam News Agency at 1240 with a 50/425 RTTY English news bulletin. (Waters-Australia)

9402.0 YHF-Israeli Mossad number station at 1746. Also noted on 5820 and 7918 kHz. (Yamaguchi-Japan)

9467.0 English female 3/2-digit numbers station at 1126. (Waters-Australia)

10006.0 Bangalore Aeradio, India, calling Dacca Aeradio, India at 1115. (Waters-Australia)

10164.0 Unid station sending 81/170 RTTY transmission here. (Waters-Australia)

10204.0 Nightwatch 01 (barely heard here) worked Surprise and then War 46 at 0349. Streamer (very strong here) worked Nightwatch 01(unheard here) at 1345 in clear voice and ANDVT. At 2008 Topsong worked Hailstorm. At 2156 Nightwatch 01 broadcast a 26-character EAM (EHLQEP..) simulcast on 9016.0, followed by Topsong acknowledging receipt of this traffic. (Haverlah-TX)

10426.0 English female 5-digit Lincolnshire Poacher number station at 1410. Also noted on 12603 and 14487 kHz. (Yamaguchi-Japan)

10780.0 NASA solid rocket booster recovery vessels *Freedom Star* and *Liberty Star* working Cape Radio during a shuttle mission. Also heard on 3041, 5711, and 6937 kHz. (Anonymous-MO)

10970.0 MIW-Israeli Mossad number station was heard in AM (AM compatible reduced carrier USB mode). Also noted on 8641 and 12747 kHz. Ended with "End of message, end of transmission" at 1427 as usual. But carrier was still on; then suddenly YHF phonetically heard once at 1429 followed by a sign-off. Noted the usual type of transmissions on 8641 and 12747 kHz. (Yamaguchi-Japan)

11175.0 Aussie 150 worked Hickam Global with phone patch to Kwajalein Ops at 0507. At 1643 Razor 33 (JSTARS aircraft) worked MacDill Global with phone patch traffic. (Haverlah-TX) Spysong working Elemendorf Global at 2317. Requesting working frequencies and monitoring status of Nightwatch 01. Elemndorf told him Zulu 175 primary, Zulu 190 secondary, and Zulu 180 was alternate. (Tom Richmond-Coeur D Alene, ID) *Welcome aboard, Tom. Please check in often-Larry.*

11181.0 PACOM 01 (good level) worked Hickam Global with a phone patch to Codebook. Codebook advised the PACOM 01 operator not to "zero the crypto gear" as an electronic tech wanted to board the aircraft and "check the crypto gear." The onboard operator told the ground party that the tech had better be familiar with a "LST5E" and the "RCU in the aircraft" or he'll be wasting his time (there seemed to be an undercurrent of stress in this patch). (Haverlah-TX)

11129.0 SAM 27000 and Reach 9003 (KC-10?) working Andrews on Mystic Star F919. (Anonymous-MO)

11220.0 Andrews called Air Force 2 at 0522. (Haverlah-TX)

11244.0 Offutt Global as the lead GHFS station with a 138-character EAM (BCLLWZ..); another string with a distinctive 23/14 end pattern and a similar 23-character block in the middle of the string at 1925. (Haverlah-TX)

11250.0 Unid station (missed ID) worked Vancouver Military with a phone patch to San Diego fleet support regarding the arrival at dock on "submarine base San Diego." Communications heard at 1607. (Haverlah-TX)

11545.0 English female 5-digit Lincolnshire Poacher number station at 1503. Also noted on 13375 kHz. (Yamaguchi-Japan)

11565.0 EZI-Israeli Mossad number station at 1430. (Yamaguchi-Japan)

12070.0 Nightwatch 01 working Woodberry at 1239. (Haverlah-TX)

12603.0 English female 5-digit Lincolnshire Poacher number station at 1410. Also noted on 10426 and 14487 kHz. (Yamaguchi-Japan)

12747.0 MIW2-Israeli Mossad number station at 1416. Also noted on 10970 kHz. (Yamaguchi-Japan)

12969.0 XSV-Tianjin Radio, China, with CW marker at 2310. (Levine-CA)

13200.0 Hickam Global with an 84-character EAM (BC3XYV..) preceding Offutt's 1604 NCS broadcast of the same message at 1600. (Haverlah-TX)

13242.0 Reach 24 Hotel 1 with a phone patch to Furious via Thule AB, Greenland, at 0102. (Anonymous-MO)

13375.0 English female 5-digit Lincolnshire Poacher number station at 1503. Also noted 11545 kHz. (Yamaguchi-Japan)

13866.0 English female 5-digit Cherry Ripe number station at 1220 in USB. Also noted on 8320 kHz. (Yamaguchi-Japan)

13868.0 Unid station I3MF calling various stations such as 4QKU, ICWR, WNIN in CW at 1213 with heavy interference from Cherry Ripe number station (13866 kHz). On another day similiar unid station FL9X operating in the same manner on this frequency at 1222. (Yamaguchi-Japan)

13960.0 Retention working MacDill AFB at 1612 for data check. SAM 60204 with a phone patch to Andrews metro via Andrews AFB on Mystic Star F291. (Anonymous-MO)

14487.0 English female 5-digit Lincolnshire Poacher number station at 1020. Also noted on 15682 and 16084 kHz. On another day same station heard on this frequency at 1410. On that day noted parallel transmissions on 10426 and 12603 kHz. (Yamaguchi-Japan)

14931.0 8BY-Unid station repeating the following CW marker at 1340 "VVV 8BY" this was followed by 3-digit number groups separated by a slant bar. Also noted on 18415 and 20946 kHz. (Yamaguchi-Japan)

15041.0 SAM 60206 with a phone patch to Andrews metro via Andrews AFB on F236 at 2101. (Anonymous-MO)

15043.0 Shadow 408 with a phone patch via Andrews AFB to DSN 339-3686 at 1845. (Anonymous-MO) *This is probably an USN E-6 Tacamo aircraft working Strategic Communication Wing One at Tinker AFB-Larry.* Offutt called Andrews after some ALE activity, with nothing heard and gone at 1541. (Haverlah-TX)

15448.0 Bangor or Banger working Lima 21 and others at 1815. (Anonymous-MO)

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Radio Reading Recommendations

A great new book has come out, five years after the previous issue—*LA DXing No. 6, 1997*, from Radio Nuevo Mundo, the Japanese group dedicated to Latin America. It's softbound, 270 pages, with lots of illustrations including sharp black and white photos. Extensive visits to remote stations in Peru are documented, as well as Mosquitia; plus articles on the last days of Radio Impacto, clandestine radio, and Castro's rise to power; and a lengthy section of word-by-word identification announcements by many stations, often quite florid. The basic text is in English, not Japanese or Spanish. No checks are accepted, but you can get a copy by airmail for a $20 bill or 20 IRCs to: Tetsuya Hirahara, RNM, 5-6-6 Nukui-kita, Koganei-shi, Tokyo 184, Japan.

Electronically, check out Harry Helms' new website which includes SW info as well as news of his personal exploits: **http://users.abac.com/harryh**

But, for right now, you can read this column for more Internet items, and on-air news of Radio Australia's painful plight, RFPI's anniversary special, Greece via USA, new station for Liberia, Maldives and Mauritius coming back but not Mozambique, Nicaragua upgrading SW, where is Voice of Free Nigeria, Russia needs help, Florida has a new SW, Vietnam's new super-power station, and a whole lot more....

ALASKA KNLS may be the source of the R. Free Asia broadcast in Chinese at 2100-2200 on 9725 (Wolfgang Büschel, *BC-DX*) *Makes sense—spare airtime, and some signal as far as Korea, China (gh)*

This is... **Alaska Calling!** KNLS ENGLISH LANGUAGE SERVICE NEWSLETTER

ALGERIA RTA in various languages at 1100-2100 varies around 11715.2, and from 15158.2 to 15159.2 (*Panlview*, Bulgaria) English at 2000 on 15158, slightly distorted (Kai Ludwig, Germany, *BC-DX*) But English at 1600 is on 15161v (Wolfgang Büschel, *BC-DX*)

ARGENTINA RAE swapped times for broadcasts in most languages, but maintained English M-F at 1900-2000 on 15345, Tu-Sa 0200-0300 on 11710. New director of RAE is currently Miss Perla Damuri (Gabriel Iván Barrera, *The Four Winds*)

AUSTRALIA RA's Darwin/Cox Peninsula station was mothballed June 30 as required by government funding cuts, forcing RA to reconfigure its transmissions from Shepparton, which does not have antennas aimed any further west than 329°, trying to serve part of Asia, at least; and necessitating reduction of services toward Pacific and hence North America. Among the dropped frequencies are 17860 and 9860; from 0900 to 1200 only one frequency toward us, 9580, which had trouble reaching the east coast as it is really aimed 30° which hits NAm around Anchorage. Programming was drastically shuffled, with no more RA shows in the 1205-1800 or 1900 UT period except news on the hour, but R. National relays. Forty staff were layed off; French and Thai services were closed down, as was Cantonese the very day that Hong Kong became subject to Chinese censorship (gh) Some 517 Australians trapped in Cambodia were advised by the ambassador to listen to VOA or BBC since RA could no longer be heard. Sen. Vicki Bourne, Australian Democrats party spokeswoman, called for immediate recommissioning of Darwin (RA webpage via Marie Lamb, *Cumbre DX*; BBCM) R. Free Asia is a possible client for leasing Darwin (R. Australia news via BBCM)

RA's *Feedback* retimed to Fri 2105—try 11880; Sat 0005 on 17795, 15510, 13755; 0605; Sun 0305 (gh)

Australian Defence Forces Radio, 13525-USB, 0433-0500+ with frequent IDs, mentions Canberra transmitter site, pop music (Randy Stewart, MO)

BELGIUM RVI will have their open house on Sat. Sept. 20 (*Radio World* via Steven Cline)

BOLIVIA R. Fides, 9624.7 at 0015 with special "Copa América" sports broadcast (Rafael Rodríguez, Colombia) This is the station that ruins our recption of CBC Northern all day; heard a R. Fides ID at 1514 (gh, OK)

CAMBODIA Khmer Rouge's Radio of the Provisional Government of National Union and National Salvation of Cambodia, which split from Pol Pot, announced it had reduced schedule to 2330-0100, 1130-1300 on "41 and 60 meter bands," really heard on 5407 (BBCM)

CANADA Co-hosts of the new morning program Sun-Fri on CBC from Sept 1 are Michael Enright, ex-*As It Happens* and Avril Benoit, ex-CJAD (Canadian Press via Mike Cooper) Presumably parts will be relayed by RCI. There may be less CBC "fill" (gh) Five-year funding effective next April is almost assured; if so, RCI will revamp programming (Bob O'Reilley, Manager on RCI *Mailbag*)

COSTA RICA RFPI's 10th anniversary celebration should be extra-special; tune *Fiesta on the Air* UT Wed Sept 17 at 0000-0600 on 7385, 7385-USB, 15050, taking live phone calls and offering prizes; and a wide variety of special programming will be featured throughout that week. From July into September is an unusual musical series, *Outstanding American Music*, Mon-Thu at 2300, Tue-Fri 0700 (RFPI *VISTA*)

Radio 88 Estéreo, Pérez Zeledón was delayed in activating its SW simulcast on 6075 due to illness of engineer, but planned to start shortly. The FM schedule starts at *1000 weekdays, *1100 Sundays with *Alegre Despertar*, and sign-off is 0500* (Tetsuya Hirahara, *TICO DXing*)

R. Puntarenas, 3040 kHz at 0944 romantic music, giving FM frequencies only, 91.9 and 105.9; its MW is supposed to be 1480, not 1520 which would produce this harmonic (Fernando Viloria, Venezuela)

CZECH REPUBLIC R. Prague, English at 0100 on 6200, sometimes produces a spur on 6295, when there is a strong hum on both (Brian Alexander, PA, *World of Radio*) Hard times at R. Prague: DX club discontinued, no longer QSLs because of staff cuts, and cannot answer mail, but still wants listeners to write in (Ben McNimley, Ont., *DXing with Cumbre*)

ECUADOR After months of inaudibility on 5865, HCJB moved to 9765 in late July for its European service including DX Partyline Sat 0809 (via George Thurman)

ETHIOPIA [non] R. Voice of One Free Ethiopia (Amharic: *Andit Netsa Ethiopia Dimts Radio Agelgilot*) is new opposition radio heard since mid-June, Sun and Wed only at 1615-1715 on 12105. Address is P.O. Box 5801, Washington, DC 20016. Aerial bearings indicate a transmitter in Central Asia FSU. Wed/Sun broadcasts and Washington address strongly resemble previous outlets, V. of Ethiopian Patriotism, and Free Radio Voice of Ethiopia Unity. Content of broadcasts indicates it is hostile to Ethiopian and Eritrean governments as "Shabiyya-Weyane joint dictatorship regime," in the language of ex-Pres. Mengistu (BBCM) 12105.00, heard on a Wednesday at 1644-1719*, mentioned Haile Selasi, good signal but lousy modulation (Michael Schaay, Netherlands, DSWCI *DX Window*)

FRANCE RFI's English broadcast is on RealAudio at:
http://www.francelink.com/francelinkE-noscript.html
What bugs me is that the English service has no public E-mail address! The one in *PWBR* does not work (Larry Nebron)

GERMANY Brother Stair, full-time on WWCR-4, and part-time on WRNO, was heard discussing an offer to lease radio time from Deutsche Telekom's Jülich, Germany site. He said he was very interested, provided funds can be raised to buy time. Currently the Overcomer Ministry is spending $100 K monthly for radio time (Jim Moats, OH)

Deutsche Welle has started making its English programs available on Internet: **http://www.dwelle.de** (DW via G. Heinen, *rec.radio.shortwave*) DW reported it will vacate its building in Cologne by 1998 because

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel program-ming; + = continuing but not monitored; 2 x freq = 2nd harmonic; J-97=May-Sept; Z-97=Summer season; W-97=Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

of asbestos and move to Bonn (Joe Karthaus, Ont.)

GREECE [non] VOG heard at 1200-1350 July 19 testing on 9590, probably from VOA, banging in whilst direct from Greece on //15175, 15630 barely audible and 9375 inaudible (John Babbis, MD) This was the first day of the new relays via VOA USA sites: 1200-1350 on 9590 Greenville to Canada, 1830-2200 on 11730 Delano to Canada, 17745 Greenville to Latin America; 0600-0800, 0900-0950 on 9775 Delano to Pacific (VOA *Communications World*) Excellent here on 9590, 11730, including English news at 1340, 1840, 2000, but rather uncoördinated and English needs polishing (gh)

HAWAI'I KWHR's second transmitter might start testing in August; check 6020 at 1300-1900, 17555 at 1900-0700, 11565 at 0700-1300 (WHR via Marie Lamb, *BC-DX*) *DXing with Cumbre* retimed from 0500 to 0730 Sat on 17780 (*DWC*)

HUNGARY R. Budapest in English retired the *Rákóczi March* by Berlioz and replaced it with the theme already used by the Hungarian service, a motif from Liszt's *Hungarian Rhapsody No. 14.* Program lineup also revamped in July: *DX-Show* only on Wed at 2110, Thu 0240 every week; mailbag ...*And the Gatepost* monthly on the last Sunday at 1910, Mon 0110, repeated following Sat at 2110, Sun 0240. And at 0100 6120 ex-6075 //9580 (*Budapest International* via Gigi Lytle)

IRAQ Iraqi opposition sources say the government has suspended broadcasts of V. of Arab Syria due to rapprochement, but V. of Iraq radio from Damascus continued, although less critical (*Al-Hayat*, London via BBCM) On MW only, still very critical (BBCM) Subsequently it was closed in response (BBC *Waveguide*)

Iraqi News Agency, INA, press radioteletype service has been monitored on F1B, 75 baud, daily in English at 1000-1400 on 10162.5; daily in Arabic at 1000-1400 on 14699, 1400-2100 on 14699, 10162.5; and also daily except Friday at 0600-1000 on both (BBCM)

IRELAND [non] West Coast Radio Ireland, via Jülich, Germany, tested another transmission in July, 0700-0800 Thu on 9700 via South American route to Australia/NZ. Their mailbag is the warmest and most listener-friendly of its type. WCRI is doing a good job with a pittance of funds, and would appreciate support to the Minister for Arts and Culture, Sile De Valera, 43 Mespil Road, Dublin 4

emerald radio productions

(Finbarr O'Driscoll, Ireland, *World of Radio*) Mailbag is during the last quarter hour each week, such as UT Thu 0145 on 9875 (gh)

Emerald Radio Productions, via WWCR in June and July, hopes to return with another series this autumn (Chuck Adair, WWCR) P.O. mistakenly rejected mail to our Box 200, Dublin; try again! Unlike WCRI which is for an Irish audience, we present programs for an audience interested in Ireland (Bernard Evans, ERP)

JORDAN R. Jordan, English on 11690 at 1000-1630 includes: *Jordan Weekly* Sat 1400, Tue 1130, Wed 1400, Fri 1130; *Friends Abroad*—mailbag Sat 1430, Thu 1130 (Stig H Lindholm, World DX Club *Contact*) Launched website: **jrtv.com** (BBCM)

KAZAKHSTAN R. Almaty new English sked: Tue, Fri, Sat 0900-0920; Wed 0920-0940 on 9620, 11720 (Ulrich Böttler, Germany, *rec.radio.shortwave*)

KOREA NORTH R. Pyongyang SW feeders were monitored during a week in June, one set of languages on 4405 from 0800 to 2150, another set on 3560 from 0900 to 2050, but probably also used in the daytime 2100-0800 period when inaudible here. Also, 14055 at 0400-0750 in Japanese; before and after those times on 3250 (Sonny Ashimori, Japan, *hard-core dx*)

KOREA SOUTH RKI URL is: **http://kbsnt.kbs.co.kr**including RealAudio (BBCM) RKI's audio via WRN on the Internet was interrupted for three months; nobody noticed until I told them and they linked up to a live stream (Martin Gallas, IL) In May, RKI got most letters from Indonesia, Japan, Germany, China, Morocco; UK and USA were not even in the top ten, but Venezuela was (RKI *Shortwave Feedback*)

Yonhap News Agency, English RTTY service: Mon-Sat 0030-0300, 0730-0900 to Asia on 6MK64-11602.5, and 6MK50-7868 (BBCM)

KURDISTAN Kurdistan Independence Radio is new at 0400-0530, 1300-1530 on 6200, 6205, 6210, says Med TV, not yet confirmed (BBCM)

LAOS Luang Prabang regional on 6973v at 1220 weak but clear //6130 Vientiane which was very good until clobbered at 1258 (David M. Clark, WA DXpedition)

LIBERIA Star Radio, "independent and impartial" began in mid-July before the elections on FM, and planned to add SW quickly. Its chief is a Briton, George Bennett; a project of Fondation Hirondelle, which also set up a station in the Great Lakes region (AFP via BBCM) Hirondelle says SW frequencies are 3400, 5890 (BBCM) Acquired four secondhand 10 kW Collins SW transmitters, previously used by DW as standby (Herbert Visser via Andy Sennitt, DSWCI *DX Window*) Is funded by the US Government (BBC *Newsdesk*)

MADAGASCAR R. Nederland in Indonesian at 1230-1325 on 9515 often ruins reception here on the other side of the world of BBC relay via Canada during this hour (Will Martin, MO; Gigi Lytle, TX; gh)

MALDIVE ISLANDS V. of Maldives plans a 10 kW HF transmitter, based on Australian government aid, to be located on the island of Mafushi, where land has already been acquired. Not Male, where the capital and the studios are located. The station is awaiting a report of the survey conducted by Australian experts last year and for Pres. Gayoom to visit Australia later this year to close the deal. The only HF operation at present comes from a modified 1 kW Racal communications transmitter which is occasionally switched on with reduced power on 5998.5 kHz for training newscasters. The engineers are also refurbishing a German Techimatic HF communications transmitter of indeterminate power which can broadcast in the 2-30 MHz range in available analog bands. E-mail: <informat@dhivehinet.net.mv> (Manosij Guha, *DX Grapevine* via *DX Ontario*) Can't find a Mafushi island; maybe Mafuri? (Dave Kenny, BBCM)

MAURITIUS Unidentified African on 9710 at 1300-1500 one day only in vernaculars; MBC plans to reactivate this channel (Roland Schulze, Philippines, *BC-DX*)

MOZAMBIQUE R. Mozambique's SW transmitters are very old and spare parts are hard to find. In addition, SW is out of fashion in South Africa, our main target country, so we plan to transform into MW and FM only with relays in that country once authorized (Iain Patrick Christie, R. Moz external service director via Andy Sennitt, DSWCI *DX Window*)

NICARAGUA R. Miskut will continue on 5770; do not assume its time is ending. Current power is inadequate. A new 500 watt SW transmitter will be on line as soon as transportation is available. With proposed SW antenna improvements, SW reception should be greatly enhanced, New program material is contemplated including "The Atlantic Baseball Net" with live sportscasts of games. In June, operations began on 104 MHz FM with local coverage using same feed as 5770. MW operations will probably not be initiated. FM is called "Radio Bilwi," the indigenous name of Puerto Cabezas. Later there may be some differences in programming on SW and FM. Broadcasting by indigenous groups in Latin America is quite rare. Radio Miskut is one such and has a dedicated regional audience. While money is very scarce, ingenuity is not (John C. Freeman, Tech Systems, early July) *See his article in Jan 97* ***MT****. Traces of the low-power operation were detectable around 1200 on 5770-USB (gh)*

NIGERIA Voice of Nigeria, Lagos, has resumed an external service on 7255 only at 0500-2300 including French, Hausa, Fulfulde, Swahili, Arabic; and English at 0500-0700, 1000-1100, 1500-1700, 1900-2100 (BBCM)

[non] V. of Free Nigeria bearing is very roughly 160° from the UK (Chris Greenway, BBCM) That's right across Africa from Algeria, near Gabon to South Africa. Since the initial test at 0400 was on a VOA frequency, 7180, before and after used for Kirundi and Kinyarwanda, I suspect US government involvement. Could be via VOA Botswana or maybe São Tomé; and Africa No. One, Gabon, also looks like a good possibility for 11680 Sat at 1900-2000. Kathy Otto at SENTECH, South Africa, says it's not from her station. However, after initially openly listing R. Kudirat, 6205 as SENTECH, this info was deleted from their website (gh) It is NOT coming from South Africa, or any BBC or VOA site, nor Morocco, but from the African side of the western Mediterranean, more likely Algeria than Libya or Tunisia for political reasons, though with better modulation and frequency stability than expected from Algeria (Chris Greenway, BBCM) FNM calls for boycott of major firms involved in Nigeria: Coca Cola, Motorola, Royal Dutch Shell (gh) Indianapolis P.O. Box addresses have been used previously by CIA-backed stations (Wolfgang Büschel, Germany, *BC-DX*) Announcers speak with American accent (Jay Novello, gh)

Also subtitled "Voice of Free Nigeria" is Radio NADECO (National Democratic Coalition), which began June 30 via WWCR 5070 M-F at 0500-0515, giving this address: 514 Tenth St. NW, Suite 600, Washington, DC 20004. Thanks to Devmedia via Don Moore for initial tip. Analysis portion of the

program is supplied by express tape, whilst the news segment is faxed to WWCR for reading by one of its announcers. For the first sesquiweek, these two were broadcast in the wrong order. NADECO monitors in Nigeria complained that it was blocked by VOA. This must have been the reason: at 0500 VOA broadcasts in English toward Nigeria on 5970 from São Tomé, producing a double-IF image 900 or 910 kHz below on cheap consumer receivers, an unfortunate coincidence, but neither station's fault. WWCR gave NADECO a bonus repeat at 1630-1645 on 15685, when reception may very well have been better, but NADECO was slow to publicize this to its listeners and website visitors to **www.nadeco.org** (gh)

PERÚ R. Santiago, Rio Santiago, 5730 at *1112-1153 fade with local announcements, romantic music; not heard in evening due to RTTY/fax (Fernando Viloria, Carabobo, Venezuela, *World of Radio*)

PHILIPPINES Vietnam complained to Philippines that Radio Free Asia was being transmitted from VOA Poro, which the Philippines wants the VOA to vacate. US Embassy denied this, saying RFA may come from Palau instead (John Orford, Philippines, WDXC *Contact* via *BC-DX*) *Site secrecy can backfire*

POLAND [non] R. Maryja, a private Catholic station in Poland, is also on SW via a hired relay in Russia, 1500-2000 on 12010, 2000-2200 on 7400 (BBCM)

PUERTO RICO [non] *La Voz de Salvación*, program with an address in Carolina, PR, and other evangelical shows such as *Una Voz en el Aire* from Los Angeles are heard on a weak LSB transmitter varying around 7544 kHz in the 1230-1500 period; also on air after 0000 but smashed by WSHB 7535 splash. No IDs are ever heard between programs or on the hour. What is this? (gh, OK)

RUSSIA Radio NERRS—Northern European Radio Relay Service—plans to broadcast to Eu/NAf/ME with 200 kW SW near St. Petersburg, and 1200 kW MW in Kaliningrad. We submitted the application in June 1996, but the Federal Service on TV and Broadcasting is persistently refusing to grant us the license without explanation, despite the fact that the Government of the Russian Federation determines licensing. Thus we appeal to the SW audience to help us as they have RCI, Channel Africa, and Radio Australia, by writing in Russian or English supporting the idea of setting up Radio NERRS to: Prime-Minister Viktor Chernomyrdin, Government of the Russian Federation, Krasnopresnenskaya 2, Moscow 103274; or to: Chairman Valentin Lozutkin, Federal Service on TV and Broadcasting, Pyatnitskaya 25, Moscow 113326. Please note on the envelope: "International Campaign of Assisting Radio NERRS" (Mikhail Timofeyev, NERRS coordinator via Nikolay Pashkevich)

SERBIA R. Yugoslavia's 0430 English broadcast to WNAm disappeared without explanation from 9580 and 11870, although 11870 was occupied by Sa'udi Arabia's Holy Koran Service (Sanchovich, gh) 0430 sked on 9580 and 11800 instead (via Marc Vissers, *rec.radio.shortwave*) *Not heard there either*

SYRIA Syrian Arab News Agency, RTTY press monitored in June, one hour later in winter, F1B, 50 baud: daily 0700-0900 Arabic to ME/Af, and 0900-1100 French/English to Eu on 11080, unconfirmed on 3560; 1100-1300 Arabic on special occasions only, 1300-1400 French/English on 11080; 1400-1700 Arabic, 1700-1800 French/English on 11080, unconfirmed 3560 (BBCM) *see also IRAQ*

TAIWAN VOFC summer sked shows *Jade Bells & Bamboo Pipes*, music show expanded to twice a week, Mon and Thu 0215, 0715, 1215, 2215, Tue and Fri 0315 (via Gigi Lytle, TX)

TAJIKISTAN [non] V. of Free Tajikistan, believed from northern Afghanistan (Tajik: *Sado-i Tajikistan-i Ozod*), approx. sked as announced in June, also in Russian: 0230-0430, 0530-0730 on 7100v, 5960v (BBCM)

THAILAND R. Thailand via Udorn to NAm changed from 15370 to 15395 at 0030-0200, 0300-0430 (Dan Ferguson, IBB, *rec.radio.shortwave*) Still mostly inaudible here. I have suggested directly to the R. Thailand director that they should arrange to use VOA sites in the USA, as Greece has done (gh) Transmission schedule will be revamped to serve the listeners better, and we are adding five languages: Cantonese, Arabic, Tagalog, Russian and Spanish. Also under construction is a website: **radiothailand.com** (R. Thailand)

TURKEY VOT's *Blue Voyage* program is a delight—love the music background (Gigi Lytle, TX) It's the final show on Saturday broadcasts, around 1900 on 13695-LSB, 2230 on 9655, Sun 0330 on 7300. The Turkish service also has a nice music hour at least Sunday at 2100 on 15385 (gh) VOT announced it would move from 7300 to 6125 due to ham QRM complaints, but I faxed them it would be a mistake due to Spain and VOA (Gigi Lytle, TX)

TURKMENISTAN Turkmen Radio's English service has resumed, reduced to 10 minutes at 1400 Tue, Thu, Fri, Sun on 5015, MW, LW (Maarten van Delft, DSWCI *DX Window*)

UKOGBANI Three former directors of the BBC launched a scathing attack on the corporation for effectively "wrecking" the World Service and called on the government to step in and reverse the damage. In a letter to *The Times*, they said the WS has been "dismantled" as a result of the restructuring ordered by BBC director general John Birt last year. The letter was written by John Tusa, Austen Kirk and Gerard Mansell (Mike Harrison, British Press Association via Mike Cooper) Program producers cannot use the BBC's own pronunciation or information units, or record library without paying a fee each time, so they are being used less with a consequent drop in program quality (Jocelyn Hay, Voice of the Listener and Viewer, *The Times* via Mike Cooper)

London AM pirate Radio Argus carried on SW tests on 15360 in April with 20 watts; no reception reports are known (Andy Walker, Radio Free London, *FRS Newsletter* via Gigi Lytle)

USA *WORLD OF RADIO* was invited to join the schedule of WGTG, Georgia, UT Tue 0400 on 5085-USB plus carrier; primary beam is toward Mexico, and it is heard in New Zealand at that time; also should make it to Europe off the back, as well as most of North America. When a new antenna is ready, the beam may change toward the north. Thanks, Dave Frantz! Also, KRVM, 1280, Eugene, OR, relays World Radio Network 24h, so should include *W.O.R.* Fri 10:30 pm, Sat 9 am PDT (gh)

WRMI basically swapped times for *Wavescan* expanded to half an hour, and *Viva Miami* reduced to a quarter hour, according to July schedule; however, only a week or two later, what we were actually able to hear on 9955 bore little resemblance to the "dynamic" schedule. Pirate specials are supposedly airing on certain Saturdays at 1800-1900: Southern Music Radio Oct. 11; Radio Sparks Oct. 25 (gh)

On 26470 FM at 0050 during sporadic-E opening, unID preaching, religious singing and hand-clapping (Alan Roberts, PQ, CIDX *Messenger*) It's operated by WJFP, 91.1 in Fort Pierce, FL. Phoned the station and they say it's 75 watts to a horizontal 5-element antenna toward Chicago; officially a cuing transmitter; they openly refer to it as a "lowpower shortwave service," and reports have been received from Venezuela, Haiti, Quebec, Michigan, Washington. The organization plans two more such units, unknown where (Alan Roberts, *World of Radio*) Also heard here during Es, soul and gospel, and giving 107.1 in West Palm Beach (gh, OK)

WEWN dropped 6890 suddenly July 1 as abruptly as it appeared last August, replaced by 5825 (gh) 6890 had interference complaints from Australia (*EDXP*)

WORLD OF RADIO on WWCR: Fri 2030 on 15685, Sat 0530 on 5070, 0605 on 3210, 1130 on 5070, Sun 0900 on 3210, 2330 on 5070, Tue 1230 on 15685. *Ask WWCR* has some new times: Sat 2030 on 12160, Sun 1115 on 15685; Mon 0500 on 5070 bumped by NADECO; see NIGERIA (gh)

Monitor Radio's final news broadcast was June 27, after which WSHB went to all-religious programming (gh) Radio was costing the church about $9.2 million a year and bringing in only about $1 million. Though public-service, losses of that size were just too great (Sue Schardt, *E-Monitor* via Ed Evans) But for the coming year, church commits $17 million to supporting the newspaper and increasingly popular **www.csmonitor.com** (David T. Cook, *CSM* via Jim Moats)

FCC has rejected an application from the Evangelical Crusade of Fishers to build a SW station at Brentwood, LI, NY (Duncan Stanworth, BDXC *Communication*) VOA once had a transmitter there

Ignoring the fact that VOA already broadcasts to these areas, there has been congressional pressure to start up additional competing surrogate services such as Radio Free Iran, Radio Free Africa, and expand Radio Free Asia to 24 hours for China (VOA *Communications World*) Pres. Clinton also said he supports 24-hour broadcasting to China in Mandarin and other dialects (Washington *Post* via Mike Cooper) Clinton pledged to work with Gingrich and others in Congress to obtain additional support for RFA and VOA to expand broadcasting aimed at China (Chicago *Tribune* via Mike Cooper) The "R. Free Africa" concept of surrogate broadcasting already exists within VOA which does not need such competition (Evelyn Lieberman, VOA Dir., on *Communications World*)

VANUATU Port Vila heard around 0600-0800 on 4960 only, local dialects and English (Bob Padula, Victoria, *EDXP*) During six days of our June DXpedition in WA it was only on 3945 (David M. Clark)

VENEZUELA R. Táchira, 4830, at 0250-0330 was relaying religious programs with R. San Cristóbal IDs (Nicolas Eramo, DSWCI *DX Window*)

R. Nacional, 9540.07, also heard in morning until 1159*, barely modulated (Dave Valko, PA, *The Four Winds*) 9504.06 starts at *1100, easy-listening music, many IDs, strong carrier but undermodulated (Jay Novello, NC)

R. Barquisimeto, long inactive on 9510, has been promoting revival of its SW service as heard locally on MW 690. Plays music of the 50s, 60s and 70s, plus news and sports. New address is: Calle 29 entre carrera 18 y 19, Barquisimeto, Estado Lara. Director is Sr. Alfonso Saer (Dr. Luis A. Guerra Brandt, Barquisimeto, *World of Radio*)

VIETNAM Voice of Vietnam has inaugurated a second high-power transmitter. It is in Can Tho province in the Mekong Delta, designated VN2, to broadcast external programs including English on SW. Total capacity is 3500 kW from three transmitters. The previous Hanoi station is VN1 (VNA via BBCM)

YEMEN R. Aden, English at 0600-0700 on 9780.2v, is blocked by Portugal weekdays, but clear Sat & Sun (Erich Bergmann, Germany, *BC-DX*)

ZIMBABWE Among several long-path Africans was ZBC Radio 3(?), 6045 from 1518 as late as 1611, English news at 1605 (David M. Clark, Grayland WA DXpedition)

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

Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0000 UTC on 11870
YUGOSLAVIA: Radio Yugoslavia. English program with *Letterbox* program, // 9580 (best quality) via Bosnia. Both frequencies good signal quality. (Lee Silvi, Mentor, OH/via email)

0012 UTC on 4760
INDIA: (Nicobar & Andaman Islands) All India Radio-Port Blair. Hindu music to ID, schedule and advisement on health care. **AIR-Delhi** on 4860 at 0057. **AIR-Thiruvananthapuram** on 5010, 0130 with Hindu song on national unity and ID. **AIR-Calcutta** on 4820 at 0024-0030, sign-on prayer *Vande Matram* in Sanskrit. Shenai music (Indian clarinette) to talk in Bengali at 0030, election results in Hindu. (Mahendra Vaghjee, Rose Hill, Mauritius)

0048 UTC on 7040.45
PERU: Radio San Ignacio. Peruvian music to long echo effect talk by live announcer over instrumental. Mentions of Santa Cruz and San Ignacio. Clear time checks and ID at 01210. (Dave Valko, Dunlo, PA/*Cumbre DX*)

0058 UTC on 3270
NAMIBIA: NBC. Utility interference on // 3290, with continuous pop music show, poor signal quality. (Giovanni Serra, Anzio, Italy/*The Four Winds*)

0124 UTC on 6085
GERMANY: Bayerischer Rundfunk. German announcer's musical intros to, "hier Bayerischer Rundfunk" identification. SINPO=23322. (Nicholas Eramo, Argentina/*Cumbre DX*).

0125 UTC on 4472
BOLIVIA: Radio Movima. Spanish. Non-stop Latin music with one brief announcement. No ID at 0200, recheck at 0235 with poor signal quality. Bolivia's **Radio Centenario de Nueva** on 4855, 0150-0200. Endless IDs and slogans. (Piet Pijers, Netherlands/*Hard-Core-DX*)

0126 UTC on 6090
BRAZIL: Radio Bandeirantes. Portuguese. Soccer commentary to ID and national news, // 11925 with fair quality. (Vaghjee, MAU)

0130 UTC on 9430
USA: Monitor Radio. Story on recent congressional debates for Grand Forks relief. (Sue Wilden, Columbus, IN)

0223 UTC on 9505
USA: WYFR. *Family Radio on a Saturday Night*, with religious music, program notes and ID, // 6065 fair signal quality. (Jim Moats, Ravenna, OH)

0240 UTC on 9655
AUSTRIA: Radio Austria. *Mailbox* program in progress at tune-in, with quiz questions, letters and station address, // 9870, 13730 excellent signal quality. (Moats, OH)

0252 UTC on 15050
COSTA RICA: RFPI. *Our Americas* in progress at tune-in, with discussion on the Panama Canal Zone. Station ID, program preview and station promo, // 7385, 7585 fair quality. (Moats, OH)

0302 UTC on 9690
SPAIN: China Radio Int'l relay. News bulletin to *News About China* segment at 0310, // 9710 excellent signal quality. (Moats, OH)

0328 UTC on 9420
GREECE: Voice of Greece. Greek. Regional music to talk and English ID at 0342, followed by weather forecast and newscast to 0350*, // 6260, 7450. (Moats, OH)

0400 UTC on 4910
ZAMBIA: Radio Zambia/ZNBC-1. Domestic service in vernaculars. Musical ID followed by voice ID, "Radio One" into features. (Sean M. Warner, Minneapolis, MN/*Cumbre DX*)

0407 UTC on 9779.76
YEMEN: Yemen Radio. Classical Arabic music to local references, though no clear ID was heard. Slight heterodyne on the upper side. (Zacharias Liangas, Thessalloniki, Greece/*Hard-Core-DX).*

0423 UTC on 15167.25
TAHITI: RFO. Huge open carrier, though occasional "snippets" of French/Tahitian talk from male announcer. New Zealand on 15115 and Radio Australia on 15365 also good at this time. (David Sharp, FL/*Cumbre DX*).

0950 UTC on 9580
AUSTRALIA: Radio Australia. *Arts Australia* show with book reviews and report on international ivory trade at 1130, 9860 kHz. (Bob Fraser, Cohasset, MA)

1030 UTC on 5965
CANADA: BBC World Service. *One Planet* program featuring women's rights and birth control controversy. Radio Japan's Canadian relay monitored on 6120 at 1130. (Fraser, MA)

1117 UTC on 15200
UZBEKISTAN: Uzbek Radio. Noted also on // 15165 under strong splatter from Radio France Int'l. Local chants with drum beat and instrumental sounds. (Serra, Italy, *TFW*)

1120 UTC on 9525
INDONESIA: Voice of Indonesia (Java). Non-stop music program to station ID, address and Japanese service commencing at 1131. (Vaghjee, MAU)

1401 UTC on 10059.2
VIET NAM: Hanoi 1. Male/female announcers in Vietnamese, to music bridge and regional music. (Veldhuis, NLD) **Voice of Vietnam** noted on 15010 in French at 2100. **Tien Noi Vietnam** on 4960 at 2205 with Vietnamese morning gymnastics. (Liangas, GRC/*Hard-Core-DX*)

1450 UTC on 13750
COSTA RICA: Adventist World Radio. Spanish programming to Central America to 1600, English service with IDs and Latin music to 1700. (Silvi, OH)

1500 UTC on 6155
SINGAPORE: Radio Singapore Int'l. News in English to national weather forecast. Pop music program from Trini Lopez and Cliff Richards. (Vaghjee, MAU)

1500 UTC on 7170
OMAN: Radio Oman. Arabic ID, "idha'atu Sultanate Oman" into news and Holy Koran readings. (Nikolay Pashkevich, Russia/*Cumbre DX*).

1520 UTC on 6165
ZAMBIA: Zambia BC. *Voice of the Church* program. Religious choral music to English songs. Drum signal at 1600 to time pips and news "for throughout the country" by lady announcer. (Vaghjee, MAU)

1647 UTC on 11780
SAUDI ARABIA: BSKSA. Arabic service monitored to 1653, // 11965 with IDs and reading a list of names. Slight signal splatter. (Serra, Italy/*TFW*)

1800 UTC on 15615
ISRAEL: Reshet Bet. Hebrew. Musical variety program to Europe, heard to 1900. Good signal with Sony 7600 portable while on vacation. (Silvi, OH)

1805 UTC on 9525
INDONESIA: (Java) Voice of Indonesia. Female announcer reading news in German. Station ID, weather forecast to report about Kashmir. (Veldhuis, NLD)

1819 UTC on 5050.06
TANZANIA: Radio Tanzania. Good signal for news in vernacular language. Several IDs following correspondent's report. Over modulated promos to text on democracy. SINPO=44444. (Mark Veldhuis, Borne, Netherlands/*Hard-Core-DX*) Station monitored in French 2045 on 5050. (Liangas, GRC/*TFW*)

1845 UTC on 9400
PAKISTAN: Radio Pakistan. Arabic text and closing ID to national anthem, *Long Live Pakistan.* (Vaghjee, MAU)

1940 UTC on 4950
ANGOLA: Radio Nacional de Angola. Portuguese. Sports commentary for soccer game, into ID at 2002 and newscast. (Vaghjee, MAU)

2015 UTC on 4970
MALAYSIA: RTV Malaysia. Arabic prayers to pop music program. RTV Malaysia (Kajang....) heard on 4845 at 2313 with commercial for *Taj Mahal Brand* into duet tune *Dil Rouba* and national news. RTV Malaysia (Kuching-Sarawak) noted on 4895, 2336-2345 with pop songs, chat and ID. (Vaghjee, MAU)

2016 UTC on 15340
CUBA: Radio Havana. Music from Roberta Flack, to Spanish programmers station ID and talk. (Wilden, IN)

2016 UTC on 3345
SOUTH AFRICA: World Music Radio. Pop song to announcements. Afro pops, ID with kilohertz quote. (Serra, Italy; Lianges, GRC/*TFW*)

2020 UTC on 17555
USA: WYFR. Alan Thayer's *Mailbag* program discussing Internet and email. (Wilden, IN)

2040 UTC on 9965
ARMENIA: Radio Yerevan. Report that U.S. oil companies are interested in Azerbaijan, and urge better relations. (Fraser, MA)

2045 UTC on 4976
UGANDA: Radio Uganda. Very weak signal for public service announcements to station ID and poetry readings. (Vaghjee, MAU) Monitored to 2100*. (Veldhuis, NLD)

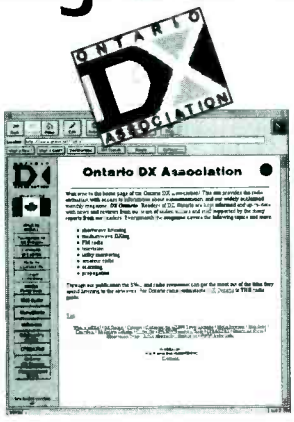
2312 UTC on 17750
USA: Voice of Free China relay via WYFR. News bulletin to segment on Hong Kong, China. *Perspectives* program at 2325, // 15600 fair quality. (Moats, OH)

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

Gayle Van Horn, gayle@grove.net

The New Neighbor @ grove.net

Welcome to the home page of the **Ontario DX Association**! We are pleased to announce the new ODXA web site via grove.net. This excellent website contains access to information about ODXA and their monthly magazine, *DX Ontario*, considered by many shortwave listeners and radio enthusiasts in Ontario as THE radio guide in Canada. Every month the magazine covers shortwave, mediumwave, FM/TV, scanning, utility, propagation, amateur radio, and more. The ODXA website was created and is maintained by Don Cassell. Comments are welcome; leave Don or any of the ODXA staff members an email when you visit at **<http://www.grove.net/~odxa/>**.



Things are finally back to normal at **China Radio International**. If you wondered why your mail snagged a bit, blame it on the move! CRI is broadcasting from new studios and has a new address. Send your letters and reports to; 16A Shijingshan Street, Beijing, China 100039.

Good news from Bulgaria. Send your old report from **Radio Dneister** (now off the air) and **Radio Moldova International** for verifications to: Rumen Pankov, P.O. Box 199, 1000 Sofia-C, Bulgaria. Please enclose one U.S. dollar and one IRC for each report.

ANGUILLA

Caribbean Beacon-1610 AM kHz. Full data verification letter. Received in 522 days for an English AM report. Station address: P.O. Box 690, Anguilla, British West Indies. (Jorge Garzon/*Hard-Core-DX*) Full data QSL letter for 11775 kHz on station letterhead signed by B. Monsell Hawell-Chief Engineer. Received in 60 days for an English report and two IRCs. Same address as 1610 AM. (Darren White, Hattiesburg, MS; Walter Szczepaniak, Philadelphia, PA)

COLOMBIA

CARACOL Bogota, 5077 kHz. Frequency only QSL card, unsigned, and station bumper sticker. Received in 260 days for a Spanish report with cassette tape and mint stamps. Station address: CARACOL S.A., Apartado Aereo 9291, Santefe de Bogota, D.C., Colombia. (Randy Stewart, Springfield, MO)

COASTAL RADIO

Playa Ancha Radio/CBV. Full data station QSL with "Armada de Chile" official stamp, signed by Fernando Saver White. Received in 32 days for an English utility report and one U.S. dollar. Station address: Valparaiso Radio, CBV, Direccion General Del Territorio, Maritimo y Marina Mercante (DGTMMM), Radioestacion Maritima, Playa Ancha, Correo Naval, Valparaiso, Chile. (Richard W. Parker, Rochester, NY)

Chatham Radio/WCC, 6376 kHz. Full data verification letter signed by Phil Davison-Technician. Received for an English utility report. Station address: MCI International Inc., Chatham Radio/WCC, P.O. Box 397, 847 Orleans Road, North Chatham, MA 02650-0397. (Clarence Thompson/via email)

Gdynia Radio/SPH, 12721.0 kHz. Full data prepared QSL card and station QSL verified with official stamps and personal letter from station operator Roman Buza. Received in 29 days for an English report and one U.S. dollar. Station address: Rekowo, 84-123, Pokchowo, Poland. (Dr. Selsyn, NY)

FRENCH GUIANA

RFO Guyane, 5055 kHz. Partial data card unsigned plus station stickers. Received in 120 days for a French report. Station address: Boite Postal 7013, Cayenne, French Guiana. (Jose Moura, Washington, DC)

GUATEMALA

Radio Cultural/TGNC, 3300 kHz. Quetzal bird/logo card with letter signed by Wayne Berger-Chief Engineer. Program schedule included. Received for an English report. Station address: Apartado de Correo 601, Guatemala City, Guatemala. (Eric Bueneman, Hazelwood, MO/*The Four Winds*)

HONDURAS

Radio Copan Internacional, 15675/7460 kHz. Full data QSL cards. Received in 669 and 440 days for an English report and a SASE. Station address: P.O. Box 526852, Miami, FL 33152. (White, MS)

HUNGARY

Radio Budapest, 5905 kHz. Partial data card unsigned, plus postcards, stickers, postage stamps and tourist brochures. Received in 60 days for an English report. Station address: H-1800 Brody Sandor utca 5-7, H-1800 Budapest, Hungary. (Moura, DC)

LAOS

Laotian National RadioTV. Registered full data letter signed by Miss Vichitsavanh Chanthery-English announcer. Received in 64 days for a taped report and two IRCs. Station address: Boite Postal 310, Vientiane, Laos. (Harald Kuhl, Germany/*Cumbre DX*)

MALI

China Radio International relay, 11695 kHz. Full data card showing *Norbu Lingka*, the original summer palace for the Dhali Lama. Mali transmitter site noted. Received in 23 days for an English report. Station address: 16A Shijingshan Street, Beijing, China 100039. (Stewart, MO)

PHILIPPINES

Radio Veritas Asia, 9520 kHz. Full data *International Year of the Family* QSL card, signed by Ms Cleofe R. Labindao. Received in 40 days for an English report and three IRCs. Station address: P.O. Box 2642, Quezon City, 1166, Philippines. (White, MS)

PORTUGAL

Radio Renascenca, 9600 kHz. Full data card unsigned. Received in 14 days for a 1993 reception report. Station address: Rua Ivens 14, 1294 Lisbon Codex, Portugal. (Fred Kohlbrenner, PA/*Cumbre DX*).

SHIP TRAFFIC

Early Bird-3EQJ3, 500 kHz (General Cargo/Bulk Carrier). Full data prepared QSL verified for an English utility report and one U.S. dollar. Ship address: Peninsular Electronics Limited, Broadquay House, Eagles Wood Business Park, Woodlands Lane, Almondsbury, Bristol BS12 4EU United Kingdom. (Hank Holbrook, Dunkirk, MD)

IOS-SYNF, 500 kHz (Bulk Carrier). Full data verification letter via registered mail from Greece. Received for an English utility and one U.S. dollar. Ship address: Glafki (Hellas) Maritime Co., P.O. Box 1722, 105 57 Athens, Greece. (Holbrook, MD)

M/V Edwin H.Gott-WXQ4511, 4077 kHz USB. Full data prepared QSL card verified in 38 days for an English utility report, plus photo. Ship address: c/o Detroit Marine Post Office, River Station, Detroit, MI 48222. (Steve McDonald, Port Coquitlam BC, Canada)

M/V Oglebay-WAQ3521-4077 kHz USB. Full data prepared QSL card verified in 30 days for English utility report, plus photo. Ship address: (same as *M/V Edwin H. Gott*). (McDonald, CAN)

TURKEY

Voice of Turkey, 6120 kHz. Full data large QSL card of Turkish glassware, unsigned, plus VOT stickers and pennant. Received in 30 days for an English report. Station address: P.O. Box 333-06.443, Yenisehir, Ankara, Turkey. (David R. Shelton, Long Beach, CA)

UZBEKISTAN

Radio Tashkent, 9715 kHz. Full data logo/map card unsigned. Program schedule, old Soviet-era postcard of Tashkent and listener contest info sheet. Received in 65 days for an English report and one U.S. dollar. Station address: 49 Khorezm Street, Tashkent. (Stewart, MO)

ZIMBABWE

Zimbabwe Broadcasting Corp./Radio Two, 3305 kHz. Full data oversized map/logo QSL card signed by Charles Warikanawa. Received in 90 days for an English report. Station address: P.O. Box HG444, Highlands, Harare, Zimbabwe. (Mahendra Vaghjee, Rose Hill, Mauritius)

How to Use the Shortwave Guide

1: Convert your time to UTC.

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

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

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

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

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

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

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

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

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

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

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

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

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

Hot News

by Jim Frimmel

Australia

Radio Australia (RA) took swift action in July to offset tremendous budget cuts. The loss of its transmitter facilities at Darwin caused a great reduction of the broadcaster's signal to Asia, forcing listeners to tune in VOA and BBC for the coverage that they had relied on from RA for so long. The reduction in shortwave frequency use also affected coverage to other parts of the world.

RA's three-pronged solution to its money problems was (1) to relay up to 12 hours a day of Radio National's programs (1200-1800 UTC plus other times), (2) to drastically reduce news coverage, and (3) to begin full-time live broadcasting via RealAudio over the internet.

The programs which are being relayed are domestic programs heard over ABC's National Radio across Australia. The loss of in-depth news tailored to RA's regional listeners will be sorely missed.

As of mid-July, RA's internet server was able to handle 80 simultaneous calls. This number was forecast to increase in order to serve more world-wide listeners. The live internet signal is monophonic and of surprisingly high quality — about equivalent to AM radio.

Shortwave listeners equipped with computers able to receive RealAudio are in for a real treat. The ability to tune in RA at any time of the day is quite an experience. The success of this endeavor should do much to promote live internet transmissions by other international broadcasters (you can be sure they are closely watching). (The URL is: **www.abc.net.au/ra/elp/elphome.htm**.)

RA's "Feedback" program now includes a regular internet spot during which time the RA webmaster discusses the latest developments in that area.

This month's selected program listings feature Radio Australia. Most were monitored via the internet.

Japan

Radio Station "FM Yokohama" became the first known FM radio broadcaster sending both audio and video live over the internet. Audio is live 24-hours and video consists of "The Breeze" at 0900-1300 UTC and "Yokohama Radio Night Live!" at 1900-2400 UTC (both Mon-Fri). You'll need to be equipped with the free RealPlayer program when you arrive at **www.fmyokohama.co.jp/** in order to receive both the audio and video.

BBC

Science programs of 15 minute lengths are now grouped under the category "Science Extra" and rotated weekly each month. The new lineup is (1) *Seeing Stars*, (2) *Soundbyte*, (3) *Wildtrack*, (4) *Waveguide*, and (5) *Science Feedback*. The popular *Waveguide* program is now heard during the fourth week of each month.

Congo

The UN High Commission for Refugees (UNHCR) distributed 500 Bayliss wind-up radios to stranded Rwandan refugees so that BBC news and information would be available in local languages.

Hungary

Radio Budapest is conducting a contest this month. Listen to their DX Show at 0230 UTC Thu for details.

Club WRN

The World Radio Network now has a listeners' club. Interested individuals can join by e-mail (*club@wrn.org*). Details are outlined on WRN's web page at **www.wrn.org/club.html**. Members will be able to buy WRN merchandise and media-related products at reduced prices, receive a broadcast schedule, and compete for a monthly drawing.

Greece

The Voice of Greece is now being heard via the Voice of America transmitters in Greenville, SC, and Delano, CA. The relays are at the follow UTC times:

0600-0800 - 9775 (to AUS/NZ/Pac via Delano)
0900-0950 - 9950 (to AUS via Delano)
1200-1350 - 9550 (to CAN via Greenville)
1830-2200 - 11730(to CAN via Delano)
1830-2200 - 17745(to Lam via Greenville)

English news can be heard on these frequencies at 1240, 1335, 1840 and 2000. Great music and other languages at other times.

Germany

Deutsche Welle's web site now offers its English programs in RealAudio (**www.dwelle.de**). *Newslink* is updated four times per day (M-F) at 09, 11, 16 and 1900 UTC. You can also find audio-on-demand for four weekly feature programs: *Inside Europe, Living in Germany, Man and Environment, and Arts on the Air*. In August, Deutsche Welle introduced *DW plus* , a new monthly publication that combines *DW-tv* and *DW-radio*. The shortwave quarterly publication (*tune in*) is expected to continue as is.

Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100	Australia, Radio	9660pa	12080pa	13605pa	13755pa
		15365pa	15415as	17750as	17795pa
0000-0100 vl	Australia, VL8K Katherine	5025do			
0000-0100 vl	Australia, VL8T Tent Crk	4910do			
0000-0015	Cambodia, Natl Voice of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0100	China, China Radio Intl	9710na	11695na		
0000-0004	Croatia, Croatian Radio	5895na			
0000-0027	Czech Rep, Radio Prague	5930na	7345na		
0000-0100	Ecuador, HCJB	9745am	21455am		
0000-0030	Egypt, Radio Cairo	9900na			
0000-0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do		
0000-0045	India, All India Radio	7150as	9705as	9950as	11620as
0000-0100	Japan, R Japan/NHK World	6155eu	6180eu		
0000-0100	Lebanon, Voice of Hope	9960va			
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100	Malaysia, RTM Kuching	7160do			
0000-0100	Netherlands, Radio	6020na	6165na	9845na	
0000-0100	New Zealand, R NZ Intl	15115pa			
0000-0050	North Korea, R Pyongyang	11335na	13760na	15130na	
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Russia,Voice of Russia WS	7125na	7250na	9820na	9830na
0000-0100	Spain, R Exterior Espana	6055am			
0000-0030	Thailand, Radio	9655af	9690af	11905af	
0000-0100	Ukraine, R Ukraine Intl	5905na	6010na	6020na	6090na
		7150na	7180na	7240na	9550na
		9560na	12040na		
0000-0100	United Kingdom, BBC WS	5965as	5970am	5975am	6175am
		6195as	9410as	9590am	11750sa
		11955as	15310as		
0000-0045	United Kingdom, BBC WS	3915as			
0000-0030	United Kingdom, BBC WS	7110as	9580as	11945as	15280as
0000-0100	USA, KAIJ Dallas TX	5810am			
0000-0100	USA, KTBN Salt Lk City UT	15590am			
0000-0100	USA, KWHR Naalehu HI	17510as	17555pa		
0000-0100	USA, Monitor Radio Intl	7535am	9430sa	15665as	
0000-0100	USA, Voice of America	7215as	9770as	11760as	15185as
		15290as	17735as	17820as	
0000-0100 twhfa	USA, Voice of America	5995am	6130am	7405am	9455am
		9775am	11695am	13740am	
0000-0100	USA, WEWN Birmingham AL	5825eu	15375na		
0000-0100	USA, WGTG McCaysville GA	5085am			
0000-0100	USA, WINB Red Lion PA	11950am			
0000-0100	USA, WJCR Upton KY	7490na			
0000-0100	USA, WRMI/R Miami Intl	9955am			
0000-0100	USA, WRNO New Orleans LA	7355am			
0000-0100	USA, WWCR Nashville TN	3215am	5070am	7435am	13845am
0000-0100	USA, WYFR Okeechobee FL	6085na	9505ca		
0000-0030 mtwhfa	Yugoslavia, Radio	9580na	11870na		
0030-0055	Austria, R Austria Intl	9655na			
0030-0100	Iran, VOIRI	6050eu	9022eu	9685eu	
0030-0100	Lithuania, Radio Vilnius	9855na			
0030-0100	Netherlands, Radio	5905as	7305as	9855as	11655as
0030-0100	Sri Lanka, Sri Lanka BC	9730as			
0030-0100	Thailand, Radio	9655va	11905va	15395as	
0035-0040	India, All India Radio	5010do	7110do	11870do	
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

Selected Programs

Sundays

0000 Australia, Radio: RA News. Five or ten minutes of world, Australian, and regional news.
0000 USA, VOA Washington DC (as): VOA News. Ten minutes of worldwide news on the hour.
0005 Australia, Radio: Oz Sounds #2. Twenty minutes of music selections by Radio Australia announcers.
0010 USA, VOA Washington DC (as): All About English. A program designed for those learning to speak English.
0030 Australia, Radio: Correspondents' Report. The ABC's foreign correspondents report home with Hamish Robertson.
0030 UK, BBC London (AE): Letter from America. Alistair Cooke presents essays about life in the USA.
0030 USA, VOA Washington DC (as): News (Special English). Ten minutes of news in slow English.
0040 USA, VOA Washington DC (as): Words and Their Stories (Special English). The origin and use of common words and phrases in American English.
0045 USA, VOA Washington DC (as): People in America (Special English). Stories about famous Americans.

Mondays

0000 Australia, Radio: RA News. See S 0000.
0000 USA, VOA Washington DC (as): VOA News. See S 0000.
0010 Australia, Radio: Awaye. Lorena Allam hosts a program of indigenous arts and issues.
0010 USA, VOA Washington DC (am/as): VOA Business Report. A weekday review of business and financial matters.
0040 USA, VOA Washington DC (as): Development Report (Special English). Helpful information for developing nations.
0045 USA, VOA Washington DC (as): This is America (Special English). Informative reports on life in the United States.

Tuesdays

0000 Australia, Radio: RA News. See S 0000.
0000 USA, VOA Washington DC (am/as/ca): VOA News. See S 0000.
0010 Australia, Radio: The Science Show. Robyn Williams presents the world of science, both at home and abroad.
0010 USA, VOA Washington DC (as): VOA Business Report. See M 0010.
0010 USA, VOA Washington DC (ca): Report to the Caribbean. The latest news affecting the region, as well as a roundup of sports, financial news, and the weather forecast.
0030 UK, BBC London (AE): Earth, Air, Fire and Water (2nd,9th). Stories from around the world which explore the meaning of creation, the relationship between the divine and the human and the significance of human life.
0030 USA, VOA Washington DC (am/as): News (Special English). See S 0030.
0030 USA, VOA Washington DC (ca): Studio 38. A bright, fast-paced weekday show highlighting American lifestyles and culture.
0040 USA, VOA Washington DC (am/as): Agriculture Report (Special English). Developments and reports on farming and agriculture.
0045 USA, VOA Washington DC (am/as): Science in the News (Special English). Recent scientific developments.

Wednesdays

0000 Australia, Radio: RA News. See S 0000.
0000 USA, VOA Washington DC (am/as/ca): VOA News. See S 0000.
0010 Australia, Radio: The National Interest. Terry Lane takes an incisive look at the week's major events.
0010 USA, VOA Washington DC (am/as): VOA Business Report. See M 0010.
0010 USA, VOA Washington DC (ca): Report to the Caribbean. See T 0010.
0030 UK, BBC London (AS): Encyclopaedia Historica. See S 0130.
0030 USA, VOA Washington DC (am/as): News (Special English). See S 0030.
0030 USA, VOA Washington DC (ca): Studio 38. See T 0030.
0040 USA, VOA Washington DC (am/as): Science Report (Special English). Developments in the world of science and technology.
0045 USA, VOA Washington DC (am/as): Exploration (Special English). NEW! Steve Ember and Shirley Griffith report on space news.

Thursdays

0000 Australia, Radio: RA News. See S 0000.
0000 USA, VOA Washington DC (am/as/ca): VOA News. See S 0000.
0010 Australia, Radio: Background Briefing. Australia's top award-winning current affairs program.
0010 USA, VOA Washington DC (am/as): VOA Business Report. See M 0010.
0010 USA, VOA Washington DC (ca): Report to the Caribbean. See T 0010.
0030 USA, VOA Washington DC (am/as): News (Special English). See S 0030.
0030 USA, VOA Washington DC (ca): Studio 38. See T 0030.
0040 USA, VOA Washington DC (am/as): Science Report (Special English). See W 0040.
0045 USA, VOA Washington DC (am/as): The Making of a Nation (Special English). Chapters from U.S. history in special English.
0054 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (4th). See W 1254.
0054 Radio Netherlands: Documentary. Indian Tiger Extinction (25th). See F 2354.
0054 Radio Netherlands: Documentary. Social Cost of Transformation (18th). See F 1454.
0054 Radio Netherlands: Documentary. Take the Low Road (11th). See A 2354.

Fridays

0000 Australia, Radio: RA News. See S 0000.
0000 USA, VOA Washington DC (am/as/ca): VOA News. See S 0000.
0010 Australia, Radio: Hindsight. See H 1605.
0010 USA, VOA Washington DC (am/as): VOA Business Report. See M 0010.
0010 USA, VOA Washington DC (ca): Report to the Caribbean. See T 0010.
0030 USA, VOA Washington DC (am/as): News (Special English). See S 0030.
0030 USA, VOA Washington DC (ca): Studio 38. See T 0030.
0040 USA, VOA Washington DC (am/as): Environment Report (Special English). A five-minute report on a specific environmental subject.
0045 USA, VOA Washington DC (am/as): American Mosaic (Special English). Reports about music, books, movies, and student life in the USA.

Saturdays

0000 Australia, Radio: RA News. See S 0000.
0000 USA, VOA Washington DC (am/as/ca): VOA News. See S 0000.
0010 Australia, Radio: Pacific Focus. See S 0405.
0010 USA, VOA Washington DC (am): VOA Business Report. See M 0010.
0010 USA, VOA Washington DC (as): Newsline. Background and insight on the news from experienced VOA correspondents and journalists.
0010 USA, VOA Washington DC (ca): Report to the Caribbean. See T 0010.
0030 Australia, Radio: Australia Today. See S 0430.
0030 USA, VOA Washington DC (am/as): News (Special English). See S 0030.
0030 USA, VOA Washington DC (ca): Studio 38. See T 0030.
0040 USA, VOA Washington DC (am/as): Environment Report (Special English). See F 0040.
0045 USA, VOA Washington DC (am/as): American Mosaic (Special English). See F 0045.

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am				
0100-0200	Australia, Radio	9660pa	12080pa	13605pa	13755pa	
		15365pa	15415as	17750pa	17795pa	
0100-0200 vl	Australia, VL8K Katherine	5025do				
0100-0200 vl	Australia, VL8T Tent Crk	4910do				
0100-0200	Canada, CBC N Quebec Svc	9625do				
0100-0200	Canada, CFRX Toronto	6070do				
0100-0200	Canada, CFVP Calgary	6030do				
0100-0200	Canada, CHNX Halifax	6130do				
0100-0200	Canada, CKZN St John's	6160do				
0100-0200	Canada, CKZU Vancouver	6160do				
0100-0200	Canada, R Canada Intl	9535am	9755am	11715am	13670am	
0100-0200	Costa Rica,RF Peace Intl	7385am	7585am	15050am		
0100-0104	Croatia, Croatian Radio	5895na				
0100-0200	Cuba, Radio Havana	6000na	9820na	9830na		
0100-0127	Czech Rep, Radio Prague	6200na	7345na			
0100-0200	Ecuador, HCJB	9745am	21455am			
0100-0150	Germany, Deutsche Welle	6040na	6085na	6145na	9640na	
		11810na				
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do			
0100-0130	Hungary, Radio Budapest	6120na	6190na	9580na		
0100-0200	Indonesia, Voice of	9525na				
0100-0125	Iran, VOIRI	6050eu	9022eu	9685eu		
0100-0200 th	Ireland,W Coast R Ireland	9875am				
0100-0110	Italy, RAI Intl	6010na	9675na	11800na		
0100-0200	Japan, R Japan/NHK World	5960na	11790as	11860as	11890na	
		13630am	15500as	15590as	17810as	
		21610as				
0100-0200	Lebanon, Voice of Hope	9960va				
0100-0200	Liberia,LCN/R Liberia Int	5100do				
0100-0200 smtwh	Malaysia, Radio	7295do				
0100-0200 m	Malta, VO Mediterranean	13605am				
0100-0125	Netherlands, Radio	6020na	6165na	9845na		
0100-0200	Netherlands, Radio	5905as	7305as	9855as		
0100-0200	New Zealand, R NZ Intl	15115pa				
0100-0200 vl	Papua New Guinea, NBC	9675do				
0100-0200	Philippines, FEBC/R Intl	15450as				
0100-0200	Russia,Voice of Russia WS	7105na	12010na	12050na	13665na	
		15180na	15595na			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300na	9440sa		
0100-0200	Spain, R Exterior Espana	6055am				
0100-0200	Sri Lanka, Sri Lanka BC	9730as				
0100-0130	Switzerland, Swiss R Intl	6135na	9885na	9905ca		
0100-0200	United Kingdom, BBC WS	5965as	5970sa	5975am	6085am	
		6145am	6175am	6195as	9410as	
		9590am	9605as	11750am	11955as	
		15280as	15310as	15360as		
0100-0200	USA, KAIJ Dallas TX	5810am				
0100-0200	USA, KJES Mesquite NM	7555na				
0100-0200	USA, KTBN Salt Lk City UT	7510am				
0100-0200	USA, KWHR Naalehu HI	17510as	17555pa			
0100-0200	USA, Monitor Radio Intl	7535na				
0100-0200	USA, Voice of America	7115as	7205as	9635as	11705as	
		11725as	15170as	15250as	17740as	
		17820as				
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9445am	
		9775am	13740am			
0100-0200	USA, WEWN Birmingham AL	5825eu				
0100-0200	USA, WGTG McCaysville GA	5085am				
0100-0200	USA, WHRI Noblesville IN	5745am				
0100-0200	USA, WINB Red Lion PA	11950am				
0100-0200	USA, WJCR Upton KY	7490na				
0100-0200	USA, WRMI/R Miami Intl	9955am				
0100-0200	USA, WRNO New Orleans LA	7355am				
0100-0200 mtwhf	USA, WVHA Greenbush ME	5850eu				
0100-0200	USA, WWCR Nashville TN	3215am	5070am	7435am	13845am	
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	11550as		
0100-0130	Uzbekistan, R Tashkent	5060eu	7190eu	9715eu	9740eu	
0100-0126	Vietnam, Voice of	7240na				
0130-0150	Greece, Voice of	6260na	7450na	9420na	11645na	
0130-0200	Netherlands, Radio	5905as	9855as	11655as		
0130-0200	Slovakia, AWR Europe	9465eu				
0130-0200	Sweden, Radio	9435as				
0130-0200 s	Sweden, Radio	7290am				
0140-0159	Vatican State, Vatican R	5980as	7335as			
0145-0200	Albania, R Tirana Intl	6115na	7160na			

Selected Programs

Sundays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. A bulletin of world and national news.
0100 USA, VOA Washington DC (as): VOA News. See S 0000.
0105 Australia, Radio: The Europeans. Maria Zijlstra presents reports and features on aspects of European politics, culture and society.
0106 Hungary, Radio Budapest: Book of the Month (7th). A monthly program devoted to a Hungarian book felt to be especially interesting to listeners.
0106 Hungary, Radio Budapest: Classical Touch (28th). A repeat oof the monthly classical music program.
0106 Hungary, Radio Budapest: Heading for Hungary (7th,21st). The biweekly program about travel to Hungary.
0110 USA, VOA Washington DC (as): VOA Sunday Interviews and features about science, sports, agriculture, and business, plus the latest American music.
0130 UK, BBC London (AE): Encyclopaedia Historica. The final episodes of Edmund Hall's series looking at old British encyclopaedias.

Mondays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. See S 0100.
0100 USA, VOA Washington DC (as): VOA News. See S 0000.
0106 Hungary, Radio Budapest: ...and the Gatepost (1st,22nd). The biweekly feedback slot where listeners have their say on programs and on any subject.
0106 Hungary, Radio Budapest: Hungarian Journey (8th). See S 0236.
0106 Hungary, Radio Budapest: Tanchaz (15th). A monthly program that features the folk music of Hungary.
0110 Australia, Radio: Dateline. See S 2310.
0110 USA, VOA Washington DC (as): VOA Today. Up-to-the-minute news summaries, hourly business and sports updates, interviews on world news events, plus features on topics from movies to medicine.
0130 Australia, Radio: Innovations. Desley Blanch reports on Australian inventions and innovative practices.
0145 UK, BBC London (AE): The Way We Are (2nd,9th). Life in the UK through the eyes of British social scientists.

Tuesdays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. See S 0100.
0100 USA, VOA Washington DC (am/ca/as): VOA News. See S 0000.
0106 Hungary, Radio Budapest: Hungary Today. The new half-hour format includes business (Tue), daily stock market briefs, cultural coverage, and everything else taking place in Hungary.
0110 Australia, Radio: Dateline. See S 2310.
0110 USA, VOA Washington DC (am/ca): Report to the Americas. See T 0010.
0110 USA, VOA Washington DC (as): VOA Today. See M 0110.
0130 Australia, Radio: Arts Australia. Lisa Harris presents reviews and comment on current events within the Australian arts scene.
0145 UK, BBC London (AE): Champions (2nd). Last of a series examining some of the fascinating and quirky stories of unusual animals.
0156 USA, VOA Washington DC (am/ca): VOA Editorial. See S 1457.

Wednesdays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. See S 0100.
0100 USA, VOA Washington DC (am/ca/as): VOA News. See S 0000.
0106 Hungary, Radio Budapest: Hungary Today. See T 0106.
0110 Australia, Radio: Dateline. See S 2310.
0110 USA, VOA Washington DC (am/ca): Report to the Americas. See T 0010.
0110 USA, VOA Washington DC (as): VOA Today. See M 0110.
0120 Hungary, Radio Budapest: Business. See M 0236.
0130 Australia, Radio: Science File. Ian Wood examines the world of science, medicine and technology.
0156 USA, VOA Washington DC (am/ca): VOA Editorial. See S 1457.

Thursdays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. See S 0100.
0100 USA, VOA Washington DC (am/ca/as): VOA News. See S 0000.
0106 Hungary, Radio Budapest: Hungary Today. See T 0106.
0110 Australia, Radio: Dateline. See S 2310.
0110 USA, VOA Washington DC (am/ca): Report to the Americas. See T 0010.
0110 USA, VOA Washington DC (as): VOA Today. See M 0110.
0130 Australia, Radio: Book Talk. Jill Kitson presents an entertaining mix of reviews and critical discussion of new books.
0156 USA, VOA Washington DC (am/ca): VOA Editorial. See S 1457.

Fridays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. See S 0100.
0100 USA, VOA Washington DC (am/ca/as): VOA News. See S 0000.
0106 Hungary, Radio Budapest: Hungary Today. See T 0106.
0110 Australia, Radio: Dateline. See S 2310.
0110 USA, VOA Washington DC (am/ca): Report to the Americas. See T 0010.
0110 USA, VOA Washington DC (as): VOA Today. See M 0110.
0130 Australia, Radio: Earthbeat. Peter Jacklyn examines environmental issues of the region from a scientific perspective.
0156 USA, VOA Washington DC (am/ca): VOA Editorial. See S 1457.

Saturdays

0100 Australia, Radio: RA News. See S 0000.
0100 Hungary, Radio Budapest: News. See S 0100.
0100 USA, VOA Washington DC (am/ca/as): VOA News. See S 0000.
0106 Hungary, Radio Budapest: Hungary Today. See T 0106.
0110 Australia, Radio: Oz Sounds #1. See S 0005.
0110 USA, VOA Washington DC (am/ca): Report to the Americas. See T 0010.
0110 USA, VOA Washington DC (as): VOA Saturday. See S 0110.
0130 Australia, Radio: Arts Australia. See T 0130.
0154 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (6th). See W 1254.
0154 Radio Netherlands: Documentary. Indian Tiger Extinction (27th). See F 2354.
0154 Radio Netherlands: Documentary. Social Cost of Transformation (20th). See F 1454.
0154 Radio Netherlands: Documentary. Take the Low Road (13th). James McDonald walks the footpath that stretches from the northern coast of Holland to the Southern province of Limburg.
0156 USA, VOA Washington DC (am/ca): VOA Editorial. See S 1457.

0200 UTC SHORTWAVE GUIDE 10:00 PM EDT 7:00 PM PDT

Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300	Australia, Radio	9660pa	12080pa	13605pa	15240pa
		15365pa	15415as	17750pa	17795pa
0200-0300 vl	Australia, VL8K Katherine	5025do			
0200-0300 vl	Australia, VL8T Tent Crk	4910do			
0200-0210	Bangladesh, Bangla Betar	4880do			
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0300	Canada, R Canada Intl	6120am	9535am	9755am	9780am
		11715am	13670am		
0200-0300	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0200-0204	Croatia, Croatian Radio	5895na			
0200-0300	Cuba, Radio Havana	6000na	9820na	9830na	
0200-0300	Ecuador, HCJB	9745am	21455am		
0200-0300	Egypt, Radio Cairo	9475na			
0200-0250	Germany, Deutsche Welle	7285as	9615as	9690as	11945as
		11965as	12045as		
0200-0300 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0200-0300	Lebanon, Voice of Hope	9960va			
0200-0300 smtwh	Malaysia, Radio	7295do			
0200-0300 s	Malta, VO Mediterranean	15550au	17570as		
0200-0230	Netherlands, Radio	5905as	7305as	9855as	
0200-0300	New Zealand, R NZ Intl	15115pa			
0200-0230 m	Norway, Radio Norway Intl	7465na	9560na		
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Philippines, FEBC/R Intl	15450as			
0200-0256	Romania, R Romania Intl	5990na	6155na	9510na	9570na
		11940na	12990na		
0200-0300	Russia,Voice of Russia WS	7105na	12010na	12050na	13645na
		13665na	15180na	15595na	
0200-0300	South Korea, R Korea Intl	7275as	11725am	11810am	15575am
0200-0300	Sri Lanka, Sri Lanka BC	9730as			
0200-0300	Taiwan, VO Free China	5950na	7130as	9680na	11740ca
		11825as	15345as		
0200-0300	United Kingdom, BBC WS	5970sa	5975am	6135af	6175am
		6195eu	9410va	9605as	11955as
		15280as	15310as	15360as	
0200-0230	United Kingdom, BBC WS	9590am	9915am		
0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0230	USA, KJES Mesquite NM	7555na			
0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	USA, KVOH Los Angeles CA	9975am			
0200-0300	USA, KWHR Naalehu HI	17510as	17555pa		
0200-0300	USA, Monitor Radio Intl	5850na			
0200-0300	USA, Voice of America	7115as	7205as	9635as	11705as
		11725as	15170as	15250as	17740as
		17820as			
0200-0300	USA, WEWN Birmingham AL	5825eu			
0200-0300	USA, WGTG McCaysville GA	5085am			
0200-0300	USA, WHRI Noblesville IN	5745am			
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na			
0200-0300	USA, WRMI/R Miami Intl	9955am			
0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0300	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0230-0300	Albania, R Tirana Intl	6140na	7160na		
0230-0259	Austria, R Austria Intl	9655na	9870sa	13730sa	
0230-0300	Hungary, Radio Budapest	6190na	9840na	11910na	
0230-0300	Netherlands, Radio	9855as	11655as		
0230-0245	Pakistan, Radio	7255as	15120as	15485as	17705as
0230-0300 vl/m-a	Philippines, R Pilipinas	11885me	15120me	15270me	
0230-0300	Sweden, Radio	7135na			
0230-0300	United Kingdom, BBC WS	7325am	9895am		
0230-0256	Vietnam, Voice of	7250na			
0230-0300 vl	Zambia, R Zambia/ZNBC 2	6165do			
0245-0300	India, All India Radio	6045do	7110do	11830do	15135do
0250-0300 sf	Greece, Voice of	6260na	7450na	9420na	11645na
0250-0300	Vatican State, Vatican R	7305am	9605am		
0255-0300 vl	Zambia, R Zambia/ZNBC 1	4910do			

Selected Programs

Sundays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. All about the events of the day in 13 minutes.
0210 Australia, Radio: Fine Music Australia. The best Australian fine music performances and compositions are presented by Ivan Lloyd.
0230 Australia, Radio: The Religion Report. Hosted by John Cleary.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (World of Culture). Cultural highlights, events, crossroads, roots, and RRI encyclopedia.
0230 UK, BBC London (AS): Letter from America. Alistair Cooke presents essays about life in the USA.
0236 Hungary, Radio Budapest: ...and the Gatepost (7th). A repeat of the biweekly feedback slot where listeners have their say on programs and on any subject.
0236 Hungary, Radio Budapest: Hungarian Forum (21st). A program for and about people of Hungarian ancestry.
0236 Hungary, Radio Budapest: Hungarian Journey (14th). A biographical sketch of a Hungarian of note.
0236 Hungary, Radio Budapest: Tanchaz (28th). A monthly program that features the folk music of Hungary (repeat).

Mondays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. See S 0200.
0210 Australia, Radio: Australia Talks Back. Australians talking about issues of the day with Sandy McCutcheon.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (Radio Tour). See S 1330.
0236 Hungary, Radio Budapest: Best of the Month (22nd). No information available.
0236 Hungary, Radio Budapest: Classical Touch (15th). The monthly classical music program.
0236 Hungary, Radio Budapest: Jazz Release (8th). The monthly music program of new and old jazz recordings.
0236 Hungary, Radio Budapest: Report on Religion (1st). The monthly feature about religion in Hungary.

Tuesdays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. See S 0200.
0210 Australia, Radio: Australia Talks Back. See M 0210.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (Pro Memoria). See M 1330.
0230 UK, BBC London (AF/AS): Champions (2nd). See T 0145.
0236 Hungary, Radio Budapest: Cultural Review (2nd,16th). A biweekly feature covering all aspects of the arts in Hungary.
0236 Hungary, Radio Budapest: Heading for Hungary (9th,16th). A repeat presentation of the biweekly program about travel to Hungary.

Wednesdays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. See S 0200.
0210 Australia, Radio: Australia Talks Back. See M 0210.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (Business Club). See T 1330.
0236 Hungary, Radio Budapest: Connections (17th). See M 0236.
0236 Hungary, Radio Budapest: Hungary Now (10th,24th). Keep better informed about things taking place in Hungary.
0236 Hungary, Radio Budapest: Life - Alternative View (3rd). See M 0236.

Thursdays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. See S 0200.
0210 Australia, Radio: Australia Talks Back. See M 0210.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (Society). See W 1330.
0236 Hungary, Radio Budapest: Radio Budapest DX Show. Celebrating its 40th year on-the-air, this weekly program for shortwave listeners includes DX news, tips, catches, and a quiz.
0254 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (4th). See W 1254.
0254 Radio Netherlands: Documentary. Indian Tiger Extinction (25th). See F 2354.
0254 Radio Netherlands: Documentary. Social Cost of Transformation (18th). See F 1454.
0254 Radio Netherlands: Documentary. Take the Low Road (11th). See A 2354.

Fridays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. See S 0200.
0210 Australia, Radio: Australia Talks Back. See M 0210.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (Citizens of the Same Country). See H 1330.
0236 Hungary, Radio Budapest: Book of the Month (12th). See S 0106.
0236 Hungary, Radio Budapest: Guest of the month (4). A monthly studio interview of a visitor to Hungary.
0236 Hungary, Radio Budapest: What's On in Hungary? (5th,19th). An in-depth review of what's happening in the entertainment arena.

Saturdays

0200 Australia, Radio: RA News. See S 0000.
0200 Romania, R Romania Intl: Info Plus. See S 0200.
0205 Australia, Radio: Ockham's Razor. See S 0605.
0230 Australia, Radio: The Health Report. See M 1513.
0230 Hungary, Radio Budapest: News. See S 0100.
0230 Romania, R Romania Intl: Panorama (European Option). See F 1330.
0230 UK, BBC London (All): At the Shoulder of History (6th). Last of the series in which John Miller talks to interpreters who have worked for US presidents from Kennedy to Bush.
0236 Hungary, Radio Budapest: Blues and the World (20th). See M 0236.
0236 Hungary, Radio Budapest: Hungary Now (13th,27th). See W 0236.
0236 Hungary, Radio Budapest: On the Edge (6th). Listen in as young people chat about things like racism, hip hop, NATO, rap, European Union, tuition fees or unpaid salaries.
0247 Hungary, Radio Budapest: The Discussion (13th,27th). The monthly roundtable talks on a variety of current events.

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400	Australia, Radio	9660pa	12080pa	13605pa	15240pa
		15365pa	15415as	17750pa	17795pa
0300-0400 vl	Australia, VL8K Katherine	5025do			
0300-0400 vl	Australia, VL8T Tent Crk	4910do			
0300-0400 vl	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0400	China, China Radio Intl	9690na	9710na	11695na	
0300-0400 vl	Costa Rica,Faro del Carib	5055do			
0300-0400	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0300-0304	Croatia, Croatian Radio	5895na	9495na		
0300-0400	Cuba, Radio Havana	6000na	9820na	9830na	
0300-0327	Czech Rep, Radio Prague	5930as	7345as		
0300-0400	Ecuador, HCJB	9745am	21455am		
0300-0330	Egypt, Radio Cairo	9475na			
0300-0350	Germany, Deutsche Welle	6085na	6185na	9535na	9615na
		9640na			
0300-0400	Guatemala, Radio Cultural	3300do			
0300-0400 m	Honduras, LV Evangelica	4820do			
0300-0400	Japan, R Japan/NHK World	17685va			
0300-0400 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0300-0400	Lebanon, Voice of Hope	9960va			
0300-0400 vl	Lesotho, Radio Lesotho	4800do			
0300-0400 vl	Malaysia, RTM Kuching	7160do			
0300-0400 s	Malta, VO Mediterranean	15550au	17570as		
0300-0330 mtwhfa	Mexico, Radio Mexico Intl	9705na			
0300-0325	Netherlands, Radio	9855as	11655as		
0300-0400	New Zealand, R NZ Intl	15115pa			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	7125na	12000na	12010na	12050na
		13645na	13665na	15180na	15595na
0300-0330	S Africa, Channel Africa	5955af			
0300-0400	Sri Lanka, Sri Lanka BC	9730as			
0300-0400	Taiwan, VO Free China	5950na	9680na	11745au	11825as
		15345as			
0300-0330	Thailand, Radio	9655na	11905na	15395na	
0300-0400	Turkey, Voice of	7270as	7300eu	15190au	
0300-0315 mtwhf	Uganda, Radio	4976do			
0300-0400	Ukraine, R Ukraine Intl	6020na	7150na	9550na	12040na
0300-0330	United Kingdom, BBC WS	5970sa	6135af	7325am	9895am
		15360as			
0300-0400	United Kingdom, BBC WS	3255af	5975am	6005af	6175na
		6180eu	6190af	6195va	9410eu
		9600af	9605as	9895am	11760as
		12095af	15310as	17790as	21660as
0300-0400	USA, KAIJ Dallas TX	5810am			
0300-0400	USA, KTBN Salt Lk City UT	7510am			
0300-0400	USA, KVOH Los Angeles CA	9975am			
0300-0400	USA, KWHR Naalehu HI	17510as	17555pa		
0300-0400	USA, Monitor Radio Intl	5850na	7535af		
0300-0400	USA, Voice of America	6080af	6115af	7105af	7280af
		7290af	7340af	9575af	9885af
0300-0330 smtwh	USA, Voice of America	4960af			
0300-0400	USA, WEWN Birmingham AL	5825eu			
0300-0400	USA, WGTG McCaysville GA	5085am			
0300-0400	USA, WHRI Noblesville IN	5745am	7315am		
0300-0400	USA, WINB Red Lion PA	11950am			
0300-0400	USA, WJCR Upton KY	7490na			
0300-0400	USA, WRMI/R Miami Intl	9955am			
0300-0400	USA, WRNO New Orleans LA	7395am			
0300-0400	USA, WWCR Nashville TN	3215am	5070am	5935am	
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican State, Vatican R	7305na	9605am		
0300-0400 vl	Zambia, R Zambia/ZNBC 1	4910do			
0300-0400 vl	Zambia, R Zambia/ZNBC 2	6165do			
0300-0400 vl	Zimbabwe, Zimbabwe BC	3396do			
0310-0340	Vatican State, Vatican R	7360af	9660af		
0330-0357	Czech Rep, Radio Prague	9480me	11600as		
0330-0355	Moldova, R Moldova Intl	7520na			
0330-0400 vl	Philippines, R Pilipinas	7730as	13770as	15330as	
0330-0400 twhfa	Portugal, R Portugal Intl	6150am	9570am		
0330-0400	Slovakia, AWR Europe	11610as			
0330-0400	Sweden, Radio	9430na			
0330-0400	Tanzania, Radio	5050af			
0330-0400	United Kingdom, BBC WS	9610af	11730af	11955as	15280as
0333-0400 mtw	S Africa, Trans World R	7215af			
0333-0400 mtwhf	Swaziland, Trans World R	7215af			
0335-0355 vl	India, All India Radio	7110do	11830do	15135do	
0340-0350	Greece, Voice of	6260na	7450na	9420na	11645na
0345-0400	Burundi, Radio Nationale	6140do			
0345-0400	Tajikistan,Radio Dushanbe	7245as	9905as		
0345-0400 as	Uganda, Radio	4976do			
0356-0400	Zambia, Christian Voice	3330af	6065af		

Selected Programs

Sundays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): VOA News. See S 0000.
0305 Australia, Radio: Feedback. Roger Broadbent answers letters and discusses new programs, reception problems, and questions about Australia.
0310 USA, VOA Washington DC (af): VOA Sunday. See S 0110.
0330 Australia, Radio: Correspondents' Report. See S 0030.

Mondays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): Daybreak Africa. Magazine program of African news, sports, features, and correspondent reports.
0301 USA, VOA Washington DC (af): Africa News. News from and about the African continent.
0305 UK, BBC London (AE/AF): Write On. See S 1205.
0310 Australia, Radio: The World Today (Part 1). Tony Eastley with current affairs updates.
0330 Australia, Radio: Sport. Five or ten minutes of sports news.
0330 USA, VOA Washington DC (af/as): News (Special English). See S 0030.
0335 Australia, Radio: The World Today (Part 2). See M 0310.
0340 USA, VOA Washington DC (af): Development Report (Special English). See M 0040.
0345 USA, VOA Washington DC (af): This is America (Special English). See M 0045.

Tuesdays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0301 USA, VOA Washington DC (af): Africa News. See M 0301.
0310 Australia, Radio: The World Today (Part 1). See M 0310.
0330 Australia, Radio: Sport. See M 0330.
0330 USA, VOA Washington DC (af): Studio 38. See T 0030.
0335 Australia, Radio: The World Today (Part 2). See M 0310.
0345 UK, BBC London (AS): Earth, Air, Fire and Water (2nd,9th). See W 0030.

Wednesdays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0301 USA, VOA Washington DC (af): Africa News. See M 0301.
0310 Australia, Radio: The World Today (Part 1). See M 0310.
0330 Australia, Radio: Sport. See M 0330.
0330 USA, VOA Washington DC (af): Studio 38. See T 0030.
0335 Australia, Radio: The World Today (Part 2). See M 0310.
0345 UK, BBC London (AE/AF): Waveguide (17th). See W 1230.

Thursdays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0301 USA, VOA Washington DC (af): Africa News. See M 0301.
0310 Australia, Radio: The World Today (Part 1). See M 0310.
0330 Australia, Radio: Sport. See M 0330.
0330 USA, VOA Washington DC (af): Studio 38. See T 0030.
0335 Australia, Radio: The World Today (Part 2). See M 0310.

Fridays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0301 USA, VOA Washington DC (af): Africa News. See M 0301.
0310 Australia, Radio: The World Today (Part 1). See M 0310.
0330 Australia, Radio: Sport. See M 0330.
0330 USA, VOA Washington DC (af): Studio 38. See T 0030.
0335 Australia, Radio: The World Today (Part 2). See M 0310.
0345 UK, BBC London (AS): The Learning World. See H 0545.

Saturdays

0300 Australia, Radio: RA News. See S 0000.
0300 USA, VOA Washington DC (af): VOA News. See S 0000.
0305 Australia, Radio: Book Reading. See F 2305.
0310 USA, VOA Washington DC (af): VOA Saturday. See S 0110.
0330 Australia, Radio: Science File. See W 0130.

Hauser's Highlights
AUSTRALIA: Radio Australia
English

for Pacific, NAm, as revised July 28

UTC	Freq kHz
2100-2130	17795, 11880
2130-2200	17795, 13755
2200-0200	17795, 15510, 13755
0200-0600	17795, 15510, 15240
0600-0800	15510, 15240
0800-0900	15510, 9580
0900-1200	9580
1200-1400	9415, 5995
1400-1700	9415, 5995, 5870
1700-1800	11880, 9415
1800-2100	11880

(Nigel Holmes, RA)

0400 UTC SHORTWAVE GUIDE 12:00 PM EDT 9:00 PM PDT

Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0500	Australia, Radio	9660pa	12080pa	13605as	15240pa
		15365pa	17795pa		
0400-0500 s	Australia, Radio	15415as	17750as		
0400-0500 vl	Australia, VL8K Katherine	5025do			
0400-0500 vl	Australia, VL8T Tent Crk	4910do			
0400-0500	Australia,DefenseForces R	13525as			
0400-0500	Bulgaria, Radio	9485na	11720na		
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0430	Canada, R Canada Intl	9715me	11835me	15275me	
0400-0500	China, China Radio Intl	9560na	9730am		
0400-0500	Costa Rica,RF Peace Intl	7385am	7585am	15050am	
0400-0404	Croatia, Croatian Radio	5895na	5920na	9495na	
0400-0500	Cuba, Radio Havana	6000na	9820na	9830na	
0400-0500 vl	Cyprus, BRT International	6150do			
0400-0500	Ecuador, HCJB	9745am	21455am		
0400-0450	Germany, Deutsche Welle	5990af	6015af	7225af	9565af
		11765af			
0400-0500 twhfa	Guatemala, Radio Cultural	3300do			
0400-0500 m	Honduras, LV Evangelica	4820do			
0400-0415	Israel, Kol Israel	7465na	9435na	17545af	
0400-0500 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0400-0500	Lebanon, Voice of Hope	9960va			
0400-0500 s	Malta, VO Mediterranean	15550as	17570au		
0400-0430 mtwhf	Mexico, Radio Mexico Intl	9705na			
0400-0458	New Zealand, R NZ Intl	15115pa			
0400-0450	North Korea, R Pyongyang	15180as	15230as	17765as	
0400-0430 m	Norway, Radio Norway Intl	7485na			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0456	Romania, R Romania Intl	5990na	6155na	9510na	9570na
		11940na	12990na		
0400-0500	Russia,Voice of Russia WS	7125na	12000na	12010na	12050na
		13645na	13665na	15180na	15445na
		15595na			
0400-0430	S Africa, Channel Africa	5955af			
0400-0404 mtw	S Africa, Trans World R	7215af			
0400-0430	Slovakia, AWR Europe	9465af			
0400-0430	Sri Lanka, Sri Lanka BC	9730as			
0400-0404 mtwhf	Swaziland, Trans World R	7215af			
0400-0430	Switzerland, Swiss R Intl	6135na	9885na	9905na	
0400-0430	Tanzania, Radio	5050af			
0400-0500	Turkey, Voice of	7340na			
0400-0415	Uganda, Radio	4976do			
0400-0500	United Kingdom, BBC WS	3255af	3955eu	5975af	6005af
		6175am	6180eu	6190af	6195eu
		7160af	9410na	9600af	11760va
		11955as	12085af	12095va	15280as
		15310as	15575va	17640af	17790as
		21660as			
0400-0430	United Kingdom, BBC WS	9605as	9610af	9895am	11730af
0400-0500	USA, KAIJ Dallas TX	5810am			
0400-0500	USA, KTBN Salt Lk City UT	7510am			
0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	USA, KWHR Naalehu HI	17555pa	17780as		
0400-0500	USA, Voice of America	6080af	7170af	7265af	7280af
		7290af	9575af	9885af	11965me
		15205va			
0400-0500	USA, WEWN Birmingham AL	5825eu			
0400-0500	USA, WGTG McCaysville GA	5085am			
0400-0500	USA, WHRI Noblesville IN	5745am	7315am		
0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	USA, WJCR Upton KY	7490na			
0400-0500 smtwhf	USA, WMLK Bethel PA	9465eu			
0400-0500	USA, WRMI/R Miami Intl	9955am			
0400-0500	USA, WRNO New Orleans LA	7395am			
0400-0500	USA, WWCR Nashville TN	3210am	5070am	5935am	7435am
0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985eu	
0400-0430	Vietnam, Voice of	12020na	15010na		
0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500 vl	Zambia, R Zambia/ZNBC 1	4910do			
0400-0500 vl	Zambia, R Zambia/ZNBC 2	6165do			
0400-0500 vl	Zimbabwe, Zimbabwe BC	3396do			
0415-0500 vl	Malawi, MBC	5993do			
0425-0440 vl	Italy, RAI Intl	5975eu	7270eu		
0425-0500	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0430-0459	Austria, R Austria Intl	6155eu	13730eu		
0430-0500 m-f/vl	Lesotho, Radio Lesotho	4800do			
0430-0455	Moldova, R Moldova Intl	7520na			
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500	Swaziland, Trans World R	3200af	4775af	6100af	
0430-0500	Switzerland, Swiss R Intl	9905ca			
0430-0500	United Kingdom, BBC WS	15420af			
0430-0500	Yugoslavia, Radio	9580na	11870na		
0455-0500	Malaysia, Voice of	6175as	9750as	15295au	
0459-0500	New Zealand, R NZ Intl	9795pa			

Selected Programs

Sundays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. Fifteen minutes of world and Bulgarian news.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0405 Australia, Radio: Pacific Focus. Coverage of issues of relevance to people of the Pacific region.
0415 Bulgaria, Radio: News Behind the News. Background to a specific item of current affairs.
0430 Australia, Radio: Australia Today. Colin Tyrus presents the issues, the places, and the characters that make up Australia.
0430 Bulgaria, Radio: Listeners' Choice. Some interesting items about Bulgaria and the top of the music charts.
0430 Romania, R Romania Intl: Panorama (World of Culture). See S 0230.

Mondays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. See S 0400.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0410 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). The afternoon magazine that provides a focus on the people and issues of the region.
0415 Bulgaria, Radio: Timeout for Music. See S 2315.
0430 Australia, Radio: Sport. See M 0330.
0430 Bulgaria, Radio: Straight from the Horse's Mouth. Discussion of a current matter affecting Bulgaria in an interview with a cognizant official.
0430 Romania, R Romania Intl: Panorama (Radio Tour). See S 1330.
0440 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0445 Bulgaria, Radio: Radio Bulgaria Calling. See S 1215.

Tuesdays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. See S 0400.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0410 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0415 Bulgaria, Radio: Events and Development. See M 2315.
0415 Bulgaria, Radio: Radio Bulgaria Spectrum. Thirty-minute digest on a wide variety of topics.
0430 Australia, Radio: Sport. See M 0330.
0430 Romania, R Romania Intl: Panorama (Pro Memoria). See M 1330.
0440 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.

Wednesdays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. See S 0400.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0410 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0415 Bulgaria, Radio: Events and Development. See M 2315.
0430 Australia, Radio: Sport. See M 0330.
0430 Bulgaria, Radio: Across the Map of Bulgaria. A travelogue program of historical sites and interesting places and people.
0430 Romania, R Romania Intl: Panorama (Business Club). See T 1330.
0440 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0445 Australia, Radio: One World. Carolyn Court reports on environmental issues important to the Pacific.

Thursdays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. See S 0400.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0410 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0415 Bulgaria, Radio: Events and Development. See M 2315.
0430 Australia, Radio: Sport. See M 0330.
0430 Bulgaria, Radio: Answering Your Letters. See T 2330.
0430 Romania, R Romania Intl: Panorama (Society). See W 1330.
0440 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0450 Bulgaria, Radio: Sports Roundup. See T 2349.
0454 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (4th). See W 1254.
0454 Radio Netherlands: Documentary. Indian Tiger Extinction (25th). See F 2354.
0454 Radio Netherlands: Documentary. Social Cost of Transformation (18th). See F 1454.
0454 Radio Netherlands: Documentary. Take the Low Road (11th). See A 2354.

Fridays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. See S 0400.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0410 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0415 Bulgaria, Radio: Events and Development. See M 2315.
0430 Australia, Radio: Sport. See M 0330.
0430 Bulgaria, Radio: Cultural Review. See W 2330.
0430 Romania, R Romania Intl: Panorama (Citizens of the Same Country). See H 1330.
0440 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.

Saturdays

0400 Australia, Radio: RA News. See S 0000.
0400 Bulgaria, Radio: News. See S 0400.
0400 Romania, R Romania Intl: Info Plus. See S 0200.
0405 Australia, Radio: Pacific Focus. See S 0405.
0415 Bulgaria, Radio: Events and Development. See M 2315.
0430 Australia, Radio: Indian Pacific. See T 1535.
0430 Bulgaria, Radio: Lifestyle. See H 2330.
0430 Romania, R Romania Intl: Panorama (European Option). See F 1330.

Frequencies

0500-0600	Anguilla,Caribbean Beacon	6090am			
0500-0600	Australia, Radio	9660pa	12080pa	13605as	15240pa
		15365pa	17795pa		
0500-0600 vl	Australia, VL8K Katherine	5025do			
0500-0600 vl	Australia, VL8T Tent Crk	4910do			
0500-0600	Australia,DefenseForces R	13525as			
0500-0600 vl	Cameroon, Radio Cameroon	4850do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0530 mtwhf	Canada, R Canada Intl	6050eu	7295af	11835af	15430me
0500-0600	Costa Rica, Adv World R	5030ca	6150ca	9725ca	
0500-0600 as	Costa Rica, Adv World R	7375am			
0500-0600	Costa Rica,RF Peace Intl	7385am	7585am		
0500-0600	Cuba, Radio Havana	9820na	9830na		
0500-0600	Ecuador, HCJB	9745am	21455am		
0500-0550	Germany, Deutsche Welle	5960na	6045na	6120na	6145na
		6185na	9615na	9650na	
0500-0600	Guyana, GBC/Voice of	3290do			
0500-0600 vl	Italy, IRRS	3985va			
0500-0530 vl	Italy, IRRS	7125va			
0500-0600	Japan, R Japan/NHK World	6110na	7230eu	11840as	11895eu
		11920na			
0500-0530	Japan, R Japan/NHK World	13630na	15230na		
0500-0600 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0500-0600 vl	Kiribati, Radio	9810do			
0500-0600	Lebanon, Voice of Hope	9960va			
0500-0505	Lesotho, Radio Lesotho	4800do			
0500-0600	Liberia,LCN/R Liberia Int	5100do			
0500-0510 mtwhf	Malawi, MBC	3380do			
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	9795pa			
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0500-0600	Nigeria, Voice of	7255af			
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	12000na	12010na	12040na	12050na
		13645na	13665na	15445na	15595na
0500-0530	S Africa, Channel Africa	9675af			
0500-0556	Spain, R Exterior Espana	6055am			
0500-0530	Swaziland, Trans World R	6100af			
0500-0530	Switzerland, Swiss R Intl	6165eu	9535eu		
0500-0515	Uganda, Radio	4976do			
0500-0600	United Kingdom, BBC WS	3255af	3955eu	5975am	6005af
		6175am	6180eu	6190af	6195va
		7120va	7160af	9410va	9600af
		9610af	9740as	11760as	11940af
		12095as	15310as	15360as	15420af
		15575va	17640af	17760as	17885af
		21660as			
0500-0530	United Kingdom, BBC WS	15280as	17790as		
0500-0600	USA, KAIJ Dallas TX	5810am			
0500-0600	USA, KTBN Salt Lk City UT	7510am			
0500-0600	USA, KVOH Los Angeles CA	9975am			
0500-0600	USA, KWHR Naalehu HI	17555pa	17780as		
0500-0600	USA, Voice of America	5970af	6035af	6080af	7170va
		7195af	9630af	11965me	12080af
		13740af	15205va		
0500-0600	USA, WGTG McCaysville GA	5085am			
0500-0600	USA, WHRI Noblesville IN	5745am	7315am		
0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	USA, WJCR Upton KY	7490na			
0500-0600 smtwhf	USA, WMLK Bethel PA	9465eu			
0500-0600	USA, WRMI/R Miami Intl	9955am			
0500-0600	USA, WRNO New Orleans LA	7395am			
0500-0600	USA, WWCR Nashville TN	2310am	3210am	5070am	5935am
		7435am			
0500-0600	USA, WYFR Okeechobee FL	5985na	9985af	11580eu	
0500-0530	Vatican State, Vatican R	9660af	11625af	15570af	
0500-0520	Vatican State, Vatican R	4005eu	5882eu	7250eu	
0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0530 vl	Zambia, R Zambia/ZNBC 1	4910do			
0500-0600 vl	Zambia, R Zambia/ZNBC 2	6165do			
0500-0530 vl	Zimbabwe, Zimbabwe BC	3396do			
0505-0600	Swaziland, Trans World R	3200af	4775af	9500af	
0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0530-0559	Austria, R Austria Intl	6015na			
0530-0556	Romania, R Romania Intl	11790af	11940af	15250af	15270af
		15340as	17720as	17790af	
0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0530-0600 vl	Zambia, R Zambia/ZNBC 1	7220do			
0530-0600 vl	Zimbabwe, Zimbabwe BC	5975do			

Selected Programs

Sundays

0500 Australia, Radio: RA News. See S 0000.
0500 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0505 Australia, Radio: Oz Sounds #1. See S 0005.
0510 USA, VOA Washington DC (af/eu): VOA Sunday. See S 0110.
0530 Australia, Radio: Media Report. Agnes Warren presents the inside story on how the communications industry operates and puts the spotlight on media people and their activities.
0530 Romania, R Romania Intl: Info Plus. See S 0200.

Mondays

0500 Australia, Radio: RA News. See S 0000.
0500 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0510 Australia, Radio: Dateline. See S 2310.
0510 USA, VOA Washington DC (af/eu): VOA Today. See M 0110.
0530 Australia, Radio: Australia Today. See S 0430.
0530 Romania, R Romania Intl: Info Plus. See S 0200.
0545 UK, BBC London (AS): The Way We Are (1st,8th). See M 0145.
0550 Australia, Radio: On This Day. See S 1155.

Tuesdays

00 Australia, Radio: RA News. See S 0000.
00 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0 Australia, Radio: Dateline. See S 2310.
0 USA, VOA Washington DC (af/eu): VOA Today. See M 0110.
0 Australia, Radio: Australia Today. See S 0430.
0 Romania, R Romania Intl: Info Plus. See S 0200.
0 Australia, Radio: On This Day. See S 1155.

Wednesdays

Australia, Radio: RA News. See S 0000.
USA, VOA Washington DC (af/eu): VOA News. See S 0000.
Australia, Radio: Dateline. See S 2310.
USA, VOA Washington DC (af/eu): VOA Today. See M 0110.
Australia, Radio: Australia Today. See S 0430.
Romania, R Romania Intl: Info Plus. See S 0200.
Australia, Radio: On This Day. See S 1155.

Thursdays

0500 Australia, Radio: RA News. See S 0000.
0500 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0510 Australia, Radio: Dateline. See S 2310.
0510 USA, VOA Washington DC (af/eu): VOA Today. See M 0110.
0530 Australia, Radio: Australia Today. See S 0430.
0530 Romania, R Romania Intl: Info Plus. See S 0200.
0545 UK, BBC London (AE): The Learning World. Dalre Brehan reports on developments in the international education scene.
0550 Australia, Radio: On This Day. See S 1155.

Fridays

0500 Australia, Radio: RA News. See S 0000.
0500 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0510 Australia, Radio: Dateline. See S 2310.
0510 USA, VOA Washington DC (af/eu): VOA Today. See M 0110.
0530 Australia, Radio: Australia Today. See S 0430.
0530 Romania, R Romania Intl: Info Plus. See S 0200.
0550 Australia, Radio: On This Day. See S 1155.

Saturdays

0500 Australia, Radio: RA News. See S 0000.
0500 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0505 Australia, Radio: Oz Sounds #2. See S 0005.
0510 USA, VOA Washington DC (af/eu): VOA Saturday. See S 0110.
0530 Australia, Radio: The Sports Factor. See M 2330.
0530 Romania, R Romania Intl: Info Plus. See S 0200.

MT Monitoring Team

Next Reporting Deadline: September 18, 1997

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THANK YOU ...

Additional contributors to this month's Shortwave Guide:

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Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am			
0600-0700	Australia, Radio	9660pa	12080pa	13605as	15240pa
		15365pa	15415as	17750as	
0600-0700 vl	Australia, VL8K Katherine	5025do			
0600-0700 vl	Australia, VL8T Tent Crk	4910do			
0600-0633	Australia,DefenseForces R	13525as			
0600-0700 vl	Canada, CBC N Quebec Svc	9625do			
0600-0700	Canada, CFRX Toronto	6070do			
0600-0700	Canada, CFVP Calgary	6030do			
0600-0700	Canada, CHNX Halifax	6130do			
0600-0700	Canada, CKZU Vancouver	6160do			
0600-0700	Costa Rica,RF Peace Intl	7385am	7585am		
0600-0608 mtwhfa	Croatia, Croatian Radio	5920eu	7165va	9830eu	
0600-0700	Cuba, Radio Havana	9820na	9830na		
0600-0700	Ecuador, HCJB	9745am	21455am		
0600-0650	Germany, Deutsche Welle	11915af	13790af	15185af	17820as
		17860af	21680af		
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do		
0600-0700	Guyana, GBC/Voice of	3290do			
0600-0700 vl	Italy, IRRS	3985va			
0600-0700	Japan, R Japan/NHK World	5975eu	7230eu	9835as	11740as
		11840as	11910am	11920na	12030as
		15230na	15550va	17810as	
0600-0700 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
0600-0700 vl	Kiribati, Radio	9810do			
0600-0700	Lebanon, Voice of Hope	9960va			
0600-0700	Liberia,LCN/R Liberia Int	5100do			
0600-0700	Malaysia, Voice of	6175as	9750as	15295au	
0600-0700	New Zealand, R NZ Intl	9795pa			
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0600-0700	Nigeria, Voice of	7255af			
0600-0650	North Korea, R Pyongyang	15180as	15230as		
0600-0630 s	Norway, Radio Norway Intl	7180eu	7295pa	9590af	13805af
0600-0700 vl	Papua New Guinea, NBC	9675do			
0600-0700	Russia,Voice of Russia WS	12000au	12010as	12040as	12050as
		13645pa	13665pa	15470pa	15490pa
		15560au	15580as	15595na	17570au
		17580as	17610as	17795as	
0600-0630	S Africa, Channel Africa	11900af			
0600-0657	S Africa, Trans World R	11730af			
0600-0610	Sierra Leone, SLBS	3316do			
0600-0630	Slovakia, AWR Europe	11640af			
0600-0630 vl	Solomon Islands, SIBC	5020do			
0600-0700	Swaziland, Trans World R	4775af	6100af	9650af	
0600-0630	Swaziland, Trans World R	11730af			
0600-0630	Switzerland, Swiss R Intl	9885af	11860af	13635af	
0600-0700	United Kingdom, BBC WS	5975am	6005af	6175am	6180eu
		6190af	6195eu	7145as	7160af
		7325va	9410va	9600af	9740as
		11760as	11780eu	11940af	12095eu
		15310as	15360as	15420af	15565va
		15575va	17640af	17785as	17885af
		21660as			
0600-0700	USA, KAIJ Dallas TX	5810am			
0600-0700	USA, KTBN Salt Lk City UT	7510am			
0600-0700	USA, KVOH Los Angeles CA	9975am			
0600-0700	USA, KWHR Naalehu HI	17555pa	17780as		
0600-0630	USA, Voice of America	5970af	5995af	6035af	6080af
		7170va	7195af	9630af	11805af
		11950af	11965me	12080af	15205va
0600-0700	USA, WEWN Birmingham AL	5825eu			
0600-0700	USA, WHRI Noblesville IN	5745am			
0600-0700	USA, WJCR Upton KY	7490na			
0600-0700 smtwhf	USA, WMLK Bethel PA	9465eu			
0600-0700	USA, WRMI/R Miami Intl	9955am			
0600-0700	USA, WRNO New Orleans LA	7355am			
0600-0700	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0600-0700	USA, WYFR Okeechobee FL	5985am	7355eu	9985eu	
0600-0700 vl	Vanuatu, Radio	3945do	4960do		
0600-0645 vl/m-f	Vatican State, Vatican R	5882va	7250va	9645va	11740va
		15595va			
0600-0630	Vietnam, Voice of	5925as	10060as		
0600-0700	Yemen, Radio Aden	9780do			
0600-0700	Zambia, Christian Voice	3330af	6065af		
0600-0700 vl	Zambia, R Zambia/ZNBC 1	7220do			
0600-0700 vl	Zimbabwe, Zimbabwe BC	5975do			
0615-0630	Switzerland, Swiss R Intl	6165eu	9535eu		
0630-0700	Belgium, R Vlaanderen Int	6035eu	9925eu	9940au	
0630-0700	Georgia, Radio	11805eu			
0630-0645 s	Swaziland, Trans World R	11730af			
0630-0658	Vatican State, Vatican R	11625af	13765af	15570af	
0631-0640	Romania, R Romania Intl	9550eu	9665eu	11810eu	15365eu
0645-0700 as	Monaco, Trans World Radio	9755eu			
0645-0700	Romania, R Romania Intl	11740pa	11840pa	15250pa	15270pa
		17720pa			
0655-0700 mtwhf	Monaco, Trans World Radio	9755eu			

Selected Programs

Sundays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0605 Australia, Radio: Ockham's Razor. Robyn Williams with straight, sharp talk about science.
0610 USA, VOA Washington DC (af/eu): VOA Sunday. See S 0110.
0615 UK, BBC London (AF): Encyclopaedia Historica. See S 0130.
0615 UK, BBC London (AS): Letter from America. Alistair Cooke presents essays about life in the USA.
0630 Australia, Radio: Correspondents' Report. See S 0030.
0630 USA, VOA Washington DC (af): VOA Sunday. See S 0110.
0631 Romania, R Romania Intl: News. World and Bulgarian news.
0645 Romania, R Romania Intl: Info Plus. See S 0200.

Mondays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0600 USA, VOA Washington DC (eu): VOA News. See S 0000.
0610 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0610 USA, VOA Washington DC (eu): VOA Today. See M 0110.
0630 Australia, Radio: Sport. See M 0330.
0631 Romania, R Romania Intl: News. See S 0631.
0640 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0645 Romania, R Romania Intl: Info Plus. See S 0200.

Tuesdays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0600 USA, VOA Washington DC (eu): VOA News. See S 0000.
0610 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0610 USA, VOA Washington DC (eu): VOA Worldwide. A daily morning program that provides in-depth analysis of global issues and events through daily roundtable discussions.
0630 Australia, Radio: Sport. See M 0330.
0631 Romania, R Romania Intl: News. See S 0631.
0640 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0645 Romania, R Romania Intl: Info Plus. See S 0200.

Wednesdays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0600 USA, VOA Washington DC (eu): VOA News. See S 0000.
0610 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0610 USA, VOA Washington DC (eu): VOA Worldwide. See T 0610.
0630 Australia, Radio: Sport. See M 0330.
0631 Romania, R Romania Intl: News. See S 0631.
0640 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0645 Romania, R Romania Intl: Info Plus. See S 0200.

Thursdays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0600 USA, VOA Washington DC (eu): VOA News. See S 0000.
0610 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0610 USA, VOA Washington DC (eu): VOA Worldwide. See T 0610.
0630 Australia, Radio: Sport. See M 0330.
0631 Romania, R Romania Intl: News. See S 0631.
0640 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0645 Romania, R Romania Intl: Info Plus. See S 0200.

Fridays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af): Daybreak Africa. See M 0300.
0600 USA, VOA Washington DC (eu): VOA News. See S 0000.
0610 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 1). See M 0410.
0610 USA, VOA Washington DC (eu): VOA Worldwide. See T 0610.
0630 Australia, Radio: Sport. See M 0330.
0631 Romania, R Romania Intl: News. See S 0631.
0640 Australia, Radio: Pacific Beat (Afternoon Edition) (Part 2). See M 0410.
0645 Romania, R Romania Intl: Info Plus. See S 0200.
0645 UK, BBC London (AE): The Way We Are (5th,12th). See M 0145.

Saturdays

0600 Australia, Radio: RA News. See S 0000.
0600 USA, VOA Washington DC (af/eu): VOA News. See S 0000.
0605 Australia, Radio: Feedback. See S 0305.
0610 USA, VOA Washington DC (af/eu): VOA Saturday. See S 0110.
0615 UK, BBC London (AF): Letter from America. Alistair Cooke presents essays about life in the USA.
0630 Australia, Radio: Arts Australia. See T 0130.
0630 USA, VOA Washington DC (af): VOA Saturday. See S 0110.
0631 Romania, R Romania Intl: News. See S 0631.
0645 Romania, R Romania Intl: Info Plus. See S 0200.

FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am				
0700-0800	Australia, Radio	9660pa	12080pa	13605as	15240pa	
		15365pa	15415as	17750as		
0700-0800 vl	Australia, VL8K Katherine	5025do				
0700-0800 vl	Australia, VL8T Tent Crk	4910do				
0700-0800	Canada, CFRX Toronto	6070do				
0700-0800	Canada, CFVP Calgary	6030do				
0700-0800	Canada, CHNX Halifax	6130do				
0700-0800	Canada, CKZU Vancouver	6160do				
0700-0800	Costa Rica,RF Peace Intl	7385am	7585am			
0700-0708 s	Croatia, Croatian Radio	5920eu	7165va	9830eu	13830au	
0700-0727	Czech Rep, Radio Prague	7345eu	9505eu			
0700-0800	Ecuador, HCJB	9645pa	21455au			
0700-0800 as	Eqt Guinea, R East Africa	15186af				
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af				
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do			
0700-0800	Guyana, GBC/Voice of	3290do				
0700-0800 vl	Italy, IRRS	3985va				
0700-0800	Japan, R Japan/NHK World	7230eu	11740as	11840as	11850pa	
		11910as	11920as	15230me	17810va	
		17815af				
0700-0800 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		
0700-0800 vl	Kiribati, Radio	9810do				
0700-0800	Lebanon, Voice of Hope	9960va				
0700-0715	Liberia,LCN/R Liberia Int	5100do				
0700-0800 asmtwh	Malaysia, Radio	7295do				
0700-0800	Malaysia, Voice of	6175as	9750as	15295au		
0700-0800	Monaco, Trans World Radio	9755eu				
0700-0758 as	New Zealand, R NZ Intl	9795pa				
0700-0800 mtwhf	New Zealand, R NZ Intl	9795pa				
0700-0750	North Korea, R Pyongyang	15340af	17765me			
0700-0730 s	Norway, Radio Norway Intl	15245me				
0700-0800 vl	Papua New Guinea, NBC	9675do				
0700-0745	Romania, R Romania Intl	15370pa	17720pa	17790pa	17805pa	
0700-0715 s	Romania, R Romania Intl	15370pa	17720pa	17790pa	17805pa	
0700-0800	Russia,Voice of Russia WS	15470as	15560au	15580as	17570au	
		17580as	17610au	17795as		
0700-0710	Sierra Leone, SLBS	3316do				
0700-0730	Slovakia, AWR Europe	9440eu				
0700-0800 vl	Solomon Islands, SIBC	5020do				
0700-0800	Swaziland, Trans World R	9650af				
0700-0800	Taiwan, VO Free China	5950na				
0700-0800	United Kingdom, BBC WS	6190af	7145as	7325eu	9410eu	
		9600af	9610af	9740as	11760as	
		11835af	11940af	11955as	12095va	
		15310as	15360as	15485af	15575va	
		17640af	17760af	17785as	17830af	
		21660as				
0700-0800 as	United Kingdom, BBC WS	17885af				
0700-0715	United Kingdom, BBC WS	6005af	7160af			
0700-0730	United Kingdom, BBC WS	6180eu	6195eu	7325af	9410eu	
		11780eu				
0700-0800	USA, KAIJ Dallas TX	5810am				
0700-0800	USA, KTBN Salt Lk City UT	7510am				
0700-0800	USA, KWHR Naalehu HI	11565pa	17780as			
0700-0800	USA, Monitor Radio Intl	7535eu				
0700-0800	USA, WEWN Birmingham AL	5825eu				
0700-0800	USA, WHRI Noblesville IN	5745am				
0700-0800	USA, WJCR Upton KY	7490na				
0700-0800 smtwhf	USA, WMLK Bethel PA	9465eu				
0700-0800	USA, WRMI/R Miami Intl	9955am				
0700-0800	USA, WRNO New Orleans LA	7355am				
0700-0800	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am	
0700-0800	USA, WYFR Okeechobee FL	7355eu	9985eu	13695af		
0700-0800 vl	Vanuatu, Radio	3945do	4960do			
0700-0800	Zambia, Christian Voice	6065af				
0700-0800 vl	Zambia, R Zambia/ZNBC 1	7220do				
0700-0800 vl	Zimbabwe, Zimbabwe BC	5975do				
0730-0755	Austria, R Austria Intl	6155eu	13730eu	15410me	17870me	
0730-0800	Ecuador, HCJB	9765eu				
0730-0745 s	Greece, Voice of	7430eu	7450eu	9425au	11645eu	
0730-0735	India, All India Radio	15185do	15260do			
0730-0800	Netherlands, Radio	9720pa	9820pa			
0730-0800 as	Palau, KHBN/Voice of Hope	9730as				
0730-0800	United Kingdom, BBC WS	15400va	15565va			
0735-0800 as	Swaziland, Trans World R	4775af	9500af	9650af		
0740-0800	Guam, TWR/KTWR	15200as				
0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do			
0745-0755	Greece, Voice of	7430eu	7450eu	9425au	11645eu	
0758-0800 as	New Zealand, R NZ Intl	6100pa				

0800-0900	Anguilla,Caribbean Beacon	6090am				
0800-0900	Australia, Radio	5995pa	9580pa	9710pa	11640pa	
		12080pa	15365pa			
0800-0830	Australia, Radio	15415as	17750pa			
0800-0830 vl	Australia, VL8K Katherine	5025do				
0800-0830 vl	Australia, VL8T Tent Crk	4910do				
0800-0900 mtwhfa	Bhutan, Bhutan BC Service	5030do				
0800-0900 vl	Canada, CBC N Quebec Svc	9625do				
0800-0900	Canada, CFRX Toronto	6070do				
0800-0900	Canada, CFVP Calgary	6030do				
0800-0900	Canada, CHNX Halifax	6130do				
0800-0900	Canada, CKZU Vancouver	6160do				
0800-0900	Costa Rica,RF Peace Intl	7385am	7585am			
0800-0808 mtwhfa	Croatia, Croatian Radio	5920eu	7165eu	9830eu	13830au	
0800-0900	Ecuador, HCJB	9645pa	9765eu	21455au		
0800-0900 as	Eqt Guinea, R East Africa	15186af				
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af				
0800-0830	Finland, YLE/R Finland	13645as	15235au			
0800-0805 s	Ghana, Ghana Broadc Corp	3366do				
0800-0900	Guam, TWR/KTWR	15200as				
0800-0900	Guyana, GBC/Voice of	3290do				
0800-0900	Indonesia, Voice of	9525as				
0800-0900 vl	Italy, IRRS	7125va				
0800-0900 vl	Kiribati, Radio	9810do				
0800-0900	Lebanon, Voice of Hope	9960va				
0800-0900	Liberia,LCN/R Liberia Int	5100do				
0800-0900	Malaysia, Radio	7295do				
0800-0825	Malaysia, Voice of	6175as	9750as	15295au		
0800-0835 a	Monaco, Trans World Radio	9755eu				
0800-0850 s	Monaco, Trans World Radio	9755eu				
0800-0820 mtwhf	Monaco, Trans World Radio	9755eu				
0800-0900	Netherlands, Radio	9720pa	9820pa			
0800-0816 mtwhf	New Zealand, R NZ Intl	9795pa				
0800-0850	North Korea, R Pyongyang	15180as	15230as			
0800-0830 s	Norway, Radio Norway Intl	15625as				
0800-0805	Pakistan, Radio	15465eu	17865eu			
0800-0900 as	Palau, KHBN/Voice of Hope	9730as				
0800-0900 vl	Papua New Guinea, NBC	9675do				
0800-0900	Russia,Voice of Russia WS	9810au	11800au	15470as	15490as	
		15560au	17610as	17795as		
0800-0900 f	Seychelles, FEBA Radio	15540as				
0800-0810	Sierra Leone, SLBS	3316do				
0800-0900 vl	Solomon Islands, SIBC	5020do				
0800-0900	South Korea, R Korea Intl	9570au	13670eu			
0800-0805 as	Swaziland, Trans World R	4775af	9500af	9650af		
0800-0900	United Kingdom, BBC WS	6190af	7325eu	9410eu	9740as	
		11750as	11760as	11940af	11955as	
		12095eu	15310as	15360va	15400af	
		15485va	15575va	17640va	17760as	
		17785as	17830af	21660as		
0800-0900 as	United Kingdom, BBC WS	15565va	17885af			
0800-0815	United Kingdom, BBC WS	7145pa	11835af			
0800-0900	USA, KAIJ Dallas TX	5810am				
0800-0900	USA, KNLS Anchor Point AK	9615as				
0800-0900	USA, KTBN Salt Lk City UT	7510am				
0800-0900	USA, KWHR Naalehu HI	9930as	11565pa			
0800-0900	USA, Monitor Radio Intl	7535eu	9845au	15665eu		
0800-0900	USA, WEWN Birmingham AL	5825eu	7425na			
0800-0900	USA, WHRI Noblesville IN	5745am	7315am			
0800-0900	USA, WJCR Upton KY	7490na				
0800-0900	USA, WRMI/R Miami Intl	9955am				
0800-0900	USA, WRNO New Orleans LA	7355am				
0800-0900 as	USA, WVHA Greenbush ME	13825af				
0800-0900	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am	
0800-0900	Zambia, Christian Voice	6065af				
0800-0900 vl	Zambia, R Zambia/ZNBC 1	7220do				
0800-0900 vl	Zimbabwe, Zimbabwe BC	5975do				
0815-0900 mtwtf	Nigeria, FRCN/Radio	3326do	4770do	4990do		
0816-0900 mtwhf	New Zealand, R NZ Intl	6100pa				
0820-0900 vl	Chile, R Esperanza	6089am				
0830-0900 s	Armenia, Voice of	15270eu				
0830-0900 vl	Australia, VL8A Alice Spg	2310do				
0830-0900 vl	Australia, VL8K Katherine	2485do				
0830-0900 vl	Australia, VL8T Tent Crk	2325do				
0830-0900	Georgia, Radio	11910eu				
0830-0840	India, All India Radio	7250do	15185do	15260do		
0830-0900	Lithuania, Radio Vilnius	9710eu				
0830-0900	Slovakia, R Slovakia Intl	11990au	15460au	17570au		
0830-0900	United Kingdom, BBC WS	15280as				
0855-0900	Guam, TWR/KTWR	11830au				

FREQUENCIES

0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000	Australia, Radio	9580pa	11640pa		
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do			
0900-0925	Belgium, R Vlaanderen Int	6035eu	7190eu		
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-0935 vl	Chile, R Esperanza	6089am			
0900-1000	China, China Radio Intl	9785pa	11755pa		
0900-1000	Costa Rica,RF Peace Intl	7385am	7585am		
0900-0908 s	Croatia, Croatian Radio	5920eu	7165va	9830eu	13830au
0900-0927	Czech Rep, Radio Prague	15640me	17485af		
0900-1000	Ecuador, HCJB	9645pa	21455au		
0900-0930	Ecuador, HCJB	9765eu			
0900-1000 as	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160au	9565af	12025af	12055as
		15410af	17715au	17800af	21600af
		21680au			
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do		
0900-0955	Guam, TWR/KTWR	11835as			
0900-1000	Guyana, GBC/Voice of	3290do			
0900-0930 vl/m-f	Italy, IRRS	7125va			
0900-0920 tfa	Kazakhstan, Radio Almaty	9620eu	11720eu		
0900-0930 vl	Kiribati, Radio	9810do			
0900-1000	Lebanon, Voice of Hope	9960va			
0900-0915	Liberia,LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-0930	Mongolia, Voice of	15170as			
0900-0925	Netherlands, Radio	9720pa	9820au	13700pa	
0900-1000	New Zealand, R NZ Intl	6100pa			
0900-0930 s	Norway, Radio Norway Intl	13800as	15625au		
0900-1000 as	Palau, KHBN/Voice of Hope	9730as			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia,Voice of Russia WS	7390as	9810as	11800as	11880as
		17610as	17795as		
0900-1000 s	Slovakia, AWR Europe	9450eu			
0900-0930	Switzerland, Swiss R Intl	9885au	13685au	17515au	
0900-1000	United Kingdom, BBC WS	5965as	6190af	6195as	9410eu
		9740as	11750as	11765va	11940af
		11945as	12095eu	15190sa	15360as
		15400af	15485va	15565as	15575va
		17640va	17705eu	17830af	21660as
0900-0915	United Kingdom, BBC WS	7325eu	15310as	15360pa	17785as
0900-0945	United Kingdom, BBC WS	9580as	11760as	11955as	15280as
0900-1000	USA, KAIJ Dallas TX	5810am			
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	9930as	11565pa		
0900-1000	USA, Monitor Radio Intl	7395sa	7535eu	9385au	15665as
0900-1000	USA, WEWN Birmingham AL	5825eu	7425na		
0900-1000	USA, WGTG McCaysville GA	9400am			
0900-1000	USA, WHRI Noblesville IN	5745am	7315am		
0900-1000	USA, WJCR Upton KY	7490na			
0900-1000 as	USA, WRMI/R Miami Intl	9955am			
0900-1000	USA, WRNO New Orleans LA	7355am			
0900-1000 as	USA, WVHA Greenbush ME	13825af			
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0900-1000	Zambia, Christian Voice	6065af			
0900-1000 vl	Zambia, R Zambia/ZNBC 1	7220do			
0900-1000 vl	Zimbabwe, Zimbabwe BC	5975do			
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do		
0920-0940 w	Kazakhstan, Radio Almaty	9620eu	11720eu		
0930-0955 mtwhfa	Austria, R Austria Intl	15455au	17870au		
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Georgia, Radio	11910me			
0930-1000	Netherlands, Radio	12065au	13710pa		
0930-1000	Philippines, FEBC/R Intl	11635as			

1000-1100	Anguilla,Caribbean Beacon	6090am			
1000-1100	Australia, Radio	9580pa			
1000-1100 vl	Australia, VL8A Alice Spg	2310do			
1000-1100 vl	Australia, VL8K Katherine	2485do			
1000-1100 vl	Australia, VL8T Tent Crk	2325do			
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1100	China, China Radio Intl	9785pa	11755pa		
1000-1100	Costa Rica,RF Peace Intl	7385am	7585am		
1000-1100	Ecuador, HCJB	9645pa	21455au		
1000-1100 as	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Guam, AWR/KSDA	11790as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	India, All India Radio	11585as	13700as	15050as	17387au
		17840as			
1000-1025	Israel, Kol Israel	15640eu			
1000-1100 vl	Italy, IRRS	7125va			
1000-1100	Jordan, Radio	11690eu			
1000-1100	Lebanon, Voice of Hope	9960va			
1000-1100	Malaysia, Radio	7295do			
1000-1100 vl	Malaysia, RTM Kuching	7160do			
1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
1000-1025	Netherlands, Radio	12065au	13710pa		
1000-1100	New Zealand, R NZ Intl	6100pa			
1000-1100	Nigeria, Voice of	7255af			
1000-1100 as	Palau, KHBN/Voice of Hope	9730as			
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1100	Russia,Voice of Russia WS	7330as	7390as	9810au	9835au
		11655as	11800au	11880as	15170as
		15435as	15490as	15510as	17560as
		17610as	17775as	17795as	
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1030	Switzerland, Swiss R Intl	6165eu	9535eu		
1000-1100	United Kingdom, BBC WS	5965va	6190af	6195am	9410eu
		9740as	11750as	11760as	11765va
		11940af	12095eu	15310as	15485va
		15565as	15575me	17640af	17705af
		17885va	21660as		
1000-1100 as	United Kingdom, BBC WS	15190am	15400am	17830af	
1000-1030	United Kingdom, BBC WS	15360as			
1000-1100	USA, KAIJ Dallas TX	5810am			
1000-1100	USA, KTBN Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	9930as	11565pa		
1000-1100	USA, Monitor Radio Intl	6095na	7395sa	15665as	15725as
1000-1100	USA, Voice of America	5985pa	6165am	7405am	9590am
		11720as	15425as		
1000-1100	USA, WEWN Birmingham AL	7425na			
1000-1100	USA, WGTG McCaysville GA	9400am			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
1000-1100	USA, WJCR Upton KY	7490na			
1000-1100	USA, WRMI/R Miami Intl	9955am			
1000-1100	USA, WRNO New Orleans LA	7355am			
1000-1100 as	USA, WVHA Greenbush ME	13825af			
1000-1100	USA, WWCR Nashville TN	2390am	5070am	5935am	15685am
1000-1100	USA, WYFR Okeechobee FL	5950na			
1000-1030 vl/m-f	Vatican State, Vatican R	5882eu	9645eu	11740eu	15595eu
		17550eu			
1000-1030	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as	15010as		
1000-1100	Zambia, Christian Voice	6065af			
1000-1100 vl	Zambia, R Zambia/ZNBC 1	7220do			
1030-1055 s	Austria, R Austria Intl	15455au	17870au		
1030-1057	Czech Rep, Radio Prague	7345eu	9505eu		
1030-1100 mtwhf	Ethiopia, Radio	5990do	7110do	9705do	
1030-1100	Guam, AWR/KSDA	15170as			
1030-1100	Netherlands, Radio	6045eu	9860eu	12065as	13710as
1030-1100	South Korea, R Korea Intl	11715am			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	17850as		
1030-1055	UAE, Radio Dubai	13675eu	15395eu	17630eu	21605me

Hello, Writers...

Do you have a topic you've always "thought about" writing up for Monitoring Times? Now is the time! Given our full-spectrum coverage, plus the interest in new technology on the one hand and nostalgia for the past on the other, there is no limit to appropriate subject matter to write about. Bone up on your research, warm up your pen, and you, too, can earn a little spending money!

Pitch your idea to the editor at mteditor@grove.net or call 704-837-9200 and ask for Rachel. Writer's Guidelines are available on the MT homepage at www.grove.net, or for an SASE.

Frequencies

1100-1200	Anguilla,Caribbean Beacon	11775am			
1100-1200	Australia, Radio	6080as	9580pa		
1100-1200 s	Australia, Radio	9415va	11660as		
1100-1200 vl	Australia, VL8A Alice Spg	2310do			
1100-1200 vl	Australia, VL8K Katherine	2485do			
1100-1200 vl	Australia, VL8T Tent Crk	2325do			
1100-1200	Canada, CFRX Toronto	6070do			
1100-1200	Canada, CFVP Calgary	6030do			
1100-1200	Canada, CHNX Halifax	6130do			
1100-1200	Canada, CKZN St John's	6160do			
1100-1200	Canada, CKZU Vancouver	6160do			
1100-1200	Costa Rica, Adv World R	5030am	6150am	7375am	9725am
		13750am			
1100-1200	Costa Rica,RF Peace Intl	7385am	7585am		
1100-1200	Ecuador, HCJB	12005am	15115am	21455au	
1100-1200 as	Eqt Guinea, R East Africa	15186af			
1100-1200	Eqt Guinea, Radio Africa	9530as			
1100-1150	Germany, Deutsche Welle	15370af	15410af	17765af	17800af
1100-1200 vl	Italy, IRRS	7125va			
1100-1200	Japan, R Japan/NHK World	6120na	7125na	11815as	
1100-1200	Jordan, Radio	11690eu			
1100-1200	Lebanon, Voice of Hope	9960va			
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 vl	Malaysia, RTM Kuching	7160do			
1100-1200 vl	Malaysia,RTM KotaKinabalu	5980do			
1100-1125	Netherlands, Radio	12065as	13710as		
1100-1200	New Zealand, R NZ Intl	6100pa			
1100-1150	North Korea, R Pyongyang	3560na	4404na	6575na	9975na
		11335na			
1100-1130 as	Palau, KHBN/Voice of Hope	9730as			
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Russia,Voice of Russia WS	4740as	11655as	11880as	15170as
		15460as	15490as	15500as	15510as
		17560as	17610as	17755as	17775as
		17795as			
1100-1200	Singapore,R Singapore Int	6015as	6155as		
1100-1130	Solomon Islands, SIBC	5020do			
1100-1130	Sri Lanka, Sri Lanka BC	11835as	17850as		
1100-1130	Switzerland, Swiss R Intl	13635as	15415as	17515as	
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200	United Kingdom, BBC WS	5965am	6190af	6195va	9410eu
		9580as	11750as	11760as	11940af
		11955as	12095eu	15220am	15310as
		15485va	15565as	15575va	17640na
		17705eu	17830af	17885af	21660af
1100-1130 as	United Kingdom, BBC WS	15190am			
1100-1130	United Kingdom, BBC WS	9700as	11765va	15310as	17785as
1100-1145	United Kingdom, BBC WS	15400af	17790as		
1100-1200	USA, KAIJ Dallas TX	5810am			
1100-1200	USA, KTBN Salt Lk City UT	7510am			
1100-1200	USA, KWHR Naalehu HI	9930as	11565pa		
1100-1200	USA, Monitor Radio Intl	6095na	7395sa	9355eu	9385au
		9430au			
1100-1200	USA, Voice of America	5985pa	6160as	9645as	9760as
		11720as	15160as	15425as	
1100-1200	USA, WEWN Birmingham AL	7425eu			
1100-1200	USA, WHRI Noblesville IN	6040am	9495am		
1100-1200	USA, WJCR Upton KY	7490na			
1100-1200	USA, WRMI/R Miami Intl	9955am			
1100-1200	USA, WRNO New Orleans LA	7355am			
1100-1200 as	USA, WVHA Greenbush ME	13825eu			
1100-1200	USA, WWCR Nashville TN	2390am	5070am	5935am	15685am
1100-1200	USA, WYFR Okeechobee FL	5950na	11830na		
1100-1130	Vietnam, Voice of	7285as	9730as		
1100-1200	Zambia, Christian Voice	6065af			
1100-1200 vl	Zambia, R Zambia/ZNBC 1	7220do			
1104-1120	Pakistan, Radio	15465eu	17865eu		
1120-1140	Australia,DefenseForces R	4763as			
1130-1200 vl	China, China Radio Intl	6995as	8660as	11700as	
1130-1200	Iran, VOIRI	9585as	11875as	11930as	15260as
1130-1140	Lesotho, Radio Lesotho	4800do			
1130-1200	Myanmar, Voice of	5990do			
1130-1200	Netherlands, Radio	6045eu	9860eu		
1130-1200	Sweden, Radio	11650na	15240na		
1130-1200	United Kingdom, BBC WS	6195am	17705va		
1130-1200 f	Vatican State, Vatican R	15595as	17550au		
1135-1140	India, All India Radio	9595do	11620do	11710do	15185do

Selected Programs

Sundays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1105 Australia, Radio: Jazz Notes. The best of Australian jazz is introduced by Ivan Lloyd.
1110 USA, VOA Washington DC (as): New Horizons. A twenty-minute documentary on a scientific, technological, or medical subject.
1130 Australia, Radio: Australia Today. See S 0430.
1130 USA, VOA Washington DC (as): Issues in the News. Members of the Washington press corps discuss current topics.
1155 Australia, Radio: On This Day. Anniversaries worth remembering.

Mondays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1110 Australia, Radio: Dateline. See S 2310.
1110 USA, VOA Washington DC (as): American Gold. Fifty minutes of classic pop music hosted by Ray Freeman.
1130 Australia, Radio: Sport. See M 0330.
1135 Australia, Radio: Countrywide. Shane Mahony with daily issues in primary industry.

Tuesdays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1110 Australia, Radio: Dateline. See S 2310.
1110 USA, VOA Washington DC (as): Now Music USA. See M 1630.
1130 Australia, Radio: Sport. See M 0330.
1135 Australia, Radio: Countrywide. See M 1135.

Wednesdays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1110 Australia, Radio: Dateline. See S 2310.
1110 USA, VOA Washington DC (as): Now Music USA. See M 1630.
1130 Australia, Radio: Sport. See M 0330.
1135 Australia, Radio: Countrywide. See M 1135.

Thursdays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1110 Australia, Radio: Dateline. See S 2310.
1110 USA, VOA Washington DC (as): Now Music USA (Top Ten). Top ten pop music hits of the week in the USA.
1130 Australia, Radio: Sport. See M 0330.
1130 UK, BBC London (AE): The Learning World. See H 0545.
1135 Australia, Radio: Countrywide. See M 1135.

Fridays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1110 Australia, Radio: Dateline. See S 2310.
1110 USA, VOA Washington DC (as): Now Music USA. See M 1630.
1130 Australia, Radio: Sport. See M 0330.
1130 UK, BBC London (AE): At the Shoulder of History (5th). See A 0230.
1130 USA, VOA Washington DC (as): Country Music USA. Country, bluegrass, and western swing, plus conversations with country performers.
1135 Australia, Radio: Countrywide. See M 1135.
1154 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (5th). See W 1254.
1154 Radio Netherlands: Documentary. Indian Tiger Extinction (26th). See F 2354.
1154 Radio Netherlands: Documentary. Social Cost of Transformation (19th). See F 1454.
1154 Radio Netherlands: Documentary. Take the Low Road (12th). See A 2354.

Saturdays

1100 Australia, Radio: RA News. See S 0000.
1100 USA, VOA Washington DC (as): VOA News. See S 0000.
1105 Australia, Radio: Fine Music Australia. See S 0210.
1110 USA, VOA Washington DC (as): Agriculture Today. Basic farming, biotechnology, food marketing, and related issues.
1130 Australia, Radio: Australia Today. See S 0430.
1130 USA, VOA Washington DC (as): Press Conference USA. Newsmakers are questioned by Washington journalists in the VOA studios.

Hauser's Highlights
USA: KJES

The Lord's Ranch, Vado, NM, has one 50 kW ELCOR and a 5 kW Harris auxiliary; a rhombic antenna with 13 dB gain aimed due north with 50° beamwidth, 20° elevation; and a rotatable log-periodic with 15.2 dB gain, 80° beamwidth, 28° elevation which is authorized at all these azimuths: 70, 100, 105, 115, 145, 150, 160, 235, 260, 325, 335, 350, 355°
(FCC website)

1200 UTC SHORTWAVE GUIDE 8:00 AM EDT 5:00 AM PDT

Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300	Australia, Radio	5995as	6080as	9580pa	11800pa
1200-1300 s	Australia, Radio	9415va	11660as		
1200-1300 vl	Australia, VL8A Alice Spg	2310do			
1200-1300 vl	Australia, VL8K Katherine	2485do			
1200-1300 vl	Australia, VL8T Tent Crk	2325do			
1200-1300	Brazil, Radio Bras	15445na			
1200-1230	Bulgaria, Radio	13790as			
1200-1215	Cambodia, Natl Voice of	11940as			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1230	Canada, R Canada Intl	9660as	9715me	11835me	11975me
		15195as			
1200-1300	Canada, R Canada Intl	9640am	11855am	13650am	
1200-1300	China, China Radio Intl	7385pa	9565pa	9715as	11795pa
1200-1230 vl	China, China Radio Intl	9660as	11700as	12110as	
1200-1300	Costa Rica,RF Peace Intl	7385am			
1200-1208	Croatia, Croatian Radio	5920eu	7165eu	13830na	
1200-1300 vl	Cyprus, BRT International	6150do			
1200-1300	Ecuador, HCJB	12005am	15115am	21455am	
1200-1300 as	Eqt Guinea, R East Africa	15186af			
1200-1300	Eqt Guinea, Radio Africa	9530as			
1200-1257	France, Radio France Intl	9805af	11600as	13625eu	15155eu
		15195eu	15540af	17575af	
1200-1230	Iran, VOIRI	9585as	11875as	11930me	15260as
1200-1300 vl	Italy, IRRS	7125va			
1200-1300	Japan, R Japan/NHK World	7125as			
1200-1300	Jordan, Radio	11690eu			
1200-1300	Lebanon, Voice of Hope	9960va			
1200-1300	Malaysia, Radio	7295do			
1200-1300 vl	Malaysia,RTM KotaKinabalu	5980do			
1200-1250	Myanmar, Voice of	5990do			
1200-1300	Netherlands, Radio	6045eu	9860eu		
1200-1206	New Zealand, R NZ Intl	6100pa			
1200-1230 s	Norway, Radio Norway Intl	9590eu	13800as	13805na	15605au
1200-1300 vl	Papua New Guinea, NBC	4890do			
1200-1255	Poland, Polish R Warsaw	6095eu	7145eu	7270eu	9525eu
		11815eu			
1200-1300	Russia,Voice of Russia WS	4740as	4975as	11655as	11785as
		11880as	15110as	15170as	15230as
		15430as	15435as	15490as	15510as
		17610as	17755as	17775as	17795as
1200-1300	Singapore,R Singapore Int	6015as	6155as		
1200-1300	South Korea, R Korea Intl	7285af			
1200-1300	Switzerland, Swiss R Intl	6165eu	9535eu		
1200-1300	Taiwan, VO Free China	7130au	9610as		
1200-1300	Ukraine, R Ukraine Intl	6020na	7150eu	12045na	12050na
1200-1300	United Kingdom, BBC WS	6190af	6195va	9410eu	9515am
		9580as	9740as	11750as	11760as
		11940af	11955as	15220am	15310as
		15485va	15565va	15575va	17640va
		17705af	17830af	17885af	21660af
1200-1300	USA, KAIJ Dallas TX	5810am			
1200-1300	USA, KTBN Salt Lk City UT	7510am			
1200-1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200-1300	USA, Monitor Radio Intl	6095na	9355as	9385au	9455sa
1200-1230	USA, Voice of America	6160as	9645as	9760as	11715as
		15160as	15425as		
1200-1300	USA, WEWN Birmingham AL	7425sa			
1200-1300	USA, WGTG McCaysville GA	9400am			
1200-1300	USA, WHRI Noblesville IN	6040am	9495am		
1200-1300	USA, WJCR Upton KY	7490na			
1200-1300	USA, WRMI/R Miami Intl	9955am			
1200-1300	USA, WRNO New Orleans LA	7355am			
1200-1300	USA, WWCR Nashville TN	5070am	12160am	13845am	15685am
1200-1300	USA, WYFR Okeechobee FL	5950na	6015na	11830na	17750na
1200-1230	Uzbekistan, R Tashkent	7285as	9715as	15295as	
1200-1300	Zambia,-Christian Voice	6065af			
1200-1300 vl	Zambia, R Zambia/ZNBC 1	7220do			
1207-1300 occsnal	New Zealand, R NZ Intl	6100pa			
1215-1300	Egypt, Radio Cairo	17595as			
1215-1300	United Kingdom, BBC WS	15220am			
1230-1255	Austria, R Austria Intl	6155eu	13730na		
1230-1300	Bangladesh, Bangla Betar	7185as	9550as		
1230-1255 s	Belgium, R Vlaanderen Int	13785na	15535as		
1230-1300 mtwhf	Finland, YLE/R Finland	11900na	15400na		
1230-1300	Guam, AWR/KSDA	13720as			
1230-1235	India, All India Radio	4860do	6150do	17860do	
1230-1300 w	Indonesia, RRI Sorong	4875do			
1230-1300	Mongolia, Voice of	12085as			
1230-1300	Romania, R Romania Intl	9690eu	11885eu	15365eu	17720eu
1230-1300	South Korea, R Korea Intl	9570as	9640as	13670as	
1230-1300 mtwhf	Sri Lanka, Sri Lanka BC	9730as			
1230-1300	Sweden, Radio	13740as	15240pa		
1230-1300	Thailand, Radio	9505as	9655as	9885as	11905as
1230-1300	Turkey, Voice of	13750eu	15290as		
1230-1300	Vietnam, Voice of	5940as	7270as	7400as	9840as
		12020as	15010as		
1240-1250	Greece, Voice of	11645af			

Selected Programs

Sundays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia: Country Club. ABC's contemporary and traditional country music with Richard Porteous.
1205 UK, BBC London (AE): Write On. Listeners' questions on World Service programs are answered by Nick Baker.
1210 USA, VOA (as): Encounter. Two experts debate their contrasting views on a subject of current importance.
1215 Bulgaria, Radio: Radio Bulgaria Calling. A weekly DX program for radio amateurs and shortwave listeners.
1230 UK, BBC London (AF): Letter from America. Alistair Cooke presents essays about life in the USA.
1230 UK, BBC London (AS East As only): Letter from America. Alistair Cooke presents essays about life in the USA.
1230 USA, VOA Washington DC (as): Studio One. Dramatizations and documentaries on significant events and personalities.
1230 USA, VOA (as): The Writers' World (3). See T 0106.

Mondays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia, Radio: Radio National Overnight. See S 1505.
1210 USA, VOA Washington DC (as): Stateside. Issues and personalities, science and politics, sports and entertainment inside America.
1230 UK, BBC London (AF): Encyclopaedia Historica. See S 0130.

Tuesdays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia, Radio. Late Night Live. Topical, political, cultural and philosophical issues with Phillip Adams of Radio National.
1210 USA, VOA Washington DC (as): Stateside. See M 1210.
1230 UK, BBC London (AF): Earth, Air, Fire and Water (2nd,9th). See T 0030.

Wednesdays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia, Radio: Late Night Live. See T 1205.
1210 USA, VOA Washington DC (as): Stateside. See M 1210.
1230 UK, BBC London (AE): Waveguide (17th). The lastest information on international radio broadcasting, with reviews of receivers and news about reception.
1254 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (3rd). RN revisits a documentary made in 1947 about university life in the Netherlands and compare the situation then with today.
1254 Radio Netherlands: Documentary. Indian Tiger Extinction (24th). See F 2354.
1254 Radio Netherlands: Documentary. Social Cost of Transformation (17th). See F 1454.
1254 Radio Netherlands: Documentary. Take the Low Road (10th). See A 2354.

Thursdays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia, Radio: Late Night Live. See T 1205.
1210 USA, VOA Washington DC (as): Stateside. See M 1210.

Fridays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia, Radio: Late Night Live. See T 1205.
1210 USA, VOA Washington DC (as): Stateside. See M 1210.

Saturdays

1200 Australia, Radio: RA News. See S 0000.
1200 Bulgaria, Radio: News. See S 0400.
1200 USA, VOA Washington DC (as): VOA News. See S 0000.
1205 Australia, Radio: Other Worlds. Brent Clough plays late night lounge music.
1210 USA, VOA Washington DC (as): On the Line. A discussion of U.S. policies and contemporary issues.
1230 UK, BBC (AF/AS): The Way We Are (6th,13th). See M 0145.
1230 USA, VOA Washington DC (as): Communications World. A look at the people, technologies, economics, and politics involved in modern telecommunications.

Belgium

If you missed Radio Vlaanderen's excellent DX program *Radio World* and have internet access, you can get the text version at URL **http://www.brtn.be/rvi/html-uk/waar/world.htm**.
(Jim Frimmel)

Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1400	Australia, Radio	5995pa	6080as	9580pa	11800pa
1300-1330 s	Australia, Radio	9415va	11660as		
1300-1400 vl	Australia, VL8A Alice Spg	2310do			
1300-1400 vl	Australia, VL8K Katherine	2485do			
1300-1400 vl	Australia, VI8T Tent Crk	2325do			
1300-1325 mtwhfa	Belgium, R Vlaanderen Int	13785as	15535as		
1300-1320	Brazil, Radio Bras	15445na			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1400 mtwhf	Canada, R Canada Intl	9640am	11855am	13650am	
1300-1400 s	Canada, R Canada Intl	11855am	13650am		
1300-1400	China, China Radio Intl	6140as	7385pa	7405as	9715as
		11660pa	11980as		
1300-1400	Costa Rica,RF Peace Intl	7385am			
1300-1330	Czech Rep, Radio Prague	13580eu	17485af		
1300-1400	Ecuador, HCJB	12005am	15115am	21455am	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400 as	Eqt Guinea, R East Africa	15186af			
1300-1400	Eqt Guinea, Radio Africa	9530as			
1300-1330 vl	Italy, IRRS	7125va			
1300-1400	Jordan, Radio	11690eu			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 vl	Malaysia, RTM Kuching	7160do			
1300-1400 vl	Malaysia,RTM KotaKinabalu	5980do			
1300-1400 occsnal	New Zealand, R NZ Intl	6100pa			
1300-1350	North Korea, R Pyongyang	4405as	9345as	9640eu	11740as
		15230as			
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1400	Philippines, FEBC/R Intl	11995as			
1300-1356	Romania, R Romania Intl	9690eu	11885eu	15365eu	17720eu
1300-1400	Russia,Voice of Russia WS	11700as	15430as	15460as	15550as
		17610as	17795as		
1300-1400	Singapore,R Singapore Int	6015as	6155as		
1300-1400 mtwhf	Sri Lanka, Sri Lanka BC	9730as			
1300-1330	Switzerland, Swiss R Intl	7230as	7480as	13635as	15120as
		15415as	17515as		
1300-1330	Turkey, Voice of	13695eu	13750va	15290as	
1300-1400	United Kingdom, BBC WS	5990as	6190af	6195va	9410eu
		9515am	9740va	11750as	11760as
		11865am	11940af	12095eu	15220am
		15310as	15420af	15485va	15565as
		15575va	17640va	17705af	17830af
		17885af	21470af	21660af	
1300-1400	USA, KAIJ Dallas TX	13815am			
1300-1400	USA, KNLS Anchor Point AK	7365as			
1300-1400	USA, KTBN Salt Lk City UT	7510am			
1300-1400	USA, KWHR Naalehu HI	6020pa	9930as		
1300-1400	USA, Monitor Radio Intl	6095na	9355as	9430as	9455am
1300-1330	USA, Voice of America	6160as	9645as	9760as	11715as
		15160as	15425as		
1300-1400	USA, WEWN Birmingham AL	7425na	11875na	15375sa	15745eu
1300-1400	USA, WGTG McCaysville GA	9400am			
1300-1400	USA, WHRI Noblesville IN	6040am	15105am		
1300-1400	USA, WJCR Upton KY	7490na			
1300-1400	USA, WRMI/R Miami Intl	9955am			
1300-1400	USA, WRNO New Orleans LA	7355am			
1300-1400 as	USA, WVHA Greenbush ME	15745na			
1300-1400	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1300-1400	USA, WYFR Okeechobee FL	5950na	11830na	13695na	17750na
1300-1400	Zambia, Christian Voice	6065af			
1300-1400 vl	Zambia, R Zambia/ZNBC 1	7220do			
1302-1400	USA, WYFR Okeechobee FL	11550as			
1330-1400	Canada, R Canada Intl	9535as	11795as	11935eu	15325me
		17820af			
1330-1400	China, Heilongjiang PBS	4840do			
1330-1400	Guam, AWR/KSDA	9650as			
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400 vl	Italy, IRRS	3985va			
1330-1400	Netherlands, Radio	9890as	12090as	15585as	
1330-1400 vl	Pakistan, Radio	9485af	11565af	15595me	
1330-1400 mtwhf	Portugal, R Portugal Intl	21515as			
1330-1400	Sweden, Radio	11650na	13740pa	15240na	
1330-1355	UAE, Radio Dubai	15395eu	17630eu	21605me	
1330-1400	Uzbekistan, R Tashkent	7285as	9715as	15295as	
1330-1400	Vietnam, Voice of	5940eu	7270eu	7400eu	9840as
		12020eu	15010as		
1335-1345	Greece, Voice of	9375eu	9590na	15175na	15630na
1345-1400	Vatican State, Vatican R	11625as	13765au		
1350-1400	South Korea, KBS-1	3930do			
1355-1400	Georgia, Voice of Hope	12120as			

Selected Programs

Sundays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Country Club. See S 1205.
1310 USA, VOA Washington DC (as): Critic's Choice. The performing arts in America.
1330 R Romania Intl: Panorama (Radio Tour). Holiday opportunities, trekking, leisure, picturesque landscape, fun, hunting, fishing, cooking tips, stamp collecting, and hobby land.
1330 USA, VOA (as): News (Special English). See S 0030.
1340 USA, VOA Washington DC (as): Words and Their Stories (Special English). See S 0040.
1345 USA, VOA Washington DC (as): People in A nerica (Special English). See S 0045.

Mondays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Music. A short interval of popular music.
1310 USA, VOA (as): All About English. See S 0010.
1315 Australia, Radio: The Planet. Lucky Oceans plays richly varied music from around the world.
1330 Romania, R Romania Intl: Panorama (Pro Memoria). History, archaeology, numismtics, treasures, museums, the trail of time and living history.
1330 USA, VOA (as): News (Special English). See S 0030.
1340 USA, VOA Washington DC (as): Development Report (Special English). See M 0040.
1345 USA, VOA Washington DC (as): This is America (Special English). See M 0045.

Tuesdays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Music. See M 1305.
1310 USA, VOA (as): All About English. See S 0010.
1315 Australia, Radio: The Planet. See M 1315.
1330 R Romania Intl: Panorama (Business Club). Economic agenda, world trade, investments in Romania, legislation, the stock exchange, business opportunities, and market wrap.
1330 USA, VOA (as): News (Special English). See S 0030.
1340 USA, VOA (as): Agriculture Report (Special English). See T 0040.
1345 USA, VOA Washington DC (as): Science in the News (Special English). See T 0045.

Wednesdays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Music. See M 1305.
1310 USA, VOA (as): All About English. See S 0010.
1315 Australia, Radio: The Planet. See M 1315.
1330 Romania, R Romania Intl: Panorama (Society). Everyday life, grassroot people, "why me?" frame of mind, she and he, the third age, and point-counterpoint.
1330 USA, VOA (as): News (Special English). See S 0030.
1340 USA, VOA (as): Science Report (Special English). See W 0040.
1345 USA, VOA Washington DC (as): Exploration (Special English). See W 0045.
1354 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (3rd). See W 1254.
1354 Radio Netherlands: Documentary. Indian Tiger Extinction (24th). See F 2354.
1354 Radio Netherlands: Documentary. Social Cost of Transformation (17th). See F 1454.
1354 Radio Netherlands: Documentary. Take the Low Road (10th). See A 2354.

Thursdays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Music. See M 1305.
1310 USA, VOA (as): All About English. See S 0010.
1315 Australia, Radio: The Planet. See M 1315.
1330 Romania, R Romania Intl: Panorama (Citizens of the Same Country). What brings us together, destiny, religion, who we are, and identities and standards.
1340 USA, VOA Washington DC (as): Science Report (Special English). See W 0040.
1345 USA, VOA Washington DC (as): The Making of a Nation (Special English). See H 0045.

Fridays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Music. See M 1305.
1310 USA, VOA (as): All About English. See S 0010.
1330 Australia, Radio: The Planet. See M 1315.
1330 Romania, R Romania Intl: Panorama (European Option). Toward Europe in the areas of legislation, pluralism, reform competition, cultural horizons, defense, stability, and communication.
1330 USA, VOA (as): News (Special English). See S 0030.
1340 USA, VOA Washington DC (as): Environment Report (Special English). See F 0040.
1345 USA, VOA Washington DC (as): American Mosaic (Special English). See F 0045.

Saturdays

1300 Australia, Radio: RA News. See S 0000.
1300 Romania, R Romania Intl: Info Plus. See S 0200.
1300 USA, VOA Washington DC (as): VOA News. See S 0000.
1305 Australia, Radio: Other Worlds. See A 1205.
1310 USA, VOA Washington DC (as): The American Agenda. An in-depth look at American political, economic, social, and financial issues.
1330 R Romania Intl: Panorama (World of Culture). See S 0230.
1330 USA, VOA Washington DC (as): News (Special English). See S 0030.
1340 USA, VOA (as): In the News (Special English). Focus on a person, organization, or issue in news reports.
1345 USA, VOA Washington DC (as): American Stories (Special English). See A 0045.

1400 UTC SHORTWAVE GUIDE 10:00 AM EDT 7:00 AM PDT

Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500	Australia, Radio	5870pa	5995pa	9415va	11800pa
1400-1500 vl	Australia, VL8A Alice Spg	2310do			
1400-1500 vl	Australia, VL8K Katherine	2485do			
1400-1500 vl	Australia, Vl8T Tent Crk	2325do			
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1500 s	Canada, R Canada Intl	11855am	13650am		
1400-1500	China, China Radio Intl	6140as	7160as	7405na	9535as
		11825as			
1400-1500	Ecuador, HCJB	12005am	15115am	21455am	
1400-1500 as	Eqt Guinea, R East Africa	15186af			
1400-1457	France, Radio France Intl	11910as	15405me	17560me	
1400-1500	Georgia, Voice of Hope	12120as			
1400-1500	India, All India Radio	9545as	11620as	13710as	
1400-1430	Israel, Kol Israel	12080na	15650na		
1400-1500 vl	Italy, IRRS	3985va			
1400-1500	Japan, R Japan/NHK World	7200eu			
1400-1500	Jordan, Radio	11690eu			
1400-1500	Malaysia, Radio	7295do			
1400-1500	Malaysia, RTM Kuching	7160do			
1400-1500 vl	Malaysia,RTM KotaKinabalu	5980do			
1400-1430	Mexico, Radio Mexico Intl	9705na			
1400-1500	Netherlands, Radio	9890as	12090as	15585as	
1400-1500 occsnal	New Zealand, R NZ Intl	6100pa			
1400-1410	Pakistan, Radio	9485af	11565af	15595me	
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC/R Intl	11995as			
1400-1500	Russia,Voice of Russia WS	4740me	4940me	4975me	9595me
		11665me	11835me	11985me	15350me
		15430me	15540me		
1400-1500	Singapore,R Corp of Sing	6155do			
1400-1500	Sri Lanka, Sri Lanka BC	9730as			
1400-1430	Thailand, Radio	9655as	9830as	11905as	
1400-1410 thfs	Turkmenistan, Turkmen R	5015eu			
1400-1500	United Kingdom, BBC WS	5990as	6190af	6195as	9410eu
		9515am	9740as	11750as	11865am
		11940af	12095eu	15220am	15485va
		15565as	15575va	17640va	17830af
		17840am	21470af	21660af	
1400-1500	USA, KAIJ Dallas TX	13815am			
1400-1500	USA, KJES Mesquite NM	11715na			
1400-1500	USA, KTBN Salt Lk City UT	7510am			
1400-1500	USA, KWHR Naalehu HI	6020pa	9930as		
1400-1500	USA, Monitor Radio Intl	9355as			
1400-1500	USA, Voice of America	6160as	7125as	7215as	9645as
		9760as	15160as	15225va	15395as
		15425as			
1400-1500	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1400-1500	USA, WGTG McCaysville GA	9400am			
1400-1500	USA, WHRI Noblesville IN	6040am	15105am		
1400-1500	USA, WJCR Upton KY	7490na			
1400-1500	USA, WRMI/R Miami Intl	9955am			
1400-1500	USA, WRNO New Orleans LA	7355am			
1400-1500 as	USA, WVHA Greenbush ME	15745na			
1400-1500	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1400-1500	USA, WYFR Okeechobee FL	5950na	11830na	17750ca	
1400-1405	Vatican State, Vatican R	11625as	13765au		
1400-1500	Zambia, Christian Voice	6065af			
1400-1500 vl	Zambia, R Zambia/ZNBC 1	4910do			
1415-1430 vl	Cyprus, BRT International	6150do			
1415-1427	Nepal, Radio	5005do	7165do		
1420-1500 as	Palau, KHBN/Voice of Hope	9985as			
1430-1500 vl	China, China Radio Intl	8660as	9880as		
1430-1500	Guam, AWR/KSDA	7400as			
1430-1440	India, All India Radio	6150do	9565do	9835do	
1430-1440 mtwhf	Indonesia, RRI Uj Pandang	4753do			
1430-1500	Romania, R Romania Intl	15335as	17720as		
1430-1500 vl	Zambia, R Zambia/ZNBC 2	6165do			
1440-1500	Myanmar, Voice of	5990do			

Selected Programs

Sundays

1400 Australia, Radio: RA News. See S 0000.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1401 UK, BBC London (All): International Question Time. Join Sheena McDonald for another series of global phone-ins. Listeners can put their questions to a distinguished panel of guest on issues of interest to a worldwide audience.
1405 Australia, Radio: Sound Quality. Tim Ritchie of National Radio presents innovations in contemporary music.
1410 USA, VOA Washington DC (as/eu): The Concert Hall. Classical music and interviews with America's great artists and conductors.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1445 UK, BBC London (AE): Letter from America. Alistair Cooke presents essays about life in the USA.
1457 USA, VOA Washington DC (as/eu): VOA Editorial. Comments expressing the official position of the U.S. Government on various subjects.

Mondays

1400 Australia, Radio: RA News. See S 0000.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1405 Australia, Radio: Radio National Overnight. See S 1505.
1410 USA, VOA Washington DC (as/as/eu): Asia Report. Correspondents' reports and background on the news, with emphasis on events in East and South Asia and the Pacific.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1445 UK, BBC London (AS): The Way We Are (1st,8th). See M 0145.
1457 USA, VOA Washington DC (am/as/eu): VOA Editorial. See S 1457.

Tuesdays

1400 Australia, Radio: RA News. See S 0000.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1405 Australia, Radio: The Planet. See M 1315.
1410 USA, VOA Washington DC (as/eu): Asia Report. See M 1410.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1457 USA, VOA Washington DC (as/eu): VOA Editorial. See S 1457.

Wednesdays

1400 Australia, Radio: RA News. See S 0000.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1405 Australia, Radio: The Planet. See M 1315.
1410 USA, VOA Washington DC (as/eu): Asia Report. See M 1410.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1457 USA, VOA Washington DC (as/eu): VOA Editorial. See S 1457.

Thursdays

1400 Australia, Radio: RA News. See S 0000.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1405 Australia, Radio: The Planet. See M 1315.
1410 USA, VOA Washington DC (as/eu): Asia Report. See M 1410.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1457 USA, VOA Washington DC (as/eu): VOA Editorial. See S 1457.

Fridays

1400 Australia, Radio: RA News. See S 0000.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1405 Australia, Radio: The Planet. See M 1315.
1410 USA, VOA Washington DC (as/eu): Asia Report. See M 1410.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1454 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (5th). See W 1254.
1454 Radio Netherlands: Documentary. Indian Tiger Extinction (26th). See F 2354.
1454 Radio Netherlands: Documentary. Social Cost of Transformation (19th). Eric Beauchemin reports or the transition from centrally-planned to market economies in former Communist bloc countries.
1454 Radio Netherlands: Documentary. Take the Low Road (12th). See A 2354.
1457 USA, VOA Washington DC (as/eu): VOA Editorial. See S 1457.

Saturdays

1400 Australia, Radio: Radio National News. See S 1600.
1400 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1405 Australia, Radio: Other Worlds. See A 1205.
1410 USA, VOA Washington DC (as/eu): Music USA (Jazz). Willis Conover hosts the VOA jazz hour.
1430 Romania, R Romania Intl: Info Plus. See S 0200.
1457 USA, VOA Washington DC (as/eu): VOA Editorial. See S 1457.

Hauser's Highlights

POLAND [non]: R. Maryja

via Samara, Russia
1500-2000 on 12010,
2000-2200 on 7400;
includes Vatican Polish 1800-1820
eight seconds delayed
(*PanIview*, Bulgaria via *BC-DX*)
To catch any naughty words? (gh)

Your Name in Lights!

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

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600	Australia, Radio	5870pa	5995pa	9615as	11660as
		11800pa			
1500-1600 vl	Australia, VL8A Alice Spg	2310do			
1500-1600 vl	Australia, VL8K Katherine	2485do			
1500-1600 vl	Australia, VL8T Tent Crk	2325do			
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1600 s	Canada, R Canada Intl	11855am	13650am		
1500-1600	China, China Radio Intl	7160as	7405na	9535as	9785as
1500-1600	Costa Rica,RF Peace Intl	7385am	15050am		
1500-1600	Ecuador, HCJB	12005am	15115am	21455am	
1500-1600 as	Eqt Guinea, R East Africa	15186af			
1500-1600	Georgia, Voice of Hope	12120as			
1500-1600	Guam, TWR/KTWR	11580as			
1500-1600 a	Ireland,W Coast R Ireland	6175eu			
1500-1525	Israel, Kol Israel	9435eu	11695as	15640ca	
1500-1600 vl	Italy, IRRS	3985va			
1500-1600	Japan, R Japan/NHK World	7200af	7240af	9535na	9750as
		11730af	15355af		
1500-1600	Jordan, Radio	11690eu			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600 vl	Malaysia, RTM Kuching	7160do			
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	9705na			
1500-1530	Mongolia, Voice of	9720as	12085au		
1500-1515 s	Myanmar, Voice of	5990do			
1500-1525	Netherlands, Radio	9890as	12090as	15585as	
1500-1600 occsnal	New Zealand, R NZ Intl	6100pa			
1500-1600	Nigeria, Voice of	7255af			
1500-1550	North Korea, R Pyongyang	4405eu	9325eu	9640eu	9975na
		13785me			
1500-1530 s	Norway, Radio Norway Intl	9985as	13805as		
1500-1530 as	Palau, KHBN/Voice of Hope	9985as			
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Philippines, FEBC/R Intl	11995as			
1500-1526	Romania, R Romania Intl	15335as	17720as		
1500-1600	Russia,Voice of Russia WS	4740me	4940me	4975me	9440af
		9595me	9675me	11775af	11835me
		12025af	12035af	15320me	15430af
		15460me	15540me	17525me	
1500-1600 sm	Russia,Voice of Russia WS	7325me	9730eu		
1500-1600 mtwhfa	Seychelles, FEBA Radio	9810as			
1500-1530 mt fa	Seychelles, FEBA Radio	11600as			
1500-1600	Singapore,R Corp of Sing	6155do			
1500-1600	United Kingdom, BBC WS	5975as	5990as	6190af	6195as
		9410eu	9515am	9740as	11750as
		11865am	11940af	12095as	15220am
		15400af	15485af	15565va	15575va
		17705af	17830af	17840am	21470af
		21660af			
1500-1530	United Kingdom, BBC WS	11860af	15420af	17880af	21490af
1500-1600	USA, KAIJ Dallas TX	13815am			
1500-1600	USA, KJES Mesquite NM	11715na			
1500-1600	USA, KTBN Salt Lk City UT	15590am			
1500-1600	USA, KWHR Naalehu HI	6020pa	9930as		
1500-1600	USA, Voice of America	6160as	7125as	7215as	9645as
		9700me	9760as	15205as	15255va
		15395as			
1500-1600	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1500-1600	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600	USA, WJCR Upton KY	7490na			
1500-1600	USA, WRMI/R Miami Intl	9955am			
1500-1600	USA, WRNO New Orleans LA	7355am			
1500-1600 as	USA, WVHA Greenbush ME	15745va			
1500-1600	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1500-1600	USA, WYFR Okeechobee FL	11830na	17750ca		
1500-1600	Zambia, Christian Voice	6065af			
1500-1600 vl	Zambia, R Zambia/ZNBC 1	4910do			
1500-1600 vl	Zambia, R Zambia/ZNBC 2	6165do			
1515-1530 mtwhf	Estonia, Radio	5925eu			
1530-1545	India, All India Radio	6150do	7140do	7410do	9565do
		9835do	11740do		
1530-1600	Iran, VOIRI	7215as	11790as		
1530-1545 sm	Seychelles, FEBA Radio	11600as			
1530-1600 mtwhf	Sri Lanka, Sri Lanka BC	9730as			
1545-1600 sh	Bangladesh, Bangla Betar	4880do			
1545-1600	Israel, Kol Israel	12080va	15650va		
1545-1600	Pakistan, Radio	9425as	9515as	11570af	11955af
		13590af	15555af		
1550-1600	Vatican State, Vatican R	9940as	13765as		

Selected Programs

Sundays

1500 Australia, Radio: RA News. See S 0000.
1500 R Romania Intl: Panorama (Radio Tour). See S 1330.
1500 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1501 UK, BBC London (AF/AS): Waveguide (20th). See W 1230.
1505 Australia, Radio: Radio National Overnight. News, current affairs, music and feature programs.
1510 USA, VOA (as/eu): New Horizons. See S 1110.
1515 UK, BBC London (AF): The Learning World. See H 0545.
1515 UK, BBC London (AS to South As only): Waveguide (20th). See W 1230.
1530 USA, VOA (as/eu): News (Special English). See S 0030.
1540 USA, VOA Washington DC (as/eu): Words and their Stories (Special English). See T 0106.
1545 USA, VOA Washington DC (as/eu): People in America (Special English). See S 0045.

Mondays

1500 Australia, Radio: RA News. See S 0000.
1500 R Romania Intl: Panorama (Pro Memoria). See M 1330.
1500 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1505 Australia, Radio: Radio National Overnight. See S 1505.
1510 USA, VOA (as/eu): All About English. See S 0010.
1513 Australia, Radio: The Health Report. A program that examines health issues and makes complex scientific data understandable.
1515 UK, BBC (AE/AS): Encyclopaedia Historica. See S 0130.
1530 USA, VOA Washington DC (as/eu): News (Special English). See S 0030.
1540 USA, VOA Washington DC (as/eu): Development Report (Special English). See M 0040.
1545 USA, VOA Washington DC (as/eu): This is America (Special English). See M 0045.

Tuesdays

1500 Australia, Radio: RA News. See S 0000.
1500 R Romania Intl: Panorama (Business Club). See T 1330.
1500 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1505 Australia, Radio: The Law Report. Susanna Lobez brings an insider's perspective to the complexities of the law.
1510 USA, VOA (as/eu): All About English. See S 0010.
1515 UK, BBC London (AE): Earth, Air, Fire and Water (2nd,9th). See T 0030.
1530 USA, VOA Washington DC (as/eu): News (Special English). See S 0030.
1535 Australia, Radio: Indian Pacific. News and analysis from across the Pacific and Asia with Di Martin.
1540 USA, VOA Washington DC (as/eu): Agriculture Report (Special English). See T 0040.
1545 USA, VOA Washington DC (as/eu): Science in the News (Special English). See T 0045.

Wednesdays

1500 Australia, Radio: RA News. See S 0000.
1500 Romania, R Romania Intl: Panorama (Society). See W 1330.
1500 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1505 Australia, Radio: Radio National Overnight. See S 1505.
1510 USA, VOA (as/eu): All About English. See S 0010.
1530 USA, VOA (as/eu): News (Special English). See S 0030.
1535 Australia, Radio: Indian Pacific. See T 1535.
1540 USA, VOA Washington DC (as/eu): Science Report (Special English). See W 0040.
1545 USA, VOA Washington DC (as/eu): Exploration (Special English). See W 0045.
1554 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (3rd). See W 1254.
1554 Radio Netherlands: Documentary. Indian Tiger Extinction (24th). See F 2354.
1554 Radio Netherlands: Documentary. Social Cost of Transformation (17th). See F 1454.
1554 Radio Netherlands: Documentary. Take the Low Road (10th). See A 2354.

Thursdays

1500 Australia, Radio: RA News. See S 0000.
1500 Romania, R Romania Intl: Panorama (Citizens of the Same Country). See H 1330.
1500 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1505 Australia, Radio: Radio National Overnight. See S 1505.
1510 USA, VOA (as/eu): All About English. See S 0010.
1530 USA, VOA Washington DC (as/eu): News (Special English). See S 0030.
1540 USA, VOA Washington DC (as/eu): Science Report (Special English). See W 0040.
1545 USA, VOA Washington DC (as/eu): The Making of a Nation (Special English). See H 0045.

Fridays

1500 Australia, Radio: RA News. See S 0000.
1500 Romania, R Romania Intl: Panorama (European Option). See F 1330.
1500 USA, VOA (as/eu): VOA News. See S 0000.
1505 Australia, Radio: Radio National Overnight. See S 1505.
1510 USA, VOA (as/eu): All About English. See S 0010.
1530 USA, VOA Washington DC (as/eu): News (Special English). See S 0030.
1540 USA, VOA Washington DC (as/eu): Environment Report (Special English). See F 0040.
1545 USA, VOA Washington DC (as/eu): American Mosaic (Special English). See F 0045.

Saturdays

1500 Australia, Radio: Radio National News. See S 1600.
1500 Romania, R Romania Intl: Panorama (World of Culture). See S 0230.
1500 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1505 Australia, Radio: Radio National Overnight. See S 1505.
1510 USA, VOA (as): Agriculture Today. See A 1110.
1510 USA, VOA (eu): The American Agenda. See A 1310.
1530 USA, VOA (as): Press Conference USA. See A 1130.
1530 USA, VOA (eu): News (Special English). See S 0030.
1540 USA, VOA Washington DC (eu): In the News (Special English). See A 1340.
1545 USA, VOA Washington DC (eu): American Stories (Special English). See A 0045.

1600 UTC SHORTWAVE GUIDE 12:00 M EDT 9:00 AM PDT

Frequencies

1600-1700	Algeria, R Algiers Intl	15161me			
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700	Australia, Radio	5870pa	5995pa	6080pa	9615pa
		11660pa			
1600-1700 vl	Australia, VL8A Alice Spg	2310do			
1600-1700 vl	Australia, VL8K Katherine	2485do			
1600-1700 vl	Australia, VL8T Tent Crk	2325do			
1600-1610	Bangladesh, Bangla Betar	4880do	15520do		
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1700	China, China Radio Intl	15110af	15130af		
1600-1700 as	Costa Rica, Adv World R	9725am	11870am	13750am	
1600-1700	Costa Rica, RF Peace Intl	7385am			
1600-1627	Czech Rep, Radio Prague	5930eu	17485af		
1600-1700	Ethiopia, Radio	7165af	9560af	11800af	
1600-1654	France, Radio France Intl	11615me	11700af	12015af	15210af
		15460af	15530af		
1600-1650	Germany, Deutsche Welle	6170as	7185af	7225as	9735af
		9875as	11810af	13690as	17800af
1600-1630	Guam, TWR/KTWR	11580as			
1600-1630	Iran, VOIRI	7215as	11790as		
1600-1700 vl	Italy, IRRS	3985va			
1600-1630	Jordan, Radio	11690eu			
1600-1610	Lesotho, Radio Lesotho	4800do			
1600-1700	Malaysia, Radio	7295do			
1600-1650 occsnal	New Zealand, R NZ Intl	6100pa			
1600-1700	Nigeria, Voice of	7255af			
1600-1630	Pakistan, Radio	9485af	11565as	11935as	15570af
		15595me			
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	7290eu	7350eu	7440af	9440af
		9615af	9730eu	9765eu	9775eu
		9880eu	9975af	11685af	11725af
		11775af	11850af	11945af	12025af
		15350af	15430eu	17525me	17875af
1600-1630	S Africa, Channel Africa	6120af	9685af		
1600-1700	Singapore,R Corp of Sing	6155do			
1600-1700	South Korea, R Korea Intl	5975eu	9515af	9870af	
1600-1700	Swaziland, Trans World R	9500af			
1600-1630	Switzerland, Swiss R Intl	12075as	13635as	15530as	
1600-1640	UAE, Radio Dubai	15395me	17630eu		
1600-1700	United Kingdom, BBC WS	3255af	3915as	5975as	6190af
		7160as	7275as	9410eu	11750as
		12095eu	15400af	15485eu	15565me
		15575va	17830af	17840am	21470af
		21660af			
1600-1615	United Kingdom, BBC WS	5990as	6195as	9515am	9740as
1600-1700	USA, KAIJ Dallas TX	13815am			
1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1700	USA, KWHR Naalehu HI	6020pa	9930as		
1600-1700	USA, Monitor Radio Intl	18930af			
1600-1700	USA, Voice of America	6035af	6110as	6160as	7125as
		7215as	9645as	9700me	9760as
		13600af	13710af	15205va	15225af
		15255va	15395as	15410af	15445af
		17895af			
1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1600-1700	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
1600-1700	USA, WJCR Upton KY	7490na			
1600-1700 smtwhf	USA, WMLK Bethel PA	9465eu			
1600-1700	USA, WRMI/R Miami Intl	9955am			
1600-1700	USA, WRNO New Orleans LA	7355am			
1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700	USA, WYFR Okeechobee FL	11550as	11705na	11830na	15695eu
		17750eu	21525af	21745eu	
1600-1610	Vatican State, Vatican R	9940as	11635as		
1600-1630	Vatican State, Vatican R	4005eu	5882eu	7250eu	9645eu
		11810eu			
1600-1630	Vietnam, Voice of	9840af	15010af		
1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700 vl	Zambia, R Zambia/ZNBC 1	4910do			
1600-1700 vl	Zambia, R Zambia/ZNBC 2	6165do			
1610-1615	Bangladesh, Bangla Betar	4880do			
1615-1700 as	United Kingdom, BBC WS	9515am	11860af	15420af	
1630-1655	Austria, R Austria Intl	6155eu	9655eu	11855me	13710as
		13730af			
1630-1657	Canada, R Canada Intl	7150as	9550as		
1630-1700	Egypt, Radio Cairo	15255af			
1630-1700	Georgia, Radio	6180eu			
1630-1700	Slovakia, AWR Europe	11600af	13580me		
1630-1700	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1645-1700 irreg	Afghanistan, Radio	7200as			
1645-1700	Tajikistan,Radio Dushanbe	7245as	9905as		
1650-1700	Eqt Guinea, Radio Africa	15186af			
1650-1700 mtwhf	New Zealand, R NZ Intl	6145pa			

Selected Programs

Sundays

1600 Australia, Radio: Radio National News. News from the Australian Broadcasting Network (ABC).
1600 USA, VOA Washington DC (af): Nightline Africa. News, correspondent reports, backgrounders, and features on world and African issues.
1600 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1605 Australia, Radio: National Radio Programming. Various programs from Australia's ABC Radio.
1610 USA, VOA Washington DC (as/eu): Encounter. See S 1210.
1630 USA, VOA Washington DC (af): News Summary. A five-minute wrap-up of the hour's news.
1630 USA, VOA (as/eu): News (Special English). See S 0030.
1640 USA, VOA Washington DC (as/eu): Words and Their Stories (Special English). See S 0040.
1645 USA, VOA Washington DC (as/eu): People in America (Special English). See S 0045.
1657 USA, VOA Washington DC (af): VOA Editorial. See S 1457.

Mondays

1600 Australia, Radio: RA News. See S 0000.
1600 USA, VOA (af): News (Special English). See S 0030.
1600 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1605 Australia, Radio: Music Deli. Paul Petran present music from a variety of cultures.
1610 USA, VOA Washington DC (af): Development Report (Special English). See M 0040.
1610 USA, VOA Washington DC (as/eu): Mideast Edition. News events, issues, people, and culture for listeners in the Middle East and south Asia, featuring on-the-scene reports and interviews with newsmakers.
1615 USA, VOA Washington DC (af): This is America (Special English). See M 0045.
1630 USA, VOA Washington DC (af): Africa World Tonight. News, sports, correspondent reports, backgrounders, and features on world and African issues.
1630 USA, VOA Washington DC (as): Now Music USA. Rock and soul hits of today and yesterday.
1630 USA, VOA Washington DC (eu): American Gold. See M 1110.

Tuesdays

1600 Australia, Radio: RA News. See S 0000.
1600 USA, VOA Washington DC (af): News (Special English). See S 0030.
1600 USA, VOA (as/eu): VOA News. See S 0000.
1605 Australia, Radio: Radio National Overnight. See S 1505.
1610 USA, VOA Washington DC (af): Agriculture Report (Special English). See T 0040.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 USA, VOA Washington DC (af): Science in the News (Special English). See T 0045.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (as/eu): Now Music USA. See M 1630.
1635 Australia, Radio: The Comfort Zone. Architecture and design, gardens, food and travel with Alan Saunders.

Wednesdays

1600 Australia, Radio: RA News. See S 0000.
1600 USA, VOA (af): News (Special English). See S 0030.
1600 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1605 Australia, Radio: National Radio Programming. See S 1605.
1610 USA, VOA Washington DC (af): Science Report (Special English). See W 0040.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 USA, VOA Washington DC (af): Exploration (Special English). See W 0045.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (as/eu): Now Music USA. See M 1630.
1635 Australia, Radio: Arts Talk. Julie Copeland discusses arts and cultural ideas with a studio guest.

Thursdays

1600 Australia, Radio: RA News. See S 0000.
1600 USA, VOA (af): News (Special English). See S 0030.
1600 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1605 Australia, Radio: Hindsight. Michelle Rayner presents current events from an historical perspective.
1610 USA, VOA Washington DC (af): Science Report (Special English). See W 0040.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 USA, VOA Washington DC (af): The Making of a Nation (Special English). See H 0045.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA Washington DC (eu): Now Music USA (Top 20 Countdown). News from the music world and the top hits of the week in the USA.

Fridays

1600 Australia, Radio: RA News. See S 0000.
1600 USA, VOA Washington DC (af): News (Special English). See S 0030.
1600 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1605 Australia, Radio: Radio National Overnight. See S 1505.
1610 USA, VOA Washington DC (af): Environment Report (Special English). See F 0040.
1610 USA, VOA (as/eu): Mideast Edition. See M 1610.
1615 USA, VOA Washington DC (af): American Mosaic (Special English). See F 0045.
1630 USA, VOA (af): Africa World Tonight. See M 1630.
1630 USA, VOA (as): Country Music USA. See F 1130.
1630 USA, VOA Washington DC (eu): Now Music USA (Top 20 Countdown). See H 1630.

Saturdays

1600 Australia, Radio: Radio National Overnight. See S 1505.
1600 USA, VOA Washington DC (af): Nightline Africa. See S 1600.
1600 USA, VOA Washington DC (as/eu): VOA News. See S 0000.
1610 USA, VOA Washington DC (as/eu): On the Line. See A 1210.
1630 USA, VOA Washington DC (af): News Summary. See S 1630.
1630 USA, VOA Washington DC (as/eu): Press Conference USA. See A 1130.
1655 USA, VOA Washington DC (af): VOA Editorial. See S 1457.

FREQUENCIES

1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800	Australia, Radio	5870pa	6080pa	6355va	9415va
		9615as	11880pa		
1700-1800 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8K Katherine	2485do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1800	China, China Radio Intl	5220af	7150af	7160af	7405af
		9570af	11910af		
1700-1800	Costa Rica,RF Peace Intl	15050am			
1700-1727	Czech Rep, Radio Prague	5930eu	15640af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	15210af	15460me		
1700-1800	Georgia, Voice of Hope	9310eu			
1700-1800	Japan, R Japan/NHK World	6035na	7110na	7200na	7225na
		9535na	9835na	11730as	11880as
1700-1800 mtwhf	New Zealand, R NZ Intl	6145pa			
1700-1750	North Korea, R Pyongyang	4405eu	9325eu	9640af	9975af
		13785me			
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1755	Poland, Polish R Warsaw	6000eu	6095eu	7285eu	
1700-1800	Russia,Voice of Russia WS	7440af	9440af	9765eu	9775eu
		9865eu	9880eu	9945af	11775af
		17875af			
1700-1730	S Africa, Channel Africa	11900af			
1700-1730	Slovakia, AWR Europe	15620af			
1700-1730	Spain, R Exterior Espana	9620eu			
1700-1800	Swaziland, Trans World R	9500af			
1700-1730	Switzerland, Swiss R Intl	9905eu			
1700-1800	United Kingdom, BBC WS	3255af	5975as	6090va	6190af
		6195eu	7160as	9410eu	9510as
		11750as	12095eu	15400af	15420af
		15485eu	15575va	17830af	17840af
1700-1745	United Kingdom, BBC WS	3915as	9630af	11860af	
1700-1800	USA, KAIJ Dallas TX	13815am			
1700-1800	USA, KTBN Salt Lk City UT	15590am			
1700-1800	USA, KWHR Naalehu HI	6020pa	9930as		
1700-1800	USA, Voice of America	6110as	6160as	7125as	7170as
		9645as	9700me	9760af	15255va
		15395as	15445af	17895af	
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	7150as	9550as
		9770as	11870as	15135as	
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1700-1800	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	9495am	13760am		
1700-1800	USA, WINB Red Lion PA	15715af			
1700-1800	USA, WJCR Upton KY	7490na			
1700-1800 smtwhf	USA, WMLK Bethel PA	9465eu			
1700-1800	USA, WRMI/R Miami Intl	9955am			
1700-1800	USA, WRNO New Orleans LA	7355am			
1700-1800 mtwhf	USA, WVHA Greenbush ME	11580af			
1700-1800	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1700-1800	USA, WYFR Okeechobee FL	11550as	15695eu	21745eu	
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800 vl	Zambia, R Zambia/ZNBC 1	4910do			
1700-1800 vl	Zambia, R Zambia/ZNBC 2	6165do			
1700-1800 vl	Zimbabwe, Zimbabwe BC	4828do			
1730-1800 vl	Cyprus, BRT International	6150do			
1730-1800 mtwhf	Georgia, Radio	6080eu			
1730-1800	Guam, AWR/KSDA	9370as			
1730-1800	Netherlands, Radio	6020af	7120af	11655af	
1730-1740	Pakistan, Radio	4950as			
1730-1800	Philippinas, R Pilipinas	11720me	11890me	15190me	
1730-1756	Romania, R Romania Intl	9550af	11940af	15340af	
1730-1800 mtwh	Swaziland, Trans World R	3200af			
1730-1800	Sweden, Radio	6065eu	13800va		
1730-1800 s	Sweden, Radio	9590eu	13800va		
1730-1759	Vatican State, Vatican R	11625af	15570af	17550af	
1745-1800	Bangladesh, Bangla Betar	7190as	9570eu	15320do	
1745-1800	India, All India Radio	7410eu	9650eu	9950af	11620af
		11935af	13780do	15075me	
1745-1800	Swaziland, Trans World R	3200af			
1755-1800	Georgia, Voice of Hope	9310eu			
1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900	Australia, Radio	6080as	9415va	9615as	11880pa
1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1800-1900 vl	Australia, VL8K Katherine	2485do			
1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1800-1900	Bangladesh, Bangla Betar	7190eu	9570as	15520do	
1800-1825 mtwhfa	Belgium, R Vlaanderen Int	5910eu	13645af		
1800-1900	Brazil, Radio Bras	15265eu			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	15050am			
1800-1808	Croatia, Croatian Radio	5895eu	7165eu	9595va	13830na
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900	Eqt Guinea, Radio Africa	15186af			
1800-1900	Georgia, Voice of Hope	9310eu			
1800-1900	India, All India Radio	7410eu	9650eu	9950af	11620af
		11935me	13770as	13780as	15075as
1800-1900 vl	Italy, IRRS	3985va			
1800-1900 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
1800-1900	Kuwait, Radio	11990na	15505na		
1800-1900 s	Morocco, RTVM Marocaine	17815af			
1800-1825	Netherlands, Radio	6020af	7120af	11655af	
1800-1900 mtwhf	New Zealand, R NZ Intl	6145pa			
1800-1830 s	Norway, Radio Norway Intl	7485eu	9590me	15220af	
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900 vl	Philippines, R Pilipinas	11720me	11890me	15190me	
1800-1900	Russia,Voice of Russia WS	7290eu	7295af	7350eu	9440af
		9675af	9775eu	9785af	9810eu
		9865eu	9880eu	9945eu	9975af
		11775af	11945af	11985af	
1800-1900 as	S Africa, World Music R	3345eu	6290af		
1800-1900	Sudan, Radio Omdurman	9200af			
1800-1900	Swaziland, Trans World R	3200af			
1800-1830	Swaziland, Trans World R	9500af			
1800-1900	United Kingdom, BBC WS	3255af	6180eu	6190af	6195eu
		9410va	12095eu	15400af	15420af
		15485va	15575va	17830af	
1800-1830	United Kingdom, BBC WS	5975as	6090va	9510as	21490af
1800-1900	USA, KAIJ Dallas TX	13815am			
1800-1900	USA, KJES Mesquite NM	15385na			
1800-1900	USA, KTBN Salt Lk City UT	15590am			
1800-1900	USA, KWHR Naalehu HI	6020pa	13625as		
1800-1900	USA, Monitor Radio Intl	9385af	13770eu	15665eu	
1800-1900	USA, Voice of America	7415af	9760af	11975af	15410af
		15580af	17895af		
1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1800-1900	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRI Noblesville IN	9495am	13760eu		
1800-1900	USA, WINB Red Lion PA	15715af			
1800-1900	USA, WJCR Upton KY	7490na			
1800-1900 smtwhf	USA, WMLK Bethel PA	9465eu			
1800-1900 as	USA, WRMI/R Miami Intl	9955am			
1800-1900	USA, WRNO New Orleans LA	7355am			
1800-1900 smtwhf	USA, WVHA Greenbush ME	15715af			
1800-1900	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1800-1900	USA, WYFR Okeechobee FL	15695eu	17555eu		
1800-1827	Vietnam, Voice of	9840eu	15010eu		
1800-1900	Yemen, Radio Aden	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900 vl	Zambia, R Zambia/ZNBC 1	4910do			
1800-1900 vl	Zambia, R Zambia/ZNBC 2	6165do			
1800-1900 vl	Zimbabwe, Zimbabwe BC	4828do			
1805-1830	Malawi, MBC	5993do			
1825-1900 vl	Cyprus, BRT International	6150do			
1830-1900 t	Belarus, Radiosta Belarus	6010eu	7105eu	7205eu	7210eu
1830-1900	Georgia, Radio	11910eu			
1830-1900	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
1830-1900 w	Saipan, FEBC/KFBS	9465as			
1830-1900	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu	
1830-1835	Somalia, Radio Mogadishu	6732do			
1830-1900	Turkey, Voice of	9445eu	13695na		
1830-1900	United Kingdom, BBC WS	6005af	9630af		
1830-1900	USA, Voice of America	7170as	7330af	9860af	
1830-1900 a	Yugoslavia, Radio	6100eu	9720af		
1833-1900	Cote D' Ivoire, RDTV	11920do			
1840-1850	Greece, Voice of	11645af	15150af		
1845-1900	Albania, R Tirana Intl	7270eu	9570eu		
1845-1900 mtwhf	Armenia, Voice of	4810me	4990eu		
1845-1900 irreg s	Mali, RDTV Malienne	4783do	4835do	5995do	

FREQUENCIES

1900-2000	Anguilla,Caribbean Beacon	11775am				
1900-2000 mtwhf	Argentina, RAE	15345eu				
1900-2000	Australia, Radio	6080pa	6355va	7240pa	9415va	
		9615as	11880pa			
1900-2000 vl	Australia, VL8A Alice Spg	2310do				
1900-2000 vl	Australia, VL8K Katherine	2485do				
1900-2000 vl	Australia, VL8T Tent Crk	2325do				
1900-1920	Brazil, Radio Bras	15265eu				
1900-2000	Bulgaria, Radio	9700eu	11720eu			
1900-2000	Canada, CFRX Toronto	6070do				
1900-2000	Canada, CFVP Calgary	6030do				
1900-2000	Canada, CHNX Halifax	6130do				
1900-2000	Canada, CKZN St John's	6160do				
1900-2000	Canada, CKZU Vancouver	6160do				
1900-2000	China, China Radio Intl	9440af	11515af			
1900-2000	Costa Rica,RF Peace Intl	15050am				
1900-1930	Cote D' Ivoire, RDTV	11920do				
1900-1908	Croatia, Croatian Radio	5895eu	7165eu	9595va	11635na	
1900-2000 vl	Cyprus, BRT International	6150do				
1900-2000	Ecuador, HCJB	12015am	21455am			
1900-2000	Eqt Guinea, Radio Africa	15186af				
1900-1930 m	Estonia, Radio	5925eu				
1900-2000	Georgia, Voice of Hope	9310eu				
1900-1950	Germany, Deutsche Welle	7250af	9640af	9670af	9735af	
		11785af	11810af	13790af		
1900-2000	Guatemala, Adv World R	5980am				
1900-1930	Hungary, Radio Budapest	3975eu	7155eu	9755eu		
1900-1945	India, All India Radio	7410eu	9650eu	9950me	11620eu	
		11935af	13770as	13780as	15075as	
1900-2000 h	Ireland,W Coast R Ireland	15625af				
1900-1925	Israel, Kol Israel	7465na	9435na	11605va	15640au	
1900-2000 vl	Italy, IRRS	3985va				
1900-2000 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		
1900-2000	Kuwait, Radio	11990eu	15505eu			
1900-1930 as	Latvia, Radio	5935eu				
1900-1915	Liberia,LCN/R Liberia Int	5100do				
1900-2000 smtwha	Malta, VO Mediterranean	9765eu	9810am	12060me		
1900-1930	Mexico, Radio Mexico Intl	9705na				
1900-2000	Netherlands, Radio	6020af	7120af	9895af	11655af	
		15315af	17605af			
1900-1951 mtwh	New Zealand, R NZ Intl	6145pa				
1900-2000	Nigeria, Voice of	7255af				
1900-2000 vl	Papua New Guinea, NBC	4890do				
1900-1930 vl	Philippines, R Pilipinas	11720me	11890me	15190me		
1900-2000	Romania, R Romania Intl	7105af	7195eu	9550eu	9690eu	
		11810eu	11940af			
1900-2000	Russia,Voice of Russia WS	7290eu	7350eu	7440eu	9440af	
		9775eu	9810eu	9865eu	9945af	
		11765af	17875af			
1900-2000 as	S Africa, World Music R	3345eu	6290af			
1900-2000	South Korea, R Korea Intl	5975eu	7275as			
1900-2000	Swaziland, Trans World R	3200af				
1900-1920	Switzerland, Swiss R Intl	6165eu				
1900-2000	Thailand, Radio	7210eu	9655eu	11905eu		
1900-1930	Turkey, Voice of	9445eu	13695na			
1900-2000	United Kingdom, BBC WS	3255af	6005af	6180eu	6190af	
		6195va	9410af	9630af	9740as	
		11835af	12095eu	15400af	15485va	
		15575va	17830af			
1900-2000	USA, KAIJ Dallas TX	13815am				
1900-2000	USA, KTBN Salt Lk City UT	15590am				
1900-2000	USA, KWHR Naalehu HI	13625as	17555pa			
1900-2000	USA, Monitor Radio Intl	9385af	13770eu	15665eu	17510af	
1900-2000	USA, Voice of America	6035af	7325af	7415af	9525pa	
		9760af	11870pa	11975af	15180pa	
		15410af	15445af	15580af		
1900-1930 s	USA, Voice of America	4950af				
1900-2000	USA, WEWN Birmingham AL	11875na				
1900-2000	USA, WGTG McCaysville GA	9400am				
1900-2000	USA, WHRI Noblesville IN	9495am	13760eu			
1900-2000	USA, WINB Red Lion PA	15715eu				
1900-2000	USA, WJCR Upton KY	7490na				
1900-2000 smtwhf	USA, WMLK Bethel PA	9465eu				
1900-2000	USA, WRMI/R Miami Intl	9955am				
1900-2000	USA, WRNO New Orleans LA	7355am				
1900-2000 mtwhfa	USA, WVHA Greenbush ME	15715af				
1900-2000	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am	
1900-2000	USA, WYFR Okeechobee FL	17555af				
1900-1927	Vietnam, Voice of	9840eu	15010eu			
1900-1930	Yugoslavia, Radio	7230au				
1900-2000	Zambia, Christian Voice	3330af	4965af			
1900-2000 vl	Zambia, R Zambia/ZNBC 1	4910do				
1900-2000 vl	Zambia, R Zambia/ZNBC 2	6165do				
1900-2000 vl	Zimbabwe, Zimbabwe BC	4828do				
1910-1955	Germany, VO Mediterranean	12060eu				
1930-2000	Georgia, Radio	11760eu				
1930-2000	Iran, VOIRI	7290eu	9022eu			
1930-2000	Poland, Polish R Warsaw	6035eu	6095eu	7285eu		
1930-2000	Sweden, Radio	6065eu				
1935-1955	Italy, RAI Intl	6015eu	7230eu	9670eu		
1950-2000	Vatican State, Vatican R	4005eu	5882eu	7250eu	9645eu	
1952-2000	New Zealand, R NZ Intl	9845pa				
2000-2100	Algeria, R Algiers Intl	15158af				
2000-2100	Angola, Radio Nacional	3355do	9535do			
2000-2100	Anguilla,Caribbean Beacon	11775am				
2000-2100	Australia, Radio	9415va	9615as	11880pa		
2000-2100 vl	Australia, VL8A Alice Spg	2310do				
2000-2100 vl	Australia, VL8K Katherine	2485do				
2000-2100 vl	Australia, VL8T Tent Crk	2325do				
2000-2100	Canada, CFRX Toronto	6070do				
2000-2100	Canada, CFVP Calgary	6030do				
2000-2100	Canada, CHNX Halifax	6130do				
2000-2100	Canada, CKZN St John's	6160do				
2000-2100	Canada, CKZU Vancouver	6160do				
2000-2100	Canada, R Canada Intl	5995va	7235eu	11690af	13650af	
		13670af	15150af	15325af	17820af	
		17870af				
2000-2100	China, China Radio Intl	5220eu	6950eu	9440af	9920eu	
		11715af	15110af			
2000-2100	Costa Rica,RF Peace Intl	15050am				
2000-2100 vl	Cyprus, BRT International	6150do				
2000-2027	Czech Rep, Radio Prague	5930eu	11600au			
2000-2100	Ecuador, HCJB	11960eu	21455am			
2000-2100	Eqt Guinea, Radio Africa	15186af				
2000-2030	Finland, YLE/R Finland	6120eu	9855eu			
2000-2007	Georgia, Voice of Hope	9310eu				
2000-2050	Germany, Deutsche Welle	7170eu				
2000-2030	Ghana, Ghana Broadc Corp	3366do	4915do			
2000-2010	Greece, Voice of	7430eu	9380eu			
2000-2100	Guatemala, Adv World R	5980am				
2000-2100	Indonesia, Voice of	9525as				
2000-2030	Iran, VOIRI	7260eu	9022eu			
2000-2100 vl	Italy, IRRS	3955va				
2000-2100 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do		
2000-2100	Kuwait, Radio	11990eu	15505eu			
2000-2030	Mexico, Radio Mexico Intl	9705na				
2000-2025	Netherlands, Radio	6020af	7120af	9895af	11655af	
		15315af	17605af			
2000-2051 smtwh	New Zealand, R NZ Intl	9845pa				
2000-2058 a	New Zealand, R NZ Intl	9845pa				
2000-2005	Nigeria, FRCN/Radio	3326do	4770do	4990do		
2000-2050	North Korea, R Pyongyang	4405eu	6575eu	9345as	9640af	
		9975as				
2000-2100 vl	Papua New Guinea, NBC	4890do				
2000-2025	Poland, Polish R Warsaw	6035eu	6095eu	7285eu		
2000-2030 mtwhf	Portugal, R Portugal Intl	7110eu	9780eu	9815eu		
2000-2100	Russia,Voice of Russia WS	7350eu	7370eu	7440eu	9620eu	
		9665eu	9775eu	9810eu	9880eu	
		13815eu				
2000-2100 as	S Africa, World Music R	3345eu	6290af			
2000-2015	Sierra Leone, SLBS	3316do				
2000-2015 irreg	Somalia, Radio Mogadishu	6870af				
2000-2100 mtwhf	Spain, R Exterior Espana	6125eu	11775af			
2000-2015	Swaziland, Trans World R	3200af				
2000-2030	Switzerland, Swiss R Intl	9885af	12075af	13635af		
2000-2015	Uganda, Radio	4976do				
2000-2100	United Kingdom, BBC WS	3255af	5975as	6005af	6180eu	
		6190af	6195va	9410eu	9630af	
		11750am	11835af	12095eu	15400af	
		15485af	15575va	17830af		
2000-2100	USA, KAIJ Dallas TX	13815am				
2000-2100	USA, KJES Mesquite NM	15385na				
2000-2100	USA, KTBN Salt Lk City UT	15590am				
2000-2100	USA, KWHR Naalehu HI	15405as	17555pa			
2000-2100	USA, Monitor Radio Intl	9355pa				
2000-2030	USA, Voice of America	4950af	6035af	7375af	7415af	
		9760af	9770af	11855af	11975af	
		15410af	15445af	15580af	17725af	
		17755af				
2000-2100	USA, WEWN Birmingham AL	5825na	13615na	15745eu		
2000-2100	USA, WGTG McCaysville GA	9400am				
2000-2100	USA, WHRI Noblesville IN	9495am	13760eu			
2000-2100	USA, WINB Red Lion PA	13790eu				
2000-2100	USA, WJCR Upton KY	7490na				
2000-2100 smtwhf	USA, WMLK Bethel PA	9465eu				
2000-2100	USA, WRMI/R Miami Intl	9955am				
2000-2100	USA, WRNO New Orleans LA	7355am				
2000-2100 mtwhfa	USA, WVHA Greenbush ME	13695va				
2000-2100	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am	
2000-2100	USA, WYFR Okeechobee FL	17555eu	17845af	21525af		
2000-2010	Vatican State, Vatican R	4005eu	5882eu	7250eu	9645eu	
2000-2030	Vatican State, Vatican R	7365af	9660af	11625af		
2000-2100	Zambia, Christian Voice	3330af	4965af			
2000-2100 vl	Zambia, R Zambia/ZNBC 2	6165do				
2000-2100 vl	Zimbabwe, Zimbabwe BC	4828do				
2005-2100	Syria, Radio Damascus	12085na	13610eu			
2015-2030	Namibia, NBC	3270do	3290do			
2025-2045	Italy, RAI Intl	7120na	9710na	11840na		
2025-2035 mtwhf	Latvia, Radio	5935eu				
2030-2100	Armenia, Voice of	7480eu	9965eu			
2030-2100	Cuba, Radio Havana	13715eu	13725eu			
2030-2100	Egypt, Radio Cairo	15375af				
2030-2100	Germany,Adventist World R	9830eu				
2030-2100	Iran, VOIRI	6165pa	6175pa			
2030-2100	Slovakia, AWR Europe	11610af				
2030-2100	Sweden, Radio	6065as	13625as			
2030-2045	Thailand, Radio	9655eu	9680eu	11905eu		

FREQUENCIES

2030-2100 as	USA, Voice of America	4950af			
2030-2057	Vietnam, Voice of	9840eu	12020eu	15010eu	
2045-2100	India, All India Radio	7150eu	7410eu	9910au	9950eu
		11620eu	11715pa		
2052-2100 smtwh	New Zealand, R NZ Intl	11735pa			
2059-2100 a	New Zealand, R NZ Intl	11735pa			

2100 UTC

2100-2130	Albania, R Tirana Intl	7110eu	9515eu		
2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2200	Australia, Radio	7240pa	9415va	9615as	9660pa
		11695pa	12080pa	15365pa	
2100-2130	Australia, Radio	6355va	11800pa	11880pa	
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8K Katherine	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2125	Belgium, R Vlaanderen Int	5910eu			
2100-2200	Bulgaria, Radio	9700eu	11720eu		
2100-2115 vl	Cameroon, Radio Cameroon	4850do			
2100-2200 vl	Cameroon, Radio Garoua	5010do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2130	Canada, R Canada Intl	11690af	13650af	13670af	15150af
		15325af	17820af		
2100-2130 mtwhf	Canada, R Canada Intl	5995eu	7235eu		
2100-2200	China, China Radio Intl	5220eu	6950eu	9920af	
2100-2130	China, China Radio Intl	3985eu	11715af	15110af	
2100-2200	Costa Rica,RF Peace Intl	15050am			
2100-2108	Croatia, Croatian Radio	5895va	7165eu	11635na	
2100-2130	Cuba, Radio Havana	13715eu	13725eu		
2100-2200 vl	Cyprus, BRT International	6150do			
2100-2200	Ecuador, HCJB	11990eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2150	Germany, Deutsche Welle	7115au	9670as	9735af	9765as
		11785au	11865af	15135af	
2100-2130	Germany,Adventist World R	9830af			
2100-2130	Hungary, Radio Budapest	3975eu	7250eu	9835eu	
2100-2200	India, All India Radio	7150eu	7410eu	9910eu	9950eu
		11620au	11715au		
2100-2130	Iran, VOIRI	6165pa	6175pa		
2100-2200 vl	Italy, IRRS	3955va			
2100-2200	Japan, R Japan/NHK World	6035as	9535na	13630as	
2100-2107 vl	Kenya, Kenya Broadc Corp	4885do	4935do	6150do	
2100-2200	Lebanon, Voice of Hope	9960va			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2107	Namibia, NBC	3270do	3290do		
2100-2200 smtwha	New Zealand, R NZ Intl	11735pa			
2100-2106 f	New Zealand, R NZ Intl	9845pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2156	Romania, R Romania Intl	7105eu	7195eu	9690eu	11810eu
2100-2200	Russia,Voice of Russia WS	7250eu	7350eu	7370eu	7440eu
		9620eu	9655eu	9665eu	9710eu
		9740eu	9765eu	9775eu	9880eu
		11840eu			
2100-2200 as	S Africa, World Music R	3345eu	6290af		
2100-2130	Slovakia, AWR Europe	6055eu	11610af		
2100-2200	South Korea, R Korea Intl	6480eu	15575eu		
2100-2130	South Korea, R Korea Intl	3970eu			
2100-2200 as	Spain, R Exterior Espana	6125eu	11775af		
2100-2105	Syria, Radio Damascus	12085na	13610eu		
2100-2110	Uganda, Radio	4976do			
2100-2200	Ukraine, R Ukraine Intl	5905eu	6010eu	6020eu	6090eu
		7170eu	7240eu	7380au	9550na
		9560na	9640na	12040na	13590na
		13720sa			
2100-2200	United Kingdom, BBC WS	3255af	3915as	3955eu	5965as
		5975as	6005af	6180eu	6190af
		6195va	7325va	9410eu	9630va
		11750sa	11835af	11945as	12095eu
		15400af			
2100-2130	United Kingdom, BBC WS	9630af	15485af		
2100-2145	United Kingdom, BBC WS	11680sa			
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KTBN Salt Lk City UT	15590am			
2100-2200	USA, KWHR Naalehu HI	15405as	17555pa		
2100-2200	USA, Monitor Radio Intl	13770eu	15280as		
2100-2200	USA, Voice of America	6035af	6040me	7375af	7415af
		9535af	9760eu	11870pa	11975af
		15185as	15410af	15445af	15580af
		17725af	17735as		
2100-2200	USA, WEWN Birmingham AL	5825am	13615na	15745eu	
2100-2200	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRI Noblesville IN	5745am	9495am		
2100-2200	USA, WINB Red Lion PA	13790eu			
2100-2200	USA, WJCR Upton KY	7490na			
2100-2200	USA, WRMI/R Miami Intl	9955am			
2100-2200	USA, WRNO New Orleans LA	7355am			
2100-2200 smtwhf	USA, WVHA Greenbush ME	13695af			
2100-2200	USA, WWCR Nashville TN	5070am	9475am	12160am	13845am
		15685am			
2100-2200	USA, WYFR Okeechobee FL	17555eu	17845eu	21525eu	
2100-2130	Yugoslavia, Radio	6100eu	6185eu		
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200 vl	Zambia, R Zambia/ZNBC 1	4910do			
2100-2200 vl	Zambia, R Zambia/ZNBC 2	6165do			
2100-2200 vl	Zimbabwe, Zimbabwe BC	4828do			
2108-2200 f	New Zealand, R NZ Intl	11735pa			
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130	United Kingdom, BBC WS	6175am	15390am	17715am	
2120-2200	Sweden, Radio	6065eu	9430af		
2130-2200	Australia, Radio	13755pa			
2130-2155	Austria, R Austria Intl	5945eu	6155eu	13730af	
2130-2157	Czech Rep, Radio Prague	11600af			
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15310as			
2130-2200	Malawi, MBC	3380do			
2130-2200	South Korea, R Korea Intl	6480eu	15575eu		
2130-2200	Uzbekistan, R Tashkent	9540as	9545me		
2145-2200 a	Greece, Voice of	7480au	9425au		
2200-2300	Anguilla,Caribbean Beacon	11775am			

2200 UTC

2200-2300	Australia, Radio	9660pa	11695pa	12080pa	13755pa
		15365pa	17795pa		
2200-2300 s	Australia, Radio	17750pa			
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2230	Canada, R Canada Intl	5960eu	9755am	11705as	13670am
		13740am	15305am		
2200-2300	China, China Radio Intl	7170eu	9880eu		
2200-2300	Costa Rica,RF Peace Intl	7385am	15050am		
2200-2210	Croatia, Croatian Radio	5895eu			
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eqt Guinea, Radio Africa	15186af			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	India, All India Radio	7150eu	7410eu	9910eu	9950eu
		11620au	11715au		
2200-2230	Iran, VOIRI	6165au	6175au		
2200-2225	Italy, RAI Intl	6150as	9565as	11815pa	
2200-2300	Kuwait, Radio	15505eu			
2200-2300	Lebanon, Voice of Hope	9960va			
2200-2215	Liberia,LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2255	Moldova, R Moldova Intl	7520eu			
2200-2300	New Zealand, R NZ Intl	11735pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2230 s	Norway, Radio Norway Intl	9965sa			
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2300	Russia,Voice of Russia WS	7125na	7250na	9620na	9665na
2200-2215	Sierra Leone, SLBS	3316do			
2200-2300	Taiwan, VO Free China	15600eu	17750eu		
2200-2300	Turkey, Voice of	6135eu	7280eu	9560na	9655na
2200-2300	United Kingdom, BBC WS	5965as	5975am	6175am	6180eu
		6195as	7325va	9410va	9590am
		9660as	9890as	9915am	11750am
		11835af	11955as	12080as	15400af
2200-2230	United Kingdom, BBC WS	12095eu			
2200-2300	USA, KAIJ Dallas TX	13815am			
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, KWHR Naalehu HI	17510as	17555pa		
2200-2300	USA, Monitor Radio Intl	13770eu	15280as		
2200-2300	USA, Voice of America	7215as	9705as	9770as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2200-2230 mtwhf	USA, Voice of America	6035af	7340af	7375af	7415af
		11975af			
2200-2300	USA, WEWN Birmingham AL	5825na	9975eu	13615na	
2200-2300	USA, WGTG McCaysville GA	9400am			
2200-2300	USA, WHRI Noblesville IN	5745am	9495am		
2200-2300	USA, WINB Red Lion PA	13790am			
2200-2300	USA, WJCR Upton KY	7490na			
2200-2300	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7355am			
2200-2300 s	USA, WVHA Greenbush ME	5850eu			
2200-2300	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2200-2300	USA, WYFR Okeechobee FL	17845eu	21525eu		
2200-2300 vl	Zambia, R Zambia/ZNBC 1	4910do			
2230-2300	Canada, R Canada Intl	5960am	9755am	13670am	
2230-2300	Cuba, Radio Havana	6000na	6180na		
2230-2227	Czech Rep, Radio Prague	7345na	11600na		
2240-2250	Greece, Voice of	7480au	9425au		
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	9705as	9950as	11620as	
2245-2300	Vatican State, Vatican R	7305as	9600as	11830au	

2300 UTC SHORTWAVE GUIDE 7:00 PM EDT 4:00 PM PDT

Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am			
2300-0000	Australia, Radio	9660pa	11695as	12080pa	13755as
		15365pa	17750as	17795pa	
2300-0000 vl	Australia, VL8K Katherine	5025do			
2300-0000 vl	Australia, VL8T Tent Crk	4910do			
2300-0000	Bulgaria, Radio	7480na	9435na		
2300-0000	Canada, CBC N Quebec Svc	9625do			
2300-0000	Canada, CFRX Toronto	6070do			
2300-0000	Canada, CFVP Calgary	6030do			
2300-0000	Canada, CHNX Halifax	6130do			
2300-0000	Canada, CKZN St John's	6160do			
2300-0000	Canada, CKZU Vancouver	6160do			
2300-0000 mtwhf	Canada, R Canada Intl	9755am	11940am	13670am	15305am
2300-0000 as	Canada, R Canada Intl	5960am	9755am	11940am	13670am
		15305am			
2300-0000	Costa Rica, Adv World R	5030am	6150am	9725am	13750am
		15460am			
2300-0000	Costa Rica,RF Peace Intl	7385am	15050am		
2300-2330	Cuba, Radio Havana	6000na	6180na		
2300-0000	Egypt, Radio Cairo	9900na			
2300-2350	Germany, Deutsche Welle	5980as	7235as	9690as	
2300-0000	Guam, AWR/KSDA	11775as			
2300-0000	Guatemala, Adv World R	11775am			
2300-0000	India, All India Radio	9705as	9950as	11620as	
2300-0000	Lebanon, Voice of Hope	9960va			
2300-2315	Liberia,LCN/R Liberia Int	5100do			
2300-0000	Malaysia, Radio	7295do			
2300-2306	New Zealand, R NZ Intl	11735pa			
2300-2315	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2300-2325	North Korea, R Pyongyang	11700na	13650na		
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-2356	Romania, R Romania Intl	5990na	6155na	9510na	9570na
		11940na			
2300-0000	Russia,Voice of Russia WS	7125na	7250na	9665na	
2300-0000	Turkey, Voice of	6135na	7280eu	9655na	
2300-0000	United Kingdom, BBC WS	3915as	5965as	5975am	6175am
		9580as	9590na	9915am	11750sa
		11945as	11955as	15380as	
2300-2315	United Kingdom, BBC WS	15400af			
2300-0000	USA, KAIJ Dallas TX	13815am			
2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	USA, KWHR Naalehu HI	15405as	17555pa		
2300-0000	USA, Voice of America	7215as	9705as	9770as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2300-0000	USA, WEWN Birmingham AL	5825na	9975na	13615na	
2300-0000	USA, WGTG McCaysville GA	9400am			
2300-0000	USA, WHRI Noblesville IN	5745am			
2300-0000	USA, WINB Red Lion PA	13790am			
2300-0000	USA, WJCR Upton KY	7490na			
2300-0000	USA, WRMI/R Miami Intl	9955am			
2300-0000	USA, WRNO New Orleans LA	7355am			
2300-0000 mtwhf	USA, WVHA Greenbush ME	9900af			
2300-0000	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2307-0000	New Zealand, R NZ Intl	15115pa			
2310-2315	Kyrgstan, Kyrgyz Radio	4010do	4050do		
2330-2355	Belgium, R Vlaanderen Int	9925sa	11690am		
2330-0000 vl	Ghana, Ghana Broadc Corp	4915af			
2330-0000	Iraq, Radio Iraq Intl	6050eu	11890eu		
2330-0000	Netherlands, Radio	6020na	6165na	9845na	
2335-2345	Greece, Voice of	9395sa	9425sa	9935sa	11595sa
2335-2345	Sierra Leone, SLBS	3316do			

Selected Programs

Sundays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2310 Australia, Radio: Dateline. Twenty minutes of overseas and local correspondent reports and analyses of regional and global issues and events, including business news.
2315 Bulgaria, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.
2330 Australia, Radio: Media Report. See S 0530.
2330 Bulgaria, Radio: Plaza Bulgaria. Thirty minutes about Bulgaria and things Bulgarian.
2330 Romania, R Romania Intl: Panorama (Radio Tour). See S 1330.

Mondays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2310 Australia, Radio: Dateline. See S 2310.
2315 Bulgaria, Radio: Events and Development. A review of upcoming events this week.
2330 Australia, Radio: The Sports Factor. Amanda Smith hosts the program that debates Australia's sporting culture.
2330 Bulgaria, Radio: Business and Finance. Economic news briefs and financial developments in Bulgaria.
2330 Romania, R Romania Intl: Panorama (Pro Memoria). See M 1330.
2355 Australia, Radio: On This Day. See S 1155.

Tuesdays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2310 Australia, Radio: Dateline. See S 2310.
2315 Bulgaria, Radio: Events and Development. See M 2315.
2330 Australia, Radio: The Health Report. See M 1513.
2330 Bulgaria, Radio: Answering Your Letters. Replies to listener letters and Bulgarian Music.
2330 Romania, R Romania Intl: Panorama (Business Club). See T 1330.
2349 Bulgaria, Radio: Sports Roundup. A review of seasonal sporting events and scores.

Wednesdays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2310 Australia, Radio: Dateline. See S 2310.
2315 Bulgaria, Radio: Events and Development. See M 2315.
2330 Australia, Radio: The Law Report. See T 1505.
2330 Bulgaria, Radio: Cultural Review. A 30-minute summary of cultural events in Bulgaria, cultural newstips, and regional music.
2330 Romania, R Romania Intl: Panorama (Society). See W 1330.

Thursdays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2310 Australia, Radio: Dateline. See S 2310.
2315 Bulgaria, Radio: Events and Development. See M 2315.
2330 Australia, Radio: The Religion Report. See S 0230.
2330 Bulgaria, Radio: Lifestyle. A look at everyday life in Bulgaria.
2330 Romania, R Romania Intl: Panorama (Citizens of the Same Country). See H 1330.

Fridays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2305 Australia, Radio: Book Reading. Serialized readings of the best Australian novels.
2315 Bulgaria, Radio: Events and Development. See M 2315.
2315 UK, BBC London (AS): Champions (2nd). See T 0145.
2330 Australia, Radio: Australia Today. See S 0430.
2330 Bulgaria, Radio: Straight from the Horse's Mouth. See M 0430.
2330 Romania, R Romania Intl: Panorama (European Option). See F 1330.
2346 Bulgaria, Radio: Radio Bulgaria Calling. See S 1215.
2354 Radio Netherlands: Documentary. 50th Anniversary Celebrations: Back to University (5th). See W 1254.
2354 Radio Netherlands: Documentary. Indian Tiger Extinction (26th). Dheera Sujan reports on how the noblest beast in the jungle may soon be no more than a romantic memory.
2354 Radio Netherlands: Documentary. Social Cost of Transformation (19th). See F 1454.
2354 Radio Netherlands: Documentary. Take the Low Road (12th). See A 2354.
2355 Australia, Radio: On This Day. See S 1155.

Saturdays

2300 Australia, Radio: RA News. See S 0000.
2300 Bulgaria, Radio: News. See S 0400.
2300 Romania, R Romania Intl: Info Plus. See S 0200.
2310 Australia, Radio: Australia All Over. Join listeners across the island continent as Ian McNamara throws the spotlight on life in Australia.
2310 Bulgaria, Radio: Topics of the Week. Headlines to the main points in the news.
2315 Bulgaria, Radio: News Behind the News. See S 0415.
2330 Bulgaria, Radio: Folk Studio. Myths, legends, customs, and rituals associated with Bulgarian holidays.
2330 Romania, R Romania Intl: Panorama (World of Culture). See S 0230.

Hauser's Highlights

UKRAINE: R Ukraine Int'l

Changes for English in Sept.-Oct.:
replace 2100 to Australia on 7380 with 1200 on 12045;
at 2100 add Latin America on 13720;
0000 to NAm add 7150 to 9550, 12040
(RUI)

LET'S TALK THE SAME LANGUAGE!

By Jacques d'Avignon
monitor@rac.ca

A few years ago, while writing a book on various propagation forecasting computer programs, I quickly discovered that the terminology and definitions used were in some cases different from one program to the other. It thus became important to prepare a small glossary of terms used.

Radio propagation forecasting is not unique in this situation. Over the years refinements are made by various researchers and they coin a word that best describes for them what they have "discovered." It is only later on that a discrepancy becomes apparent and it is necessary to more clearly define the new terms and in some cases define their synonyms.

I was able to retrieve from IPS' homepage in Australia, an extensive list of definitions and acronyms used in the field of radio propagation forecasting. I have selected what seems most applicable to our use. The glossary will be spread over three months, and is reproduced with the permission of IPS. So do not lose your magazine! At the end of the of the series I have inserted a short bibliography of four books which will satisfy the curiosity of the expert as well as of the beginner.

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 September to 14 October 1997 Flux=86 SSN=26

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	22	19	14	12	11	11	11	11	11	9	8	10	10	12	18	20	20	20	21	22	23	24	24	24
WESTERN EUROPE	9	8	8	8	8	8	8	8	8	8	*	*	*	10	12	15	16	16	16	15	14	13	11	9
EASTERN EUROPE (P)	*	8	8	8	10	10	9	*	*	*	*	*	*	*	12	15	15	14	13	*	*	*	*	*
MEDITERRANEAN	11	11	11	11	11	10	9	*	*	*	*	*	*	*	13	16	17	17	18	17	16	*	*	*
MIDDLE EAST (P)	11	11	13	13	11	*	*	*	*	*	*	*	*	*	11	14	15	13	12	*	*	*	*	*
CENTRAL AFRICA	18	17	14	12	10	10	10	*	*	*	*	*	*	*	16	18	19	19	19	19	20	20	20	20
SOUTH AFRICA	14	13	12	11	10	10	11	*	*	*	*	*	*	*	18	20	20	20	20	19	18	16	15	15
SOUTH EAST ASIA (P)	19	19	18	16	*	*	*	*	*	*	*	9	9	9	10	12	14	14	14	13	*	*	*	15
FAR EAST	18	18	17	15	12	11	10	9	9	9	8	9	9	9	9	10	10	10	10	*	13	17	18	18
AUSTRALIA	22	21	21	19	14	*	*	11	11	11	11	11	10	10	10	13	12	*	*	*	16	20	22	22
TO/FROM US MIDWEST																								
SOUTH AMERICA	19	15	12	10	10	10	10	10	9	8	7	9	11	15	19	19	19	19	20	21	21	22	22	22
WESTERN EUROPE	10	10	9	9	9	9	9	9	9	9	*	*	12	15	17	18	18	18	18	18	16	15	13	11
EASTERN EUROPE	8	8	8	8	9	9	8	*	*	*	*	*	*	12	15	16	16	15	13	12	*	*	*	*
MEDITERRANEAN	11	11	11	11	10	10	9	*	*	*	*	*	*	15	17	18	18	18	18	16	14	12	11	11
MIDDLE EAST (P)	11	11	12	11	10	*	*	*	*	*	*	*	*	12	15	16	16	14	13	*	*	*	*	11
CENTRAL AFRICA	17	15	13	11	10	10	10	*	*	*	*	*	*	17	19	20	20	20	20	20	21	21	21	20
SOUTH AFRICA	14	13	11	11	10	10	10	*	*	*	*	*	*	18	20	20	20	20	21	20	18	16	16	15
SOUTH EAST ASIA (P)	18	17	15	*	*	*	*	*	*	*	*	9	9	10	12	14	14	13	13	13	*	*	*	14
FAR EAST	19	18	16	13	11	*	*	9	9	9	9	9	9	10	10	10	11	11	*	*	13	17	18	19
AUSTRALIA	22	21	18	*	*	*	*	11	11	11	11	11	10	10	13	13	12	*	*	*	17	20	22	22
TO/FROM US EAST COAST																								
SOUTH AMERICA	13	10	9	9	9	9	9	9	8	7	7	10	15	17	18	18	18	19	19	20	20	20	19	16
EUROPE	9	8	8	8	8	8	8	8	8	7	8	12	16	16	16	17	17	17	17	16	15	13	12	10
EASTERN EUROPE	8	8	8	8	8	8	8	*	*	*	*	11	14	16	17	17	16	15	14	12	10	9	9	8
MEDITERRANEAN	11	11	11	10	9	9	9	9	*	*	*	13	17	18	18	18	18	19	19	15	13	12	11	11
MIDDLE EAST (P)	11	11	11	10	9	*	*	*	*	*	*	13	16	18	18	18	17	15	14	12	12	12	11	11
CENTRAL AFRICA	14	13	12	12	11	11	11	11	*	*	*	15	19	21	21	21	22	22	22	22	22	22	20	17
SOUTH AFRICA	14	12	12	11	10	11	11	*	*	*	*	16	20	21	21	21	21	22	22	20	18	17	16	15
SOUTH EAST ASIA (P)	15	13	*	*	*	*	*	*	*	*	*	10	13	15	15	14	13	13	*	12	12	11	10	13
FAR EAST	17	15	13	*	*	*	*	9	9	9	9	9	11	11	11	*	*	*	*	*	13	17	19	19
AUSTRALIA	20	16	*	*	*	*	*	11	11	11	11	10	11	14	14	13	*	*	*	*	17	20	21	22

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

RADIO PROPAGATION GLOSSARY

Absorption Limited Frequency (ALF)
This is the lowest frequency for reliable radio communications by the ionosphere. The ALF is significant only on daylight sectors of circuits.

Aurora
Excitation of particles from the sun spiralling in the geomagnetic field near the poles resulting in the release of energy in different forms, including light.

Auroral Oval
Band around each geomagnetic pole where aurora are most likely to occur.

Corona
The outer atmosphere of the sun with low density and high temperature. Visible as an extended bright region about the sun during solar eclipse.

Coronal Hole
A low density region of the corona with relatively low temperature. Coronal holes are the sources of high speed solar wind streams.

D region
The lowest region of the ionosphere where most HF absorption occurs. Present during daylight hours only.

E Layer
A solar controlled ionospheric region around 80-150 km. Present during daylight hours.

E Layer Screening
A radio signal directed to the F layer is deflected and attenuated by the E layer. E layer screening occurs when the E layer MUF is greater than the operating frequency. The signal cannot reach the F layer and propagation is via multiple E layer hops. These modes are very heavily attenuated, especially when more than two hops occur, and effective communication is not possible.

F Region
Located above about 160 km. During the day, it often divides into two regions. The lower region is the F1 region and the upper region is called the F2 region. At night there is only an F region.

Flare
An explosion on the sun usually releasing large amounts of energy and particles, and usually occurring within an active region. Flares are more likely at solar maximum.

foE
The critical frequency of the E layer. The maximum frequency which can be reflected from this layer.

foF2
The critical frequency of the F2 layer. It is the maximum frequency which can be supported by the F2 layer when a wave is vertically incident upon the layer.

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My Receiver Autobiography

I don't know if you have had a chance to see Fred Osterman's second edition of his book, *Shortwave Receivers Past and Present,* but every time I pick it up I can guarantee I will lose an hour or so looking at all the beautiful old receivers in there. Some I have owned, some I've dreamed of owning. Either way, it gets the old memory generator cranking.

They say you never forget your first kiss, your first car, or your first drill instructor. Well, as beginners to the radio hobby, I can also assure you that you will never forget your first receiver. (And if you're like me, your second, third, or further receivers, as well.) As you go along in your radio hobby, changes in technology, along with your skill and wallet size, will all have an effect on the equipment you will choose. Further, you may find you lean toward particular features that will direct your choices.

Over time, this will develop into a personal receiver "autobiography," documented in your logs and in your memories. If I give you mine, it may inspire you to develop your own through your hobby career.

Hallicrafters S-120

The early sixties brought about many radios of essentially the same ilk: single conversion receivers with hybrid construction. That means they had both tubes and some semiconductors that usually turned up in the power supply section in their circuitry. Most shortwave radio hobbyists of my age and station got their start with one of these units.

My particular choice was the S-120. The reasons? Hey, I was a beginner. I didn't know from anything about radios except that I wanted to hear all those signals from far away. I found it used for less than $50, and even that was probably more than I had to really spend back then.

The previous owner had tried to modify the unit but all he succeeded in doing was making the case "hot" by misaligning the chassis when he put it back. So within a few hours of getting this rig I already had to take it apart to get things right.

This started two trends that I have become known for amongst all my friends. First, I prefer to buy used gear. Second, it's usually not too long before I take the receiver apart. Back then, all I could do for an antenna was about thirty feet of wire strung around my bedroom but I still got good results from Europe, and, with a tailwind, Asia could be heard. Strange as it may sound, I don't remember whatever happened to this radio. I don't recall ever selling it to anyone. It may still be at the bottom of one of my junk boxes. If I ever see one at a hamfest I may just pick it up for old time's sake just to see what I can hear with it today.

You never forget your first radio: this was mine.

Radio Shack Realistic DX-160

A lot of current prominent DXers have to admit they did their first serious DXing with this receiver's predecessor, the DX-150 or the DX-150A or B. I found somebody selling a one-year-old DX-160 in 1976 for the princely sum of $75—less than half the going price for a new unit.

This receiver is highly underrated in some circles. It had solid state construction with Field Effect Transistors (FETs). Even though it was still single conversion it had fairly good selectivity. This was still back in the days of analog tuning and much was accomplished with creative twiddling of the main tuning and separate bandspread dials. You folks who came into the hobby after the digital revolution really missed the intense character building that such convoluted tuning schemes provided. Next time you run across an old-timer, ask him or her if they still have their old receiver's "tuning log scale charts."

This is another radio I dug into rather quickly. Several modifications were published in *FRENDX*, now called *The Journal* of The North American Shortwave Association (NASWA). I couldn't pass up the chance to melt some solder, so my unit received Murata filters in place of the bypass capacitors, front end and power supply diode protection, and a few other tweaks.

In addition to shortwave listening this receiver was with me when I entered the Amateur Radio world. It had mute and standby features that made it great to use with the simple transmitters I was beginning to fool around with. It was the receiver I took off to college and worked well with an antenna made of aluminum foil tacked on my dorm room walls. Its later life with me found it devoted to medium wave listening. I finally sold it to a friend for what I paid for it so I still get to see it from time to time.

Hammarlund HQ-180A

I never actually bought this receiver, but I did have the privilege of baby-sitting the well known DXer Dan Robinson's unit while he was in Africa. This receiver represented the pinnacle of the "classic" period of the shortwave listening hobby. It was a triple conversion tube receiver. (The HQ-180 became the HQ-180A with the addition of silicon rectifiers). We're still talking bandspread tuning, but this could be resolved down to a few kHz with a good eye and a steady hand. This receiver has always been well thought of by the medium wave crowd and I quickly discovered that aspect of the hobby with this radio's help.

While it was well used, since it was a guest in my shack, I couldn't really tear into it the way I would had it been my own. I hated to give the rig back to Dan when he came back stateside. But it remains a fond memory.

Collins R-390A/URR

At this point in time I am no longer a "Kid" depending on allowance and part time jobs while in school and college. I had set up a budget for radio gear. Much of it went to feed the ham radio monkey, but I still kept enough aside to eventually get the ultimate in shortwave receivers. I related the fine points of how I purchased this fine rig in July's column, so I won't dwell on that. Let's talk about what's really important: this receiver's in-

credible performance.

First of all, the R-390A was not for sissies! It weighed in at 65 pounds. Adjusting and servicing it was considered a full time job by its original owners, the United States military. Nowadays, a couple of its 24 tubes are literally worth their weight in gold. Also, to get decent audio out of it you had to resolve the 600 ohm impedance to something more tolerable. Still, you would have to spend in excess of a thousand dollars even today to find a receiver that is more flexible and selective. Its incredible abilities were the result of a sophisticated "slug" tuning system and a series of mechanical filters.

With this rig (and finally space for a decent longwire) I filled my log book with all of those stations that hobbyists drool over in club magazines. Further, this machine performed wonderfully in the medium wave bands and it wasn't too long before I had it hooked up to a four foot box loop. Never one to be afraid to work on receivers, I found that there was a need for more information to allow hobbyists to perform some of those maintenance operations that the military issue manual expected to keep this rig fat and happy. To this end I started up the R-390 Users Group newsletter which eventually came under the hand of Ralph Sanserino, a noted hobbyist. If you can live with the high expectations that such an old tube type monster requires, you won't find a better value anywhere else.

Sony 2010

The only shortwave receiver I ever bought new, the 2010 represents, in my humble opinion, one of the best portable receivers ever produced. With its digital tuning and highly flexible memory scheme, this receiver remains the standard by which all other portables, including Sony's own later receivers, are judged. Also, breaking with tradition, it is the only radio I haven't had a particular urge to modify. True, there are improved filters available for this unit and a few other tricks. I just always felt it was fine for its purpose as it is, i.e., for use whenever I'm traveling or too lazy to turn on one of the big rigs.

Many folks, including myself, use this unit as a sort of "spotting" receiver to scan the bands in search of interesting signals. Its abilities in this area are hardly matched by other receivers. Once the prey has been spotted, it is simple enough to bring a more sophisticated receiver into the picture. But don't be surprised if half the time the Sony 2010 stands up to the task without any help. I don't know of any other receiver model that has been in constant production for so many years. Sony sure got their money's worth out of that R&D team.

Yaesu FRG-7700

I reached a point in my radio career where even I had to admit that my pair of R-390As were starting to get a bit long in the tooth. They had served both Uncle Sam and Uncle Skip well and they deserved a bit of a rest. The Sony 2010 notwithstanding, I knew I would be looking for a good used receiver to take up the daily shortwave monitoring tasks in my shack. The opportunity came when Bill Oliver, the publisher of the NASWA *Journal* won an new Japan Radio NRD 525 at the Kulspville Winterfest a while back. I knew he had an FRG-7700 he wouldn't be using anymore, so a deal was struck.

The newer (by my standards) FRG-7700 included such features as digital tuning and a small but useful 12 channel memory. It has become my current daily use receiver. That old Hallicrafters S-120 had four tubes: The FRG-7700 has 37 integrated circuits, 107 transistors, and 97 diodes. Technology has come a long way in the twenty years that separate these two radios. These units can be found on the used market for under $300 and are a good value.

I guess the point I have been trying to make all along to you beginners out there, is that you can have a full and enjoyable radio hobby on a budget that won't break the bank. Nothing can be more disheartening than throwing a lot of money at the hobby in hopes of increased performance. If anybody ever tries to tell you this is an expensive hobby, send them over to my shack. I've got the log books to prove that it isn't, and now you know the receivers that I used to make it all happen.

The Future

I must admit that I'm interested in the new Digital Signal Processing (DSP) receivers that are hitting the market. But as always, new technology is a bit costly. I'll wait awhile and keep an eye on the used gear web sites. But actually, lately I've taken a giant step backward. These days I do my listening with very basic receivers such as the MFJ-8100 World Band Receiver. The folks at MFJ sent me one of these simple regenerative receivers to review a while back and I never quite got around to returning it.

Anybody can hear those hard to get stations with a high dollar receiver. My current kick is to do it as cheaply as possible. Maybe the next receiver in my autobiography will be a crystal set. Whatever's fun!

BELOW 500 KHZ

DXING THE BASEMENT BAND

Kevin Carey WB2QMY
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Getting Ready

September usually signals the start of improved conditions for longwave listening. There's still some static to deal with, but in most parts of North America, it should be on its way out. This month, we'll discuss things you can do to get ready for the upcoming season and give you a solid chance at some special catches this winter.

Antennas

Because they are continually exposed to the elements, antennas and feedlines are the most vulnerable part of your station. Now is a good time to check them for damage or loose connections. For wire antennas, be sure to check the support ropes for signs of fraying. There's few things as disappointing as a fallen antenna in the middle of winter—it often means waiting until spring to make repairs. While you're at it, be sure to check all ground connections, too.

In the Shack

If you're like many listeners, you've probably spent very little time on the low bands over the summer months, so now is a good time to fire up the rig and make sure everything is in order. As a minimum, you'll want to check the frequency calibration and sensitivity of your receiver. I like to have three or four local "reference" stations to tune to periodically as a way of verifying receiver performance.

DXing Resources

One of the most important tools for successful longwave work is *information*. Besides the monthly news and tips we provide here, there are several other resources you should consider.

First, you'll need a beacon directory. A long respected guide for longwave is the *Aero/Marine Beacon Guide* by Ken Stryker (current price $15 postpaid). It can be ordered directly from Ken at 2856-G W. Touhy Avenue, Chicago, IL 60645. Although an update has not been issued in many years, most of the information remains valid. (A notable exception concerns the listings for US Coast Guard beacons. Most of these have been shut down entirely or converted to DGPS service.)

Another very useful list of beacons can be found in the *Grove Shortwave Directory* (Grove Enterprises, P.O. Box 98, Brasstown, NC 28902). Although its main focus is on shortwave utilities, the back of the directory contains a rather comprehensive list of longwave stations—both beacons and military VLF utilities. The current price for the directory is $9.95.

There are also numerous sources of longwave data on the Internet. Past columns have presented many of these. (See April '97 for an example.) A new addition worth mentioning is the "Very Low Frequency (VLF) and lower" *QST* article bibliography available via the ARRL website (**http://www.arrl.org/**). It contains over 20 VLF listings from the years 1943 to 1994. Complete reprint information is included in the list.

Not active on the Internet? You can also obtain the list by sending an SASE to: ARRL Headquarters (Technical Dept.) 225 Main St., Newington, CT 06111.

Logsheets

A very useful tool for beginning a new DX season is last year's log. It allows you to quickly spot changes in the band, and check for DX targets right away, without sifting through hundreds of other signals.

If you're just starting out, why not create your own logsheet? A good one for LF use should contain entries for the station call, ID pitch, carrier frequency, date/time of reception, and a column for any pertinent remarks. As a convenience, I also like to show the airline distance for each of my intercepts.

The complexity of your log is up to you. You can keep things simple with a pencil and paper, or go high-tech using a PC and a spreadsheet program.

Going, Going, GWEN

Those raspy packet bursts from Groundwave Emergency Network (GWEN) stations (150–175 kHz) could soon be history. There's a plan underway to convert them to DGPS beacons. The latest word is that they will be moved into the same frequency range as the other DGPS beacons (285-325 kHz). This would be a very welcome change for LOWFERS operating in the lower part of the 160–190 kHz band.

This seems like a wise move on several other accounts. First, the hardware already exists, and is readily adaptable to DGPS service. GWEN sites are designed for long-range communications and it should be possible to achieve nationwide daytime coverage when they are set up for DGPS service.

It could also mean a big win for Washington, politically speaking. By converting these cold war relics into something useful, and saving a ton of money in the process, they will surely gain points with the public. If you'd like more information on the GWEN story, check out the message area on the LWCA's web site (**http://members.aol.com/lwcanews/index.html**).

Vintage VLF

When I think of prominent longwave DXers, Hank Holbrook (MD) always comes to mind, especially as it relates to marine stations. Since the 50's Hank has QSLed over 3500 longwave stations—including beacons, ships, and coastal stations. When I asked Hank to see some of his early cards, he sent me a whole stack of them, along with an impressive pile of signed verie letters.

This month, two of Hank's earliest cards are shown (see Figures 1 & 2). How many of you recognize these call signs?

FIGURE 1. *Beacon CBL/278 kHz, Venezuela, (Nov. 1961)*

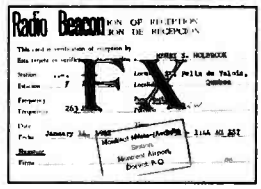


FIGURE 2. *Beacon FX/ 263 kHz, Quebec (Jan. 1962)*

End Notes

I am happy to report a new addition to our family with the arrival of our second child, Jordan. A growing family means having to choose your radio time more carefully, but I consider it to be an excellent trade-off.

I hope to hear from *you* to find out what's new in your longwave activities. Loggings, questions and comments are always welcome at P.O. Box 98, Brasstown, NC 28902. An SASE guarantees a response.

Note on advertisement below: *As of 4/26/94 it become unlawful to market cellular-capable receivers in the U.S. Atlantic Ham Radio assures us that it will give a full refund and hold customers harmless from shipping expenses if a purchased unit is returned to the vendor by US Customs.*

Doug Smith, W9WI
72777.3143@compuserve.com

Phantoms of the Dials

So you're tuning across the dial, when you hear it on 680 kHz: "Real Country, 1590 WDBL." Hmmm.. There isn't any station on 680 anywhere around here, how is it I'm hearing WDBL on that frequency? Did the FCC license WDBL to run a second transmitter on this other frequency? Or is there a pirate station out there rebroadcasting WDBL?

No, what you're actually hearing is a figment of your radio's imagination, an "image." Images, intermodulation, and other spurious signals generated within your receiver are an annoying fact of DX life. Learning to recognize them will improve the accuracy of your log, and possibly save you the embarrassment of reporting an exotic catch that isn't really there!

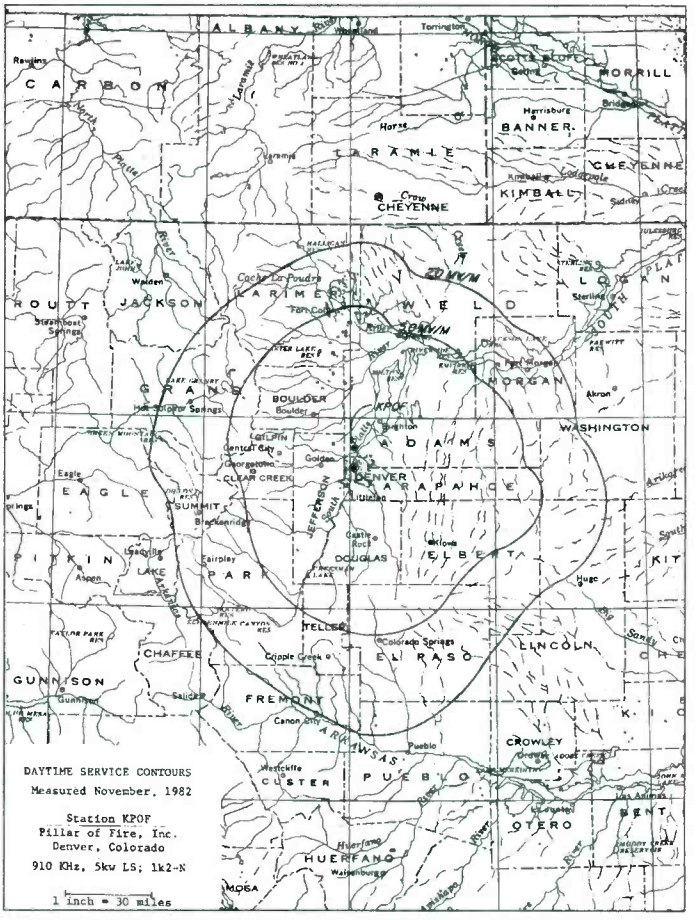
The most common type of spurious response on AM is the "image." This is the result of the "superheterodyne" circuit, invented by Armstrong in the 1920s and used in virtually every radio and TV sold today. In one of the first stages of your receiver, the received signals are "mixed" with the output of a variable-frequency local oscillator, yielding a constant "intermediate" frequency (or "IF"), usually 455 kHz.

For example, if you want to listen to WLAC on 1510 kHz, you mix the 1510 kHz signal with a 1965 kHz signal from the local oscillator. The result is a copy of the WLAC signal on 455 kHz. Now if you decide to listen to WDXN-540 instead, you move the local oscillator to 995 kHz. The difference is still 455 kHz. By using a constant IF frequency, you can build an amplifier with high gain and selectivity, without the complexity of having to tune it.

Unfortunately, there's more than one way to get 455 kHz. If your local oscillator is operating on 995 kHz, it will mix with WDXN-540 to yield 455 kHz. But the difference between 995 and 1450 is also 455 kHz; if you live near WGNS-1450, you might hear it, too. A quick look at the math shows that the image frequency is always 910 kHz higher than the frequency you're tuned to. So to put it simply, when you hear a station on the "wrong" frequency, check to see what's coming in 910 kHz higher; you may solve your own mystery.

FM usually doesn't suffer this problem. FM receiver manufacturers chose an IF frequency of 10.7 MHz, making the "magic" difference frequency 21.4 MHz. The FM band isn't that wide — for a FM receiver tuned to 88.1 MHz, the image is at 109.5. If you live very close to an airport or aeronautical navigation aid, you might hear an image from it. But these transmitters are of rather low power, and intended for reception in aircraft, so they don't cause much trouble for FM receivers.

Images do, however, plague TV sets. The picture IF of a TV is 45.75 MHz (for sound, 41.25MHz). This is high enough that images can't affect the VHF channels, but they can be seen on UHF. The "magic number" is 91.5MHz — a bit more than 15 TV channels. A set tuned to channel 32, at 579.25 MHz, will have its local oscillator operating on 625 MHz. The image will be on 670.75 MHz, in channel 47. (This particular image caught me one day in Madison, Wisconsin. I was trying to figure out who the Fox station was on channel 32, when they ran an ID as WMSN-TV. Yes, WMSN-TV operates on channel 47.)



Patrick Griffin of suburban Denver sent in this coverage map for his local station KPOF-910.

I mentioned above that FM receivers usually don't suffer from image responses. While this is true, they are susceptible to other kinds of spurious reception. Most common is front-end overload. This happens when two or more extremely strong signals are present at the antenna. The signals mix not only with the local oscillator, but with each other, and more importantly, each other's harmonics.

Imagine that you're driving through West Nashville, midway between the towers of WPLN-90.3 and WRVU-91.1. Both stations are *very* strong. Your receiver generates the second harmonic of WPLN, at 180.6 MHz. This second harmonic then mixes with the WRVU signal at 91.1 MHz. If you do the math, you'll find the difference frequency is 89.5 MHz, and if you tune your radio to that frequency, you'll probably hear a mix of WPLN and WRVU audio. (Which can be very annoying if you're a jazz fan trying to listen to WMOT-89.5, about 35 miles away!)

You can recognize front-end overload interference by the audio characteristics. If it sounds like two (or more!) stations are broadcasting on the same frequency, especially if one of them seems unusually loud, you're hearing front-end overload. Front-end overload can also affect TV, where you can recognize it as a second picture superimposed on, or

floating through, the main picture.

Unfortunately, fixing spurious reception isn't easy. On AM, using a selective antenna (like the Select-A-Tenna or, for the more serious DXer, the Kiwa loops–both available from the Grove catalog) can help quite a bit. On FM and TV, avoid using preamplifiers unless you live a long way from the nearest station. (I live over 20 miles from the nearest TV station, and still get some overload interference when my antenna is pointed at their tower.) Use the biggest directional antenna you can get away with: the directional characteristics can "null out" the interfering signals. In extreme cases, an attenuator (like the Grove ATT-1) can help.

■ Expanded-band news

The first formal applications for expanded-band frequencies appeared in the FCC Public Notices in mid-June. So far, of the 88 stations allowed to apply, 63 have actually filed for permission to move. Incidentally, DXers are reporting that KXBT in California has moved back to 1640, as predicted in the June *MT*.

■ Bits and Pieces

• Usually, when you hear what sounds like two FM stations broadcasting on the same frequency, it's either front-end overload or a skip opening. But in Asheville, North Carolina, in early June, there really *were* two stations broadcasting on the same frequency! Zebulon Lee, long time operator of WSKY-1230, decided in 1987 to apply for the newly-opened 96.5 MHz allocation in suburban Biltmore Forest. After promising to sell the AM station, Lee was granted an interim permit for the FM. However, five of the other 12 applicants refused to accept the decision. Lee's permit was challenged (and upheld) five times. Finally, in 1993, he decided to build the station. WZLS signed on as Asheville's only local rock station, and with the local emphasis for which his old AM station was known.

But in 1994, the other applicants appealed again. This time, they won. The FCC ruled that its staff shouldn't have given Lee the go-ahead to operate WZLS, as a 1993 federal court decision had overturned the Commission's policy of promoting non-absentee owners, a policy responsible for Lee's winning the permit. The Commission suggested Lee, and the other applicants, join in a partnership; that would eliminate the need to pick a most-qualified applicant, and allow the immediate grant of a permanent license. The other applicants agreed, but Lee refused. The other group was granted a permit with the similar call WZRQ.

On June 1 at midnight, WZRQ-96.5 signed on the air — but WZLS, feeling it still held a valid license (appeals in federal court were still pending), continued operating. After 22 hours of battling for the channel, the FCC threatened WZLS with a $20,000 fine, and it left the air. Expect this case to stay in the courts for awhile...

• Along with the expanded-band applications, the first five digital TV applications have also been filed. WESH-TV Daytona Beach, Florida, (channel 2) was the first to file, applying for channel 11 on June 13.

• There's a surprising amount of activity on the new-stations front these days. Call letters have now been assigned to the permits for 800 kHz in Sauk Rapids, Minnesota (WBHR), and 1450 in Colona, Colorado (KAVP). WVNS-670 in Claremont, Virginia, (near Norfolk) went on the air in late May. And applications have been filed for permits for new stations at Seward, Alaska (1240), Waddington, New York (670), and Casper, Wyoming (1400).

• Finally, the new multiple-ownership rules have made for some rather large Public Notices! In June, the underlying ownership of Capstar Broadcasting changed hands. It took over 150 kilobytes of text to report the transfer of control of 158 broadcast licenses and three translators.

With both the expanded band and digital television building up steam, the fall of 1997 promises to be an interesting one indeed for the domestic-band DXer. Let us know what you're hearing & seeing; write to P.O. Box 98, Brasstown NC 28901, or via the Internet to 72777.3143@compuserve.com. Good luck!

George Zeller
George.Zeller@acclink.com

Radio Metallica Worldwide Using WJDI Transmitter

Radio Metallica Worldwide continues to be the biggest pirate radio story of the year. Dr. Tornado has been blasting forth on nearly a daily basis with a powerhouse signal that has been heard worldwide. He reports that he's received scores of reception reports, and he says that he's going to send out QSLs as quickly as possible.

Monitoring Times has learned from two sources who have spoken directly with Dr. Tornado that his 10,000 watt transmitter was manufactured by the famous George Donahue of **WJDI.** Donahue is legendary for his construction of high power AM transmitters with pristine wideband audio quality. One of WJDI's transmitters broke the pirate power record on Christmas Eve 1996, when the station's 15 kW broadcast on 1620 kHz was easily heard all over North America. Donahue's relationship with Dr. Tornado explains the "flamethrowing" powerhouse signal from Metallica.

No North American pirate has ever transmitted as frequently as Dr. Tornado, or with as powerful a signal. If he keeps this up, we may have to re-classify him as a regular broadcaster, and add Radio Metallica Worldwide to the "Shortwave Guide" column in the center pages of this magazine. If you have not heard a pirate before, or if like Eric Shelley of San Francisco you're having trouble bagging east coast pirates, this one is a realistic target, regardless of your receiving equipment.

Cuban Clandestines

John Nichols, well known Professor of Communications at Penn State University, sends word of his chapter on Cuban clandestines in *Messages from the Underground: Transnational Radio in Resistance and in Solidarity,* edited by Nancy Lynch Street and Marilyn J. Matelski. This book, published by Praeger, is widely available. Nichols provides an excellent analysis of Cuban clandestine and quasi-clandestine broadcasting in the 1980's and the 1990's. Bookstores everywhere should be able to order this volume for you; clandestine buffs will certainly want a copy.

In a related item, **La Voz del CID** has returned to its 6305 kHz frequency after a couple of months of silence. Chris Smolinski of Reisterstown, Maryland, reported them coming in loud and clear in mid-July at 0230 UTC. Nichols points out that there are few pure "black" anti-Castro clandestines left. You ought to try logging this one, which is the last of a breed.

More Nigerian Clandestines

The English language Nigerian clandestine scene has grown by two more stations. **Radio NADECO** is scheduled via **WWCR** in Nashville for fifteen minutes at 1630 and 0500 UTC on 15685 kHz. If you've never heard a clandestine program, this will be a good target.

Harald Kuhl of Germany says he's hearing another Nigerian clandestine, the **Voice of Free Nigeria.** It's on for an hour at 1900 UTC on 11680 kHz. Ed Rausch of New Jersey reports that the signal is also good in North America at this hour.

New FRW Address

Chris Lobdell, editor of the excellent *Free Radio Weekly* internet pirate newsletter, advises us that the e-mail address for *FRW* has changed: ***lobdell@tiac.net*** is the new contact point. This excellent resource is free to listeners who submit loggings. Why not drop Chris an e-mail for additional information on this service?

What We Are Hearing

Your pirate loggings are always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address at the top of the column. All frequencies are in kHz, with times in UTC.

North American pirate stations listed here use the following addresses: PO Box 1, Belfast, NY 14711; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 28413, Providence, RI 02908; PO Box 146, Stoneham, MA 02180; PO Box 11522, Huntsville, Alabama 35814, and PO Box 293, Merlin, Ontario N0P 1W0. For return postage, enclose three 32¢ stamps in the envelope to USA addresses. $2 US or two International Reply Coupons go to foreign maildrops.

We have another excellent turnout of reporters who heard 50 different stations this month. Obviously North American pirate activity continues at a record breaking pace.

Fred Flintstone's signal almost rivals Metallica

6YVOS, Voice of Smoke- 6955 at 0100. Pigpen Marley usually plays reggae, but a recent show expanded the format with Grateful Dead tunes. Addr: Providence. (Chris Scott, Cincinnati, OH; Harold Frodge, Midland, MI; Niel Wolfish, Toronto, Ontario; Rich and Talea Jurrens, Katy, TX)

Anteater Radio- 6955 at 0100. They still transmit their own rock music shows, but they have been heard worldwide through an occasional Radio Metallica in-studio appearance. Addr: Belfast. (Gregory Majewski, Oakdale, CT; John Sedlacek, Omaha, NE; Kenny Love, Columbia, SC; Michael Prindle, New Suffolk, NY; Lee Silvi, Mentor, OH; Shawn Axelrod, Winnipeg, Manitoba; Frodge; Jurrens; Wolfish)

Free Hope Experience- 6955 at 2330. Major Spook has been featuring rock music, a mailbag segment, and some identifications in Morse code CW. Addr: Blue Ridge Summit. (Jurrens; Prindle; Silvi)

Friday Radio- 6955 at 2245. They appear only on Fridays, promoting the joy of an upcoming weekend. Addr: Providence. (Prindle)

He Man Radio- 6955 at 0230. He Man, using upper sideband as the "Manliest of All Modes," is back with his unique male view of the world from a hilltop in Ohio. Addr: Blue Ridge Summit. (Dick Pearce, Brattleboro, VT; Jurrens)

Hope Radio International- 6955 at 1300. MJ, the most active pirate of 1990 and 1991, disappeared for a while. Recent transmissions seem to be recordings of his old shows, so it's not clear if he's still responding to correspondence. Addr: Blue Ridge Summit. (John Arendt, Oswego, IL; Frodge; Silvi)

Indira Calling- 6955 at 0030. This new pirate programs East Indian music. If you can't hear All India Radio very well, this one is an alternate. Addr: Providence. (Zeller)

Jerry Rigged Radio- 6955 at 0100. Some recent shows from them have been announced as tests, always with cuckoo clock sound effects. Addr: Providence. (Majewski; Silvi)

Jolly Green Radio- 6955 at 0015. Little is known about this new operation, which started off with a mix of rock music and Morse code that was announced as a test. Addr: None. (Jurrens; Majewski; Silvi)

KIRK, Voice of the Ozarks- 6955 at 0000. A confusing mix of pirate station ID's comes from this strange station; don't let its references to **Radio Doomsday** fool you. Addr: None. (Jurrens)

KOLD- 6955 at 0230. Aldo Batista is the only pirate that regularly programs big band music. He traces the history of the music between songs. Addr: Stoneham. (Jurrens; Scott; Silvi)

KRAP- 6955 at 0200. Fred Flintstone's booming AM signal carries rock and roll programming. If it weren't for Metallica, KRAP would be considered a real powerhouse transmitter.

Addr: Blue Ridge Summit. (Howard Espravnik, Gallatin, TN; Steven Cline, Indianapolis, IN; Ross Comeau, Andover, MA; William Hassig, Mt. Prospect, IL; Frodge; Jurrens; Love; Majewski; Scott; Silvi; direct from the station)

Laser Hot Hits- 6955 at 0015. Like most European pirates, this one is dominated by rock music. Niel heard them via a North American relay. Addr: Merlin. (Jurrens; Wolfish)

Lounge Lizard Radio- 6955 at 0100. As we see in their QSL, their lounge music allegedly comes from a lounge in Steubenville, Ohio named after *MT* reader Alan Masyga. Addr: Providence. (Pearce; Silvi; direct from the station)

Lounge Lizard Radio from Steubenville

Mystery Radio- 6955 at 0030. The Shadow plays a distinctive blend of complex rock and new age music. He's an excellent verifier. Addr: Stoneham. (Axelrod; Jurrens; Love; Sedlecek)

Not Mystery Radio- 6955 at 0130. Parodies of other pirates are quite common on shortwave. This one ribs The Shadow at Mystery Radio. Addr: Providence. (Axelrod; Jurrens; Majewski; Scott; Wolfish)

Omega Radio- 6955 at 2200. Dick Tator normally programs Christian rock bands, but sometimes he slips into secular tunes. They use a new maildrop, but this one should work. Addr: Blue Ridge Summit. (Silvi)

Orbital Mind Control Satellite- 6955 at 0000. This station had previously been obscure when it was active three years ago. It has returned with a better signal and "high weirdness" skits about space with Captain Crosshatch and a visitor from Uranus. Addr: Belfast. (Zeller)

Radio Azteca- 6955 at 0200. Bram Stoker is the most active DX comedy station on the air today. He's easy to recognize by the sound effects from the Bull-winkle cartoon. Addr: Belfast. (Frodge; Jurrens)

Radio Clandestine- 6955 at 0300. R. F. Burns is back! This station, which is probably the most influential North American pirate in history, started broadcasting nearly 25 years ago. Recent rock and comedy shows broke a string of inactivity going back a few years. When you hear this one, you're picking up a legend of shortwave radio broadcasting. Addr: None currently. (Ray Carmen, Canton, OH; Hassig; Scott; Silvi)

Radio Conga Hits- 6955 at 0200. This interesting new station combines rock, blues, and conga music. An enthusiastic announcer rolls his "r's" while giving the identifications. Addr: None. (George Zeller, Cleveland, OH; Silvi)

Radio Frog Euphoria- 6955 at 0215. Captain Ganja is back, sometimes changing the middle name of his marijuana advocacy station from "Free" to "Frog." Addr: Belfast. (Jurrens)

Radio Eclipse- 6955 at 0030. Rock music, skits, and parody ads, which are a staple on many pirates, are Steve Mann's format on this one. The news is that they have a maildrop. Addr: Providence. (Hassig; Jurrens; Majewski; Scott; Sedlacek; Wolfish)

Radio Eurogeek- 6955 at 0100. This clever station makes fun of Europirates, but they also have programmed jabs at Glenn Hauser of *MT*. Addr: Providence. (Gigi Lytle, Lubbock, TX; Frodge; Jurrens; Scott; Silvi)

Radio Fusion Radio- 6955 at 0000. Their rap music shows still come to us from the College of Knowledge. Addr: Providence. (Majewski)

Radio Garbanzo- 6955 at 2315. Fearless Fred, one of the funniest raw talents in radio today, is active again with new productions of original comedy. Addr: Belfast. (Axelrod; Prindle)

Radio KAOS- 6955 at 0100. Although Joe Mama made a farewell broadcast months ago, he's still heard occasionally, and Marty got his QSL. Addr: Belfast. (Marty Sanchez, Rio-Rancho, NM; Love)

Radio Metallica Worldwide- 6955 at 0200. Once again we have a deluge of Metallica logs. Addr: Blue Ridge Summit. (Ranier Brandt, Germany; Kevin Nauta, Grand Rapids, MI; Brandon Artman, West Chester, PA; Arendt; Cline; Comeau; Frodge; Hassig; Jurrens; Love; Majewski; Pearce; Scott; Sedlacek; Silvi; Wolfish)

Radio Morania- 6950 at 0130. Originally produced by an electronics magazine more than two decades ago, this hilarious parody of East European shortwave broadcasters is always a real treat when it resurfaces. Interviews with workers in the chocolate mines are featured. Addr: None. (Silvi; Wolfish)

Radio One- 6950 at 0130. Bobaloo's rock oldies shows are very slick productions, up to the level of anything you'll hear on commercial radio. Addr: Belfast. (Jurrens; Scott; Silvi)

Radio Tellus- 6955 at 0100. The format is rock music on this one, with a trademark "Oh, Yeah!" slogan by the announcer. Addr: Providence. (Axelrod; Jurrens; Majewski; Silvi)

Radio Tornado Worldwide- 6955 at 0000. Given Radio Metallica's enormous impact, it was inevitable that a parody would emerge. This one endlessly plays a loop of guitar chords from Metallica's signature tune "Secret Agent Man," while inserting intentionally boring phrases recorded off the air from Dr. Tornado's utterings. These include Metallica's maildrop announcements, but it's not clear if the parody also uses BRS. Addr: Probably none. (Frodge; Silvi; Wolfish; Zeller)

Redneck Radio- 6955 at 0315. Rustic country music of ancient vintage dominates the format on this newcomer. Addr: None heard. (Zeller)

Sons of the Republic- 14200 at 0015. Few heard this semi-clandestine broadcast in the 20 meter ham bands, but Peter says that they criticize the government. Addr: None. (Peter Gonzalez, Irvine, CA)

Up Your Radio Shortwave- 6955 at 1500. Conservatives may have Rush Limbaugh, but liberals have Woody B. Serious' biting political comedy on the pirate bands. Addr: Blue Ridge Summit. (Silvi)

Voice of Anarchy- 6960 at 2330. Leonard Longwire's latest unusual effort was various music that listeners should choose between for a new United States national anthem. Addr: Blue Ridge Summit. (Axelrod; Majewski)

Voice of Bizarro World- 6955 at 0330. In the odd world of Bizarro, everything is backwards. Their shows are strange, but are amusing and entertaining. Addr: Huntsville. (Scott)

Voice of Communism- 6955 at 0345. This veteran pirate from the 1980's has returned. They're an intentionally heavy-handed clever parody of the old Radio Moscow, complete with the low rumble in the carrier that the USSR's shortwave transmitters made notorious. They have never QSLed. Addr: None. (Silvi)

Voice of Juliet- 6955 at 0200. Their theme is female issues, but the station does not have the overt feminist perspective made famous by **WYMN.** Addr: Merlin. (Brandt; Pearce; Prindle; Silvi)

Vox America- 6956 at 2330. Don't confuse them with the USA's international broadcaster. Since they play rock music and comedy, you probably won't. Addr: Unfortunately none. (Comeau; Majewski; Prindle; Silvi)

WARR- 6955 at 0200. This marijuana advocacy station is dominated by rock music and comedy. After very lengthy delays, Captain Nobeard says he's working on QSLs to be mailed shortly, so some may have them by the time you read this. Addr: Belfast. (Axelrod; Frodge; Hassig; Love; Majewski; Scott; Silvi)

WBIG- 6955 at 0000. Big Mike doesn't have the big signal that Dr. Tornado has, but he programs rock music with some flair. Addr: Belfast. (Robert Ross, London, Ontario)

WLIS- 6955 at 0330. Jack Boggan's interval signals give us a tour of dozens of shortwave broadcasters on one frequency. Addr: Blue Ridge Summit. (Frodge; Jurrens; Scott)

WLS- 6955 at 0000. Somebody has been using genuine jingles from the days when WLS in Chicago was a medium wave rock powerhouse in 890 kHz. The music seems inserted by the pirate. Addr: None heard. (Majewski)

WMFQ- 6955 at 2330. Their main purpose seems to be sending out QSL's, but the broadcasts feature an unusually diverse mix of rock, country, calypso, and other foreign music. Addr: Providence. (Frodge)

WMPR- 6955 at 1415. Their rock music fare is periodically supplemented by identifications, always with the station name read by a man and the 6955 frequency read by a woman. Addr: None. (Comeau; Jurrens; Majewski; Pearce; Prindle)

WNOT- 6955 at 0130. The Amazing Munford's signal improved tremendously when Radio Metallica began relays of WNOT's rock music productions. Addr: Blue Ridge Summit. (Hassig; Scott; Wolfish)

WREC- 6955 at 1900. P. J. Sparx combines rock, comedy, and the largest collection of parody novelty rock songs this side of Dr. Demento. Addr: Belfast and Blue Ridge Summit. (Axelrod; Brandt; Frodge; Hassig; Jurrens; Majewski; Pearce; Prindle; Scott; Silvi)

WRKO Shortwave- 6955 at 0200. This new pirate has been relaying of hit music countdowns from the Boston medium wave station on 680 kHz with these call letters. The pirate adds its own material occasionally. Addr: Blue Ridge Summit. (Silvi; Wolfish)

WSRR- 6955 at 0100. Solid Rock Radio seems to have permanently changed its main identification to these call letters. Addr: Belfast. (Majewski)

Ike Kerschner, N3IK

Simply Delightful

A short time ago a local ham friend introduced me to a novice (actually a Tech Plus) that had been licensed for over two years and was never on the air! His reason for not being on the air was that he could not afford the $2,000 plus that a rig costs. And, his only interest was in long distance reception (DX). My friend, knowing that I had several loaner rigs, thought I might be able to help him get started.

Our new Tech, Tony, was actually fairly skilled at copying CW and could easily copy ten words a minute or better, thanks to frequent listening to CW on his SWL receiver (an old HQ-145). Tony was really anxious to get on the air, but was convinced he needed at least $1,500 to purchase a rig that would enable him to work DX.

Since he already had a decent receiver I suggested building a simple CW transmitter out of parts in my junk box. Tony restated his desire to work DX and his belief that a simple transmitter wouldn't be of any value to him. My argument was; since it was free, why not give it a try? If only to humor an old guy, Tony agreed to make the attempt.

Three week-ends later Tony had a 25 watt crystal controlled transmitter that could work 80 and 40 meters. The transmitter was a single 6L6 tube (yes, a vacuum tube), used plug-in coils for changing bands, and looked sort of old timey. From the look I got from Tony I knew it was going to be an uphill battle convincing him to try the rig, so I offered to help him set it up and try it out.

Tony lived in a mobile home park where he was required to have an antenna that could not be seen. His SWL antenna was a 70 foot long wire at an average height of 15 feet and made from about 24 gauge insulated wire, strung between his porch roof and two small trees. Our only choice was to couple the rig to it and give it a try. The antenna had to be trimmed to about 55 feet to get it to resonate (i.e., accept power from the transmitter) on the 80 meter Novice band. This was truly basic ham radio!

Did it work? Yep, it did. First contact was with a station in Maine about 350 miles away, and to Tony it was real DX! Tony went on from there to improve his antenna system (he has added a 40 meter antenna at the same 15 foot elevation). His best DX to date is the West Coast—not exactly what Tony was thinking about, but what the heck; with 25 watts and midget antenna it's not bad. It's been nearly two years since that first contact and Tony is still enthralled with his basic rig.

Your junkbox or mine? Either one will yield what it takes to cobble together a serviceable transmitter to get on the air in CW. Photo courtesy of George Ashleman, KB9ENX. Special thanks to the Wheaton Community Radio Amateur Club, Wheaton, IL.

My point in relating this story is to encourage those of you who cannot afford the best to give *simple* a try. There are thousands of used rigs available at reasonable prices, and if you feel confident in your skill, building a usable rig is entirely feasible. If you have no electronics background, go to your local ham club and ask for help — you might be surprised at the volunteers.

Building can become addictive. While not many of us can duplicate a two kilobuck rig it is not too difficult to construct a station of superior quality. In addition, as building skills and technical knowledge improve, so will your station.

Power

If you have been reading this column for any length of time, you are aware that I promote QRP (low power) every chance I get. Most hams do not understand that power is not the answer to every problem encountered on the HF bands. Normally if your transmitter power is five to ten watts you can work anything a one hundred watt station can. In fact, a watt or two is usually adequate. I do suggest 25 to 50 watts for new hams because at that level you are competitive with 95% of the other stations on the band and can feel confident your signal is right there with everyone else. As you acquire operating skill reducing power to a watt or less will provide a challenge and lots of fun.

Antennas

The antenna is one area any average ham can work on to improve performance. Many hams use simple wire antennas and never feel inadequate. Antenna experimenting is for many of us a hobby in itself. Buy a few antenna manuals and have fun trying the various configurations you find in them, or go hog wild and try your own super special sky hook.

Please understand; the above does not mean that I am opposed to the esoteric and progressive technologies and modes available to us as hams, nor do I feel everyone should operate low power CW only. I am pointing out that we do not need to spend a lot of money to have a good time in this hobby!

Lectrokit

I recently acquired a "Lectrokit" QRP kit. This inexpensive little rig is a bit different from the average QRP transceiver and we will have a full report on it next month. Once more we have run out of column ... see ya next month.

SPECIAL EVENT CALENDAR

Sep	"Wavescan" DX Contest	(1) One reception report on any AWR transmission over any SW station, dated September 1997. (2) List your 5 smallest QSL cards, giving dimensions and full QSL details as listed on each card. Enclose business sized, self-addressed envelope, plus US postage or IRC coupons. Send: 1997 Wavescan DX Contest, Box 29235, Indianapolis, IN 49229, USA.
Sep 6	Special Event Station W4MT	Peninsula ARC at Langley AFB, commemorating Air Force 50th Anniversary, Air Combat Command. 9am-5pm. Lower portion 10,15,20m (SSB/CW) and 144.630 MHz (FM). Name, address, QSL to: Rene B. Valladares KE4WMG, 178 Goodwin Neck Rd., Yorktown, VA 23692, (757) 875-9644
Sep 5-6	Mena, AR	Queen Wilhelmina Hamfest/ Charlotte Lee, KC5DOR, 870-642-7656
Sep 6	Pell City, AL	St. Clair Co ARES/RACES / Johnny Thompson, N4MLP, 205-884-4613
Sep 6	Seminole, FL	Clearwater ARS / Chris Schwab, KD4PHS, 813-298-2167
Sep 6	Dalton, GA	Dalton ARC/ Harold Jones, N4BD, 706-873-2291
Sep 6	Rolling Meadws, IL	W9DXCC Conv / Phil Camera, KB9CRY, 708-343-1696
Sep 6	Spencer, IN	Owen County ARA / Kathryn Smith, KB9INU, 812-829-2140
Sep 6	Walker, MN	Cass Hubbard ARC / Bill Beebe, N0SFJ, 218-547-3147
Sep 6	Columbia, MO	Centrl Missouri RA / Robert McMinn, KB0TCR, 573-446-2897
Sep 6	Lewistown, MO	Mississippi Vall Hamsters / Bob Neff, KB0OIO, 573-288-5936
Sep 6	Erie, PA	Radio Assoc of Erie / Chris Robson, KB3A, 814-474-1211
Sep 6	Uniontown, PA	Uniontown ARC / Carl Chuprinko, WA3HQK, 304-594-3779
Sep 6-7	Austin, Man	Manitoba AR Museum / Dave Snydal, VE4XN, 204-728-2463
Sep 7	Livermore, CA	Livermore ARK / Noel Anklam, KC6QZK, 510-447-3857
Sep 7	Joliet, IL	Bolingbrook ARS / Ed Weinstein, WD9AYR, 630-759-7005
Sep 7	Gaithersburg, MD	Fndtn for Amateur Radio / Chuck Sommer, N4OSD, 301-249-6544
Sep 7	Findlay, OH	Findlay RC / Patrick A. Tendem, WS8T, 419-358-8945
Sep 7	Butler, PA	Butler Co ARA / Gerald Wetzel, W3DMB, 412-282-6777
Sp13-14	Melbourne, FL	Platinum Coast ARS / Allen Hudson, N4PTM, 407-773-9658
Sep 13	Dallas, GA	Dallas ARC / Bill Houston, WD4LUQ,770-445-9191
Sep 13	Alexandria, LA	Central La. ARC / Jack Brossette, WA5ETL, 318-445-1962
Sep 13	Greenville, MS	Greenville Rptr Assn / Paul Serio, N5PS, 601-332-7668
Sep 13	Ballston Spa, NY	Saratoga Co RACES / Darlene Lake, N2XQG 518-587-2385
Sep 13	Shattuck, OK	Great Plains ARC / Donald Swallow, N5VJE, 405-921-3676
Sep 14	Trenton, NJ	Del Valley RA / FallFest 97, PO Box 7024, W Trenton, NJ 08628, (609) 882-2240. Location: Tall Cedars of Lebanon picnic grove (I-195 E to Exit 2; Yardville, S Broad St to end; left onto Old York Rd; next right onto Sawmill Rd; 1.1 miles on right. Talk-in 146.670(-). 8am, adm $5, non-ham spouses and children free.
Sep 14	Yonkers, NY	Westchester Emergency Comm Assoc (WECA) / Bill Hertwig N2QZB, (914) 271-1832w/961-2268h or info-line (914) 741-6606. Location: Yonkers Raceway (15 min from LI and NJ bridges) Talk-in 147.060 MHz. 8am-2pm, adm. $6.
Sep 14	S Dartmouth, MA	SE Massachusetts ARA / William M. Miller, Jr., K1IBR, 508-996-2969
Sep 14	Mt. Clemens, MI	L'Anse Creuse ARC / Richard Dzick, N8MQU, 810-268-4671
Sep 14	Monett, MO	Ozarks ARS / Joe Nix, KB0RVB, 417-235-8359
Sep 14	Omaha, NE	AK-SAR-BEN ARC / Dave Kline, WJ0Z, 402-592-4930
Sep 14	Monroe, NC	Union Co ARS / Zachary Davies, KF4FDE, 704-536-1952
Sep 14	Wheeling, WV	Triple States RAC / Ralph McDonough, K8AN, 614-546-3930
Sep 20	Mtn Home, AR	Twin Lakes ARC / Miles P. Waldron, N5QMI, 501-492-4466
Sep 20	Sebastopol, CA	Sonoma Co Radio Amateurs / Rick Reiner, K6ZWB, 707-575-4455
Sep 20	Gainesville, GA	Lanierland ARC / Mike Hall, N4HGO, 770-535-2119
Sep 20	Chanute, KS	Chanute Area ARC / Charlie Ward, WD0AKU, 316-431-6402
Sep 20	Cave City, KY	S Kentucky Hamfest / Larry Brumett, KN4IV, 502-651-2363
Sep 20	Lincoln, ME	Bagley ARC / Max Soucia, N1KGS, 207-732-3263
Sep 20	Warroad, MN	Lake of the Woods RA / David Landby, KB0HAP,218-386-1092
Sep 20	Mt. Holly, NJ	S Jersey Radio Assn. / Ed Baud, N2YAJ, 609-888-0467
Sep 20	Portland, OR	Hoodview ARC / Ed Clulow, N7TL, 503-257-4822
Sep 20	Wichita Falls, TX	Wichita ARS / Danny Caldwell, KA5IVZ, 940-322-8743
Sep 20	Randolph, VT	Cntrl Vermont ARC / Barry Driscoll, KE1BV, 802-479-1408
Sp20-21	Anchorage, AK	Alaska Conv / Lillian Marvin, NL7DL, 907-277-6741
Sp20-21	Peoria, IL	Peoria Area ARC / John Coker N9FAM (309)692-FEST, jcokereastpeoria@worldnet.att.net. Location: Peoria Exposition Gardens (fairgrounds), Northmoor Rd & Univ St. Open 6am.
Sep 21	Adrian, MI	Adrian ARC / Brian KG8CO, (517) 265-1537 or kg8co@juno.com, www.qsl.net/W8TQE/ Location: Lenawee Co Fairground. 8am-2pm
Sep 21	New Pt Richey, FL	Suncoast ARC / Mimmie, KO4FB (813)937-7455, Marv, N2AT, marv@ix.netcom.com. Location: New Port Richey Rec Center, 6630 Van Buren, NPR; talk-in 145.35- & 147.15+. Adm $5
Sep 21	Newtown, CT	Western CT Hamfest / Bill Schaeffer N1PJG, PO Box 3441, Danbury, CT 06813-3441, (203)798-2831. Talk-in 147.12/.72. Adm $4
Sep 21	Cincinnati, OH	Greater Cincinnati ARA / Paul N. Riedel, WB8NFT, 513-681-6263
Sp26-27	Mobile, AL	Mobile ARC / Tommy Thompson, KC4OLV, 334-653-9239
Sp26-28	Aurora, On	Canadian Ladies ARA / Cathy Hrischenko, VE3GJH, 905-473-9972
Sep 27	Drummondville, QB	Drummondville ARC / Claude Vendette, VE2CVJ, 819-848-2595
Sep 27	Daytona Beach, FL	Daytona Bch ARA & Embry Riddle / John Munsey, KB3GK, 904-677-8179
Sep 27	Hudsonville, MI	Grand Rapids ARA / Jim VanMalsen, KB8QAQ, 616-887-8673
Sep 27	Horseheads, NY	ARA of the Southern Tier / David Lewis, WA2HTL, 607-589-7495
Sep 27	Schnecksville, PA	Delaware-Lehigh ARC / Ray Bilger, W3TDF, 610-346-7313
Sep 27	Anderson, SC	Anderson RC / Brooks Jordan, KD4FRO, 864-226-8950
Sep 27	Cookeville, TN	Cookeville RA, TN Tech ARC / Rich King, KD4ABC, 615-528-7171
Sp27-28	Grayslake, IL	Chicago FM Club / Mike Brost, WA9FTS, 708-457-0966
Sp27-28	Walla Walla,WA	Walla Walla ARC / Jeff Stidham, KC7FUY, 509-525-5296
Sep 28	Longmont, CO	Boulder ARC / 303-673-0289
Sep 28	Framingham, MA	Framingham ARA / Bev Lees, N1LOO 508-626-2012
Sep 28	Cottleville, MO	St. Peters ARC /Allen Underdown, N0GOM, E-mail: wbrco@valuenet.net
Sep 28	Yonkers, NY	Metro 70cm Network / Otto Supliski, WB2SLQ 914-969-1053
Sep 28	Butner, NC	Falls Lake ARC / Bill Sims, W4WKS, 919-383-4419
Sep 28	Cleveland, OH	Hamfest Assn. of Cleveland / William Beckman, N8LXY 216-999-7388
Sep 28	Springfield, OH	Independent RA /Bernie Corbin, N8XKF 937-882-6559
Oct 5	Queens, NY	Hall of Science ARC / PO Box 131, Jamaica, NY 11415; Arnie Schiffman WB2YXB (718)343-0172 (evenings only). Location: NY Hall of Science parking lot - Flushing Meadow Park, 47-01 111th St, free parking; Talk-in 444.200rptr, 146.52simp.9am-3pm, adm $5.

Send announcements of events or club information to: Editor, Monitoring Times, P.O. Box 98, Brasstown, NC 28902-0098. Fax 704-837-2216; e-mail mteditor@grove.net. See MT's homepage on **www.grove.net** for complete event and club listings.

CLUB CIRCUIT

North American Club Listings V - B

Vancouver Shortwave Association: Box 500, 2245 Eton St., Vancouver, BC Canada V5L 1C9, (604) 255- 8987 fax. Shortwave. *LOGJAM.* Meets 3rd Thurs. 7pm at 920 Davie St.

World DX Club: Arthur Ward, 17 Motspur Drive, Northampton, England NN2 6LY (in USA-Richard D'Angelo, 2216 Burkey Drive, Wyomissing, PA 19610). Worldwide. All bands with emphasis on SW. *Contact.* $22 overseas airmail. Meets every 6 weeks in Reading, UK.

Worldwide TV/FM DXers Association (WTFDA): P.O. Box 17333, Asheville, NC 28816, www.users.sccoast.net/daustin/wtfda.shtm l. Worldwide membership; TV DX, FM BC, VHF utilities. *VHF-UHF Digest.* Annual convention. $24 annual in U.S. $2 for sample.

Worldwide Ute News: Rick Baker, ae411@yfn.ysu.edu for info - worldwide membership; non-broadcast utility stations under 30 MHz. Free electronic newsletter WUNNEWS (may also be obtained by computer disk via PO Box 16533, Washington, D.C. 20041-6533); join by sending e-mail to majordomo@grove.net with following in e-mail message: "subscribe wun." (No club dues) Through World Wide Web: www.leonardo.net/berri/wun.

All Ohio Scanner Club: Dave Marshall, 20 Philip Drive, New Carlisle, OH 45344-9108. U.S. northeast of the Mississippi; VHF/UHF/HF utilities. Net Mon 9:30pm 146.940. *American Scannergram.* www.aosc.rpmdp.com . $18 U.S, $21 Can/Mex, $28 ww. $3 sample. Annual summer meeting.

American Eagle Sideband CB'ers Club: Keith Herzig KC5LPQ, P.O. Box 751, Chester, MA 01011. Mainly New York/New England area. Sunday evening net/chat 37 LSB at 9:00 pm. Free sample newsletter.

American SW Listener's Club: Stewart MacKenzie, WDX6AA, 16182 Ballad Lane, Huntington Beach, CA 92649, (714) 846-1685; wdx6aa@aol.com. Western US, Pacific, Asia. SWBC, utilities, longwave, clandestine.*SWL.*$24 US, $25 Can/Mex. $2 sample ($3 ww). Meets1st Sats 10am address above.

Association of Clandestine Enthusiasts (A.C.E.): Kirk Baxter, P.O. Box 11201, Shawnee Mission, KS 66207. US, Europe and Middle East; Pirate and clandestine. *A.C.E.* $20 US, US$21 Can/Mex, US$27 ww.

Association of Manitoba DX'ers (AMANDX): Shawn Axelrod, 30 Becontree Bay, Winnipeg, Manitoba, R2N 2X9 Canada, (204) 253-8644. Manitoba; LW, MW, SW, and VHF/UHF. Meets monthly. $2.

Association Scanner Montreal: Nicolas Gagnon, 5083 Charleroi St. App 2, Montreal, CANADA H1G 2Z6; *VHF-UHF*, French language, Quebec Province area. Info: 514-955-0788.

Bay Area Scanner Enthusiasts: Bruce Ames, P.A.O., 105 Serra Way #363, Milpitas, CA 95035, (408)267-3244. Western U.S.; 25+ MHz. *Listening Post* (bi-monthly). Meets 2nd Mons. 7:30 Milpitas Police Admin Bldg. $25 US, $2 sample, or SASE for info.

Bayonne Emergency Radio Network (BERN): Ray Baron/Bob Frasca, P.O. Box 1203, Bayonne, NJ 07002-6203, 1-800-286-2876. Metro NJ, NY; Fire/disaster, pub safety.

Boston Area DXers: Paul Graveline, 9 Stirling St., Andover, MA 01810-1408, (508)470-1971, 50 mile radius Boston; 3-30 MHz. Meets 3rd Fris 7:30pm, The Lexington Club, Route 4/225 1/4 mi W of Rte 128.

Doug Demaw, W1FB

A Simple Receiver You Can Build

"Learn by Doing" is my motto. Some of the simplest projects can provide the most fun if you are willing to heat a soldering pencil and spend a few hours at your workbench. Among the more exciting circuits are simple regenerative receivers. Many of them rival the sensitivity of $1000 plus store bought superheterodyne receivers.

There is always a thrill associated with hearing a distant shortwave station with a bare-bones receiver that you built. This month we examine two simple regenerative receiver front ends that can be connected to a hi-fi or other audio amplifier to obtain speaker volume.

Two Low-Cost Circuits

Figure 1 shows two single-transistor regenerative receiver detectors. Circuit A uses a junction field-effect transistor (JFET). The example at B utilizes a 2N2222 bipolar transistor. R1 in both examples is the regeneration control. As it is adjusted it causes the detector transistor to go into self-oscillation. When Q1 or Q2 are oscillating, they are effectively operating as variable frequency oscillators (VFOs) and detectors for CW and SSB signals. When they are not oscillating they are simple detectors that change RF energy to audio frequencies for making AM signals coherent.

Neither figure 1 circuit has sufficient audio output power to drive headphones or a speaker. Therefore, an audio amplifier must be connected to the output of the detector.

How the Detectors Operate

Both figure 1 circuits depend upon changes in the dc operating voltage (via R1) to make them operate in the regenerative mode. Regeneration is dependent also upon positive feedback. This means that part of the transistor output power is fed back to the input circuit (L2 coil tap). It must be of the same phase, rather than 180 degrees out of phase (negative feedback), in order to cause oscillation or regeneration. The circuit at A depends upon changes in Q1 drain voltage for controlling regeneration. Circuit B relies upon variations in the Q2 base bias to cause regeneration.

When regeneration commences, the detector oscillates and produces increased gain. The gain is much lower when copying AM signals, since there is little or no oscillation occurring.

Some Shortcomings

There are performance trade-offs to accept when using simple circuits of the type in figure 1. Regenerative receivers radiate a signal on the frequency to which they are tuned. If you live near a ham radio operator or another SWL, chances are that he or she will hear your receiver when you are tuned to the same frequency he is using. This can be minimized by adding a preamplifier ahead of the detector. A circuit is provided in figure 2A. The JFET preamp yields 10 dB of gain to make your regenerative receiver more sensitive. This preamp helps to isolate the oscillating detector from the antenna.

Another problem with regenerative receivers is that the user will hear signals on both sides of center frequency or zero beat. Single-signal reception, like that obtained with superheterodyne receivers, is not possible with a regenerative receiver. This can result in twice as much QRM (signal interference) if there is a lot of activity near the receive frequency.

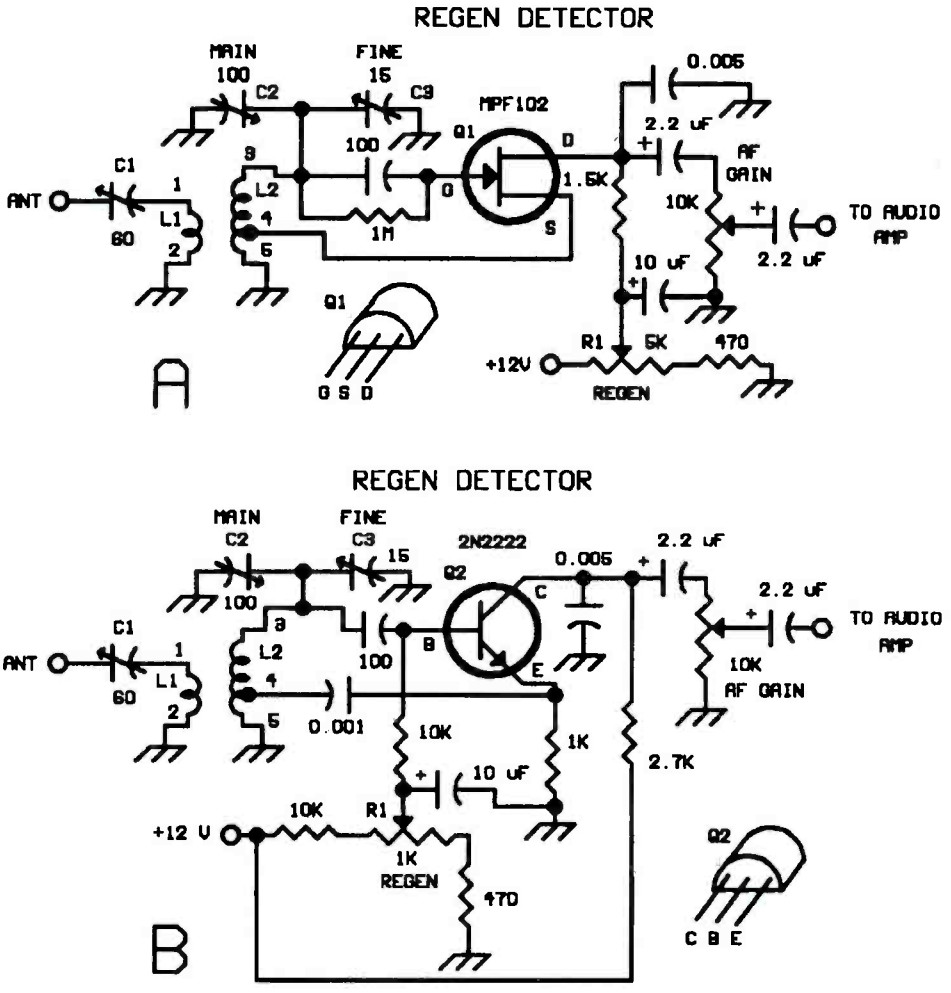


FIGURE 1 — *Schematic diagrams for two regenerative detectors. Fixed value capacitors are disc ceramic. Polarized capacitors are electrolytic or tantalum, 16 volts or greater. Fixed value resistors are 1/4-watt carbon film. C1 is a 60 pF trimmer. C2 and C3 are panel mount air variables. L1 has 4 turns of no. 24 enam. wire 3/16 inch below L2 (see figure 3). L2 has 35 close-wound turns of no. 24 enam. wire on a 5/8 inch OD piece of PVC pipe, 1-1/2 inches long. Tap L2 at 8 turns above grounded end. If a 410 gauge shotgun shell is used, wind 57 close-wound turns of no. 26 enam. wire on the plastic part of the shell. Tap L2 at 14 turns above grounded end. L1 has 6 turns of no. 26 enam. wire 3/16 inch below L2. R1 is a linear taper carbon control. Use an audio taper control for the 10K-ohm AF gain potentiometer.*

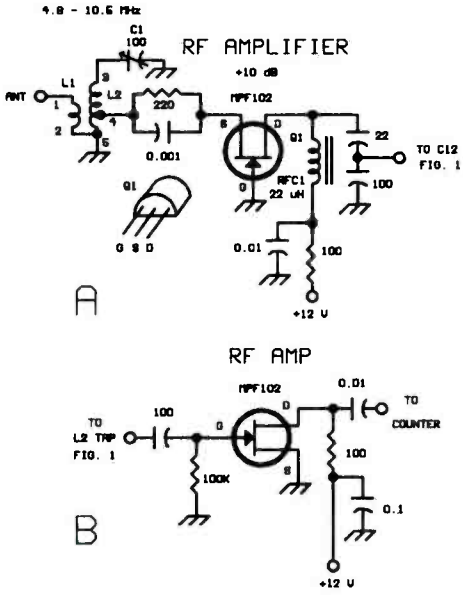


FIGURE 2 — ***An RF preamplifier is seen at A. C1 is a panel mount air variable (larger of the two sections in a transistor AM radio tuning capacitor suitable). L1 and L2 have the same dimensions as for figure 1. Circuit B shows an amplifier that may be added for using a frequency counter as a digital readout device (see text).***

It is sometimes necessary to readjust the regeneration control when changing the receive frequency by 50 or more kHz. Also, your ability to separate stations (selectivity) will be considerably less than when using a superheterodyne receiver that has IF filters for AM, SSB and CW bandwidths.

However, when we consider the simplicity of the figure 1 circuits versus their remarkable performance, our construction project makes good sense in terms of money spent and pleasure gained.

Adding an Audio Amplifier

Output from the volume controls in figure 1 can be connected to an existing mono or stereo amplifier for headphone or speaker operation. You may want to purchase a low-cost audio amplifier kit for use with this and other workshop projects. Among the kits available are the MCM Electronics no. 80-1490. This is a 4-watt audio amplifier that operates from +12 volts and costs $12.95.[1] Ramsey Electronics offers its no. BN-9 2-watt audio amplifier kit for +12-volt operation at $8.95.[2] You may also purchase an audio amplifier kit from Hosfelt Electronics. Their no. AA-1 delivers 1.5 watts, operates from +12 volts and costs $10.95.[3]

Construction Tips

Either circuit in figure 1 can be built on perforated board or "dead bug" style on a scrap of regular PC board. Keep all leads as short and direct as practicable. This is especially important for the leads and parts that carry RF energy. See figure 3 for coil winding details.

The coil and capacitor values given for the figure 1 circuit provide a tuning range from 4.8 to 10.5 MHz. This span includes WWV at 5 and 10 MHz, the 30- and 40-meter amateur bands, the popular pirate frequencies, and numerous short-wave broadcast frequencies. This part of the radio spectrum ensures good reception, day and night.

Two tuning capacitors are specified in figure 1. C2 is for coarse (fast) tuning and C3 is for bandspread (slow) tuning. Improved smoothness of tuning will result if you use a vernier drive on C3.

L1 and L2 in figure 1 can be wound on PVC pipe or on an expended 410-gauge shotgun shell. Winding data for both types of coil forms is given in figure 3. When tapping L2, be sure to put a piece of tape under the turn where the tap is made. This will prevent short-circuiting adjacent coil turns. A shorted turn or turns will spoil the Q of a coil and degrade the performance.

Regenerative detectors need to be housed in metal project boxes. An earth ground should be connected to the box. This will prevent unwanted "hand capacitance" (detuning) effects when you put your hand near the tuning knobs. An open chassis with a metal panel is often sufficient for preventing the foregoing annoyance.

C1 in figure 1 is a mica, plastic, or ceramic trimmer. It is adjusted with the antenna connected. Too large a value at C1 can cause excessive coupling to the antenna, which will prevent the detector from regenerating. C1 should be set for reliable regeneration, consistent with maximum signal strength. The setting for C1 will depend upon the type of antenna you erect.

Be sure to use shielded audio cable or miniature RG-174 coaxial cable for the connection between the figure 1 detector and your audio amplifier. The shield braid for this cable should be grounded at each end to prevent picking up 60- or 120-Hz hum.

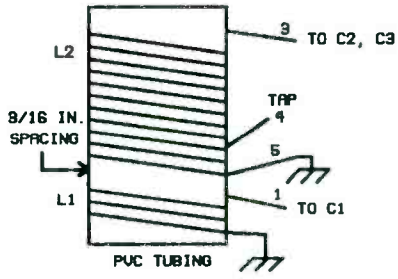


FIGURE 3 — ***Pictorial drawing of L1 and L2 on PVC pipe (see figure 1). The spacing between the two windings is 3/16 inch. L1 can be wound over the grounded end of L2 if desired.***

Adjustment and Use

A dipole cut for 7.1 MHz (66 feet overall) and fed with RG-58 coaxial cable will be satisfactory for reception with the figure 1 circuit. Alternatively, you may erect a piece of no. 14, 16, or 18 gauge wire which is 33 feet or 99 feet long. An earth ground, such as the copper cold-water pipes in your home, should be used with this end-fed wire. Connect the earth ground to the receiver circuit ground.

To copy CW or SSB signals you will need to tune in the signal for maximum strength, then advance the regeneration control (R1) until a beat note is heard for CW, or the SSB signal becomes understandable. This will require adjustment of C3 to permit tuning to the correct sideband. For 40-meter amateur signals you will need to utilize the lower sideband. Use only enough regeneration to ensure a quality CW or SSB signal.

The same procedure is followed when tuning in an AM signal. However, the regeneration is set so that oscillation almost commences. At this threshold point you should not hear a beat note (whistle) when you tune away from the center of the AM signal.

If the range of the regeneration control (R1) in figure 1 does not permit going from no regeneration to full regeneration, try experimenting with the value of the 470-ohm resistor at the right side of R1.

If you plan to use the preamplifier in figure 2, be sure to adjust C1 of figure 1 in the same manner as when an antenna is connected directly to C1. Tune for the best sensitivity that allows the detector to be regenerative when R1 is adjusted.

Tag Ends

If you don't wish to build one of the figure 1 circuits, but have a yen to assemble a receiver kit, you may wish to order the Ten-Tec 9-band shortwave receiver kit, no. 1253, that sells for $59.[4] Ramsey Electronics markets a shortwave receiver kit, no. SR-1, for $29.95. See note 2.

Other FETs may be used at Q1 of figure 1A, such as the 2N4416 or a dual gate MOSFET (40673, 3N211, etc.) with gates 1 and 2 joined. You may use a 2N3904 or 2N4400 transistor at Q2 of figure 1B. Don't be afraid to experiment.

If you want to go modern with the receiver you can connect a frequency counter to the system for direct digital readout. In order to do this you will need to add the isolating amplifier in figure 2B. The frequency counter will not provide a reading unless the regeneration control is advanced sufficiently to make Q1 or Q2 oscillate.

Notes

1 — MCM Electronics, 650 Congress Park Dr., Centerville, OH 45459-4072. Phone: 1-800-543-4330.
2 — Ramnsey Electronics, 793 Canning Pkwy., Victor, NY 14564. Phone: 1-800-446-2295.
3 — Hosfelt Electronics, 2700 Sunset Blvd., Steubenville, OH 43952-1158. Phone: 1-800-524-6464.
4 — Ten-Tec, Inc., 1185 Dolly Parton Pkwy., Sevierville, TN 37862-3710.

Jean Baker, KIN9DD

Charting the Way

Welcome aboard! Today we'll take a look at those vital aeronautical charts and see how they contribute to the safety and efficiency of every flight.

Sectional Charts and VHF Terminal Control Area Charts: Sectional charts are designed for visual navigation by slow and medium speed aircraft. There are 38 sectional charts which cover the entire United States. Their scale is fairly large - 1:500,000. That is, one inch on the chart equals 500,000 inches (6.86 nautical miles) on the ground.

Since the sectional and terminal control area (TCA) charts are used for visual navigation, they are designed to highlight information a pilot will see from an aircraft. Topographic information on the charts portrays the terrain and elevations. Also highlighted are visual checkpoints used for visual flight rules (VFR) flights. They include populated places; drainage such as lakes, rivers, and creeks; roads and railroads, and other landmarks.

It goes without saying that airports are highlighted on these charts. Essential information about each airport is shown next to its symbol, so a pilot has immediate, ready reference to the information. Sectional and TCA charts also depict visual and radio aids to navigation, controlled airspace, restricted areas, obstructions, and other related data. Different colors highlight essential information such as boundaries of terminal control areas.

Terminal Control Area Charts are twice the magnification of sectional charts so that more detail may be included. That is because pilots using them are flying in a terminal control area, with its higher density of aircraft traffic.

In planning a flight under visual flight rules, a pilot will draw the route on a sectional chart, then devote careful study to the information presented on it. He will concentrate on identifying obstacles, locating potential emergency landing sites, highlighting navigational aids, and becoming as familiar with all aspects of the flight route as possible.

To use the charts, only a basic knowledge of map reading skills is helpful. Each chart has a very comprehensive legend, which explains the symbols used on it. Sectional and TCA charts are revised semiannually; several Alaskan sectional charts and the Puerto Rico, Virgin Islands TCAs are revised annually.

World Aeronautical Charts (WACs): World aeronautical charts are drawn to a scale that is half that of the sectional; 1:1,000,000. At that scale, one inch equals 13.7 miles. They are convenient for navigation by moderate-speed aircraft. There is less detail shown than on either the sectional or the TCA charts, because the scale is smaller.

Topographical information on the WACS includes cities and towns, principal roads, railroads, distinctive landmarks, drainage, and relief features (indicated by spot elevations, contours, and gradient tints). Aeronautical information includes visual and radio aids to navigation, airports, airways, restricted areas, and obstructions. These charts are revised annually, with the exception of several Alaskan and Mexican/Caribbean charts, which are revised every two years.

Enroute Low-Altitude Charts: These are designed for flight under instrument flight rules (IFR) in the low altitude stratum — the "victor" airways under 17,000 feet. The area charts furnish terminal data in a large scale format for congested areas such as Washington, Los Angeles, New York, Chicago, and several others.

Enroute High-Altitude Charts: These charts are designed for flight in the high-altitude stratum — the jet route structure at flight level 180 and higher. These charts are less cluttered than the low-altitude ones, as navigational aids are usually spread farther apart in the high-altitude environment.

Charted VFR Flyway Planning Charts: These publications show multiple VFR routings through high-density traffic areas which may be used as an alternative to flight within the major controlled traffic flows. The charts use a scale of 1:250,000.

Planning charts:

VFR/IFR (Preflight) Planning Chart: This chart is produced at a small scale of 1:2,333,232, or one inch for every 32 nautical miles. It is printed in two parts so that, when assembled, it forms a composite VFR planning chart on one side and an IFR planning chart on the other.

Flight Case Planning Chart: This publication is designed for preflight and enroute flight planning for VFR flights. Scale is 1:4,374,803.

Gulf of Mexico and Caribbean Planning Chart (self-explanatory)

North Atlantic Route Chart: These are used for monitoring transatlantic flights by controllers and ground station radio operators.

North Pacific Oceanic Route Chart: Also designed for use by controllers and radio operators.

EnRoute High Altitude Planning Chart: This chart is used for IFR enroute planning at or above 18,000 mean sea level. Information is revised every 56 days.

Instrument Approach Procedures (IAP) Charts: IAP charts are published in 15 bound volumes displaying the aeronautical data required to execute instrument approaches to airports in the United States, Puerto Rico, and the Virgin Islands. New volumes are released every 56 days, and procedural changes occurring within the 56-day cycle are reflected in one volume issued at mid-cycle.

Standard Instrument Departure (SID) Charts: Standard procedures for departing from a given airport.

Standard Terminal Arrival (STAR) Charts: These charts expedite ATC arrival route procedures and facilitate transition between enroute and instrument approach operations. Both SIDS and STARS often have appropriate nicknames, e.g., the "HeHaw" arrival into Nashville, Tennessee. All SIDS and STARS names contain only five letters.

Alaska Terminal Publication: This document contains charts depicting instrument approach procedures, standard instrument departures, standard terminal arrivals, airport diagrams, and radar minimums for use by all civil and military aircraft in the state of Alaska.

Helicopter Route Charts: Aviators operating in major metropolitan areas with large concentrations of helicopters need these charts. Scale is 1:125,000, twice as large as the TCA charts previously mentioned.

There are other charts and maps, but the aforementioned are the most important ones for pilots to use. You can obtain these charts and maps at your local fixed base operator; they're educational and fun to use when monitoring the aero bands.

More MWARAs

Let's pick up two more Major World Air Route Areas (MWARA). All frequencies are in kHz and upper side band.

Southeast Asia (SEA)

(SEA-1): Frequencies: 3470, 6556, 10066, 13318, 17907. Ground stations: Bali, Bangkok, Colombo, Calcutta, Dhaka, Guangzhou, Jakarta, Kathmandu, Kuala Lumpur, Kunming, Madras, Male, Singapore and Yangon.

(SEA-2): Frequencies: 3485, 5649, 5655, 8942, 11396, 13309, 17907. Ground Stations: Bali, Bangkok, Denpasar, Guangzhou, Hanoi, HoChi Minh, Hong Kong, Jakarta, Kuala Lumpur, Kota Kinabalu, Manila, Seoul, Singapore, Tokyo, and Vientiane.

John Fulford, WA4VPY
email: johnf@emi.net

The Feds are talking ... but where?

Any hopes that federal activity in my area might increase over the summer months have now died, but the following incident has given me another clue about where the action has gone.

A few weeks ago, over 100 units from the local sheriff's department, local police, Federal Bureau of Investigation, Internal Revenue Service, Drug Enforcement Administration, Bureau of Alcohol, Tobacco, and Firearms, and Immigration and Border Patrol did a joint raid and arrest scenario on an infamous drive-up crack house. This was a legitimate "business" known as "The Land Of OZ." It had a liquor license and did walk-in bottle trade. It also was one of the largest crack cocaine distribution points in Palm Beach County, Florida. After it was all over, over 50 people were arrested, the liquor license lifted, and the property seized.

This business is approximately fifteen miles from my location. Over the past few weeks I had been hearing tactical drug buys on the sheriff's tactical repeater of 159.15 MHz. This repeater can be heard over much of Palm Beach County. All transmissions are in the clear. It only takes a few minutes of monitoring each night to figure out where the drug buys are happening that day, though I heard no reference to a specific business.

I also monitor all federal channels that I know of in the Palm Beach County area. Guess what I heard on them regarding the drug buys? You get a cookie if you said, "nothing." That's right: not even a peep. Perhaps a lull in the normal amount of administrative traffic from the local federal field offices should have given it away, but I figured a lot of agents were out on vacation. It turns out they were right in the middle of the operation, working with the locals and using local radio channels.

The City of West Palm Beach is fast becoming the trunking provider for much of Palm Beach County. Also found on the WPB trunking system are the cities of Atlantis, Palm Beach Gardens, and Riviera Beach. I remember listening to the sheriff's repeater and hearing a trunking radio in the background. A couple of references were made to the "city radio." I figured they were using WPB trunking to coordinate with local units. I was only partially correct: The units were using the WPB trunked system for nearly *all* of the activity leading up to the raid.

Television crews were there at the time of the raid, and I made sure I taped every evening news I could find. Going back and looking at the tapes, I saw only trunking radios and cellular phones. The federal agents, complete with their black hoods and body armor and sporting the appropriate federal logo on their bodies, were all carrying trunked radios.

According to a radio shop that "would know," there have been several sub-fleets added to the WPB trunked system for federal agencies and multi agency operations. I did not push him for the talk group and/or subfleet identifications, but by the time this column was written, I had them programmed into my "monitoring device." I will not be kept out in the cold on their next operation.

A contributor to the Fedcom list posted an almost identical experience. A massive federal operation was planned for a town south of Raleigh, North Carolina. On the morning of the raid there was *no* FBI traffic, neither in the clear nor encrypted. The only clue was that the previous day there had been talk of vehicles heading toward that location. The evening before the raid the FBI traffic was rare and encrypted. There was no indication as to the nature of the operation.

The day of the raid all went well and concluded with a press conference. That evening our monitor went by the location. There were numerous state and federal vehicles there. At the local gas station were several federal vehicles with their federal antennas. All of the agents were waiting to use the pay phones.

Not everyone can hope to catch this kind of action in their neighborhood. Unless you live in a major metropolitan area or a known narcotics hot spot, such as a national forest or on the US/Mexico border, surveillance traffic is rare. Many investigations are handled by only one or two agents. Back when this was my job, we would go for several weeks and never key up our microphones. When we did talk to each other, sometimes we would be using frequencies designated for other uses, such as marine band, business band, and even citizens band. Nowadays, with the introduction of field programmable two way radios, both mobiles and portables, it is hard to say exactly where a stakeout team may be.

Also remember that the range of surveillance traffic is usually short. Unless your sheriff's department puts all of its surveillance traffic on a countywide repeater, the traffic is usually done on simplex channels. These channels, most often in the 155, 418, and 460 MHz frequency bands, will be unit-to-unit simplex. The transmitting range is about five miles for a 60 watt mobile in the 160 MHz range on a simplex channel.

It helps to connect to an outside antenna; also, living in a tall building helps. Because of the increased altitude of their transmitting antennas, I routinely monitor DEA operations on 418.750 MHz simplex from airplane to ground, and Customs aircraft on 166.4625 MHz. The units on the ground won't be heard on simplex unless they are within a five mile radius.

Reports from Our Readers

Chris Parris sent in the following intercepts from his recent trip to **Kansas City, Missouri**.

Frequency	Use	P/L if known (Hz)
162.225	VA Medical Cntr-Paging	
162.900	Unknown simplex traffic	
164.225	Same	
164.375	Dept. of Energy	
164.500	Unknown simplex traffic	
165.2375	Customs	100
166.200	VA Med Cntr Repeater Out	114.8
167.5125	FBI	
167.4500	Department of Energy	
168.850	Same--Both Repeater out	
168.575	VA Med Cntr	141.3
168.800	GSA Operations	118.8
169.500	Unknown simplex	
169.550	Unknown base station	
170.650	Same	
170.925	Same	
413.850	Alarms and security	118.8
413.950	GSA Repeater	118.8
414.750	Postal Inspectors	82.5
415.200	GSA--parallel with 413.95	
415.225	Unknown user	
415.300	D.of Agriculture	118.8
416.400	Unknown user	
417.200	GSA Repeater	118.8
418.225	IRS Criminal Division	123.0
418.900	DEA Repeater Out	156.7

Michael Holzinger in Grant's Pass, Oregon, sent in the following intercepts:

Siskiyou National Forest

Frequency	Use
171.3875	Ch. #1--Dispatch
171.1500	Ch. #2--Dispatch
415.575	Link Channel #1
168.6250	Air Guard

167.9500	Air to ground
168.2200	National Incident Reporting
170.5000	Car to car simplex
170.5500	Project #1
168.2000	Tac 2
168.7000	Tac 1
169.7000	Law Enforcement net Yellow
168.0250	Law Enforcement net Blue
166.3500	Bureau of Land Management
167.7875	FBI
418.9500	DEA

The FBI in the Medford Field Office uses 167.4625 and 167.4875 MHz.

An anonymous contributor sent in some intercepts for the **Puget Sound** area. They are:

Frequency	Traffic
163.650	Fire officers checking hydrants
164.800	U.S. Forest Service (this is a Secret Service frequency)
167.7625	FBI
418.675	DEA simplex surveillance
139.050	Military traffic
165.2375	Customs

■ Federal Trunking

Larry Van Horn submitted the following in response to a request for the new trunking frequencies for **Camp Pendleton, California**.

Base	Mobile
406.550	413.275
406.950	413.475
407.325	414.200
408.750	415.825
409.750	416.225
409.950	413.900
412.950	418.350
413.050	418.550

This is a standard government trunking scheme. If you find any of the above frequencies active in your area, check all of the frequencies. I'll bet you will find a federal trunking system.

Not all trunking systems have to be in the 400 or 800 MHz band. **Fort A.P. Hill**, a part of the Military District of Washington, has just gone to a VHF trunked system. Their frequencies are:

141.2000 142.475 142.925 143.325 143.400 MHz

■ Family Service?

I received a letter from someone (we'll call him Mr. A), who related the following story. Our contributor lives in a large metropolitan city. His new neighbor across the street works for one of the "three letter agencies." Mr. A tried to make friends with him at first, but the fed would not give up any communications intelligence, But one day he did.

The fed told Mr. A that although their vehicles have two way radios installed — obvious by the antenna on the vehicle and the control head under the dash of the vehicle in the driveway — he almost never uses it. He prefers his own cell phone and the one provided by his agency. He went on to say that a good 90-95 % of the traffic between agents are on cell phones and those pesky pagers: The two way radio accounts for that five percent of the time when they need to reach a number of agents in a hurry.

The fed stated they operate two types of surveillance. The first type is where one or two agents just "sit" on a residence. The second type is roving. The radios used during the roving surveillance have been changed. He said his agency previously used their "company" radios on the car to car channels, but have gone to a new type of radio. When questioned about this new radio, the fed stated that he did not have one with him, but that he had seen them for sale in the local Radio Shack; they had only a 1/2 mile range and were inexpensive and easy to operate.

I can think of a couple of types of radios that Radio Shack sells that would fit that equation. The first are the amateur radio portables, but I think we can rule them out. The second are the VHF and the UHF portables — a possibility. The third, and the type I would put my money on, is the new Family Radio Service. These portables are cheap and easy to operate. One large private detective agency here in Palm Beach County conducts all of its roving surveillance on the FRS channels, the most common being 462.7125. It looks like we have a new set of frequencies to put into our scanners to monitor! Let me know what you hear.

■ Dig the Sounds

As a final challenge, check out the nationwide federal itinerant frequencies. These include:

418.750	418.075	both simplex channels
168.350	408.400	both control/mobile channels
163.100	418.050	both repeater out and simplex channels

There is a federal operation in Houston using DES encryption on 168.350. It's unknown who is doing it. Also, if you live near the Sandia National Labs in Livermore, California, the frequency of 413.850 MHz is using some kind of encryption that does not sound exactly like the DES that is most common on the other federal frequencies. Instead of a hissing tone it is more of a "gurgling" hissing tone.

Go to it, you amateur sleuths, and we'll see you next month on the federal bands... wherever they may be.

SATELLITE TV

ADVENTURES IN THE CLARKE BELT

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Lessons From The Field

If you hang around the electronics field a while, you'll pick up enough information to actually be of use to others. That's what I've discovered since I installed my first satellite system in 1984. And, since 1988 I've been writing about the subject of satellites and television in this column. I've seen dozens of satellite programmers come and go, many manufacturers start and flourish or go belly-up. Receiving equipment prices have plummeted. Programming subscriptions are cheaper than ever with a wider variety available. Technology has made incredible strides (some more worthwhile than others).

There have also been some surprising developments which have served to underscore the unpredictability of the industry and defy conventional wisdom. Some of these developments were plain business miscalculations and others were not of this world. Just this year we've seen the collapse of AlphaStar (last hog to the DBS trough) and the mysterious demise of Telstar 401, gone long before its time.

Ten years ago, conventional wisdom was that the Ku band would soon supersede C-band and confine that mode to the Smithsonian. Just this June Telstar 5, with its expected lifespan of 15 years, was launched and its 24 C-band channels are rapidly filling up. In fact, three other new C-band birds were brought into service in 1997. Ten years ago the specter of scrambling had many industry leaders wringing their hands and crying, "The skies are going black!" There are more channels available now in the clear than ever. Ten years ago a complete C-band system with top grade receiver would cost nearly $3,000. Today that price is under $1,600.

This Drake ESR 1824 is a top of the line satellite receiver which sells for under $1,000 new. Bottom line receivers of other brands go for under $300 new. (Courtesy R.L. Drake, Co.)

Abandon Your Dreams

The first thing you should do when you contemplate getting involved with satellite TV reception, is to plan your dream system. It might be comprised of a 30 foot dish and a General Instrument 4DTV receiver for starters. The next thing you should do is get rid of these notions. You don't need expensive gear to enjoy this hobby. In fact, you'll get a certain satisfaction in seeing and listening to signals from space for less than the price of a decent scanner.

Here are some things I've learned. Get to know someone who's a satellite TV dealer. You'll be amazed at the things he or she is willing to give you. I've gotten all kinds of neat, working, useful satellite gear just for carting it out of the shop. You may have to pay as much as $25 or $50 for a decent used receiver.

Many folks are abandoning their C-band systems to hop on the DBS bandwagon. Don't be afraid to ask neighbors, friends, acquaintances, or just plain strangers who are doing so, what they'd take for their system. Offer $200 for the dish/electronics and another $200 or $300 for the receiver, depending on age and condition. They'll be happy to be rid of their big dish and have you pay for their new DBS system. Of course, the deal will be yours, because three years later they'll have shelled out $1,000 to $3,000 in viewing fees while you'll have paid as little as $0, depending on your viewing addiction.

Later, as you get involved in the hobby, you can add a Ku system, buy an SCPC receiver or up-grade your listening system. Adding a Dolby Pro-logic capable stereo to your sound system will pay big dividends of listening pleasure as you listen to the digital audio from a Videocipher II encrypted signal. With a couple of extra speakers, your family will be amazed at the theater-style sound as you watch movies. Put a little extra butter on the popcorn and crank up the volume!

Care and Feeding of Your Dish

Another thing I've discovered through the years is that many of the technical aspects of this hobby are consumer friendly. While it's doubtful that you'll actually be able to dig into a receiver or LNB to effect repairs, there are many things you can do by yourself without paying high-priced professionals. Now, I'm not begrudging anyone a decent living, but there are many times when you may not need the services of a satellite dealer. First you should know that most dealers charge by the hour and that hour usually starts when they leave the shop. If you're like most satellite viewers and live in the country there could be a two hour charge just for coming and going. At $50/hour, that adds up!

Installations are easy to do and mail order companies like Skyvision have done everything possible to allow you to do the installation yourself. Most manufacturers also have toll-free trouble numbers to call when your installation isn't working. I've had very good experiences with the friendly folks at General Instrument and Uniden trouble numbers. There's also a nationwide number to call for folks with old gear from deceased manufacturers or out-of-business dealers. (It's called Troubleshooters: 800-625-1293, weekdays and Saturday between 11 a.m. and 10 p.m. ET.)

If you're doing a new self-installation, save all the manuals and follow directions closely. If you've bought an older system with no manuals, copies can usually be had from the manufacturer for a small fee. If the company is no longer in business, copies may still be available from other older dealers or by consulting a reputable repair firm (Professional Satellite Repair, 814-342-5635, is a good place to start.)

Trouble-shooting Your System (Three Quick Lessons)

The most common mistake consumers

make is in configuring the system. There are a lot of components and a lot of wire connections to make. Double check all connections before panicking. Other simple mistakes are: not having the TV or VCR set to the proper output of the satellite receiver, or, not having power cords plugged in.

Satellite component manufacturers have very strict quality control. It's quite rare to have a faulty component right out of the box. If there is a problem, suspect your work first and the manufacturer last. I once had a receiver which would not be operated by the remote control which came with it. Before I panicked, I checked the "brand new" batteries which went into the remote control and, sure enough, one was dead. After replacing the batteries, I didn't have a problem.

#1 - Won't Switch Polarity

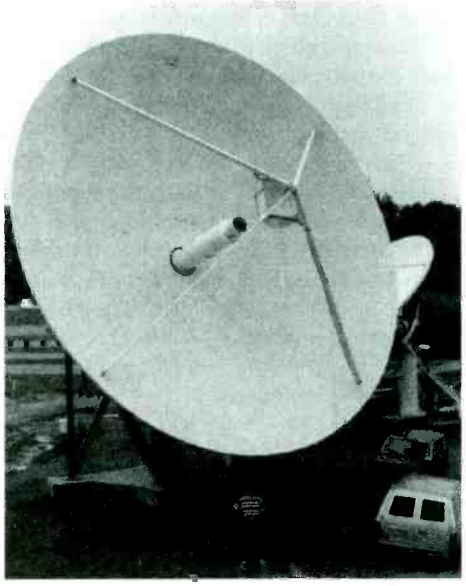
Here's an idea of how easy it is to troubleshoot your own system. If your receiver doesn't appear to be switching polarity do this: Check the voltage at the back of the receiver with a cheap ($10 from Radio Shack) voltmeter. There should be 5 to 9 volts, depending on the receiver. Anything less than 5 indicates the receiver has a problem. If the voltage there is OK, check the voltage at the end of the polarizer wire at the dish. Again, you should get at least 5 volts. If you don't, there could be a break in the cable. If there is, it indicates a problem with the polarizer motor.

Remove the plastic throat cover at the feed horn and look inside. There may be a wasp nest or some other obstruction preventing the probe from rotating, which is how you get a change in polarity. If there's a wasp nest, be careful! At any rate, be careful with the probe, as it is set "just so" for proper polarization; try not to touch it. If there's no obstruction, take a small Phillips head screw driver and remove the four screws which hold the polarotor motor (usually blue and about 2" x 2" x 1").

Be careful not to drop the screws (you'll never find them in the grass) and watch for a rubber gasket which might fall out of the motor as well. Taking off the motor you'll see a nylon disc with a slot in it which is attached to the probe on the other side. Now, take a standard screw driver and rotate the probe manually with the screwdriver. If it rotates freely, then it indicates the polarotor motor should be replaced. Disconnect the three wires which attach it to the corresponding wire which goes to the house and replace the motor.

If the probe did not rotate freely it could mean that the motor is fine and that there is some dirt or other obstruction on the nylon. Use a graphite or other fine powder lubricant to dust around the nylon disc. Work the probe again with the standard screwdriver. Don't use WD40 or other potentially damaging chemical solvent on the disc, as you might compound the problem.

See how easy that was? You used a cheap voltmeter and two screw drivers and saved about $150.



Here I am standing under my dream dish. This 10 meter monster actually belongs to Ted Turner. When this dish was pointed at the horizon it had sparkle-free pictures off Russia's Gorizont 26 at 11 degrees West. (Photo by Peggy Reitz)

#2 - Dish Won't Move

It's the same with the dish drive motor. When you want to move to another satellite the dish may not move. Don't panic. Again, start with the receiver. You should have 20 to 36 volts at the receiver. Now go to the wires at the dish. It should be the same there. Look for loose connections or broken wires.

Your receiver may prompt you with a screen message such as "No return pulse" or something similar. This indicates the pulse counting (necessary to tell the receiver to shut off when it's moving) is not taking place. You may only have to replace the reed switch in the motor housing. This is a five minute procedure and a $20 part with your cheap voltmeter and two screwdrivers.

#3 - No Picture

Now, let's say you turn on your receiver and there's no picture. First, check to see that everything is plugged in, connected, and set to the right channel. Next, get out your voltmeter and measure the voltage at the "F" connector where your RG/6 cable from the dish plugs into the receiver. There should be about 28 volts. If it's considerably less, the receiver is probably at fault.

Now check the voltage at the dish end of the cable. If it's at the receiver but doesn't make it to the dish, then the cable is cut or a connection is damaged: Replace the cable. If the voltage is there, it's most likely a damaged LNB. The easiest way to determine if the LNB is good is to replace it with one known to be good.

It's always advisable to have a cheap, used, working LNB on hand to use for such occasions. You can pick up an old 80 or 100 degree working LNB for $10 to $25 dollars. If you replace the suspect LNB with your old working one and you get a picture (never mind that the picture may be a little noisy), then you need a new LNB. You'll need your cheap voltmeter, a cheap LNB, and a small wrench to diagnose the problem.

Do-it-yourself! It's easier than you think.

Bill Cheek
email: bcheek@san.rr.com

A WiNRADiO Upgrade Opener

Save this column! You may need it as I present a series of performance and feature upgrades for the emerging WiNRADiO wide-spectrum communications receiver. Introduced a little over a year ago, WiNRADiO overcame the stigma of interference and noise associated with computers and radios. WiNRADiO proved that not only can computers and radios coexist, but they can also be integrated into one chassis without adverse effect.

WiNRADiO is a 500 kHz - 1.3 GHz receiver on an 8/16-bit card that plugs into a 16-bit expansion slot of most any IBM-PC/compatible computer, 386/up. WiNRADiO runs natively under Windows 3.1x, Windows 95, and Windows NT, and it can also work under later versions of MS-DOS. Even though not particularly recommended, WiNRADiO can operate in an 8-bit slot in older AT/286/compatible computers.

One of WiNRADiO's claims to fame is that it plugs into the computer's CPU/RAM/data bus, not to the slower, less efficient serial (COM) port like other "computerized radios." RS-232 (com port) technology is time-honored and proved, but it is antiquated compared to the upcoming Universal Serial Bus. There is no better way to connect a device to a computer than directly to its bus, whether it be ISA, EISA, VLB, PCMCIA, or PCI.

WiNRADiO uses the standard ISA bus that's available in all 286 and higher PCs. Even though the ISA (Industry Standard Architecture) bus is the oldest, it remains universal in PCs and will be around for a long time yet.

Unveiling WiNRADiO'S Mysteries

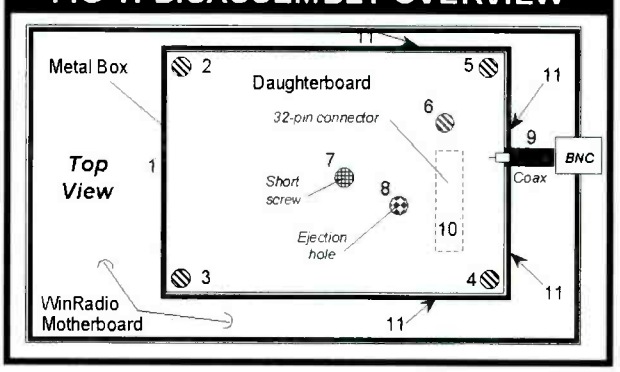
Barely a year old, WiNRADiO carved a niche into the stone walls of hobby radio, and there are indications that it found favor in certain commercial and government circles as well. Interest in WiNRADiO is picking up, as more "insider information" about it bubbles to the surface. The more I tinker with mine — the fewer its mysteries!

Yes, WiNRADiO can be hacked and we're going to do it in coming issues. However, to conserve space in subsequent columns, the disassembly instructions will be presented just once — now. ***Earmark and save this issue for future reference***. This information will not be repeated, but will be repeatedly referenced.

Disassembling WiNRADiO

First, turn off the computer; carefully remove WiNRADiO from its card slot. Lay it out flat, compartment side facing you, BNC connector to the right. There are a few things you need to know to safely disassemble the WiNRADiO board. Refer to the numbers in Figure 1 for the below steps and to the details in Figure 2.

FIG-1: DISASSEMBLY OVERVIEW



1 – Remove the warranty label. Remove the cover of the shielded compartment. This requires gentle prying all the way around, a little bit at a time.

NOTES FROM A FACTORY REP: If you manage to bend the metal lid, don't worry, we have spares! One thing we found: inserting a screwdriver under the lid into one of the two rectangular cut-outs, then using lever action, can warp the lid. This obvious way was the way we intended. However, we found a better way to remove the lid: put a screwdriver under the corner, rest it on the PC holder bracket and lever up carefully a little bit. Then insert the screwdriver into the opening and slide it along the longer side between the lid and the box, in a fairly rapid movement. (Zzzzzip!) If properly done, the lid springs out, intact. (Never use the large capacitor as a rest for the screwdriver.)

2-6 – Conventional machine nuts and phillips screws; the screws insert from the back of the motherboard, and the nuts are tightened onto the daughterboard inside the shielded compartment. Remove 2 - 6.

7 – Conventional machine nut and phillips screw, where the screw inserts from the back of the board, but the nut is unseen (beneath the PCB); not on top like 2-6 above. This screw is shorter than screws 2-6. Don't remove it yet, but be aware that if the nut comes off, it will slide around under the PC board. This screw and nut hold the metal box to the motherboard and need not be removed to extract the PCB.

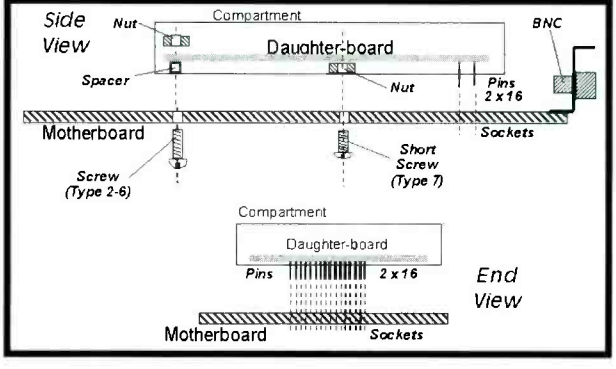
8 – This is a hole like 2-7 above, next to the connector, but is not for a screw. It is an access hole through which to insert a blunt shaft and push (no components to destroy) the PCB out of the 32-pin connector. (See 10) *There are two ways to extract the PCB, so wait!*

9 – This is the coax feeder from the BNC connector to the RF Input on the daughterboard. First unsolder the center conductor from the PCB; then unsolder the shield from the chassis. This end of the coax must be completely loose; don't tamper with the BNC. *NOTE: too much heat for too long can damage this coax.*

10 – You can't tell exactly by looking, but this is the header of a 32-pin male plug that mates the daughterboard to a socket on the larger motherboard below it. There is a cutout hole in the metal box through which the daughterboard pins protrude to plug into the motherboard.

11 – These are approximate pry points where to insert a flat blade screwdriver to leverage

FIG-2: DETAIL VIEWS



the metal box up from the motherboard, if screw 7 is first removed. *But wait!*

You don't want to bend or break any pins. If you do, there could be a problem. The pins are spaced 0.1-inch center-to-center; compatible with my favored pin-line sockets. So if you break a pin, it might be repairable with a pin-line plug or socket. Try not to go there, if you know what's good for you.

Factory Way To Remove The PCB

A FACTORY REP SAYS: We had an animated debate on the best method of removing the PCB from the motherboard, everyone obviously having their best, time-honored procedure! And I thought that there was just one way; the professional way!

Well, the pro's differed on this. I tried all suggested methods and I think the best one (for me) is probably inserting a screwdriver into hole 8 from beneath the backplane and gently push out the receiver board.

However, this assumes that you don't unscrew 7 nor remove the metal box. Only unscrew 2,3,4,5 & 6 and remove only the receiver board; the metal box stays put — this saves you at least some of the trouble with the insulator sheets.

Now here's *my* way: I removed screw 7 and pried the metal box up from the motherboard using Points 11 as pry-lever access. I bent only one pin slightly, easily straightened. You might not be so lucky. I misplaced one of the clear acetate insulator sheets, too.

So which PCB removal method is best? I think the way I did it is a little safer, but the factory guy can't be all wet, so think it through first!

Study Figures 1 and 2, these steps, and your WiNRADiO before actually doing anything. Then work slowly and carefully. Whatever you do, protect that 32-pin connector!

■ Reassembling WiNRADiO

Reassembly is straightforward: first position the clear insulator sheets as they were before they came off. (One goes between the motherboard and the metal compartment, a second one lays inside the metal compartment beneath the daughterboard, and a third sheet lays on top before the cover is replaced.)

Lay the metal compartment (*without* the daughterboard) on the motherboard (with the first insulator sheet in place), and orient the screw holes. Insert the short screw at Point 7 and securely tighten its nut first! Obviously, if you didn't remove the metal box from the motherboard in the first place, there is no need to replace it.

Now lay the second insulator sheet in the bottom of the box, making sure the holes line up. Then lay the daughterboard in the compartment so the holes align with the spacers. Align the male pins of the connector (10) with the holes on the motherboard. You really can't see what you're doing, so it has to be by "feel," but you can tell. When you are certain they're aligned, offer a prayer and press on the header of the connector so that its pins push into and firmly seat in the sockets on the motherboard.

Insert screws 2-6 from the back of the motherboard; attach and tighten their nuts from the top of the daughterboard. Position the coax back to its proper position and resolder the center conductor to its place on the daughterboard. Resolder the shield to the chassis. Replace the cover, pressing firmly into place all the way around. Check everything twice and reinstall WiNRADiO in a card slot in the computer.

This concludes the procedure for tearing WiNRADiO down to service level. There really isn't much to it, and once you've done it a time or two, you'll be an expert.

■ What's Coming Down?

I have several WiNRADiO mods in the queue and more on the drawing board. The first three will consist of upgrades to the specs and performance. There will be a hack to improve the PLL Phase Noise; another to reduce or eliminate residual crossover distortion; and another to improve the sensitivity of the NFM and AM modes.

We are working on a means to improve the selectivity in the shortwave bands without overtightening the selectivity of the VHF-UHF bands where some slop is necessary. Many other possibilities loom. Stay tuned.

WiNRADiO has found a place in my warbag of radio assault weapons! I'm not sure a better deal can be found between the $60 bargain-basement specials and the $6000 kick-butt, world class, blow 'em away receivers like the Icom R-9000. Cheap stands on its own merits, while the best don't get "bester," just costlier. There are plenty of fine players in between, but WiNRADiO could offer the most for the least! The potent RF Spectrum Scope (reviewed last month) tipped the scales for me.

The latest information and software updates for WiNRADiO are available at the US Web site at **http://www.WiNRADiO.com** and at the Australia site: **http://www.WiNRADiO.net.au.** These sites also contain programming information (both 16 and 32 bit) for those who want to write their own software for the WiNRADiO receiver (the information in the manual is superseded). If you don't have a WiNRADiO, you can still download the latest software and run it in demo mode.

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The Every Two Years Computer Industry Blowout

In the consumer electronics industry, and especially in the personal computer sector, the pace of development is both exciting and frightening.

I was speaking with a high school classmate who is now a medical doctor and we were swapping career stories. To make an analogy between his world and mine, I asked him to imagine the human body radically changing structure and composition every eighteen to twenty-four months. His reply was that this would be impossible, since it would require constantly relearning the "new" medicine! Then he looked at me and said, "You're crazy to do it!"

Well, guess what: it's time for another "crazy" computer industry market watch update.

Going Up!

CD ROM drive speeds — the speed at which data can be retrieved from a CD ROM — are going through the roof! A twelve times (12X) drive now costs what a 4X did a year ago: around $110. But as we speak I know of at least two companies which are preparing to launch 20X+ CD ROM drives.

As a result of this crazy horse race, $50 now buys a high quality 8X+ CD ROM drive. I've had 1,2,4 and 8X drives. I must confess that I see little noticeable operational difference between the 4 and the 8X. So buyer beware of costly specification upgrades which just help your ego and not your computer's operation.

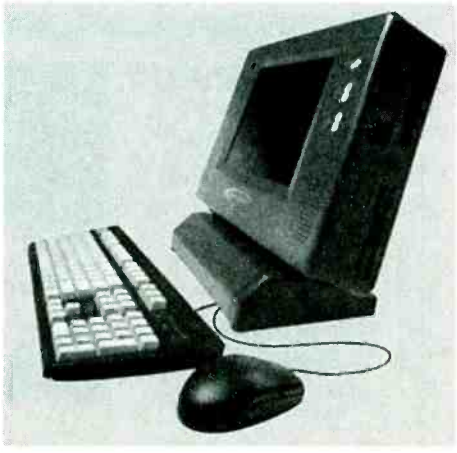
Meanwhile, the first DVD (digital video disk) based ROM drive has been released. I have not spoken to anyone who has used it as yet. DVD ROMs hold the same promise that CD ROM gave and never really achieved: personal computer multimedia programs with full motion video content and quality. The DVD could make non-video graphics a thing of the past. Keep watching.

Going Down!

With Intel's introduction of their new MMX Pentium microprocessors the price of the original Pentiums dropped by nearly 50%! Hey, what's wrong with a Pentium 133 MHz? Nothing, except if you have the need to claim that you have the latest and greatest. (In which case I suggest you get a life instead.)

A Pentium 133 MHz with 1 Gig hard drive, 3.5 inch floppy, 8X CD ROM drive and keyboard was seen in a CompUSA store at a price around $1500. But wait: The amazing part is that this computer by Monorail also included a 10+ inch full color LCD flat panel screen. *And* it was all housed flat behind the screen. The whole system, with color screen, was the size of the screen with a thickness of about four inches! No tower case or desk case. Simply a thick picture frame-like screen. The sign over the Monorail logo read "Sold-Out." Why am I not surprised?

Hard drive prices appear to be steady, but look closer. Last year I "stole" a brand name 1 Gig drive for $240. "Great deal!" my doctor friend might say. Well, today $240 buys you a 2.1 Gig drive. The price is the same, but the capacity has doubled.



Flatbed photo scanner prices are really dropping. One measure of quality is the resolution of a photo scanner, measured by DPI, or image composing dots per inch. The other parameter is digital word accuracy, bit size (which is roughly a composite measure of: the number of colors it can resolve, image sharpness, and potential overall resolution). I just bought a 300 x 600 DPI, 24 bit, single pass photo scanner for around $140, after all rebates. Just four months ago this machine sold for $260+.

What has triggered this price reduction is the introduction of 600 x 600 DPI machines. For text and medium quality picture work the one I bought is just fine. The 600 x 600 are aimed more to the higher quality photo requirements. But at $140, the 300 x 600 DPI, 24 bit prices are *very* tempting.

Holding Steady

After a few months at the end of last year when inkjet printers were dropping $25 per month off their prices, they have stabilized around the $180 range for a good quality color inkjet printer.

RAM memory prices have also found their bottom at $89 for 16 Meg of 72 pin memory, as used in the Pentium motherboards. Interestingly, while trying to upgrade my wife's 486 to 16Meg I found that this 36 pin memory now costs $140! Gee, do ya' think someone is trying to push us toward a Pentium and away from a perfectly good 100 MHz 486?

Laser printer prices also seemed to have bottomed out around $375. I think as electronic still photo cameras take over the home camera market the color laser printer has to

come down in price from thousands of dollars to the mid-hundreds. Perhaps this is where the laser printer companies' energies and resources are going, instead of lowering the price of the current black and white laser printers.

"Magic" Revisited

In July we took a look at Computer Aided Technologies' (CAT) file management and conversion program "MAGIC" version 1.1. CAT has now released version 1.3 with a few modifications along the lines of our suggestions and observations. Wow! Some companies really do listen to their customers.

In particular, out of range, or bogus frequencies which sometimes result from file conversion, must now pass a user-entered frequency band filter. For example, last time we tried version 1.1 it converted a frequency file which incorrectly resulted in an entry for Tallin Air, a commercial airliner, on 1441 MHz. Somehow the program grabbed on to the time (1441 - 2:41 PM) and thought it was a frequency.

Now, with version 1.3, the user can set the "Range Of Acceptance." If we know that the list is a shortwave list, then the valid range is set from 1 to 30 MHz. Or, for the case of a list of commercial aircraft in the VHF band, the valid range of acceptance would be 108 to 137 MHz. All converted frequencies are tested by Magic to ensure they fit in the range before they are included in the final converted file. This "Range Acceptance Feature" does the job nicely.

Magic: Now You See It ....

We also reported a video problem with version 1.1 in which part of the screen was cut off or truncated. My speculation that this was a function of the video card used was confirmed by Head Cat, Jim Springer. Jim's team has fixed the problem with the introduction of version 1.3. I did not see the cut screen syndrome when I ran version 1.3 on my Pentium 133 using a Diamond Stealth 2 Meg VRAM video card — the same system on which I tested version 1.1.

Finally, Scanstar, WinRadio, RadioManager, and Scannerwear files have been added to the list of Magic's readable files. Check out CAT's advertisement for ordering details on Magic version 1.3.

C&R's Hottest Topic Ever

Of all the topics we have covered in Computers and Radio over the past years, the disappointing results that we have all experienced with converting printed frequency lists into computer files tops the list. I still receive letters on this over two years old topic. I guess this may be due to the marketing hype we were exposed to by the media concerning photo scanner "technology."

It was just a few years ago when most of us tried to use relatively inexpensive hand photo scanners for file capture with poor results. With our limited personal budgets the $100 to $200 hand scanners were our only choice. Then, flatbed scanner prices started around $600.

But again, all that has changed. As I told you before, I have just bought a new flatbed color scanner for under $150. As soon as I have a chance to unpack it we'll give another try to photo scanning frequency files. Also, optical character recognition (OCR) programs have been "developing" with some powerful shareware OCRs now available. Stay tuned for "Real or Scam: Photo Scanning Frequency Lists 1997" in the coming months.

Yep, in our house the new photo scanner proved to be a much more needed household appliance than the garden chipper/shredder. Score one for the radio guy!

Rich Arland, K7SZ
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Here We Go A-Roving

This year I have re-entered the V/UHF aspect of our hobby. Last spring I managed to find a mint ICOM IC-402 70 cm SSB/CW QRP (low power) portable rig that was popular about 15 years ago. By beating the bushes on the Internet, making phone calls, and much pleading, I managed to procure the two matching units, the IC-202 2 meter and IC-502 6 meter radios, to round out the trio. Now I had the basis for a VHF+ mountaintopping and rover station for 6 meters, 2 meters and 70 cms. Watch out, "grid-hopping" here we come!

Now, for the VHF-challenged among us, "grids" refer to the Maidenhead grid square system whereby the entire surface of the world is broken down into squares corresponding to longitude and latitude. This gives a quick indication where a station is located. Case in point: if we are engaged in a QSO on VHF and I tell you that I am located in Hazelton, Pennsylvania, it may take you several minutes to find that area on a map. However, if I tell you I am located in FN10, and you have a grid map, you can pinpoint my location in a matter of seconds. Grids are cool.

"Roving" is a contest entry where one or two individuals drive to various locations to make contact with other stations in the contest. They "rove" around, set up their V/UHF stations and give out contacts to other contest participants.

Mountaintopping is as old as VHF. In the early days of VHF experimentation, it was soon learned that the higher the operator was in relation to sea level, the further he could transmit and receive signals. With the portable rigs available today (including my 15 year old ICOMs) it is possible to set up a small station on a hill top or butte and have a ball working DX contacts hundreds of miles away using a couple of watts RF output.

In my efforts to apply our **K.I.S. Radio** philosophy to V/UHF roving, my first hurdle—obtaining the necessary RF equipment — was done in fine style, spending only $325 for all three radios: less than the cost of a new 2 meter FM transceiver!

Since the little ICOMs only put out 3 watts CW or 1.5 watts SSB, RF amplifiers are necessary to increase the radiated power to the 30 to 50 watt level. I wanted to maintain a very compact station, so I needed a dual band amp for 2 meters and 70 cms. Mirage [1] had the answer in their BD-35 model. We'll have more on this in an upcoming column.

My RF problems were solved on 2 meters and 70 cms; however, I was forced to use the 6 meter IC-502 "barefoot," without a linear amp.

I weighed several antenna possibilities, including using horizontally polarized omnidirectional antennas, directional yagi antennas, and a combination of both. I settled on using a combination of omnidirectional antennas by PAR Electronics [2] and some small yagis for my first attempt at roving.

The 6m beam sits atop the tripod at left. The short pole on top of the camper holds the 6m Omni antenna. The longer pole holds a 70 cm Omni at the very top and a 2m Omni about half way down.

PAR Electronics offers a novel approach to omnidirectional, horizontally polarized V/UHF antennas. Shaped like a triangle, these loop-variants offer good omni characteristics (invaluable when roving) and virtually no detuning in wet weather. They look a little weird, but they perform well, and the cost is reasonable.

I ordered one antenna for 6 meters and another for 2 meters. Their 70 cm version was still in prototype stages but Dale, W4PO, sent a working sample which arrived the day before the contest. These omni antennas clamp to the roof rack on my Coleman pop-up using telescoping aluminum swimming pool brush handles (hey, I'm cheap!)

The PAR Omnis work very well, especially on Low Earth Orbit (LEO) satellite passes for RS-10 and 15 (a real plus for Field Day). Total cost for the 6 and 2 meter antennas: $129 with shipping.

Murphy Strikes Again

Even without the organ grinder and the monkey, I was ready to take this show on the road. First deployment: the June VHF QSO Party (June 14/15) sponsored by the ARRL. Luckily I live about 20 minutes from the junction of four grid squares. With a little driving and some ingenuity, I would be able to activate FN10, FN11, FN20, and FN21 for an hour or two each as K7SZ/R (the "/R" stands for a rover station for contest purposes).

I have seen pictures of other rover stations and mine certainly didn't look like anything that had ever appeared in the magazines! Fig #1 says it all! The antennas and most of the mast sections are bunjied atop the Coleman pop-up camper for transport to the operating location. Once in place, special mounting brackets on the camper's roof rack hold the masts, which support the PAR omnis. The rotatable yagi antennas are mounted on a AN/GRA-4 mast with tripod adaptor. Total height for the GRA-4 system is 20 feet, which is more than adequate for a roving operation.

The K7SZ/R entourage consisted of my wife Tricia, my 3 year old granddaughter Kielan, and myself. It was dark when we arrived at our campsite in FN21 in the middle of a thunderstorm and torrential rains. With Kielan sound asleep in her car seat, Trailer Park Patti and I began setting up camp in a monsoon, which is *not* my idea of a fun time. But things were to get worse....Edsel Murphy lives for moments like this.

Promptly at 7:30am our neighbors fired up power saws and started constructing a wooden deck for their trailer. Then the all terrain vehicle crowd destroyed any remaining chance of sleep. Stumbling out of the sack, I fixed coffee and started assembling antennas. I cranked down the camper and put the PAR Omnis on the roof, routing the coax through the ends of the camper. Next came the GRA-4 tripod. Initially I tried to place three antennas on the mast, but ended up with some interaction, so I downsized the operation to use only one antenna at a time on the mast. This was tedious and frustrating.

The radio gear checked out fine and I was ready to start the contest from our FN21 campsite as soon as the clock hit 1400 local (1800 Zulu). First contacts were with the K3YTL

group on top of Red Rock Mountain on 6 and 2 meters. K3YTL is the Murgas Amateur Radio Club station, named for Fr. Joseph Murgas, the wireless pioneer who lived and worked in Wilkes-Barre, PA, in the early part of the century. I worked a couple more contacts with other stations and decided to go to Hazelton and activate FN10.

We arrived at a Wal-Mart store about 4pm local and found an operating location in the back parking lot. I quickly set up the 6 meter antenna on the mast and made contact with K3YTL. Next came 2 meters followed by 70cms as quickly as I could change antennas. For several hours I worked more contacts from FN10. I wanted to press on to FN11 just up the road, but I was overruled by the rest of the contest team. Back at the campsite we had dinner, and I returned to the radio, working a few more stations on 6 meters.

Sunday morning found us enjoying a quick breakfast after a restful night's sleep. I fired up the rigs and was scanning around on 6 meters looking for new stations when the laptop computer died! That was *IT*! I was through. Since we had a 3pm commitment at home that afternoon, I decided to strike the antennas and break camp.

My total score for my first roving endeavor was only 200. I made very few Qs and was extremely frustrated. I thought that things would go much smoother than they did. Time for some retrospection...

Lessons learned:

1. Scout out your proposed roving operating locations *before* the contest. Physically drive your proposed route and inspect each location from which you plan to operate. Secure the necessary permission from land owners or residents. Many people do not understand our radio hobby, and a little prior explanation can smooth the way.

2. Remember our **K.I.S.** philosophy and take only the necessary equipment to do the job. My eagerness to help out the K3YTL group added several transverters for microwave bands and associated antennas ... all of which should have been left home on my first rove.

3. Use good quality coaxial cable. I had decided to use the new RG-8X+ certified quality coax from The Radio Works [4] instead of RG-213 or 9913 cable. This was a *big* mistake. I was trading convenience and ease of handling for dB. I needed every single dB of power from the transmitters into the antennas (and from the antennas into the receivers). RG-8X+ is good for frequencies up to about 30 MHz (maybe as high as 50 MHz if runs are very short), but not into the UHF region. One of the causes of the problems with the 70 cm station was the use of RG-8X+ instead of coax designed for low loss at 450 MHz.

4. Since you are using good coax, also take the time and spend the money for the proper connectors. Leave the "VHF" connectors (PL-259/SO-239) alone and go with BNCs and N-connectors. The impedance bumps and losses of the "VHF" connectors are not worth the hassle. The quest for each dB is critical, so don't skimp on RF connectors.

5. Plan, plan, plan, and plan some more. Don't overlook any details on your rover station. Ask one or two of the local VHF+ operators in your club for help and ideas. To prevent frustration and fatigue, your station should be designed for ease of operation, creature comfort, and simplicity.

6. Don't overextend yourself. My first time out as a rover was way too ambitious an effort since I was inexperienced. It would have been better to settle for operations on 6, 2 meters, and 70 cms using gain antennas and activate only two grids rather than trying to operate from four grids with seven bands.

7. Develop a roving schedule and *stick to it*! If you want to activate four grids during a contest weekend, plan when you will arrive and depart each grid. The roving schedule will become your itinerary. This helps keep your efforts focused.

8. Avoid frustration at all costs! This is a *fun* hobby; make it so.

I hope you have enjoyed our little diversion into VHF+ roving. It is clear that VHF+ weak signal work is not for the faint of heart. It takes work, time, energy, and desire to play on the V/UHF bands and do it correctly. In short, VHF+ is quite a challenge.

By the way, don't think this column is just for ham radio operators. Quite the contrary! The V/UHF scanner crowd, along with the satellite DXers, can learn some valuable lessons here, as well. Weak signal work on the high bands can be very rewarding if you are willing to learn about minimizing losses (in your receiving system) and the proper methods of installing your gear and optimizing your station.

Until next time, **Keep It Simple**.

Footnotes:

[1] Mirage Communications Equipment, 300 Industrial Park Road, Starkville, MS 39759 TEL: (800)-647-1800 FAX: (601) 323-6551

[2] PAR Electronics, 6869 Bayshore Drive, Lantana, FL 33462
TEL: (407) 586-8278 FAX: (407) 582-1234

[3] MFJ Enterprises, Inc. P.O. Box 494, Mississippi State, MS 39762 TEL: (800) 647-1800 FAX: (601) 323-6551

[4] The Radio Works, P.O. Box 6159, Portsmouth, VA 23703
TEL: (800) 280-8327 FAX: (804) 483-1873

Scanner Antenna Comparisons: A Futile Exercise?

By Bob Grove

A recent test we performed here at *MT* headquarters revealed how difficult it is to compare antennas objectively without a proper test range. We had an opportunity to test, side by side, several popular scanner antennas. S.R.P. Trading (Unit 33 Nash Works, Nash Lane, Belbroughton, West Midlands, DY9 9TD, England), manufacturer of the popular Sky Scan desk top antenna and a periodic *MT* advertiser, made available several of their models. Three popular Grove Enterprises antennas were used for comparison. Unfortunately, due to lack of time, we set up what turned out to be a worst case scenario.

Base station antennas were only a few feet above the ground and adjacent to a metal building; mobile antennas were substituted in rotation on a car roof, also next to the building. A hand-held scanner was used for audible signal comparisons.

The following "results" show how difficult it is to draw conclusions about antennas by swapping between them and listening for differences in strength. Relative positions of the antennas, height above ground, presence of nearby metallic surfaces (including the coax line and mast), fluctuations in signal strength and polarization, and other factors were constant frustrations. Nonetheless, Table 1 indicates what we found based upon overall experience with other, cut-to-frequency antennas:

TABLE 1

Freq. MHz	Grove Stealth	Grove ANT-4	Grove Omni	Sky Scan Desktop	Sky Scan DX	Sky Scan Mobile
27-29	Poor	Poor+	Poor	Poor+	Poor	Poor
46-49	Poor	Fair	Good	Poor+	Fair	Poor+
150	Good+	Good+	Good+	Good	Good+	Good+
460	Good-	Good	Good	Good+	Good	Good
860	Good-	Fair	Good-	Good-	Good-	Good-

So what does all this mean? It means that the test was less than objective; with too many variables to have meaning. What is the difference between Fair and Good-? Poor and Poor+? Not much. There were no profound differences among the samples. None worked well for 27 MHz CB reception (of course not—they're all too short!), all sounded equal on 150 MHz high band signals as well as 460 MHz UHF (they should; all had resonant elements at these frequencies), and 860 MHz reception was pretty much equal as well.

If any conclusion can be drawn, it would be reasonably safe to say that all six antennas performed nearly identically, and that six different listeners, using the six different antennas on six identical radios, would hear pretty much the same thing. In all fairness to the Sky Scan series, they are made of durable, machined aluminum, while the Grove Omni is composed of much flimsier TV-antenna aluminum tubing. Of course, the relative prices reflect the difference in construction, and even the lighter-weight antenna provides years of dependable service.

Part Two: So How Do You Perform a Valid Test?

On a real test range, the test antenna would be mounted high above the surface of the ground, with the vertical antenna well away from the metallic mast. A stable signal source would be radiated from another mast, perhaps 100 feet away, at the same elevation. The test antenna would be slowly rotated to determine its directivity pattern. A sensitive, calibrated test receiver or field strength meter would compare the relative signal strengths. Only then would the results have meaning.

An intrepid experimenter who loves to take shortcuts, I decided to try again with rubber duckies—and one 6"-46" telescoping antenna—from a variety of manufacturers. Mounting an 18" radial ground plane about three feet above the ground and connected by coaxial cable to a spectrum analyzer (a receiver with an S meter would also work), I watched relative signals strengths across the bands while switching antennas in position. Additionally, I listened for differences in background noise ("hiss") on a scanner.

The subjects were a Radio Shack PRO-43 stock antenna, the Antenex/Centurion DEXE and DEXY, the Premier RD78 and RD8, the Grove ANT-8 telescoping whip, the Austin Condor, and two general-purpose S.R.P. whips. Differences of 2-3 dB were not considered significant for receiving, given the variable environment of a hand-held scanner (see discussion below). The results were as follows:

The Grove ANT-8 was good on VHF low band (30-50 MHz) as well on all other ranges, but its length had to be adjusted to frequency for optimum performance. All other antennas were dreadful on low band, and they should be—they are all too short. The original PRO43 duckie, DEXY, and RD8 worked well on VHF high band (150-174 MHz) and UHF (450-512 MHz), but poorly at 800 MHz.

The RD78, which should have offered better performance than its shorter—and less expensive—brother, did not perform as well. The DEXE worked well on 800 MHz, but was deaf as a doorknob everywhere else. The two S.R.P. whips, one for 100-300 and the other for 600-1000 MHz, were dreadful; I'm not sure what their resonant frequencies were, but they weren't in the ranges we listen to. In remarkable contrast, the Condor worked well on high and UHF, and on 800 MHz it showed higher response than any other duckie.

The Bottom Line

Handheld scanners operate in a constantly changing environment; signal absorption from the user's body, reflection from nearby metal surfaces like vehicles and buildings, turning and bending away from the polarization of the arriving signals, changes in signal propagation, the effective mass of the radio as an antenna counterpoise, and many other factors, in addition to the nature of the whip, limit their effectiveness.

For general purpose use, stick with the original antenna. Where weak signal reception is a concern, go with the Condor. For continuous frequency coverage, if you don't mind its length and weight or adjusting it for frequency, try the Grove telescoping whip. For general purpose listening, the handheld scanner user would be hard pressed to tell the difference among most flex antennas sold for scanner use.

WHAT'S NEW?

PRODUCTS AND BOOKS OF INTEREST

by Larry Miller

Contributors: Rachel Baughn, Bob Grove

Help for All Receivers

Every receiver can use a little help. Whether you've a high-end JRC NRD-345 or ICOM R8500, or something a little more "back to earth," there are always times when you wish you had a little something extra — a little "ooomph" to pick that station out of the hash. Even casual listeners can benefit from an improvement in the sound quality of voice and music.

Several years ago, Grove introduced the SP-200. The unit, which "cleans up" the audio from your receiver, was an immediate success. Using all analog circuitry (to avoid the distortion created by digital signal processors), it combined a powerful audio amplifier and four-inch speaker with separate bass and treble equalizers, a variable passband notch/peak filter, an adjustable noise limiter, and a variable hang 0-45 second squelch control for an often dramatic ability to bring barely receivable signals out of the background and into the foreground.

There was one problem. In the middle of this success, one of the parts for the SP-200 became unavailable, forcing a redesign of the unit. The immediate result was that some people who wanted an SP-200 had to be turned away. In the end, however, the redesign has produced an improved SP-200, now offered to you as the SP-200B—and at no increase in price. Powered by 12 VDC (sold separately), the SP-200B is handcrafted in the U.S.A. and mounted in a handsome oak cabinet. You'll want the SP-200B front and center in your radio room!

The SP-200B is now in stock and ready to ship. To get yours, call Grove Enterprises at 800-438-8155 or send $199.95 plus $8 UPS to Grove at 7540 Hwy 64 W, Brasstown, NC 28902.

Latin American DXing

A few months ago as I was cleaning out some shelves, I came across one book that made me wax nostalgic. It looked like it had been prepared on a manual typewriter and pasted up with Elmer's Glue. But the stories! I enjoyed this book!

LA DXing No. 5 was put out by a Japanese shortwave DX organization, Radio Nuevo Mundo. The group, which concentrated on Latin American DX, stood out because of the zealousness of its members. If someone had a question about a particular station they had heard, these people got on a plane, trekked through the jungle, and visited the station! The resulting information, pictures, station logos, and stories gave a look at LADX unparalleled anywhere else in the hobby. But they don't make publications like that anymore.

You guessed it — a month or two later, I got an e-mail from Tokyo: *LADX No. 6* is now available, five years after the last edition!

Here's what's in this edition. First is a list of Latin American station by frequency. Next, arranged by country, is a list of station identifications to help you identify that station you heard. Then come the stories.

Takayuki Inoue Nozaki tells the story of dozens of Peruvian shortwave stations, their history, equipment, and personnel — all firsthand. Other DXers take small planes into the jungles to find clandestine facilities, and there's even a story by Don Moore on the last days of Radio Impacto — including pictures of its trashed and abandoned studios. Each is well illustrated with photos, logos, station schedules, and more.

Treat yourself to a copy. The only way that I know to get it is to send 20 IRCs or $20.00 in cash to Tetsuya Hirahara, 5-6-6 Nukui-kita, Koganei-shi, Tokyo 184, Japan. Mention *MT* when you write.

South Asia Radio Guide

Alok Dasgupta has produced issue #10 of his *South Asia Radio Guide*. The booklet provides schedules for 50 vernacular language broadcasts — in tongues like Asamese, Dogri, and Kok Borok — as well as a separate English language section and a list of DX programs. The *South Asia Radio Guide* is 23 pages long and costs 7 IRCs. You can get yours by writing to Alok Dasgupta, 1123 R.N. Tagore Rd., Calcutta - 700 077, India. If you have any questions, Mr. Dasgupta also has an e-mail address: *alokdg@GIASCL01.vsnl.net.in*

Phone Home From the Stars

You don't have to worry. No matter where you go, you're going to be able to stay in touch. Nowadays, it doesn't matter where on this planet you are, you can still make a phone call home or get your e-mail. Satellite phones aren't the "technological marvel" they were even a few years ago.

Market forces are making them smaller, better, and driving down the price.

The O'Gara Mobilephone is a handy unit that fits in your briefcase, costs $4,495, and has a calling plan that can go as low as low as $2.95 per minute!

The O'Gara Mobilephone is lightweight and rugged with a magnesium cabinet that's durable enough for travel anywhere in the world. The O'Gara makes it easy to step up to worldwide satellite communications! To order, call Grove at 800-438-8155.

Music from the Stars

You can scour the AM band for radio stations. You can tune in FM and look for skip. You can explore the galaxy of stations broadcasting from every point on the globe on shortwave. What many people miss out on is the fact that you can also DX space... the final frontier (music swells beneath announcer...)

There is a whole galaxy of "radio" stations on satellite, and the new SC-50 audio subcarrier/FM2 Satellite Receiver is the key to opening this entirely new world of audio DX for you. The SP-50 covers all of the FM2 and audio subcarrier channels from 10 kHz to 9 MHz — an area filled with hundreds of channels of programming. There's everything here from music programs, to sports

and talk to news and religious broadcasters. Many international shortwave broadcasters can even be found here, in crisp, glorious digital audio! You can kiss that static and fading goodbye forever!

I do have to tell you that this is not a stand-alone unit. It's designed to work with a C-band 11.7 - 12.2 GHz home satellite system (not a direct broadcasting system). It is, however, very simple to install, taking under 3 minutes to hook up! Go where no man has gone before! (I had to get that in somewhere.) Open up your satellite receiver to the world of satellite audio. Get the SP-50 audio subcarrier/FM2 Satellite Receiver. To order, call Grove at 800-438-8155. It's $399.95 plus $17 UPS.

Guide To Worldwide Weather

Noted for his comprehensive and up-to-date radio listening guides, Joerg Klingenfuss's 17th *Guide To Worldwide Weather Services* (1997/1998) is an exhaustive compendium of sources for global weather reports on both radio (navetex, radiofax, radiotelex) and the Internet.

Over 400 pages of information, packed with illustrations, present the user with sample reports from hundreds of educational and governmental institutions and agencies. Charts, forecasts, crop calendars, jet stream velocities, tropical storm tracking—it's all in these reports, available free if you know where to look. All updated 1997.

The *Guide To Worldwide Weather Services* is available from *MT* advertisers or from the publisher for $40 including worldwide shipping (Klingenfuss Publications, Hagenloher Strasse 14, D-72070 Tuebingen, Germany). — *BG*

Micro Machines

Optoelectronics has just announced a new line of miniature, low-cost test equipment called Techtoyz (pronounced "tek toys"). The first in the line is the Micro DTMF Decoder. Packed in a beeper-style case, it's perfect for portable, hands-free operation. With its built-in microphone, DTMF tones are automatically decoded from the signal source of tape recorders, receivers, two-way radios or anything else where touch tone can be heard by the decoder. There's also a built-in audio jack for direct connection to any audio source.

The Micro DTMF Decoder can decode up to 12.5 characters per second while displaying characters on its LCD. All DTMF characters are automatically stored in the unit's 2,000 character memory.

The Techtoyz Micro DTMF Decoder from Optoelectronics is available for just $89.00. You can order direct from Opto by calling 1-800-327-5912. Their address is 5821 N.E. 14th Ave., Ft. Lauderdale, FL 33334. Mention *MT* when you call, would you?

Spectrum Display Kit

JPS Communications, Inc., has announced the availability of a Spectrum Display Kit for their NIR-12 Noise/Interference Reduction and Filter Unit.

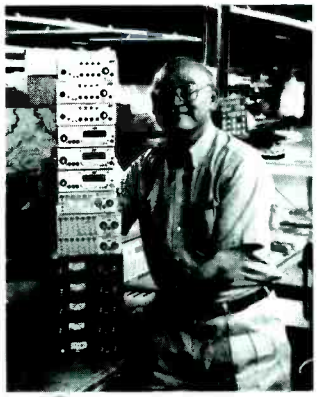
The SPEC-12 is a software

and hardware kit that consists of software, a new PROM and the SDK-12 kit for the NIR-12. The kit provides a hardware serial port with which to send spectrum data to an unused serial data port on the PC for display. The software will run on either DOS or windows on a 486 or faster. A 386 can be used if it has a math coprocessor. Control of the SPEC-12 is via the function keys on the PC keyboard and resolution may be toggled between 15 Hz and 30 Hz. The SPEC-12 is available direct from the factory for $75.00, including shipping. For more information or to order, call JPS at 919-790-1011 or write to them at P.O. Box 97757, Raleigh, NC 27624.

Business Briefs

• According to *Radio World*, LPB, Inc., a manufacturer of low-power transmitters for the broadcast industry, is charging that the FCC is allowing pirate radio manufacturers to "terrorize our airwaves." John Devecka, sale manager at LPB complains that the FCC is not enforcing the law regarding non-type accepted equipment and attributes the problem to a reduction in FCC field personnel. "I turn away (pirate broadcasters) all the time, probably a dozen a week," says Devecka. LPB, he says, could double its annual sale figures immediately if they decided to start selling to pirate operators.

• MFJ, the ham radio equipment manufacturer, is celebrating its 25th anniversary this year. The company, which was founded by Dr. Martin Jue in Hollandale, Mississippi, attributes its success to "low prices, quality work and construction, and innovative ideas." Starting with a $9.95 active audio filter kit in 1972, MFJ now produces over 500 products. To get



Martin Jue

their catalog, call 601-323-5869.

• "FCC certified scanners that have been modified to enable reception of cellular frequencies are no longer FCC certified and may not be legally marketed," says Julius Knapp, Acting Chief of the Policy and Rules division of the U.S. Federal Communications Commission, in a June 30 letter to Grove Enterprises. Although the letter presumably applies to retailers reselling scanners, individuals hoping to sell their own old equipment might want to be aware of the FCC's stance. Knapp also says that the FCC will be initiating a rule making proceeding in the near future "to expand and clarify the Commission's regulations for scanning receivers..."

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902 Press releases may be faxed to 704-837-2216 or e-mailed to mteditor@grove.net.

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

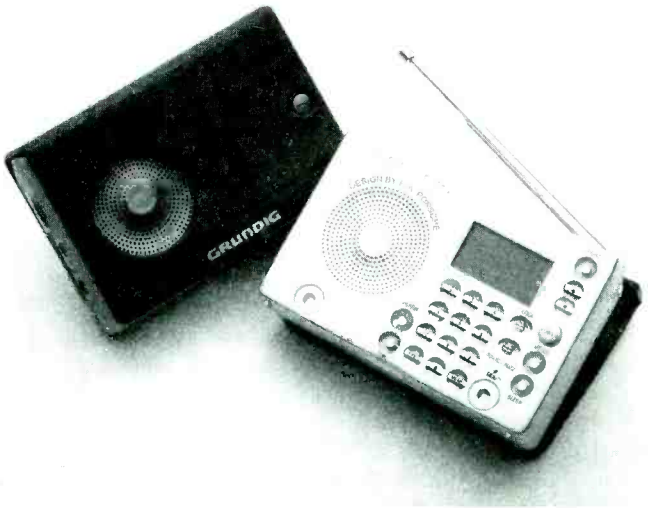
Porsche Designs a Radio, Made by Grundig

This guy I know, his passion in life is Porsches. He zips them along winding country roads, races them on weekends, and gets greasy as a Pelahatchie piglet lubricating them to perfection.

Them? Yep, he's got two—or at least he did until his blonde wife took off with the white Porsche, three kids, and the dog. I never asked him which of the deportees he missed the most.

But now he can have his two Porsches again—this time without paying for more than one car. That's thanks to the folks at Grundig, who have decided that the time has come to put as much effort into the *appearance* of a radio as into the performance. To do this, they retained the services of renowned German designer F.A. Porsche. You guessed it, the "Porsche" of Porsche car fame—most recently, the Boxter.

The result is the Grundig G2000A compact portable, and what a knockout!



When you want to use the radio, you simply flip over the front part of the case so it clings magnetically to the back. Not only does this get the case out of the way, it also allows the case to serve as an elevation panel to place the radio at a handy angle for operation.

Flap over a case

To begin with, there is no separate protective travel case. Instead, a lambskin leather case is affixed to the cabinet by snaps and magnetic catches. This offers fulltime protection to the radio's case and controls, but that's not what makes it special.

When you want to use the radio, you simply flip over the front part of the case, like the flap on a handbag, so it clings magnetically to the back. Not only does this get the case out of the way, it also allows the case to serve as an elevation panel to place the radio at a handy angle for operation.

It makes so much sense, you have to wonder why nobody thought of it before.

With the case pulled back, what is revealed is a plastic cabinet persuasively manufactured to look like aluminum (you have to tap it to be sure). Following Porsche's design philosophy of "form follows function," the cabinet perforations for the speaker follow exactly the shape of the speaker cone, right down to a hole-free rise in the center. The overall effect is like the crater of a high-tech volcano. The rectangular keys and their associated round orifices are equally innovative and attractive—ergonomically functional, too.

The last time Grundig tried using a snappy modernist design, it was with the Yacht Boy 500 portable. Not only was the result far less attractive than the G2000A, it had several operating inconveniences imposed upon it in the name of style.

Not so the G2000A, which fares much better on both counts. Yes, there are nuisances, but they're all minor. For example, the folded antenna is clumsy to retrieve, as it is wedged between the cabinet and the case. And the magnetic catches which hold the case closed are weaker than they should be. Too, the protruding power button sometimes gets in the way when the slew buttons or meterband selector are used.

Withal, Mr. Porsche's creative touch is what makes this radio special. However, as a performer this radio is on more pedestrian turf.

Predictable operating controls

Operation is in the AM and wideband-FM modes—single-sideband and CW are not supported. Tuning is by keypad in handy telephone format, 20 presets, up/down slew buttons which tune shortwave in 5 kHz increments, "signal-seek" scanning and a meterband carousel button. There is no tuning knob. Of the 20 presets, five are for AM, five for FM, only five for shortwave 2300-7400 kHz and five more for shortwave 9400-21600 kHz.

7405-9395 kHz "hole"

Why the frequency split? Because the radio uses two "SW bands," SW1 and SW2, just like radios did years ago. It's an archaic inconvenience brought about by enthusiastic cost-cutting, but worse is that the 7405-7600 and 9000-9395 kHz portions of the world band spectrum are missed completely. Particularly in North America, where the 7100-7300 kHz portion of the 41 meter band is reserved for use by hams, rather than broadcasters, the region just above 7400 kHz is home to a number of major outlets.

Reasonable roster of features

Made in China, the G2000A is a small compact portable which uses three "AA" batteries. Its illuminated LCD includes a digital frequency readout in XX.XX MHz format for even channels, and XX.XXx MHz format for odd channels—an offbeat arrangement characteristic of a number of low-cost Chinese-made models.

Sharing that frequency display is a 24-hour World Time clock, which replaces the frequency readout when the radio is off, or with the radio on by pressing a carousel "mode" button which has nothing to do with "mode" as we normally think of it (AM, FM, SSB, and so forth). Also on the LCD is a simple on/off-type signal-strength indicator.

The antenna rotates and swivels, a practical advantage. There is a travel power lock, much-needed because of the power button's protrusion—it's the only control accessible with the leather case closed. The clock includes alarm/sleep functions, and there is a reset orifice in case the microprocessor gets its knickers in a twist.

Performance mixed

Coming as it does in the wake of such fine Grundig performers as the Yacht Boy 400 and the low-cost Yacht Boy 305, the G2000A's overall performance is something of a letdown.

To begin with, when you tune from one channel to the next with the slew control, you have to wait a full second for the radio to "catch up" and produce any sound. That may seem niggling, but anyone who is into bandscanning will find this to be an annoyance.

Sensitivity to weak signals is also far from DX caliber, especially in the "SW2" (9400-26100 kHz) range. How far? Stations coming in loud and clear on a Sony ICF-2010 in the SW2 range fade in and out, mixed with circuit hiss, on the G2000A. Whatever else this receiver is, assuming our sample is not faulty (as we go to press no other units are as yet available), it is not a logical choice for North American listeners much west of the East Coast states and provinces.

You would presume that a $149.95 receiver introduced in 1997 would have double conversion, but the G2000A doesn't. As a result, image rejection is poor, even by the dismal standard of single-conversion receivers.

Yet, there are performance virtues. To begin with, selectivity is superior by any yardstick. Adjacent-channel signals are coped with about as well as you can hope for in a portable lacking synchronous selectable sideband. Of course, with 5 kHz tuning increments you can't detune the receiver slightly to reduce adjacent-channel interference further, nor can you hear the relatively small number of off-channel signals properly.

As you would expect with a Grundig model, audio quality on shortwave is quite decent for a receiver of this size. FM audio fares less well, being thin and tinny, but not harsh.

Outstanding design, everyday performance

In all, Grundig's new G2000A portable makes a strong, positive visual statement that should impress potential newcomers to world band, as well as friends and spouses of those who decide to buy it. It redefines the visual landscape of world band radio, lifting it from the aesthetically banal to a striking example of modern design.

But as to performance, while it's reasonable, it is simply not in the same league as the cheaper Grundig Yacht Boy 305, much less the slightly more costly Yacht Boy 400.

There are signs that the sort of innovative, eye-catching design found in the G2000A may eventually appear in future Grundig models, as well. To the extent this brings fresh blood into world band radio—and it almost certainly will—this has to be welcome news to all of us who feel kindly towards shortwave listening.

Sony ICF-2010 repairs back on track

A number of *MT* and *Passport to World Band Radio* readers have written recently to complain that Sony of America repair facilities has been refusing to provide parts or service for the ICF-2010 world band receiver. It turns out that some repair and parts personnel have been looking at the '2010's date of introduction and concluding that it must be an obsolete model, and therefore no longer supported.

Of course, the '2010 is far from obsolete and is to be offered for sale new by Sony of America indefinitely. However, this receiver was so advanced when it came out that even now it remains the technological standard bearer and top performer among shortwave portables, regardless of price or size.

I had a talk about this with the appropriate manager at Sony of America, and after a few rough starts it appears that he has managed to make the repair and parts personnel aware of the unusual standing of the ICF-2010. Henceforth, it should be attended to for parts and service in the same manner as is any other contemporary Sony product.

This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

RADIO DATABASE INTERNATIONAL WHITE PAPER® reports contain virtually everything found during exhaustive tests of premium shortwave receivers and outdoor antennas. For a complete list, please send a self-addressed stamped envelope to RDI White Papers, Box 300M, Penn's Park PA 18943 USA; or go to www.passport.com.

Bob Parnass, AJ9S

Stridsberg Engineering Receiver Multicoupler

You have one antenna and two scanners. How can you connect them together so both scanners can use the same antenna simultaneously? Your first inclination may be to use a $3 "Tee" connector, an inexpensive but poor solution. Two scanners connected together without isolation will interact with each other in at least two ways:

- 1. Local oscillator energy from one radio can be coupled into the other, causing birdies.
- 2. The front end bandpass filtering in one receiver can "load down" the other receiver, radically reducing sensitivity.

A receiver multicoupler, more commonly known as a "splitter," permits one antenna to be shared by two or more receivers. Unlike a simple T connector, a good multicoupler provides a degree of isolation between the receivers. Some signal loss is inherent in any multicoupler, so it may not be suitable for reception of very weak signals unless an amplifier is added to compensate for the loss.

Stridsberg Engineering manufactures a line of receiver multicouplers for industrial use and another line for hobby use. Couplers have a 50 ohm impedance and are available in either 2 or 4 port configurations and in various frequency ranges. BNC connectors are standard, though UHF, SMA, and N connectors may be special ordered.

We tested two Stridsberg Engineering MC202 splitters. The MC202 is a 2 port model, rated for use between 10 and 1,000 MHz with a loss of slightly more than 3 dB. Average port to port isolation is rated at 32 - 35 dB. It is built inside a rugged, cast metal box.

We measured the loss characteristic using two different test fixtures. One setup consisted of a synthesized Hewlett-Packard spectrum analyzer and matching tracking generator. Our other setup used a lab grade synthesized RF signal generator and a digital RF millivoltmeter. Results using the two test setups tracked closely.

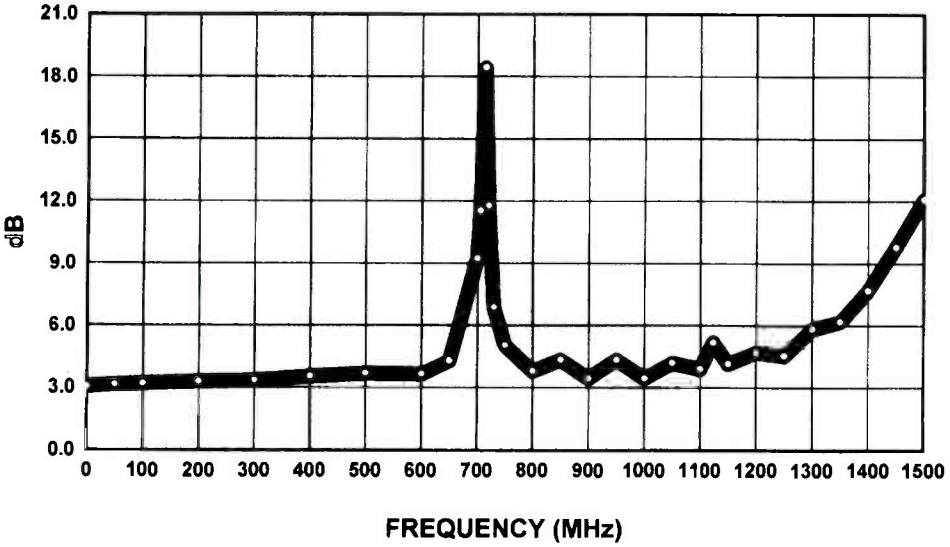
Our first MC202 measured a higher than normal loss above 750 MHz, with an 11 dB loss at 850 MHz rising to about 13 dB at 1000 MHz. We discussed the results with John Stridsberg, President of Stridsberg Engineering, who was very helpful. John determined that the MC202 was defective and promptly shipped a new MC202 for testing.

Stridsberg Engineering MC2304 Multicoupler

The second MC202 performed much better. Except for an 18 dB notch near 714 MHz, the replacement MC202 exhibited fairly low loss from about 0.5 to 1200 MHz, well beyond its rated frequency limits (see graph). The MC202 we tested was priced in the $70 range, but John told us that Stridsberg Engineering will be constructing future multicouplers using surface mount techniques, which will reduce costs and prices.

For more information, contact Stridsberg Engineering, Inc., PO Box 5040, Shreveport, LA 71135-5040, telephone (318)861-0660.

Stridsberg Engineering MC202 Splitter
Measured Signal Loss



Notes:
Measurements made on second sample in 50 ohm system.
Unused port terminated in 50 ohms.

G/Wiz Modification

We reviewed the Uniden/Bearcat BC235XLT Trunktracker scanner last July. It is able to follow conversations in talk groups and fleets in the most popular type of 800 MHz Motorola trunked systems. You can scan the same Motorola type systems using a conventional scanner with the rescan delay disabled, though you won't be able to track the conversations automatically.

Scanning Ericsson EDACS trunked systems is more challenging. When a station stops transmitting on an EDACS system, the repeater carrier remains on the air and three annoying scanner-jamming beeps are transmitted. While your scanner is stuck listening to the beeps, the conversation has moved to another channel. Some hobbyists have equipped their scanners with a G/Wiz board as a countermeasure.

Simply put, the G/Wiz circuit instructs your scanner to start scanning again as soon as it hears the first beep tone. A G/Wiz-equipped scanner will not distinguish between talk

groups like a Trunktracker, but it will scan right past the beeps to find conversations. The G/Wiz is touted as being able to skip over mobile data terminal transmissions as well, though we couldn't verify this. It is not designed to handle channels transmitting encrypted voice or continuous control data, so control channels should be locked out of your scan list for best performance.

Broadcast engineer Terence Brennan originally developed the G/Wiz to help news gatherers at his broadcast station monitor the local sheriff's EDACS system. The G/Wiz became popular with local scanner hobbyists and is now available through Scannermaster (tel. 800-722-6701) and The Ham Station (800-729-4373).

G/Wiz can be installed in most Radio Shack and Uniden scanners, including base and portable models. There are two versions of G/Wiz. Each version is optimized to work in different model scanners, so it's important to specify the make and model of scanner when ordering.

Installing a G/Wiz will almost certainly void your new scanner's warranty. You can purchase a G/Wiz for about $90 and install it yourself, but home installation and alignment will be difficult for customers with 10 thumbs or who lack a small soldering pencil. Terry recommends you send your scanner to Scannermaster or The Ham Station for a free, professional installation. Be sure to contact either vendor to make arrangements first.

Written instructions are available for each model scanner. We installed the G/Wiz inside a Radio Shack Pro-2006 using the double sided tape provided and soldered four wires to the points in our PRO-2006 clearly identified in the instruction sheet. Two tiny potentiometers must be adjusted during alignment, a procedure spelled out in the instructions.

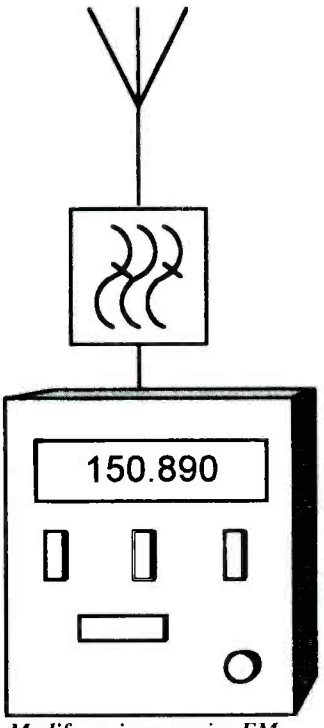
If you are performing your own installation, Terry recommends you add a small single pole, three position switch (Radio Shack #275-325) on the outside of your scanner. The instructions tell how to connect the switch (not supplied) so the G/Wiz can be enabled, disabled, or placed in "MAX" mode. MAX mode rejects birdies and dead carriers at the expense of sometimes skipping over weakly modulated voice.

Without the switch, the G/Wiz is connected at all times, and we found it often muted our PRO-2006 when we tried to open the squelch to find data channels.

We used the Stridsberg Engineering receiver multicoupler discussed earlier to split an antenna between our ICOM IC-R8500 and PRO-2006, each programmed with frequencies of Illinois State Police EDACS systems. Our G/Wiz worked surprisingly well while scanning the ISP systems.

We had only two problems; the PRO-2006 had a strong birdie on one of the ISP frequencies, so we had to lock it out. The other problem arose when all the EDACS transmitters in one system locked in continuous transmit mode for two days straight! It's unusual for the repeaters in the ISP trunked system to lock up and we have no explanation for it. We could hear officers transmitting as they normally would, but the repeater transmitters stayed on the air, confusing the G/Wiz at times.

Otherwise, the G/Wiz worked adeptly. The scanner-jamming beep tones were designed to foil listeners. Like a like martial arts fighter, the G/Wiz cleverly used the beeps to its advantage—triggering on them to accelerate scanning to the real action! We no longer heard those devilish beeps.



Modify an inexpensive FM trap to reduce FM broadcast station interference to your frequency counter.

The G/Wiz is neatly constructed on a single printed circuit board using surface mount components. These include about five transistors and three ICs, but the IC part numbers had been removed on the evaluation unit, preventing further identification.

There are three tiny LEDs mounted on the board. A green LED is used as an indicator during alignment. The purpose of the two red LEDs was not explained in the accompanying literature, though our tests suggest one LED signifies the presence of non-voice signals and the other remains lit as long as the G/Wiz forces the scanner to remain scanning.

We had no schematic or block diagram of the G/Wiz and constructed a test fixture to stimulate it while observing its behavior. We injected our PRO-2006 with an 860 MHz NFM signal from a lab signal generator. The signal was modulated at 4 kHz deviation using sine waves from a synthesized Hewlett-Packard function generator.

Our G/Wiz detected tones in the 4610 - 5080 Hz range, which makes it responsive to the 4800 Hz beeps emitted on our state police EDACS systems. We observed that the G/Wiz forced our PRO-2006 to scan for a 2 second period after it detected the first tone. The G/Wiz is more complicated than our simple test belies, though we didn't reverse engineer it further.

We were pleased with the G/Wiz. The construction is professional grade and it performed well in most of our tests. If you want to monitor EDACS trunked systems, this gadget is for you.

Low Cost FM Trap for the Scout

Nikesh Kadakia uses an Optoelectronics Scout frequency counter to sleuth for nearby signals to monitor. However, his Scout often locked onto strong commercial FM broadcast transmissions in the 88-108 MHz range instead of "juicier" 2-way radio transmissions. Nikesh bought a small, rectangular-shaped FM trap (TUSA #27-126) for under $4 and carefully replaced its F connectors with BNC connectors.

The trap's 75 ohm impedance rating didn't prevent it from effectively reducing the FM interference to the Scout. I'm not familiar with TUSA components and recommend you check out your Radio Shack or radio/TV dealer.

TRACKING THE TRUNKS

Larry VanHorn
trunktracker@grove.net

Questions. We do get questions!

Glad to see a few of our *MT* readers drop me some email on the trunk tracker after our last issue hit the street. So let's get right to the *TTT* mailbag.

***Q.** I understand that the trunktracker can only follow one trunked group at the same time, but can you program in more than one set of trunking frequencies in the same bank?*

A. The designer of the Trunktracker Greg Knox provides us with the following answer:

"No, you can't lock out frequencies in trunking mode. To prove this try the following experiment. In trunked programming mode, program in all the frequencies for a single trunked system into one of the banks. Now lock out all of those frequencies. Select the bank you just programmed, as a trunked bank. The radio will search for and find the data channel; you'll see it works the same as if no frequencies were locked out.

"You can put multiple systems in one bank, but the radio will track the system whose data channel it finds first. It won't matter that you have locked out all but one. The data channel in the lowest position within the bank will be the one found first (if you are in range of that system). If you set the other data channel frequencies to 000.000, then they will be ignored and this scheme has a chance to work. But most systems have several frequencies that they regularly rotate as the data channel. Which one will you lock out?

"Besides this problem, once the radio has found a data channel it will interpret all the other trunking frequencies in the bank as valid voice channels assigned to the system whose data channel it has found. This won't keep the radio from working, but it will degrade the error performance of the OSW decoding step, particularly in the fringe area. In short, we didn't design the radio to be used this way, so you can't really expect it to work too well if you try to use it like this."

***Q.** Can you put conventional frequencies mixed with trunked frequencies in the same bank? I understand that you can't trunktrack and listen to conventional frequencies at the same time.*

A. Yes, you can put non-trunking frequencies in the same bank as the trunked frequencies. There are two programming modes in the BC-235 XLT trunktracker: conventional and trunked. You must be in conventional mode to program in a non-trunking frequency. In trunked programming mode the radio "knows" all the valid 800 MHz trunking frequencies and won't let you put a non-trunking frequency in a bank set aside as a trunking bank. But if you put a non-trunking freq into a trunked bank in conventional mode it'll still be there when you go to trunk mode. The radio will ignore it completely. The only problem this causes is to reduce the number of trunked frequencies you can put in the bank. Some big systems need all 30 channels.

And now to this month's trunking profile...

Cobb County, Georgia

Callsign: KNJH400 Preset Fleet Map: E1P12

856.2125 856.7375 856.9875 857.2125
857.7375 857.9875 858.2125 858.7375
858.9875 859.2125 859.7375 859.9875
860.2125 860.7375 860.9875

208	County 911 Dispatch
272	Disaster 1
304	Disaster 2
336	Disaster 3
368	Disaster 4
432	County 911 Adminstration
464	County Manager
496	Powder Springs PD Dispatch
528	Powder Springs PD Private/Tactical
560	County Fire Dispatch
592	County Fireground 1
624	County Fireground 2
656	County Fireground 3
688	County Fireground 4
720	County Arson
784	County Fire Administration
816	County Fire Inspections
848	County Fire Training
880	County Fire Miscellaneous
912	County Fire Support
944	County Fire Mutual Aid
976	County Police Zone 1
1008	County Police Zone 2
1040	County Police Zone 3
1072	County Police Zone 4
1104	County Police Selective Traffic Enforcement Program (STEP)
1200	County Police Administration
1296	County Police Zone 1 Private
1328	County Police Zone 2 Private
1360	County Police Zone 3 Private
1392	County Police Zone 4 Private
1424	County Police STEP Private
1488	Sheriff Dispatch F-1
1520	Sheriff Emergency
1552	Sheriff Command
1744	Sheriff Command Private
1776	Sheriff MCS
1904	County Animal Control
1936	County Animal Control Private
1968	Metro Ambulance Dispatch
2000	Careline/Metro Ambulance Private
2032	Medic-One Ambulance Dispatch
2064	Medic-One Ambulance Private
2096	Puckett Ambulance Dispatch
2128	Puckett Ambulance Private
2160	County Hospitals
2192	Transit Express
2224	Parks
2256	National Parks
2384	Medical Examiner
2480	Central Service
2512	County Fleet Maintenance
2608	Building Inspectors
2640	County Tax Collectors
2672	Roads Department
2704	Roads Department Private
2736	County Sanitation
2768	Traffic Engineering
2800	Traffic Engineering Private
2832	Transit Local
2864	Transit Fleet Wide All Call
2896	Transit Para
3216	911 Emergency
3312	Board of Education
3440	Georgia State Dept of Transportation
3536	Smyrna FD Dispatch
3568	Smyrna FD Private
3600	Smyrna PD Dispatch
3664	Kennesaw PD Dispatch
3696	Kennesaw PD Private
3728	Marietta PD Patrol 1
3760	Marietta PD Patrol 2
3792	Marietta PD STEP
3824	Marietta PD Car/Car
4048	Marietta FD Dispatch
4080	Marietta FD Fireground
4176	Marietta FD Medical
4208	Marietta Water Dept Dispatch
4336	Marietta Water
4688	Marietta 911
4784	Kennesaw Public Works
4816	Kennesaw Administration
4848	County Transit Private
4912	County Transit Supervisors
4944	County Youth Detention
5040	Smyrna 911
5072	Kennesaw College PD Dispatch
5104	Kennesaw College PD Private
5392	Smyrna PD F-2
5424	Smyrna PD F-3 Private
5584	Smyrna FD Fireground
5684	Smyrna FD Medical
6352	County Police CDL
6416	Cumberland Mall
700-2/8	County Water

And that does it for this month. If you have system information that we can profile in this column, you can send your information to: **trunktracker@grove.net** or P.O. Box 98, Brasstown, NC 28902.

You may not know our name . . .

but our history gives us away!

While the name RELM Communications (formerly Regency Electronics) may not make you think of scanners, it soon will. We're re-entering the scanner market with top-quality, professional scanners. With that goal in mind, we're excited to introduce the HS 200 portable scanner. The HS 200 covers 13 bands including aircraft and 800 MHz. Other features include:

- 200 Channels, 10 Banks
- PL/CTCSS
- Fast Scan
- Bank Scan
- Priority Scan with Hierarchy
- Direct Channel Access
- Search Hold
- Birdie Lockout
- 10 Priority Channels
- DPL/DCS
- Scan Delay
- Weather Scan
- Priority
- Search
- Channel Lockout
- LCD Display

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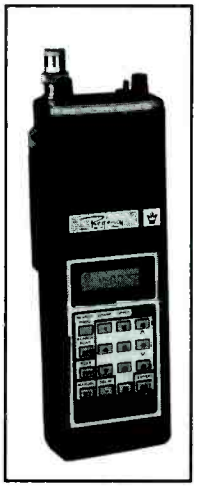


Pictured Right:
The HX 1000 was a popular scanner under the Regency Electronics name.

RELM™
COMMUNICATIONS

7505 Technology Drive
West Melbourne, FL 32904
407-984-1414
Fax: 407-984-0434

Clem Small, KR6A

The Accidental Radio Signal

There are a number of "unplanned" radio signals—by-products of some other activity or event—which we can monitor. Some are quite interesting and worth seeking out. Others are just plain annoying! Let's see what some of them are, how they propagate to our receiving antennas, and how we monitor them.

■ Unplanned Manmade Signals

Some of the most unwelcome signals on the bands are manmade noise. We've all been annoyed by the pesky harmonics which our TV sets radiate. Such things as electric motors with badly sparking brushes, high voltage power lines with leakage problems, and various other kinds of electrically-powered equipment can produce signals which interfere with, or even completely mask, our radio reception. These signals are strong enough to cause problems locally, but usually don't propagate beyond a few miles with enough strength to cause serious reception problems.

■ Static Interference

The term "static" is frequently used to describe popping or crackling radio-noise interference which we hear on our radios. Generally the lower-level, more-constant background received noise on HF or lower frequencies is called "sferics" (short for "atmospheric noise"), and the occasional louder crashes of noise are called "static."

The term "static" is probably derived from the fact that static charges which accumulate on sand or dust particles can cause popping or crackling interference noise when these particles are blown against an antenna and share their charges with the antenna. Actually such static-electricity sources are uncommon in most locations. Most sferic and static interference is caused by lightning discharges, primarily in the tropics.

Lightning discharges are wideband generators of radio waves just as the old-time spark-gap radio transmitters were. The radio waves so generated propagate as any other radio wave. The power in a lightning discharge can be extremely high (over 400 megawatts!), and these waves propagate great distances.

Because frequencies above the HF band propagate less well over distance than do lower frequencies, we hear relatively little static or sferics at VHF and higher frequencies. It is possible to determine whether a thunderstorm is approaching your location or receding from it by using this differential propagation.

As a storm approaches, you will be able to hear its static crashes on progressively higher frequency bands. The static will be received as high as perhaps 30 MHz or higher when the storm is close. As the storm recedes, its static becomes progressively weaker on the higher frequencies, and you must tune to progressively lower bands to continue to detect it as it retreats. (For safety, don't use an outside antenna when the storm is actually in your area.)

■ Cosmic Noise

Some received noise actually originates in outer space! Radio astronomers make a profession of detecting and studying these cosmic signals, most of which come from our own galaxy. The level of received cosmic noise is relatively low, and it is not often a problem for work at HF or lower. In weak signal work, such as moon-bounce propagation, cosmic noise is a limiting factor. Our own sun produces especially strong interference for such work.

■ Whistlers, Chirpers, and even a Chorus

In non-vacuum space, signals of higher frequency propagate faster than do lower frequency signals. Thus, as lightning generates noise, the lower frequency signals travel slower than the higher frequencies.

Listening with a wideband receiver from about 1 kHz to 30 kHz you may hear a whistle or chirp that starts at a higher pitch, and gets progressively lower as the lower frequencies arrive later than the higher ones. Propagation paths for the whistlers are thought to include trips into the earth's magnetosphere.

When several signals are received close together in time they are called a "chorus."

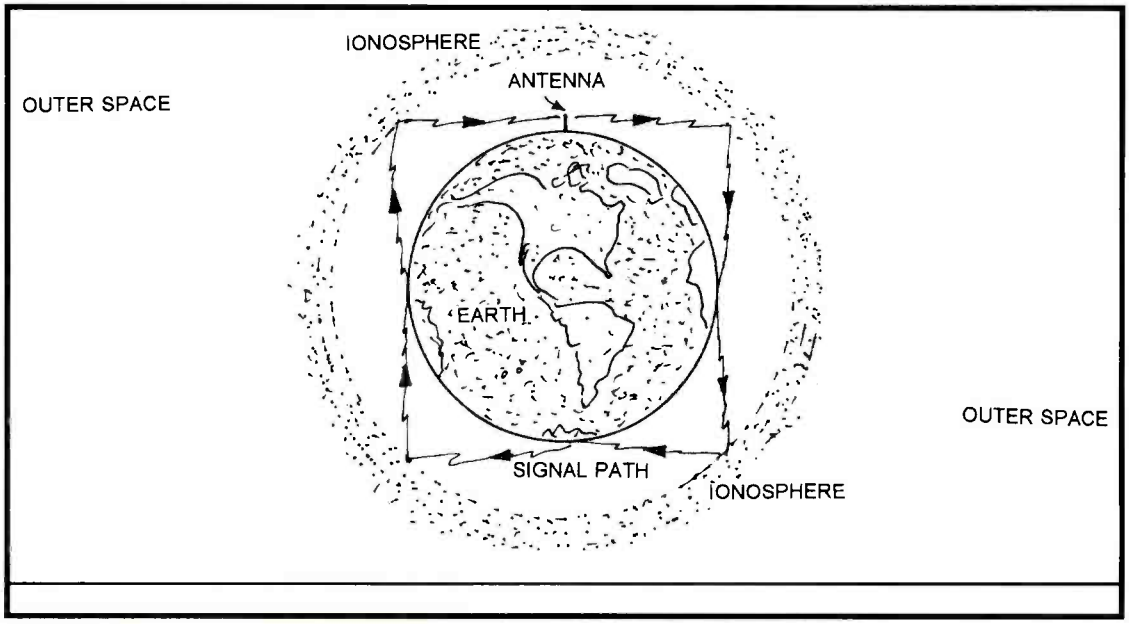


FIGURE 1. *Around the world propagation utilizing one antenna.*

■ Talk to Yourself Around the World.

When conditions are appropriate, HF and even lower frequency signals can

propagate completely around the earth. It is therefore possible for them to return to, and be received by, the antenna from which they were transmitted (fig. 1). Hams occasionally report instances where they have tapped their transmitter's code key, and, about 1/8 second later, heard a "dit" as their own signal returns to their antenna from an around the world trip!

An even more exciting way of talking to yourself is called "long-delayed echo." On rare occasions a radio operator will complete a transmission and listen for a reply, only to hear the last few words of their own last transmission! The mechanism by which this is accomplished is not yet understood, but it is definitely not a simple around-the-world delay as in the previous example; the delay is several seconds rather than the fraction of a second required for around-the-world radio-wave travel.

■ How to Hear Unplanned Signals

No monitoring buff in his right mind wants to hear static and sferics, but there is actually a kind of research receiver designed specifically to listen to such signals. This "sferics receiver" or "lightning recorder" can measure the intensity, rate of occurrence, and direction of arrival of these natural radio signals. If, as discussed above, you want to monitor static to track a storm, listen on frequencies where no other transmissions are audible. Maximize the RF gain of your receiver. A nondirectional antenna will allow the most accurate indication of storm movement.

Some radio operators connect a small neon bulb between their antenna and ground; when a storm is nearby they can detect nearby lightning occurrences via the bulb flashes. Take a direct hit, and your whole radio shack flashes!

Sometimes we monitor manmade interference to find its source. You can use the nulls in a loop-antenna response pattern of a small, hand-held receiver to indicate the direction of the source of the noise.

The VLF band, where whistlers, chirps and choruses are found, overlaps in frequency with the human hearing range. It is possible to utilize an audio amplifier with a relatively short antenna connected to its input as a receiver. However, you must be far from power lines and any other source of interference to receive these signals. Watch Kevin Carey's column in *MT*, "Below 500 kHz," which carries excellent coverage of this topic at times.

Amateur radio astronomers often build special antennas and receivers for listening to cosmic noise. (Write to Society for Amateur Radio Astronomers, SARA, 247 N. Linden St., Massapequa, NY 11758, or see **http://wbs.net/sara.html** for more information.) If you have a good VHF, UHF, or microwave beam antenna which you can point at the sun, you may be able to note the heavy radio noise it produces.

Long-delayed echos are very rare, and I've never heard one. Any of you readers have suggestions for finding and monitoring them?

RADIO RIDDLES

■ Last Month:

I said, "Consider the counterpoise beam described above. Imagine that we swing the counterpoise up in the air parallel to the dipole such that its height was the same as the dipole. Space the dipole and counterpoise 1/4 wavelength apart. By the way, the counterpoise has a new name when used in this new position; so does the antenna. What are those names, and how have we changed the antenna's performance by our change in the counterpoise's position?"

Well, repositioning and spacing the counterpoise changes it into a reflector for the dipole. The antenna is now a Yagi-Uda beam; its main lobe will be perpendicular to the dipole, and pointing more horizontally from the dipole in the direction opposite its reflector. The antenna now has lower vertical-angle radiation than before. For best low-angle results, elevate the whole antenna to a half wavelength above ground.

■ This Month:

In our discussion of received interfering signals why haven't we covered those pesky "birdies" we sometimes hear scattered across our dials?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. Til then Peace, DX, and 73

Bob Grove, WA4PYQ
bgrove@grove.net

Bob's Tip of the Month

Build This All-purpose Battery Pack

Bob Brown of Bad Axe, Michigan, shares this construction project of an excellent accessory for radio hobbyists: A universal battery pack for portable operation.

Bob's project revolves around a cluster of D-cell holders purchased from Radio Shack® and allows selection, by means of a simple jumper, of 1.25 volt steps using NiCds from 1.25 to 12.5 volts, or 1.5 volt steps using replaceable alkalines from 1.5 to 15 volts. Bob thoughtfully sent along other accessories we might need for operation: a standard 2.1 mm coaxial power cable, a polarity-reversal adaptor, and even a heavy-duty rubber band to hold the cells in place!

The battery pack's single connector can be used for powering an accessory, and for charging from an optional cigarette lighter cord, AC wall adaptor, or even a solar panel.

Materials Required (Radio Shack part numbers included)

270-396	4D-cell holder (2 required)
270-386	2D-cell holder
274-1563	2.1 mm DC jack
64-2346	Cushion feet (one pack)
64-2361	Double-sided foam tape strips (one pack)

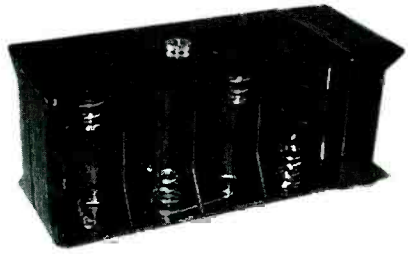
Tools and Miscellaneous Parts Required

Soldering iron
Rosin core solder
Black PVC electrical tape
Heavy-duty rubber band
Two five-inch lengths of 18 gauge (or so) stranded, insulated hookup wire (two colors, preferably red and black).

Assembly

1. Strip and tin both ends of both five-inch wires; strip and tin as well the ends of the six leads of the three D holders.

2. Solder the positive (red) hookup wire to the center-pin lug of the power jack, and the negative (black) wire to the outside lug. Wrap a turn or two of electrical tape around the center lug to insulate it, then twist the two wires into a pair. Set the jack aside.



3. On both 4-D cell holders, route the wires to the rear of the holders. Stick a foam tape strip (leaving outside adhesive covered) from top to bottom at each end of the back (not spring contact side) of one 4D-cell holder. This will be used later to attach the other 4D holder. Place the two 4D holders back to back on the workbench, wire leads up.

4. Stick two foam strips from top to bottom of the back of the remaining 2D holder, together at their inner edges, leaving the outside adhesive covered, and place it's back flush against the close end of the pair of 4D holders, wire leads up.

5. Twist, solder, and tape the ends of the four closest wires in a series circuit (red of 4D holder to black of 2D holder, red of 2D holder to black of 4D holder). This leaves one remaining pair at the far end of the 4D holders.

6. Remove the protective backing from all foam strips. Press the 4D holders firmly together, making sure they are aligned back to back. Route the two remaining wires through the bottom center hole, then press the back of the 2D holder against the end of the assembled 4D holders, making sure it is aligned properly at the sides and bottom.

7. At this point all three holders are secured together by the foam tape. Push the soldered and taped leads up and out of the way into the space between the holders, leaving the two leads protruding from the center hole. Tightly run a strip of black PVC tape along the top and bottom gaps between the 4D holders, but leave the holes uncovered.

8. Carefully trim one side of the top hole until it tightly accommodates the jack when it is screwed in, wires protruding through the bottom hole. It is a good idea to cement the jack in place with epoxy, quick-setting gel, or other rapid-setting compound.

9. Match the colored wire pairs (red to red, black to black), solder and tape the two pairs separately, then press them back into the hole. Finish wrapping the flat surfaces with black PVC tape for rigidity and cosmetics. Press the four rubber feet onto the four bottom corners. The battery pack is now complete.

Power Cable

Using convenient two-conductor wire of appropriate length and gauge for the task, solder 2.1 mm connectors (Radio Shack® 274-1567 or 274-1569) to each end, paying attention to polarity (center pin of both plugs must be attached to the same wire).

Polarity Adaptor Cable

For applications requiring reversed polarity, use a short piece of two-conductor cable with one of the same type plugs described above at one end, but a 274-1577 on the other. Be sure the connections are cross-polarized (center pin of one end is connected to outer shell of other end).

Jumper cable

When some of the cells are removed from the battery pack for lower voltage operation, the unused sections must be short-circuited by a jumper. This is constructed of a single piece of flexible, insulated hookup wire with a miniature alligator clip (270-387, 270-1540, or similar) soldered to each end. Preassembled jumpers are available as 278-1156, but they are rather flimsy.

***Q.** I can no longer hear my Highway Patrol on 42.34 MHz or the hospital on 155.340 MHz. I have replaced the BNC connector on my scanner with no improvement. Any suggestions? (Marc Ard, Georgetown, SC)*

A. Are you hearing all other 42 and 155 MHz signals just as strong as before? Have you checked the cable and connectors? Were the two missing signals formerly strong? If the answer to these question is yes, then the former frequencies are simply inactive. Check with another scanner hobbyist or a nearby Radio Shack owner to see if they notice the same thing. Possibly these services have upgraded to another frequency set.

If other signals are also missing or low in strength, and the antenna system checks out okay when connected to a different scanner, the problem is clearly with your radio.

***Q.** Here in a suburb of Cleveland I frequently hear 420 MHz signals from Detroit to my west, but never from Buffalo to my east. Is this a one-way weather or skip phenomenon? (George Austin, Euclid, OH)*

A. It's not likely to be sporadic-E "skip" or similar solar enhancement of the atmosphere (SEA) which rarely goes above 100-200 MHz. From a geographical standpoint, Detroit is about 100 miles directly across the waters of Lake Erie, while Buffalo is some 200 miles away, with some hilly terrain involved.

I suspect that what you are hearing—and not hearing—is a result of a combination of distance, terrain, and occasional ducting, a "pipeline" effect attributable to weather fronts, which, in your case, come by way of Detroit.

***Q.** If a triple-conversion scanner is better than double-conversion for reducing images, why do I hear airplanes in non-aircraft bands? (Kevin Lamb, Covington, TN)*

A. While most images are produced by the oscillator's fundamental frequency, oscillator harmonics produce additional products which may be detected by the scanner if its filtering is inadequate to remove them. Considering the amount of technology at such low cost in consumer scanners, it's amazing they work as well as they do when compared with the high cost of professional equipment with fewer functions and features.

***Q.** Where can I get an S meter for my scanner? (Marc Ard, Georgetown, SC)*

A. Signal strength (S) meters for scanners consist of active components, including a transistor and associated resistors as well as the meter movement and a power source (battery or scanner-derived power). Diagrams for such add-on devices have been published for years in many hobby publications (including *MT*). At the present time, I am unaware of anyone doing the modification as a regular business.

Grove Enterprises has a supply of brand new, 2-1/2" diagonal, back-lit S-meters available for stalwart experimenters; the meters can be mounted in an inexpensive Radio Shack project box along with necessary components. The meters are $9.95 each plus $2.75 shipping (less in quantity), but mention my name when ordering since nobody else knows they're in stock!

***Q.** Just out of curiosity, why, when I touched a meter probe to a resistor in my ham rig, did I hear AM radio stations coming through the speaker? (Dean Burgess, Manchester, MA)*

A. Congratulations, you just reinvented the crystal radio of the early 1900s! You touched the wire probe (now acting as an antenna) to the detector circuit. The tiny signal voltage, modulated by audio, is detected by a crystal diode (now silicon or germanium rather than the old galena), then boosted by the audio amplifier for audibility.

The rest of the radio (RF and IF stages) provides selectivity, the ability to separate that mire of stations.

Questions or tips sent to "Ask Bob," c/o *MT* are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of *MT*, or e-mail to **bgrove@grove.net**. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: **www.grove.net**

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(Letters, continued from Page 4)

Bob says, "This missed the real point of interest since you tested for possible interference on GMRS output frequencies, not input frequencies. Had you tested a model that included the seven other frequencies (channels 8 through 14) ... you might have noticed the problem we experienced."

Bob quotes from their Crest REACT (Radio Emergency Associated Communications Team) newsletter, *REACTivities*: "When the unit was keyed on a frequency adjacent to a GMRS repeater input, using a tone known to be in the repeater, that repeater was activated. ... one repeater was activated at 7 miles from the site, and another at over 13 miles from its site."

He concludes, "I strongly urge your readers who buy the 14-channel models to use only channels 1 through 7 so as not to risk interferences with repeaters."

Lightning Makes Ozone

John Winslow of Rosharon, Texas, enjoyed June's article on lightning, but said, "If O'Driscoll had gone a bit further in his article, he would have followed that ozone is a major by-product of the process of lightning."

John wrote in an earlier letter "to give voice to a growing awareness of the lack of scientific evidence to support the so-called ozone layer damage caused by chemical and/or certain compounds ... Out of all the uproar, everyone has failed to consider one very important fact of everyday life: all over our globe, about every 5-15 seconds, major thunderstorms occur [with] lightning strikes throughout the duration of each storm.

"One of the curious side effects of this process is the production of the gas ozone, which is caused by the extremely high voltage and current of each lightning strike. ... In which case the idea of the ozone layer being depleted is one big hoax being perpetrated by the Environmental Protection Agency (EPA) and its supporters" — a contributing factor in the rising cost of being "politically correct."

Letters to the Editor are welcome at PO Box 98, Brasstown, NC 28902 or by e-mail to *mteditor@grove.net*

— Rachel Baughn, editor

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CLOSING COMMENTS

By Bob Grove, Publisher

What's the Big Secret?

It's an all-too-common story: An eager hobbyist interested in communications receives a master frequency file from the Federal Communications Commission (FCC), only to be perplexed and disappointed when he tries to find listings like "FBI" and "CIA," or even "NOAA." If this is a "master" file, where are the missing frequencies?

To begin with, the FCC is encharged with maintaining and licensing only non-federal-government agencies—police, fire, businesses and industry, hams, broadcasters, and so on. Federal agencies are all handled by Office of Spectrum Management (OSM), a division of the National Telecommunications and Information Agency (NTIA) of the Department of Commerce (DOC). Matters affecting the Government Master File (GMF) database are resolved by periodic meetings of representatives of the member agencies composing the Interdepartment Radio Advisory Committee (IRAC).

Until fairly recently, the unclassified GMF was, in fact, available to the public, and was published by Grove Enterprises both as a set of microfiche records and as a printed volume (*The Federal Frequency Directory*). Then, in 1982, urged by the Department of Defense (DOD), President Reagan issued a Presidential order classifying the entire GMF.

The rationale for withdrawing this information from public scrutiny is called the "matrix theory"—if you can see all of the frequencies that are unclassified, it doesn't take a rocket scientist to spot the holes representing the classified frequencies! Judiciously monitored, transmissions on these classified frequencies could theoretically yield information affecting national security.

It didn't seem to matter to government officials that the records had been available for decades to anyone who asked—even to the Russian government, then our greatest concern. They have even been published for public, worldwide distribution by the International Telecommunications Union (ITU) as a service of the International Frequency Registration Board (IFRB) in Geneva, Switzerland. Listing after listing from the FBI, Customs, State Department, and many other federal agencies have reposed on that database for decades.

Ironically, a spirited dispute now waging among the DOD, DOC, FCC, and Government Accounting Office (GAO) may well have been averted if the historical record sharing had continued. (See GAO Internet web site **www.gao.gov/new.items/ns97131.pdf**.)

The 1982 classification order itself was overkill—even frequencies for public broadcasts of the National Weather Service were classified! Of course agencies were free to declassify and release their own records—as in the case of the weather broadcasts—but the master file was gone for good. Or was it?

Several years ago, OSM proposed merging the unclassified records in the GMF with the FCC database. This was done in an attempt to simplify access to these records under the Spectrum Openness Program, which, sadly, was recently terminated by successive budget cuts in OSM.

However, a new security policy issued by President Clinton may provide access once again to the unclassified records in the GMF, and officials report they have nearly completed coordination of these files with the agencies involved and with Department of Justice (DOJ) Freedom of Information Act (FOIA) experts.

When the task is completed, a determination will be made as to how the records will be made available—perhaps on line, or perhaps through subscription sales. Let's hope that this time logic and good sense prevail. A publicly-available database could result in more effectively resolved interference disputes, improved frequency planning, streamlined license application procedures, and substantially fewer FOIA requests from the public. The enormous reduction in government paperwork and the goodwill generated in the public and private sectors alone are sufficient justification for restoring these spectrum allocations into the public record.

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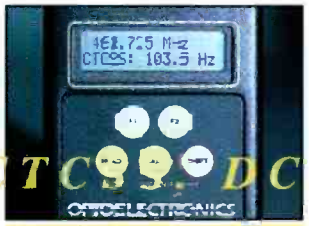

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