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In this issue:

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Monitoring Times

Vol. 32 No. 12 December 2013

Goodbye and Good Luck!

At the end of his radio and television broadcasts, legendary newsman Edward R. Murrow would say, "Good night, and good luck."

At the end of its thirty-third year, legendary radio magazine *Monitoring Times* has the same message, only for us it's, "Goodbye and good luck."

On behalf of all of the writers, columnists and editors who have come before me, *Monitoring Times* says goodbye and wishes all of our readers the best of luck.

Bob Crain's cover photo, is emblematic of the the times in which we live. The old towers pictured on the front cover had outlived their technological usefulness in the VLF submarine service. As he notes, they were repurposed for modern communications. A tower is still, after all, a tower.

And, so it is with publishing. Newspapers and magazines across the U.S. with histories far outstripping our own have recently faded into the past, while others are being repurposed to serve a new digital era.

MT retires just as Bob Grove intended, with the respect of the radio community and at the top of its game.

On Our Cover

Towers at Navy Station Annapolis on Greenbury Point, across the Severn River from the Naval Academy. These remaining towers, were saved from destruction when the Navy decommissioned the VLF submarine radio service, and are now owned by Anne Arundel County. They were repurposed for the county and city of Annapolis public safety digital trunked radio system. There is a State of Maryland interoperability site on the tower in addition to a Navy system which is hard to verify. (Caption and photo by Robert Crain taken 11/13/2010 at 4:45 pm using a Nikon D300 f/9 at 1/320 sec ISO-200.

C O N T E N T S

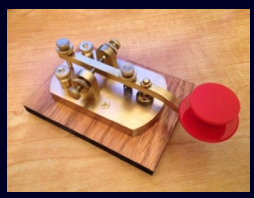

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Table Of Contents

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to the editors

editor@monitoringtimes.com

For the final issue of *Monitoring Times* we're turning the tables. Instead of letters from readers to the editors we present letters from the editors to the readers.

Bob Grove W8JHD, Founder and Publisher, *Monitoring Times*, writes:

As we close the final chapter of this thirty-three year publishing adventure called *Monitoring Times*, I would like to acknowledge the support of tens of thousands of readers, the quality of writing from our columnists and contributors; the top-notch editorial work of Ken Reitz, Rachel Baughn, and Larry Van Horn; the elegant artistry of physical composition by my son Bill; the competent and conscientious administration by Belinda and Chanel; and the managerial guidance from my wife Judy. A successful business is one of cooperation by its workers, and appreciation from its customers. We have had both, and I thank all of you.

Bob and Judy.

Judy Grove, Co-owner of Grove Enterprises writes:

I got into the business because Bob wanted to write a bit on the monitoring hobby. Then he wanted to invent some of the smaller accessories for the hobby....we were off and running. Since I had zero interest in the hobby but loved organizing businesses, we separated our talents. Bob created and I managed with our coming together for regular consultations to see if we were both on the right track.

Our attendance at hamfests always astounded me. The people were so warm and friendly to us and really seemed appreciative of what Bob was creating. I will miss talking to these folks at hamfests and over the phone.

Becoming knowledgeable enough about the hobby to talk with our suppliers was a real learning curve for me but everyone, from the biggies like WiNRADiO to the small suppliers like LF Engineering were so very helpful, I could figure out what we needed and why. Thank you all for a great 35 years.

Rachel Baughn, *MT* Managing Editor 1991-2012 writes:

There is no way to adequately sum up 30 years of working for *Monitoring Times*, its wonderful staff and the Grove family. It was on-the-job training at the beginning as we adopted computer technology as soon as it became affordable. I originally entered all the text into newspaper columns and pasted them up by hand for printing by the local press.

I was blessed with many friendships in the wider radio community, beginning with Larry Miller, who became editor when *MT* merged with his shortwave magazine. Most of what I know about editing and putting together a magazine came from Bob Grove, Larry Miller, and Larry Van Horn. I was editor from 1991 until 2012.

I never met most of our writing staff, freelance writers or longtime readers in person, except for those who were able to attend one of the seven *MT* conventions or the three SWL Fests (Winterfest) I attended. Those are precious memories I will never forget. Others I know only through phone calls and emails, but our relationship was always one of mutual appreciation and respect. I think we writers were all amazed that we could actually get paid for doing something we enjoyed so much, and the letters of appreciation from the readers was ample reward. I know we all join in wishing Bob and Judy Grove a well-deserved retirement; we could have asked for no better employers.

It truly amazes me to realize how much the world of technology and computers evolved over *MT*'s lifetime. From adopting early home computers for typesetting to bringing the first Internet service into Clay and Cherokee counties, Grove Enterprises was on the cutting edge of technology in our part of rural North Carolina. Email and the Internet revolutionized what we were able to do in journalism as well as opened up a global marketplace for Grove Enterprises.

Rachel Baughn and Jeff White in 2006 at NASB conference.

Personal highlights of my career were getting to witness a Shuttle launch from the press box at Cape Canaveral, and a memorable trip to Colorado arranged by my husband Harry. He, Larry Van Horn, and I toured NORAD HQ deep under Cheyenne Mountain, visited the Air Force Space Command's satellite tracking center at Falcon AFB, and, as we were leaving, were treated to an impromptu tour of the Denver International Airport and its communications center.

Rachel Baughn and Larry Van Horn tour NORAD facilities in 1995

As technology continues to evolve, so will radio, and so will the radio hobby. I wish you the very best, and I encourage you to continue to share your technical knowledge, your questions, and your memories via *The Spectrum Monitor* and any other new media that may come along next. As one of our contributors used to sign off – ¡Onward!

Larry Van Horn N5FPW, Monitoring Times Assistant Editor, Milcom columnist, feature writer, former Editor-in-Chief, Satellite Times, best-selling Kindle book author writes:

I have had many fond memories as a member of the *Monitoring Times* staff over the last 30 years. In my travels I have met many *MT* readers and radio hobbyists, and I have had more than my share of adventures as an *MT* staffer. Probably my favorite memory is the time that Rachel and Harry Baughn, and I went to tour NORAD in Colorado Springs. What a trip that was. We were given the VIP tour of the Mountain. You would have thought we were from *National Geographic* or the *New York Times*.

One of the funniest things that happened during our tour occurred in one of their command and control spaces that were responsible for tracking all of the major military assets, friend and foe, land, sea and air, over all of North America. As we walked into the darkened space, those colorful map displays were absolutely awesome. Of course, they were not supposed to be real time, just a demo version of the real thing, or so they thought.

After the briefing, during Q&A, I asked our briefer what that orange boat symbol was off the coast of Norfolk, Virginia. I knew the answer and so did our briefer who immediately turned red and admitted it wasn't supposed to be there. Someone didn't scrub the screen of the real time data. They seized Harry's film, developed it and removed any reference to that neat real time screen we got to see.

When we got to the final briefing with the Deputy Commander of NORAD, a Canadian general, apologized and explained that the orange ship was a Russian Intel trawler that hangs around offshore of the U.S. East Coast watching our U.S. Navy ships. All that led to a great feature article, with frequencies here in the pages of *MT*.

Of the dozens of feature articles that I have written in this magazine for over 30 years, one from October 1994, titled *Drugs, Spies and Numbers* really sticks out. Based on an extensive investigation, I was able to determine that the five-digit Spanish number stations were being used to transmit Intel and instructions to U.S. drug field agents in Latin America. Within a year of publication, those five-digit numbers disappeared completely from shortwave.

Do you remember that old *MT* ad that ran every month in the early tabloid years until Grove was forced to remove it? It read, "The CIA subscribes, so should you." Cause and effect? Maybe it was.

I have met many great hobbyists and *Monitoring Times/Satellite Times* staffers over my 30 years. Some of them showed up in the *MT/ST* office as they were traveling through western North Carolina. Most folks may not remember *Satellites Times***,** but I had the honor of serving as the creator, managing editor, and chief cook and bottle washer of that Grove magazine for five years. That was a great staff of guys, including current *MT* managing editor Ken Reitz. We did some really good stuff.

Most of the people I have met in this hobby and some of my fondest memories were at the annual *MT* conventions in Knoxville and Atlanta. For instance, there was the first time I met Jacques d'Avignon (*MT* propagation columnist) in the *MT* hospitality suite at an Atlanta convention. This old Texas boy isn't worth a darn speaking most languages, much less French (Jacques was French Canadian). I butchered his name big time when I went over to introduce myself. I'm very glad he had a wonderful sense of humor as he had to correct my pronunciation of his last name several times (sorry, it was a French thing). I thought Rachel Baughn was going to lose it as she was laughing so hard at me at my vain attempts at US-Canadian relations. We were sorry to hear from Kevin Carey that Jacques died earlier this year.

Then there was the rest of the Canadian contingent, an old friend Bob Evans and his two Canadian friends Ian and Erick. They were great folks, two of whom are no longer with us. I'm writing a new Amazon Kindle book that will be released before the end of the year on HF Aero monitoring that I'm dedicating to my mentor on this subject, the late Bob Evans.

And then, there was the Australian duo of Bob Bell and Mark Harnahan. The office girls swooned over Mark's accent (a couple I think even had a crush) and, as we soon discovered, these two fun-loving Aussies loved to party into the wee hours of the morning.

Finally, no mention of those conventions is complete without acknowledging the Milcom mafia. We had some great after hour's meetings that would extend well into the next morning. Boy, did a lot of information and frequencies get shared in those marathon sessions!

When I think back over the many radio friends I have lost in the last few years, it saddens me. There are names that many of you know, and some you may not know, that I have had the honor to call friends: Nada Byers (Grove employee), Casey Davis (Grove employee), John Bailey (*MT/ST* Art Director), John Dilbeck (Grove employee), Dr. Bruce Elving (*FM Atlas*), Fred Maia (*W5YI Report*), Bill Godby (*MT*'s "Havana Moon" who wrote for us before he wrote for *PopComm*), Wayne Green (Publisher/Author *73 Magazine*), Gene Hughes (Publisher of *Police Call*), Don G. Edwards (Aero Monitor), and a dear old friend, the TomCat, Tom Kneitel (editor of *PopComm*). Rest in Peace all, your work is done.

All in all, it has been a wonderful 30 years with *MT*. I will miss all the great people we met and corresponded with over the years. But the most important of those will be Rachel Baughn and Bob Grove.

We've laughed, we've cried, we sweated, and we have bled (those paper cuts are a nightmare), but most of all, I think we were the best editorial team ever assembled and produced a quality radio magazine that has been second to none. Finally, after 30 continuous years of monthly deadlines, and never missing a single issue or deadline, I'm putting the *MT* editorial calendar in the shredder.

And as we put this final edition to bed, Bob, Judy and Rachel may be retiring, but Gayle and I aren't. Our small publishing house, Teak Publishing, is doing very well. In fact, as I write this letter, my new Amazon e-book, the *North American Enroute Aviation Guide* is an Amazon #1 best seller. I could not have pulled that off if I had not put in those 30 years on the staff of *Monitoring Times* magazine.

It has been wonderful to remember what we have accomplished and we are looking at creating new memories as we move into the future of publishing radio information in the 21st century. 73 to all and good hunting!

Bill Grove, Art Director writes:

My memories of *Monitoring Times* and Grove Enterprises start from a very young age. My father founded the company when I was seven years old, so I have grown up with it around me. I would watch him feverishly work with his radios and have a gleam in his eye as new products arrived for review. My first imporant memory, however, was the time he got a Radio Shack TRS-80 for review. He just kind of stared at it, not knowing what to think. I however, found it utterly fascinating and ended up learning the system and helping him write his review. That was the beginning of my journey.

As the years went by and Grove started getting recognized we began to attend hamfests. We had a friend of ours design a little shack that we could move from show to show. It looked like a little log cabin. My job was to serve homemade lemonade to the kindly folks that wandered by. I was all dressed up in the most country outfit they could find and just smiled and served. I enjoyed it, but would break away to go visit my friend Paul at JRC. He always had the latest computers and gadgets to proudly show off.

I remember when *Monitoring Times* started, Rachel Baughn was doing the layout of the magazine using a program called Spellbinder. It was nothing more than a glorified word processor that allowed a bit more control over fonts and columns. She had a specialized laser printer and when she needed to change fonts, she would yank out a cartridge from her collection and slap it into the printer so she could do that one section. For many, MANY years, *MT* was layed out using border tape, wax, scissors and a LOT of creativity. It astounds me how they ever got it done.

More years passed and I would stay interested in computers as my father contined his love of radio. Occasionally our paths would cross and our interests would merge. My father wanted to start a BBS (Bulletin Board System) so I came in and got that running and maintained it for our customers to dial in and get the latest radio information. We had four lines for folks to use and it was quite popular for the time.

Then Grove decided to become the first Internet service provider in our area. This was during the time of those endless AOL disks streaming through the post office. I worked closely with some other techs to get the system fully-fuctional and viable for Grove Enterprises. GroveNet was born and went on for several years until it was sold to another local ISP. I once again branched off to start my own comptuer company in the area.

Finally, the time came when they needed someone to help do the layout for the magazine. My interest in computers and my parent's need for a graphics layout/designer would come together and last for fifteen years. I look back and it's tough to remember when I wasn't doing *MT*. As I write this, typing words on the final copy of *Monitoring Times*, it is most bittersweet. I have been around to meet every employee. I have been around to witness every project. I have been around to go through every trial and tribulation that have made Grove Enterprises and *Monitoring Times* what they are today. I owe so much to my parents, my friends, the radio hobbyists, my fellow co-workers, the writers and the people who have come before me that have taught me so much.

So, to all of the readers of *Monitoring Times* and all of the customers of Grove Enterprises I say thank you. Thank you for giving me the opportunity to serve as I have. Thank you for supporting our efforts and for making my father's dreams a reality. Thank you for giving us all that you have and for being part of our radio familly. May God bless each and every one of you in all that you do.

Ground Fault Protection and the AC-DC Radio

By Rich Post KB8TAD

The ground fault interrupter (GFI), also known as a "residual current device," is one of the greatest life-saving inventions of the past fifty years although it's seldom recognized as such. Invented to improve electrical safety in the gold mines of South Africa, improved versions of the device are now required where inadvertent grounding is possible through contact with plumbing, concrete floors, frequently wet areas, or other hazardous locations.

The GFI works by comparing the electrical current flowing between the line and neutral conductors of an AC circuit. Any difference in current between those two conductors is likely caused by a "ground fault" that routes electricity from the line to a different path than the neutral. That path might include a human being contacting the line through a faulty power tool and getting current flowing through the body with possibly deadly consequences.

The GFI comes commercially in several varieties. The most familiar one is the GFCI outlet (Ground Fault Circuit Interrupter), now required in bathrooms, kitchens, garages, outdoor power outlets, and a variety of other electrically hazardous locations. The GFCI has the usual three contacts found in regular outlets; line, neutral and safety ground. A GFCI compares both the difference between line and neutral, and difference between neutral and safety ground. The common household GFCI is designed to shut off the power when as little as 4 to 6 milliamps is detected as a ground fault. That tiny current is below the threshold of shock level that might cause death.

ALCI cord and hair dryer. Close-ups of an ALCI plug showing test and reset buttons.

A second version is the ALCI (Appliance Leakage Current Interrupter). This device is permanently attached to the power cord, replacing the ordinary plug. Like a regular power plug, it only has two poles, line and neutral. It is polarized with one wider blade that only fits the neutral side of an outlet. Inside of what looks like a fat plug with two buttons is the same type of circuit for comparing and shutting off power in the event of a ground fault. The ALCI is designed to trip just like a GFCI when a fault of 4 to 6 milliamps is detected. It is most commonly found as the large plug on a hand-held hair appliance such as a hair dryer or curler.

A true ALCI has two buttons, one for "test" and one for "reset." Instructions often suggest testing every month or so by pressing the test button. That simulates a ground fault. Pressing the test button should cause the ALCI to instantly shut off power to the appliance. The reset button does exactly what it says. It resets the ALCI so that power and ground fault protection are resumed.

The AC-DC radio.

In the 1930s, in order to reduce the manufacturing cost of radios, the AC-DC set was introduced. An AC-DC set could operate directly off the power line without needing a power transformer. The tube filaments, some with ballasts, are all in series adding up to power line voltage. These are also called "hot-chassis" sets because one side of the power line is connected to or switched directly to the chassis. Depending upon the orientation of the power plug, the chassis would be connected either to the line or to the neutral. For the typical set, which switched the power line to the chassis by means of the on-off switch on the volume control, the chassis might be connected to the line or to the neutral. If the chassis happened to be switched to neutral when the set was turned on, it would be "hot" when turned off because the chassis would then be connected to the line by way of the cold tube filaments.

Millions of such sets were produced. The hazard from electrical shocks from such sets was well known in the 1930s and later. Since most of the sets were wood or plastic as were the knobs, the hazard was somewhat minimized unless it was easy to touch the chassis. *Consumer Reports* magazine of that era named sets as "unacceptable" if the chassis or chassis bolts protruding under the cabinet could be touched or come into contact with any metal surface. Later AC-DC sets used a "floating ground," in which the direct power line connection to the chassis was changed so that a resistor and capacitor were connected between that line and the chassis. That reduced the possible shock level.

Setchell Carlson model 427 "Frog-Eye"

These old AC-DC radios are now collectible. To those of us whose hobby is restoring old radios, use of an isolation transformer when servicing an AC-DC set is a requirement. But what about those who use the radios after we service them, including our children or grandchildren? They are not familiar with the hazards. Can we make those radios a bit safer? We could mount an isolation transformer inside the cabinet if

Metal radios retrofitted with ALCI plugs. Left to right Hallicrafters S-38, Echophone EC-1, Minerva Tropic Master and Hallicrafters S-41.

there is room, but that is not possible for most sets. One answer to making the sets a bit safer is replacing the radio set power cord with an ALCI plug and cord taken from a hair appliance.

The most hazardous AC-DC radios are the early 1930s sets with an open back. Even after World War II, radios with the power line switched to the chassis were still being produced. As an example, the popular Setchell-Carlson model 427, often nicknamed the "Frog Eye" because of its design, is of 1947 vintage. It has a fully exposed chassis accessible from the bottom that has one side of the power line switched directly to that chassis. It and similar radios with a chassis that can be directly touched are crying for a safety improvement.

A second category of "most dangerous set" is a hot-chassis AC-DC set with metal cabinet. Larger AC-DC sets that were originally intended for shipboard-use, such as the Scott SLRM, MacKay 128, the National NC-44 usually have enough room inside for a permanent isolation transformer. Smaller metal AC-DC sets usually don't have room for a transformer. Some examples of these sets in my collection include the Hallicrafters S-38 and S-41, the Echophone EC-1, and the Minerva Tropic Master. All of these switch the power line to chassis. Most have insulators between the chassis and the metal cabinet but that insulation may have deteriorated or broken down over time. In some cases, the flimsy cardboard back is broken or missing. Again, safety improvements are warranted.

Some AC-DC kit radios with the power line switched to chassis, such as from Meissner, did not come with a cabinet, just a chassis.

Knight "Ocean Hopper" retrofitted with an ALCI plug and cord for safety.

Again, rewiring and an ALCI plug and cord will reduce the hazard. Metal-panel AC-DC kit radios such as the Knight Ocean Hopper, Space Spanner, Lafayette KT-135 and similar sets, most of which have the safer floating grounds, are good candidates as well. Wireless broadcasters from Knight, Lafayette and others are also transformerless AC-DC designs and should be improved for safety. Three-way portables are also transformerless sets that can also benefit from an ALCI for improved safety.

Rewiring AC-DC sets

For those AC-DC radios that switch the power line directly to the chassis, I often rewire the sets to take advantage of the fact that ALCI plugs are polarized. I want the wide neutral blade to connect directly to the chassis or, in the case of sets using floating B-, usually to the negative side of the electrolytic filter capacitors. That means the power switch is connected only to the line side (the narrow blade on the ALCI plug). The power switch is then rewired to feed the rectifier and the series filaments. If you are hesitant to rewire the power switch in the radio, don't let that stop you from replacing the power cord with one with an ALCI plug.

ALCI plug and cord sets removed from used hair appliances found in flea markets and thrift stores. All have the two buttons for "Test" and "Reset".

An ALCI is not a Fuse

An ALCI is a people protector, not a set protector. An ALCI only protects from fault currents, not from an overload on the usual line to neutral current. Many AC-DC sets are wired so that a part of the rectifier tube filament burns out in case of an overload. Adding an appropriate fuse in a well-insulated holder inside the radio on the line-side before the power switch will provide additional short-circuit protection.

Buying Hair Appliances with ALCI Plugs

Some new hair appliances no longer come with ALCI plugs. I buy used hair dryers and curlers at thrift stores and resale shops, usually for less than $3 each. Be aware that a true ALCI must have both the test and reset buttons. A cheaper protector, called an "immersion detection circuit interrupter" (IDCI) has no buttons or only a reset button. It uses a sense wire in the appliance itself and only shuts off if it detects the appliance coming into direct contact with water. Avoid those as they are not true ALCI devices and will not provide proper ground fault protection for a radio.

How about Tube-Type Record Players?

Most of the little tube-type amplifiers in older record players are also transformerless designs. The safety of these will also be improved with an ALCI plug and cord upgrade.

Protecting unsuspecting future users of our nice but rather hazardous AC-DC radios can be done by simply modifying the sets with a bit of modern technology. If you have room for an onboard isolation transformer, then install one. If not, an ALCI plug and cord replacement will greatly improve the safety of an AC-DC "hot chassis" device.

MT

Restoring an Old Classic Brass CW Key to Active Service

By Bob Patterson K5DZE

Cleaning and restoring an old CW brass key for active service can be a fun and very practical project. I decided to try my hand at restoring a brass key and finally I ran across an old dirty, scratched up key that seemed to call out to me to find a home for it in the shack.

The particular key that I chose to restore was a *Signal Electric R-62* all brass, heavy duty key. It is an old key with some brochures offering it as far back as the 1920s. As I understand it, this key was designed for use with spark gap transmitters and it was produced in three versions that only varied in the size of the 'keying contacts.' The keys were designated the R-62 (3/16"), R-63 (1/4"), and R-64 (3/8").

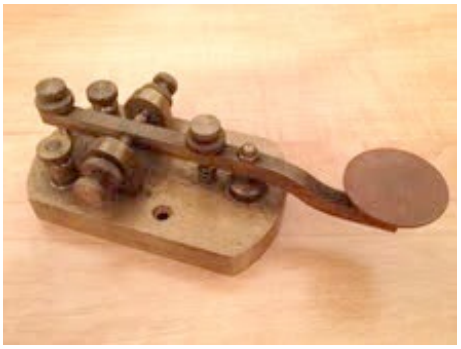
In years past, it was popular with ham operators and sold new for $3.50 to $3.90 depending on which model you chose. Today, these keys can often be found on eBay or at hamfests priced at $25 to $50. Mine cost $21.50.

Signal Electric went out of business in the 1960s, but some information about their keys is available on the Internet. My particular key has no serial number or markings, and may even be a 'generic' copy of an R-62. A number of these keys were even made without markings and sold by Sears! For me, the only historical value was what I placed on it. I wanted another operational brass key for my Shack and I was not looking for an item for a true key collection, so this had a lot to do with how I chose to 'restore' this key.

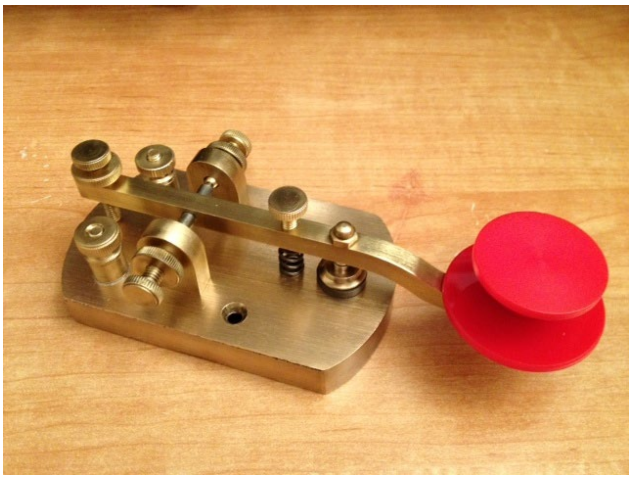
Most collectors would surely say a good cleaning with soap and water and perhaps a mild cleaner is all you should do to an old key, lest you ruin its historical value. They advise never to use wire brushes, abrasive polishes, or any kind of electric rotary tool such as a Dremel or a Chicago Electric to work on an old brass key. Doing so can remove dates, names, numbers and historical data etched in the brass.

While I completely understand and concur with this for collectors of historical keys, the R-62 is a common key and my goal was to polish and return it to active service for my personal use, so how I went about the effort was strictly up to me. The results show it was a successful effort visually, and its operation is certainly most enjoyable. Here is how I did it and how you can get the same results with this or other old, ordinary brass keys.

I began by photographing the key with my iPhone taking a number of close up pictures from various angles. This provided a 'photo journal' to follow when I re-assembled the key after cleaning and polishing the individual pieces. The photos also helped me insure that I put the key together exactly as it had been before it was disassembled, an idea that later proved very helpful. Lastly, the photos provide some good 'before' and 'after' pictures to record the change that took place!



Brass key before.



Brass key after.

Carefully disassemble the key for cleaning by removing all parts that can be removed. Place these parts in a small bowl being careful not to lose any screw, washer, or insulator. *You can make an excellent parts container out of a discarded plastic salad container or frozen food tray.*

Tools that I used included a *variable* speed rotary tool (Chicago Electric) with various small steel and brass wire brushes, and fabric polishing wheels. I also used needle nose and regular pliers, *safety goggles*, Brasso Metal Polish, Flitz Polish, cotton gloves, soft cloths for hand polishing, Q-Tip swabs, assorted screw drivers, and several pieces of cardboard. If you assemble all of these items on a small table that is covered with a dark towel or cloth, it will make your effort easier and avoid a part from sliding off the table.

Begin your cleaning by placing all of the parts in a bowl of very hot water and dishwashing detergent to soak for about 10 minutes. Then carefully *(*so as not to drop or lose a part*)*, clean each part with a fine bristle toothbrush and Soft Scrub kitchen/bathroom cleanser. Rinse well (not over a drain) and dry with an old towel.

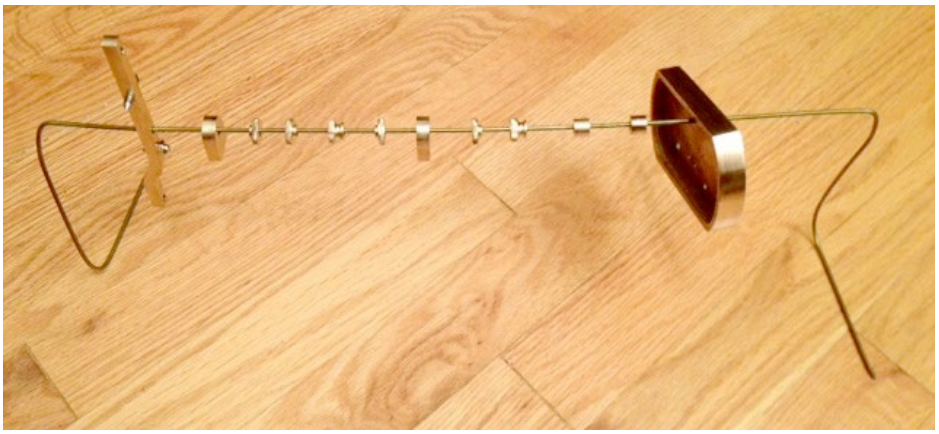
Using a Q-Tip swab, place some Brasso Metal Polish on the brass key base and holding the part with needle nose pliers, use the rotary tool on *low* to *medium low speed* with a steel wire brush to polish the base. This will take off any varnish, heavy dark oxidation, and stains to bring the brass to a nice bright shine. Place a little piece of cardboard or cloth between the key part and pliers as you hold the brass part so you won't scratch or mar the finish.

Wipe and polish the part clean and repeat the process until it is as clean and shiny as you like. Now, do the same thing again with *Flitz Polish*. Repeat this with each part. You will see the improvement each time you repeat this cleaning/polishing cycle. The particular brass key design I selected has a brushed brass finish and it did not scratch as you might imagine, instead it shined up very nicely as you can see from the pictures. This process does take time and patience to obtain the desired results, but it is well worth the effort.

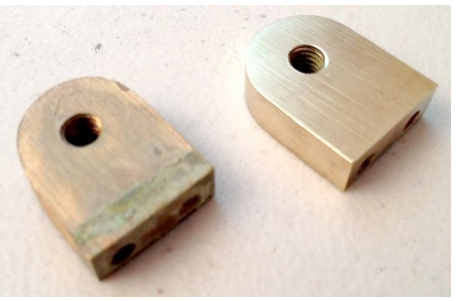
Once you have cleaned and polished each part, use cotton gloves or a soft clean towel to handle the pieces. If you handle parts with your bare hands, the oil in your skin will stay on the part and begin to cause the brass to discolor and darken.

After cleaning, wipe each part down with denatured alcohol to insure all moisture and oils are removed (a tip of the old telegrapher's visor to KB4KBM for that) and then mount each screw/bolt on a piece of thick cardboard where the tops can be spray painted with varnish or Minwax Polyurethane spray (Clear Semi-Gloss). Make a simple wire rack out of a coat hanger to 'hang' the other parts on for spraying. This spray will protect the now highly polished finish from oxidation.

Place cellophane or electrical tape around



Brass key paint rack (a coat hanger).



Brass key parts before and after.

screw threads, key contacts (if you didn't remove them), bearing contacts, and other parts that you do not want to paint/spray. A broken Q-Tip stick inserted into screw holes will keep the holes from filling with spray. Use several light coats of spray instead of one very heavy coat of spray.

When *totally* dry (12-18 hours), reassemble the key and place a *very tiny* drop of gun oil in each bearing/pivot mount. (Toothpicks work well for this.)

If your key has a Navy type knob with a finger block (the disk under the knob) and these need replacing, contact the Vibroplex Key Company to order replacements. They have nice replacements in Black or Red that work nicely for the Signal Electric 'R' series keys. You can add the two new knobs to make your key a Navy version, or you can just use one knob if you prefer a single knob key.

Mount the key on any type wood base you like. You can make a custom base of your choice, you can order a nice wood key base from eBay, or you can do as I did and easily make a base for .25 cents by using flooring samples available from home improvement stores. These samples are almost the right size when you get them, come in several thicknesses, are available in numerous high polish finishes to complement your key, and most have a rubber backing. Trim these to size (I used 3.25" x 4.5" as a base size) and then paint the edge in a color you like. (I used a light oak base with the edge trimmed in black.)

Notes:

Flitz Polish is available at most gun stores. It is commonly used to polish feed ramps, bolts, and other metal parts that need a smooth, shiny and highly polished surface.

Do not use the rotary tool on the key contacts. These are often silver and can be damaged easily. A very light touch of Flitz Polish on a Q-Tip works well to clean these contacts and then hand polish. *Do not let Flitz polish dry on the contacts or key.*

You can 'brush paint' your key, spray it with polyurethane or varnish, or you can use car wax to polish and coat you key and its parts. The wax coating will have to be cleaned and replaced occasionally when it begins to wear off, as it does not put a lasting protective coating on the key like varnish or polyurethane.

Safety goggles are a MUST for this project! Small rotary tool wire brushes will sling off tiny wire bristles as they are used. At medium or faster speeds these wires are like tiny needles and can easily go in your eye. *DO NOT forego this safety precaution!* Cleaning is best done out on the patio or your workshop.

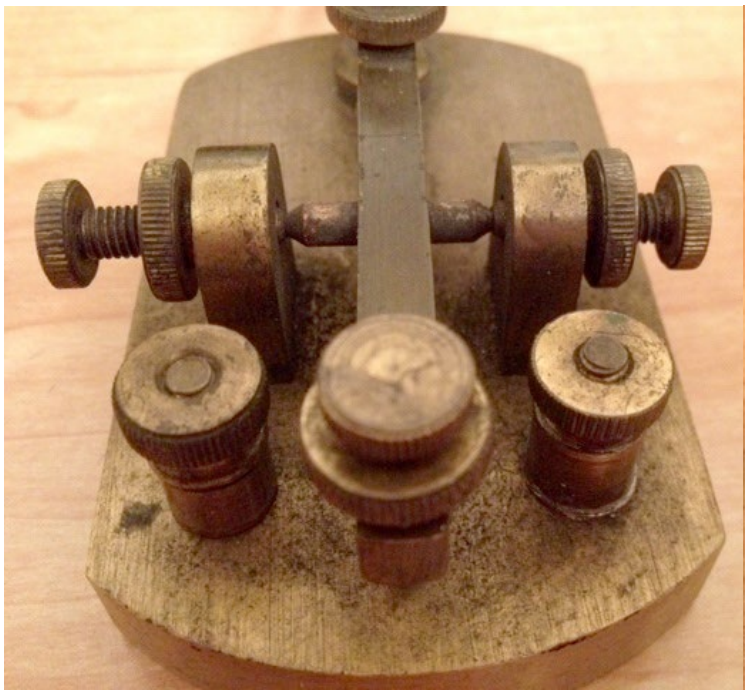
Other household brass cleaning ideas such as the use of ketchup, Worcestershire sauce, lemon and salt, and other methods will indeed clean brass, but for the heavy build-up on my brass key, the wire brush and polishes mentioned worked far better for me.

Brass brushes also work well, but these are not as aggressive as steel brushes. Try both and use what you like best for your key.

Do not clean or rinse parts over a sink or drain as you can easily lose a part down the drain and brass parts cannot be recovered with a magnet on a string!

Be careful wearing cotton gloves around a rotary tool or setting the tool near a polishing towel as these can be easily be snagged by the fast rotating tool's wire brush.

You can see from the pictures that this old veteran key restored very nicely. It makes a handsome addition to any shack, plus it operates really well. One can only wonder what stories it could tell.



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Thank you!

Bob and Judy Grove as well as the staff at Monitoring Times for helping us stay informed about the hobby we all love!!

Radio Has Been My Life

By Bob Grove W8JHD, Founder and Publisher of *Monitoring Times*

My fascination with electronics began as a two-year-old as I reached up toward the pushbuttons on my grandfather's Philco console. Pressing the buttons would reset the motor-driven dial. "Bobby, don't do that!" was a phrase that became very familiar to me.

Peeking behind to see the radio's innards, I was hypnotized by the soft orange glow of the filaments in its myriad vacuum tubes.

Dr. Frankenstein was my mentor; watching the elaborate, arcing voltage discharges in his movie laboratory held me spellbound. Making the climbing spark of a Jacob's ladder became my young life's goal, and several years later I had made several of them with various high-voltage transformers and pairs of vertical wires.

Discovering a radio chassis in an abandoned railroad shack was the impetus that got me started in the radio hobby. Plenty of shocks zapped me by that old lump of electronics, but I felt an attraction that I couldn't explain. And then, I was given a Philco cathedral-style, tabletop radio with a shortwave band. Hearing those voices from around the world awakened my inquisitive spirit and the life-long hobby was born.

It was decades before scanners, but police communications could be heard just above the AM broadcast band, typically around 1700 kHz. There I would listen to dispatchers from the Cleveland Police Department, as I copied their incident reports with pencil and paper. Whatever I would do with those reports, I didn't know, but I was ready.

After accumulating years' worth of electrical and electronic gadgets, I met a ham radio operator, David Crossley, W8BCO, a kindly gentleman who eased me into amateur radio. At age 13, I sat nervously with a group of expectant license applicants as the Morse code machine beeped its test message. I flunked. It was only five words per minute, but it sounded like thirty. Two tests later I passed my Novice exam and was issued a license, WN8JHD. Decades later I gradually moved up to my Extra Class license as W8JHD.

My station was mostly home brew, a tube transmitter using a 6AG7 oscillator and a 6L6G output amplifier. My receiver was a relic borrowed from Dave, but it worked. For an antenna, I stretched a wire from my bedroom window to a post in the ground, but with it I worked the world.

Much of my time was spent listening to foreign broadcasts, with the eventual discovery of utility two-way communications which were fascinating to monitor. As such communications moved up into the VHF region, I acquired WWII surplus radios and modern converters to listen in.

College interposed study obligations which got in the way of having fun with radio, so I flunked out. This didn't set well with my parents who actually thought I should plan on doing something with my life. A short spate of working as a mail clerk for the Chesapeake and Ohio Railway proved to me that they were right. Back to college I went, and I actually passed this time and earned a diploma.

My mountains are a restful place.

As a Novice licensee I went through a lot of WWII surplus.

Teaching high school presented an opportunity to share the wonders of ham radio with my science students, and I soon established a ham radio club. Several students passed their ham tests and became licensed. Years later, I would run into them during the passage of life and they would thank me for introducing them to their newfound professions in technology. This was personally very rewarding.

By 1978, Judy and I had experienced the pitfalls of living near the big city of Ft. Lauderdale. Our house was burglarized, prized personal possessions had been stolen, gasoline was being siphoned out of our car by a next-door neighbor, and our seven-year-old son Bill had been offered drugs by another neighbor. It was time to move from Florida to the beautiful mountains of North Carolina.

I sent teaching applications to every school district in the western corner of the state and only one position in my field was available. I said "yes"

I've had collies all my life. Misty and Lady are twins -- numbers six and seven.

without even visiting the rural community. To North Carolina we moved, settling first in a snake and bug infested trailer in the woods, but soon locating an ideal home in Brasstown.

Teaching school here was sheer joy. The students were friendly, drugs were unheard of – although some of them smoked and chewed tobacco – and the air was clean. We were surrounded by trees and enjoyed the little critters that lived in and near them.

After teaching there for two years, my entrepreneurial spirit began to draw my attention. In the sparsely settled mountains, my scanner was limited in its reception range. I wondered if a TV antenna could be modified for the public safety bands. It could, and it worked well. A Georgia antenna manufacturer took our plans and the Grove Scanner Beam and Grove Enterprises were born.

I started advertising it along with some other notions that radio hobbyists could use, and customers appreciated our catalog with its informative text features which offered hints for effective listening. Several customers said I should start a regular publication for that area of interest since ham radio magazines weren't covering the utility listening hobby. I complied, and *Monitoring Times* hit the market.

MT was the first magazine to concentrate on products and articles specifically for listening to the radio spectrum. We introduced low-cost RG-6 TV coax as a cost-effective substitute for larger, more expensive RG-8 and lossier RG-58. We discovered and disclosed the origins of the mysterious spy number stations dotting the shortwave dial. We were the gateway which combined amateur radio and radio monitoring into one consummate hobby. And we defended in front of a Congressional hearing the right of radio listeners to hear open transmissions which weren't scrambled.

But progress is unavoidable, it is the natural evolution of accumulated knowledge. The radio hobby first competed with, but now shares in the domination of the computer age. On the down side, listening targets have diminished in number. Many shortwave broadcasters have submitted to satellite and streaming audio or vanished completely due to inadequate funding and decreasing audiences. Increasing numbers of public safety and government agencies have chosen encrypted modes for communications privacy. The growing availability of free information on the Internet has impacted the print medium. And a depressed global economy has retarded sales of receivers and scanners.

On a personal note, I will miss all of you – thousands of radio enthusiasts who share our love of radio communications. But, it's time to take leave of the daily responsibility of processing orders and answering questions from my friends around the globe. Judy and I will have more time to spend with our family. Judy can devote more time to her nature photography. I will have more time to teach adult classes in psychology and geology, do folk dancing and, of course, monitor the radio spectrum.

With warmest regards to all,
Bob and Judy Grove

Bob's published and hand-autographed autobiography with photos, *Misadventures of an Only Child*, is available for a limited time for $19.95 including U.S. postage. Send your check to Bob Grove, 7540 Highway 64 West, Brasstown, NC 28902.

Yes, I play drums, although not everyone wants to hear them!

Reflections – Some Closing Thoughts

By Bob Grove W8JHD

Antennas

Over the years, I've answered more questions about antennas than any other subject. There are no mysteries about antenna design, but there is misinformation. In general terms, a good transmitting antenna is a good receiving antenna, but the reverse isn't necessarily true.

For shortwave listening, sensitive modern receivers will pick up signals worldwide with only 20-30 feet of wire, vertical or horizontal, any gauge, insulated or uninsulated, and copper or aluminum. Just make sure it's in the clear of large obstructions and at least 15-20 feet above the ground if it's horizontal. Verticals work fine mounted at ground level so long as there are no nearby obstructions. Erect it as far from your residence as practical to avoid electrical noise sources.

Do you want the best and cheapest shortwave receiving antenna you'll ever need? Take a 24-foot length of paired "zip cord" (speaker wire, household electrical cord, etc.) and remove 5 additional feet from one of the conductors making it 19 feet in length.

Cut back the outer jacket and shielding on your coax about an inch, and cut about a half inch of the insulation away from the center conductor and solder it to the unseparated end of the two wires. No ground is needed.

Tie about a foot of twine, rope or string to the end of the single wire, and tie a knot around a rock on the other end of the rope. Throw the rock as high as you can (at least 24 feet!) over a tree branch. That's it. It's best to use a tree at some distance from the house to reduce electrical noise interference, and of course enough coax to reach the radio. The coax can lie on the ground or even be buried to keep the squirrels from eating it!

Coax Choices

Any antenna needs to be fed with coaxial cable. For signals below 30 MHz, common coax styles like RG-58, RG-59, RG-6, and RG-8 will work just fine. For VHF/UHF, don't use RG-58 except for short runs because the higher you go in frequency, the more signal you will lose. While that's also true of any style coax, RG-58 is particularly lossy. Never use RG-174 if you're serious about listening or transmitting.

Don't worry about the impedance of the cable; 50 or 72 ohms will work interchangeably for virtually any application, transmitting or receiving. The slight change in reflected power (VSWR) makes little difference in actual performance. Pay attention to loss figures for the coax, especially at VHF and more so at UHF. The longer, the lossier.

Spectrum analyzers

I guess I've always been a pushover for spectrum analyzers. Being able to visually witness in real time all the signals on a band at once is a treat. When a new signal pops up, you can grab it immediately.

Do you wonder what frequencies are being used by a mysterious new office with an antenna on the roof? Sure, a signal-sensing scanner with its bar-graph display can reveal it – provided it's within the band limits of the scanner, and provided that the sweep rate of the scanner is fast enough to catch quick transmissions. But a spectrum analyzer will let you know wherever it is in the spectrum and whenever it is transmitting.

WiNRADiO SDR (Courtesy: WiNRADiO)

How far away is that lightning storm? Tune in around 30 MHz (this isn't critical – it is just open spectrum) and watch the display peak up when the lightning strikes, then count the seconds until you hear the thunder. Every five seconds is about a mile.

What frequency is your remote car lock on? How about those remote control models and toys? And what about those RFIDs on clothing, kids and pets?

Fortunately, companies like WiNRADiO are responding to the growing demand by customers to include spectrum analyzers in their receivers. And, unlike plain spectrum analyzers, you get a fine receiver as well.

Change

Long time listeners sense changes in their listening quarry as poor propagation, budget cuts, spectrum re-farming, trunking, digitization, WiFi, satellite relays, P25, Sirius XM, satellite TV, interoperability, and encryption become more than buzz words, they are limiting readily-receivable radio communications.

But the bands are far from dead. Many countries continue to rely on shortwave broadcasting to propagate their messages to the world. Scanner manufacturers are releasing new models with extended capability for reception as much as the law allows.

Public safety agencies know that scanner listeners often assist them with tips during emergencies, and are now seeking ways to utilize digital techniques for their own systems while still providing methods for listeners to follow their dispatches.

In my area, the sheriff has switched to occasional, un-decodable digital transmissions for efficiency and privacy protection. But he is planning to offer either a secondary channel for conventional public scanner access, or on-line, streaming audio of the agency's less private communications.

Many public safety communications are already available at the touch of your computer's keyboard.

A look into the future

The days of large analog radios with their panels full of tuning dials are over. Like many of our seasoned veteran listeners, I miss the dials. But there's no question that computers are here to stay, and digital signal processing (DSP), now accelerated to software defined receivers (SDRs), are conquering the marketplace.

But that's just the beginning. SDRs are now being built into USB-connected dongles, a little larger than a memory stick. Right now the leader is the FunCube Dongle Pro Plus, based in England and originally designed for amateur satellite monitoring. Many such devices may be found on the Internet during a search for DAB, DVB, and RTL dongles.

FUNcube dongle Pro Plus. (Courtesy: FUNcubedongle.com)

Imagine plugging your future wideband dongle into your smart phone and receiving everything on the air. It's coming.

Don't be misled by doomsday prophecies; radio as a hobby will be around for a long time, and I'll be listening. MT

Dan Veeneman
danveeneman@monitoringtimes.com
www.signalharbor.com

The More Things Change....

The December issue of *Monitoring Times* magazine has traditionally been devoted to nostalgia, recalling the wonder and excitement of "the good old days." For some, those were evenings spent with glowing vacuum tubes, listening to the hiss of distant shortwave stations, bringing home foreign programs and culture available nowhere else. For others, it was the novelty of being able to follow the immediacy and drama of fast breaking police chases and dangerous fires as they happened, direct and unfiltered through the voices of first responders who were participating as events unfolded.

This final issue of *MT* marks the end of a remarkable publishing effort spanning more than three decades, a time during which a number of significant changes came to our hobby. However, the French have an appropriate phrase: *plus ça change, plus c'est la même chose*, meaning "the more things change, the more they stay the same." Despite all of the changes we've experienced over the decades, the wonder and excitement of those bygone days can still be found on the air.

❖ Evolving Technology

Technological change has been a two-edged sword for scanner listeners. Higher frequency bands, new signal formats and trunking operations have all added complexity to monitoring. Scanner manufacturers and hobbyists have managed to meet these challenges by applying new technology in innovative ways.

When listeners wanted to hear more than a single channel, new receivers were introduced that could "scan" multiple channels, moving automatically from one to the next and stopping when an active transmission was found.

When listeners were limited to a handful of channels available in receivers based on plug-in crystals, manufacturers responded with redesigned models that used a (then) new technology called frequency synthesis, enabling storage of hundreds of channels. This had the added benefit of allowing arbitrary tuning to nearly any frequency without needing to go out and buy more crystals.

When public safety agencies began moving to higher frequency bands, primarily 800 MHz, scanner companies responded with new models that could scan those higher bands. Other companies sold add-on converters that brought the higher frequencies down to a range that could be scanned by older units.

When large radio systems began to use trunking to share scarce spectrum resources, hobbyists created software to monitor control channel message formats, opening the door for manufacturers to build scanners that could automatically track trunked activity.

When public safety agencies began using Association of Public-safety Communications Officials (APCO) Project 25 (P25) digital standards, manufacturers eventually produced models that could decode the Common Air Interface (CAI) and later track the new control channel trunking format. These P25-capable scanners use sophisticated software running on digital signal processors (DSPs), another technology made possible by the rapid advances in integrated circuits over the past four decades.

❖ Internet Resources

Listings of frequencies for a geographic area, painstakingly compiled and printed in books, have given way to web site listings and electronic user group files. Most modern scanner models can now load electronic files containing frequencies and talkgroup identifiers, either cloned from another scanner or installed via a connection to a personal computer after downloading from a web site.

Getting help to use your scanner or understanding all of its features used to be limited to the printed user manual or perhaps a telephone call to the manufacturer's customer service line. These days, help is widely and freely available via the Internet, on web sites and in chat rooms where like-minded folks can be found.

Even listening to local radio traffic in a distant city was limited to tape recordings and occasional periods when atmospheric conditions were just right to carry VHF and UHF signals hundreds of miles. These days, again via the Internet, there are dozens of audio servers that allow you to hear, in real time, public safety activity from many cities both large and small.

❖ Software-Defined Radio

In addition to the Internet, the enormous increase in affordable computing power has introduced a whole new way of monitoring. Radio front ends that work as computer peripherals now allow software to process and manipulate digital representations of the spectrum. Ranging in price from $20 on up to several thousand dollars, a variety of plug-in devices now on the market convert radio signals into a stream of binary digits ("bits"). These streams are then processed by open source software made widely available via the Internet.

Relatively basic software packages can identify and tune to active channels just like a scanner, producing understandable conversations from analog or digital voice traffic. More capable devices and software can monitor multiple channels simultaneously, allowing listeners to record all of the activity occurring on a radio system for later review. Analysis tools can also provide insight into system operation and configuration, allowing for more effective monitoring.

❖ Encryption

One of the most contentious topics related to public safety radio systems is encryption. Listeners, both hobbyists and professionals such as journalists, have long used scanners to monitor law enforcement activity and keep tabs on police behavior. However, in the past few years a number of agencies have decided to encrypt all police radio traffic, not only for sensitive operations like narcotics surveillance and hostage negotiations, but also for routine work like traffic stops and burglary alarm checks.

Agencies typically justify this secrecy as an issue of officer safety, despite losing the eyes and ears of the listening public who have historically assisted the police by calling in tips and observations. For instance, a number of law enforcement agencies in the western part of Maryland are now moving to full-time encryption on all of their radio channels. The Washington County Sheriff's Office as well as the municipalities of Hagerstown, Boonsboro, Hancock and Smithburg have announced or have already moved to encrypted operations. Fire and Emergency Medical Services calls remain in the clear, mainly due to the expense and logistical difficulty of moving numerous rescue companies and volunteers to new equipment.

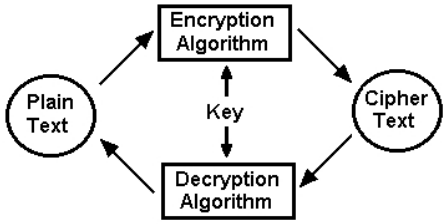
According to officials, the decision to encrypt was driven in part by the widespread availability of smartphone applications that stream police radio transmissions to cellular telephones. By encrypting everything, officials hope to improve officer safety and increase the privacy of personal information passed over the airwaves. Anecdotal reports from police traffic

stops include mention of hearing their own radio traffic coming from a suspect's cell phone.

❖ Effective Encryption

From a practical perspective, early encryption on analog systems was not particularly effective. Most methods used some form of voice-band inversion-scrambling, meaning that the analog voice signal was split up into two parts, a low side and a high side. The two parts were inverted, with the low side brought up in pitch and the high side brought down to a low pitch. This inverted sound was transmitted over the air to the receiver, where the inversion was undone. Scanner listeners heard a voice that sounded somewhat like the cartoon character Donald Duck, however after some practice many could understand most of what was said.

Once radio systems that transmitted voice in digital form came into operation, it became possible to make encryption much more secure. The data bits representing speech could be passed through powerful algorithms that thoroughly transformed them into unintelligible sequences. Only with the proper decryption key in the receiver could those sequences be transformed back into the original bits.



Despite the increase in potential security, there remain weaknesses that could be exploited. First, not all encryption algorithms are equally powerful. Many proprietary algorithms implemented by certain manufacturers turned out to not offer much actual protection. Other algorithms, such as the Data Encryption Standard (DES) that was developed as a Federal standard in the 1970s, has become vulnerable to brute force attacks (basically, guessing until the right answer is found) implemented on today's fast computers. Second, powerful encryption algorithms are only as good as the keys that secure their operation. If a system operator chooses keys that are weak or easily guessed, then breaking the encryption becomes much easier. Also, if the system operator does not change keys at regular intervals (an amount of time called the *crypto period*), then brute force decryption methods can become more effective.

Of course, federal regulations in the United States discourage breaking this kind of encryption. However, enforcing those regulations is difficult, especially if, for example, the encrypted data is sent outside of the country via the Internet, where it could be decrypted and sent back.

❖ Radio Failures

Scanner listeners are not the only ones facing challenges. More than a decade after the attacks of September 11, 2001, we're still seeing shortcomings in critical radio systems.

First responders to the shooting incident on September 16, 2013 at the Navy Yard in Washington, D.C., have reported a number of problems with the public safety radio system. Police officers found that they could not reach their dispatcher to exchange information. When personnel from the Naval District Washington Fire and EMS Department entered the location of the incident, Building 197, they also found themselves unable to communicate with dispatchers or other first responders. The Navy fire department has 13 stations across the D. C. area, with a total of about 250 firefighters. The radio system they use was purchased in 2005 from

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Monitoring Times has long been known as the leader for news, reviews, features and frequencies, but all that is coming to an end in December of this year. For a limited time, you can own the complete MTXpress Anthology, every issue, with every detail from 1999-2013. Packed with reviews, frequencies, tips, features and all the columns you have come to know and love, this anthology will be an indispensable part of your radio collection. No more thumbing through trying to find the right article. This DVD will be completely searchable and will allow you to instantly find the information you need. Or, if you're just wanting to flip through some pages, you can do that as well, if full-color PDF files. Pro-order your copy today before you miss your chance!

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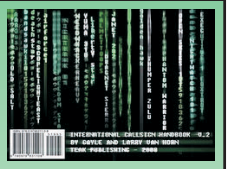
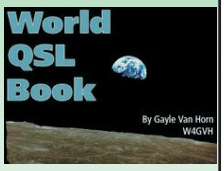
Radio hobbyists interested in receiving and identifying radio stations in the HF/VHF/UHF radio spectrums now have a new whopping 1414 page CD-ROM publication to aid them.



International Callsign Handbook is a concise world directory of various types of radio station identifications covering the military, government, maritime, aeronautical, and fixed radio stations on CD-ROM. Thousands of callsigns and other types of identifiers have been collected from our own personal log book, official sources and dedicated hobbyists who contributed their material.

World QSL Book - Radio hobbyists interested in receiving verifications from radio station now have a new CD-ROM publication to aid them in the art of QSLing. This 528-page eBook covers every aspect of collecting QSL cards and other acknowledgments from stations heard in the HF spectrum.



"I'm impressed. This is a comprehensive collection of worldwide radio identifiers likely (and even some less likely) to be heard on the air. Over the years the Van Horns have earned the well-deserved respect of the monitoring community. Accurately assembling a collection like this is a mammoth undertaking. Congratulations on a job well done."
Bob Grove - December 2008 What's New Column, Monitoring Times magazine

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M/A-COM, now a part of Harris Corporation.

Personnel had to fall back to using personal cellular telephones and the incident commander assigned runners to physically relay messages between the command center inside a nearby building and equipment staging area where radios actually worked. Navy personnel eventually borrowed radios from D. C. fire department to perform their duties.

Other problems also surfaced. For instance, the building fire alarm had to be silenced because it was interfering with the radios that were otherwise working.

There had been complaints about the system for many years, including a lack of in-building coverage. Poor signal strength may also be a contributing factor in reports of rapid battery depletion, where radios rated for eight hours of operation exhausted their charge in less than three hours. In locations where the signal is marginal, a portable radio may automatically increase transmit power and repeatedly attempt to contact the repeater site. This can quickly drain the batteries without providing any real service to the user.

There were also several reports that the radios do not provide interoperability with non-Navy first responders, making it much more difficult to coordinate operations with other police and fire departments. Although the radios do have the capability to switch to the simpler and more common analog mode, doing so disables the emergency identification function, sometimes called the mayday button, leaving the user more at risk if they experience difficulty and need immediate assistance.

Although a review of these problems is reportedly underway, officials have been more focused on implementing FirstNet, a new nationwide public safety radio network based on Long Term Evolution (LTE) technology. More than $7 billion has been set aside to begin the network, but it will be many years before it is operational.

❖ NASCAR™

While many organizations are moving to digital radio technologies, one sport is moving back to analog. After a series of race manipulation scandals earlier this year, NASCAR (National Association for Stock Car Auto Racing) management issued a number of rule changes in September to curb suspicious team behavior, such as oddly timed pit stops, intentional spins and targeted collisions. These activities occasionally altered the final outcome of some races, leading to charges of less than full competition and a loss of credibility for the association.

The rule changes include a ban on digital communication between a spotter in the stands and the crew chief, who must now use analog radios exclusively, allowing officials and the public to overhear their conversations during a race. Previously, only communications with the driver was required to be analog. Spotters had been using digital radios to send secret observations and instructions to teammates, choosing opportune moments to perform pre-arranged actions. These detailed conversations were kept off the analog channel, both to avoid detection and to keep from overloading the driver with too much information.

NASCAR has long encouraged fans to listen in on radio transmissions between car and crew, acknowledging the additional engagement and entertainment value such activity brings. Now they are hoping to use that openness to keep racing teams honest and competitive by allowing fans to hear all communications from the spotter stand to the team.

In addition to the ban on digital radios in the spotter stand, only one spotter per team will be allowed on the spotter stand and spotters will be limited to two analog radios, scanners and a handheld fan device. These fan devices, such as FanVision, are available for rent or purchase and provide video, audio and information related to drivers, teams and their cars.

❖ Ventura County, California

Lack of effective radio coverage is a common problem in many jurisdictions. Ventura County in southern California is taking steps to address this issue. Ventura County is located on the Pacific coast just north of Los Angeles and is home to about 800,000 people spread over 2,200 square miles of varying terrain. Most residents live in the southern part of the county, while the northern part is typically rugged, mountainous wilderness that is subject to seasonal wildfires.

Ventura County spent nearly $10 million installing amplifiers and microwave backhaul links at eighteen sites across the region to improve coverage and signal quality. The old system, more than 15 years old, reached end-of-life in 2006 and had become difficult to maintain, with no support from the manufacturer and few spare parts to be found.

Last summer and fall each firefighter and emergency medical technician in the county was issued a Motorola portable radio called the APX 6000. These radios were chosen to work with the improved VHF simulcast system and have also been programmed with county sheriff frequencies for direct interoperability. The radios offer several safety features, including a mayday button that identifies the firefighter in distress to a dispatcher and sufficient battery capacity to operate for at least 12 hours. The radios are also colored bright green rather than basic black, making it easier to see in a dark or burning building where visibility is limited. The county spent almost $2 million on the radios, chargers and spare batteries.

Despite the new technology upgrades, Ventura County can still be monitored using a basic analog scanner. The new equipment at each of the 18 repeater sites should also improve signal reception for listeners.

Freq	Description
129.950	Sheriff Helicopter
151.025	County Public Works
151.055	Sheriff (Lockwood Valley Dispatch)
151.070	Sheriff (Traffic Operations)
151.130	Sheriff (West Dispatch)
151.220	CalFire Air-to-Ground
153.785	County Public Works
153.815	County Public Works
153.830	County Fire (Brush Tactical)
153.845	Sheriff (Special Weapons and Tactics)
153.875	County Fire (West Command)
153.950	County Fire (East Tactical)
154.010	County Fire (Dispatch 1)
154.025	County Fire (West Tactical)
154.115	County Public Works
154.235	County Fire (Air-to-Ground)
154.265	Mutual Aid Tactical (White 2)
154.280	Mutual Aid Command (White 1)
154.295	Mutual Aid Tactical (White 3)
154.325	County Fire (East Command)
154.415	County Fire Repeaters
154.725	Sheriff Detectives (Surveillance 2)
155.025	County Emergency Medical Services (Mednet 5)
155.055	County Fire (Dispatch 1 Simulcast)
155.100	County Fire (North Command)
155.145	Sheriff (East Car-to-Car)
155.160	Sheriff Search and Rescue
155.175	County Emergency Medical Services (Mednet 4)
155.205	County Emergency Medical Services (Dispatch)
155.355	County Emergency Medical Services (Ventura and Santa Paula Hospitals)
155.385	County Emergency Medical Services (Simi Valley Hospital)
155.415	Medical Examiners Office
155.535	Sheriff (Records)
155.830	County Fire (West Tactical)
155.835	County Fire (West Command)
155.985	County Fire (Brush Command)
156.015	Sheriff Mutual Aid (Countywide)
156.150	Sheriff (East Dispatch)
158.730	Sheriff (West Car-to-Car)
158.805	County Fire (West Command)
158.850	Sheriff Detectives (Surveillance 1)
159.180	County Fire Mobile Repeater
159.210	Sheriff (Command)
453.550	County Building Security
453.700	Simi Valley Transit Bus
860.9625	County Court Bailiffs
860.9625	Jail Operations

That's all for this month, and for this column. It has been a pleasure and a privilege to write for *Monitoring Times* and to hear from readers across the country. I maintain a web site at **www.signalharbor.com** with radio and scanner-related features, including a trunking scanner comparison list and information about digital standards like APCO Project 25. I remain available via email at d*an@signalharbor.com* and look forward to hearing from you. Until we meet again, happy scanning!

ASK BOB
GENERAL QUESTIONS RELATED TO RADIO

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Q. Where in the shortwave bands do I listen for ham radio operators, and what modes do they use? (Daniel Alpern, email)

A. The shortwave (high frequency) ham bands are:

1.8-2.0, 3.5-4.0, 7.0-7.3, 10.1-10.15, 14.0-14.35, 18.068-18.168, 21.0-21.45, 24.89-24.99, and 28.0-29.7 MHz

Digital modes (Morse code, RTTY and PSK31) occupy the lower part of these bands, and voice (single sideband or SSB) dominate the upper portions. Lower sideband (LSB) will be heard in the 1.8, 3.5, and 7.0 MHz bands and upper sideband (USB) on the other bands including the new 5.3-5.4 MHz range.

Q. With many of my local public safety stations switching to narrowband, I don't hear scanner signals as far as I used to.

A. This is typical of reception on a wideband receiver when listening to narrowband signals. It is similar to using the wideband FM (WFM) position to hear narrowband FM (NFM) signals – the hiss is much greater, thus interfering with voice reception, because the receiver is sampling too wide a swath of spectrum to hear just the narrow channel being used. Most of what it hears is the noise on either side of the signal frequency.

Older scanners designed for 25 kHz deviation (bandwidth) are now receiving 6.25 and 12.5 kHz signals, so the noise on either side diminishes receivability, especially on fringe signal strengths. There is also some signal strength reduction – 2 or 3 dB – in the original narrowband signal itself. Antenna improvements and higher transmit power can make up for the difference.

Q. What does the phrase "DC to daylight" mean in describing receivers. (Mario Filippi, N2HUN)

A. This description is hyperbole meaning, quite simply, wide frequency coverage. As electromagnetic waves become higher and higher in frequency, they eventually pass radio wavelengths and become light waves.

Q. I have heard that the government purposely makes GPS readings inaccurate to prevent terrorism; is this true? (Kenneth Pearson, Freehold, NJ)

A. No. it's not. Decades ago, the U.S. government purposely prohibited accuracy on the GPS readings, but now the military GPS downlinks and the public downlinks have virtually identical accuracy – typically a few feet.

Q. Are cell phone conversations any more secure today than years ago when anyone with a scanner could listen in to the call? Are the same frequencies used now and are conversations encrypted?

A. The same frequencies are still used, and the voices are now digitally encrypted. No receiver, scanner or decoder can be sold in the U.S. that will allow you to listen to the conversations.

Q. I have two different scanners that I can't use within 15 miles of my city because weather broadcasts cut in on channels for other services. How can this be eliminated? (W. Hugh, email)

A. This is a very common problem in large cities if you live near a National Weather Service transmitting tower, though some scanners are more vulnerable than others. What you are encountering is called front-end overload, and this can cause a variety of problems including de-sensitization ("desense" which causes the entire radio to have degraded sensitivity), imaging (the same signal is heard on multiple frequencies as well as the frequency on which it is transmitting), and intermodulation ("intermod" which mixes two or more strong signals to produce the combination on a phantom frequency).

All of these interference products can be reduced and in many instances eliminated by placing a notch filter, adjusted for the offending transmitter frequency, between the antenna and the scanner. An example of such a filter for weather broadcasts can be found at **www.grove-ent.com/ftr162ds.html**.

Q. Upon looking up some receiver specifications, I've come across several abbreviations for units with which I'm not familiar. Could you explain what they are? (John Maikisch, K2AZ)

A. There is quite a bit of math involved in the complete definitions, but this broadside approach will provide some understanding of the references. These are close approximations to get you started, not absolute definitions and can be found on the web using your search engine.

S/N+N: Signal to noise ratio plus noise level is a signal strength measurement made by starting with the signal to noise ratio, then adding the noise level.

SINAD: Another way of expressing the signal strength is by the total level of the contents of a received signal plus the noise and the distortion, as compared to the unwanted background noise.

dB: The decibel (literally hundredths of a bel) is a relative value comparing one signal level to a reference level.

uV: A microvolt (millionth of a volt) is a minute amount of intensity in an electric charge, often used to express the received signal voltage in absolute terms.

BW: Bandwidth is the actual width of radio spectrum occupied by a signal, it may be anywhere from nearly zero for an unmodulated carrier wave to hundreds of kilohertz for more complex wideband signals like wideband FM and multiplex.

MDS: the minimum detectable signal is just what it implies, the weakest signal voltage that can still be copied above the background noise.

IP2, IP3: The second and third intercept points refer to a graph which expresses where strong signals begin to distort the receiver's linear amplification. IP3 is commonly called intermodulation ("intermod").

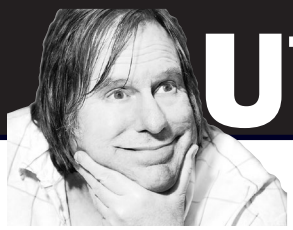
dBm: Decibels per milliwatt is a way to express the power ratio of an amplified signal against a one milliwatt standard reference.

Q. What do TRBO and FMN modes mean and can they be picked up on any type scanners? Our taxi company has nothing but funny interference noises on their licensed frequencies now. (Terry Hanson, email)

A. TRBO (MOTOTRBO) is a proprietary digital radio system used by Motorola. A scanner cannot decode the voice contents. It is used so that competitive taxi companies can't listen in on a scanner and chase fares dispatched by the other company.

NFM is simply narrowband frequency modulation, meaning the width of radio spectrum taken up by the signal is narrower than before (6.25 or 12.5 kHz rather than the former 25 kHz). It is required by the FCC so that more licensees can be crowded into the same amount of spectrum. Any scanner can still monitor the contents of a narrowband signal.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.)



Hugh Stegman, NV6H
mtutilityworld@gmail.com
www.ominous-valve.com/uteworld.html
http://mt-utility.blogspot.com

CLP44: Cuban Mystery Deepens

CLP44, a call assigned to the Cuban embassy in Harare, Zimbabwe, continues to be heard on approximately 19151.5 kilohertz (kHz). While there have been various times logged, the same two guys mentioned last month apparently have a daily schedule at 1600 Coordinated Universal Time (UTC).

Signals seem to be the most audible in the Eastern U.S. and Europe. Zimbabwe, in southeastern Africa, does have propagation at this time. The signal strength is never very high, and the continuous whine of the mode being used makes them easy to dismiss as just more dirty carriers.

The mode is still PSK31, a binary phase-shift keying scheme with variable-length characters and a low 31.25 baud rate. It's being generated by an amateur package called MixW, which was created in the Ukraine. Many free ham programs decode PSK31.

Other calls and modes are in use. One PSK31 exchange ended with "pasa a fonia" (go to phone). Followed by Spanish-language voice. PPA, in The Netherlands, heard CLP3, the old Moscow embassy call sign, calling. CLP1, the former Havana Foreign Ministry, in continuous-wave (CW) Morse code.

All this is beginning to sound like the genuine reactivation of a Cuban diplomatic network. Conversation has included detailed instructions for message handling, and a reference (in Spanish) to "public, official, or secret" documents. Presumably these documents are transmitted using modes and frequencies that are still unknown.

Much of this information comes from Mike Chace-Ortiz, *MT*'s knowledgeable digital column editor. Thanks, Mike!

HM01 is Changing

By Cuban standards, HM01, the "Hybrid Mode" numbers station from its Directorate of Intelligence (DI), has been positively tight in its format. It has been until now, anyway. This week, it's all over the place.

Superficially, it sounds the same, but those tracking such things have found changes in how the program is organized. Sometimes the call-up is missing. Sometimes the sections have different lengths.

The transmission slot at 2300 UTC hasn't been heard in a week. No new frequencies have been found. 2100 and 2200 continue on the same frequencies, and these are always audible pretty much anywhere in the United States.

2100 is currently using 11635 on Sunday, Monday, Wednesday, and Friday; and 16180 on Tuesday, Thursday, and Saturday. 2200 is 10715 on Monday, Wednesday, and Friday; and 17480 on the others.

Transmissions are still in plain, ordinary, double-sideband, amplitude modulation (AM). Lately, a pulsing, low-frequency, audio noise sometimes appears right around the carrier. This is not a power supply hum. It sounds more like heavily filtered speech. On occasion, very weak music has also bled through.

Since Radio Havana, Radio Rebelde, and even Radio Reloj have been heard on these carriers before, crosstalk in the studio or at the transmitting site is suspected. It's worth listening to Cuban broadcast frequencies any time this happens.

radio reloj

By the time this column runs, HM01 will have undoubtedly changed again. Check the usual places for the latest.

Lights Out

It feels like yesterday when this editor submitted his first column. It was, however, quite a number of years ago. A few things have changed, but most have stayed the same.

The first column was hastily assembled to meet a deadline. It concerned the international maritime radio service created after the sinking of the RMS *Titanic*, and how well it had worked right up until its complete replacement around the turn of the 21st century.

This replacement did not kill shortwave utility radio, even though a lot of people predicted the worst. Obviously, there was still enough going on to put in all these columns. Today, as the last one is written, activity continues worldwide.

Sometimes, people spend too much time missing the big commercial voice stations. These were indeed exciting for many reasons, as their skilled operators spoke to the world with huge signals intended for ships and airplanes. Ultimately, though, they became economic dinosaurs.

Nostalgia makes it easy to forget that their content was often pretty depressing. Mostly, one heard seafarers fighting with their wives over money, or distraught landlubbers bearing bad news for passengers. Altogether too many AT&T High Seas Operator calls began with, "I hate to ruin your cruise, but… ." Those who really want soap operas can still find them on daytime television.

Some people also miss Morse code. Well, hams still use it. So do the Russian, Chinese, and Israeli militaries, at least for now. While the replacements for Morse did put some great telegraphers out of work, their unattended operation also created interesting new sub-hobbies. One can now go and have a life, then return to see what their radio and computer have found in their absence.

Weaker Signals

Utility listening requires a greater knowledge of computer networking today, but this is not scary. It's a fun challenge. Besides, everyone's got a computer. People routinely discuss technical issues that only professional consultants needed to know ten years ago. A big benefit of all this is the greater usability of weak signals.

Real "DX," the logging and verifying of distant transmitters, was always about weak signals. It was part of the challenge, and that's a good thing. Signals in general are becoming weaker. Replacement base transmitters are generally much lower powered than their flame-throwing predecessors, and there are fewer of them. More transmissions come from mobiles.

While signal strengths decline, noise levels rise. Everything's electronic nowadays, and nearly all of it radiates noise on the high frequency (HF) band where most of this hobby takes place. Much of this emission is in clear violation of international electromagnetic standards, but that and $4.75 American gets you a nice latte at Starbuck's. Commerce nearly always speaks louder to regulators than obscure treaties.

For all these reasons, low signal to noise ratios are here to stay. HF technology can and will deal with it.

How to Kill HF

The only way HF radio will ever go away in any of our lifetimes is if everyone keeps predicting its doom. That becomes a self-fulfilling prophecy, discouraging innovation on the band to deal with these new realities.

Actually, in the really advanced places, there's a rediscovery of the ionosphere and a big push to develop faster digital modes that can cope with its various uncertainties. This can't happen, though, if technically untutored decision makers and budgeters only hear how HF is dead. That will kill it.

Radio is technology, and technology is problem solving. Problems don't get solved if people whine all the time. Problems get solved when someone has a "crazy" idea such as sending Morse code without wires using spark gaps, or making cheap processing chips emulate million-dollar mainframes. Everything is amateur at the beginning.

Don't mourn, innovate.

Onward…

Utility World lives. The blog, web site, YouTube channel, e-mail address, and Twitter account are all on various commercial servers that aren't going anywhere.

Logs can be submitted to the same e-mail address as now. It's too much trouble to change it. They'll run on the blog, which is more timely anyway.

Those with a serious interest in HF utility radio and a valid desire to contribute should check out the UDXF list that's been mentioned here before. It's a class act, and everyone will help its founders keep it that way.

Sincere thanks to Anthony Agnelli, Rick Baker, Rachel Baughn, Paul Beaumont, Glenn Blum, Ary Boender, Attu Bosch, Charles Brain, Camillo Castillo, Mike Chace-Ortiz, Eric Christensen, Mark Cleary, Gary Cohen, Dean Delahaut, Richard Dillman, Kim Elliott, ENIGMA 2000, Mario Fillipi, Martin Foltz, Pete Giugliano, Bob Grove, Bob Hall, Jeff Haverlah, Robert Homuth, Lynn Kelly, Michel Lacroix, Rick Larkin, Giacomo Malnati, Ken Maltz, Jack Metcalfe, Mark Morgan, "MDJ," "MDMonitor," "Mike," MRHS, Ron Perron, Peter Poelstra, Jim Pogue, Leslie J. Polt, Patrice Privat, Ken Reitz, Thomas M. Rösner, "Token," Jeff Seale, Tom Sevart, Chris Smolinski, Robbie Spain, Allan Stern, UDXF, Larry Van Horn, Eddy Waters, Day Watson, Bob Wilcynski, Takashi Yamaguchi, and anyone else who ever contributed. These are the people who made this a world class column. 73, and catch you on the bands.

ABBREVIATIONS USED IN THIS COLUMN

110A.....Military MIL-STD-188-110 serial data modem
ALE.....Automatic Link Establishment
AM.....Amplitude Modulation
BOM.....Australian Bureau of Meteorology
CIS.....Commonwealth of Independent States
COTHEN.....Customs Over-the-Horizon Enforcement Network
CW.....On-off keyed "Continuous Wave" Morse telegraphy
DHFCS.....UK Defence High-Frequency Communications Service
DSC.....Digital Selective Calling
E11/E11a......"Stritch" family numbers, in English
FAX.....Radiofacsimile
FEMA.....U.S. Federal Emergency Management Agency
FSK.....Frequency-Shift Keying
G06.....Russian military intelligence, numbers in German
G11......"Stritch" family numbers, in German
HFDL.....High Frequency Data Link
HFGCS.....High Frequency Global Communications System
HM01.....Cuban AM "hybrid" mode, voice plus digital
HMCS.....Her Majesty's Canadian Ship
ID.....Station identification
LDOC.....Long-Distance Operational Control
M03.....CW version of "Stritch" family numbers
M12.....Russian CW numbers
MARS.....U.S. Military Auxiliary Radio System
MCW.....Modulated CW, includes AM with tones
MFA.....Ministry of Foreign Affairs
MFSK.....Multiple Frequency-Shift Keying
MX.....Generic for Russian single-letter beacons/markers
NAT.....North Atlantic air route control, families A-F
NATO.....North Atlantic Treaty Organization
NAVTEX.....Navigational Telex
NDB.....Non-Directional Beacon
OPBAT.....Operations, Bahamas and Tortugas
Pactor.....Packet Teleprinting Over Radio, modes I-IV
RTTY.....Radio Teletype
Selcal.....Selective Calling
SESEF.....Shipboard Electronic Systems Evaluation Facility
Sitor.....Simplex Telex Over Radio, modes A & B
UK.....United Kingdom
Unid.....Unidentified
U.S.....United States
USAF.....U.S. Air Force
USCG.....U.S. Coast Guard
USN.....U.S. Navy
Volmet.....Scheduled, formatted, aviation weather broadcasts

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

372.0 OZN-NDB, Prins Christian Sund, Greenland, MCW ID at 0354 (PPA-Netherlands).

516.0 YWA-NDB, Petawawa, Ontario, Canada, MCW ID, at 0238 and 0302 (Mario Filippi-NJ).

520.0 F9-NDB, Miramichi-Chatham, Ontario, Canada, MCW ID, at 0302 (Filippi-NJ).

523.0 JJH-NDB, Johnstown, NY, MCW ID at 0157 (Filippi-NJ).

529.0 LYQ-Private NDB at WWRB Radio, Morrison, TN, MCW getting broadcast splatter from 530, at 0237 (Filippi-NJ).

1956.0 "2"-Unknown, possible fishing beacon, CW ID followed by short dash every four minutes, at 0314 (Filippi-NJ).

2187.5 002570500-Floroe Radio, Norway, DSC test calling self, at 0333 (PPA-Netherlands).

2749.0 VCS-Canadian Coast Guard Radio, Halifax, NS, weather in alternating male and female voices, at 0245 (Filippi-NJ).

3845.0 "F-8-G"-Unknown NATO military, radio checks with "0-L-S" and "C-8-J" (tactical trigraph IDs), at 1919 (PPA-Netherlands).

3866.0 LDBO-Russian military tactical ID, encrypted duplex CW traffic; similar on 5163, 5205.5, 5522, 7512, 7963, 7967, 7977, 8072, and 13128; at 1925 (PPA-Netherlands).

4209.5 TAH-Istanbul Radio, Turkey, Sitor-B bulletins in Navtex format, at 1823 (PPA-Netherlands).

4583.0 DDK2-Deutscher Wetterdienst), Hamburg/ Pinneberg, RTTY SYNOP weather observation codes (BBXX header), for many automated Northern Europe shoreside stations, at 1941 (Hugh Stegman-Netherlands Remote).

4756.0 PT00-Austrian military, calling TA00, also on 7562, ALE at 2008 (Ary Boender-Netherlands).

5156.8 "L"-Russian Navy, St. Petersburg, single-letter CW beacon (MX), also on 6917.5, at 0413 (PPA-Netherlands).

5194.0 959-"Stritch" numbers (E11a), callup "959/30" and weak message, at 1710 (MPJ-UK).

5201.0 Unid-Russian Air Defense, CW null tracking strings with local time and all data padded to ? character, also on 5806, at 1838 (PPA-Netherlands).

5287.0 32V1-Swedish military, coded ALE text exchanges with 31V2 and 31V3, at 1637 (Boender-Netherlands).

5343.0 RIT-Russian Navy, Severomorsk, CW signal check with RGR77, at 1836 (PPA-Netherlands).

5352.0 TWVS2-Spanish Guardia Civil, Salamanca, calling TXX2, ALE at 0720 (PPA-Netherlands).

5389.0 R1K-Unknown military participant in NATO exercise Combined Endeavor 2013, calling RS6G, also on 6899 and 11046, ALE at 0939 (Boender-Netherlands).

5424.0 193-Russian Intelligence "German Lady" (G06), computer voice with callup "193 59," and 5-figure-group message ending 00000, at 1800 (MPJ-UK).

5485.0 ASDF-Chinese military, calling YUQW, CW at 1801 (PPA-Netherlands). *[Note the English keyboard sequences - test or default? -Hugh]*

5598.0 New York-NAT-A, working Speedbird 34N (British Airways), at 0400 (PPA-Netherlands).

5739.0 C2FY-Special call for Combined Endeavor, passing 110A data traffic with T3CY, at 0703 (PPA-Netherlands).

5815.0 270-"Stritch" numbers in German (G11), null-message callup "270/00," at 1755 (MPJ-UK).

5892.0 ABCD-Austrian military, ALE link check with CDEF, also on 6803, at1400 (Boender-Netherlands). *[More defaults? -Hugh]*

6433.0 262-G11, null-message callup "262/00," at 2000 USB (MPJ-UK).

6606.0 4XZ-Israeli Navy, Haifa, numbered CW messages in 5-figure groups, at 0345 (Tony Agnelli-FL).

6668.0 344-Georgian border guards, calling 00, ALE at 1907 (PPA-Netherlands).

6676.0 Karachi Volmet, Pakistan, fast male robot voice with aviation weather, at 1848 (PPA-Netherlands).

6694.0 Halifax Military-Canadian Forces, NS, working a technical radio problem on a test with recently refitted submarine HMCS *Windsor*, at 0225 (Filippi-NJ).

6712.0 "03"-HFDL ground station, Reykjavik, Iceland, uplink to VP-BLY, an Aeroflot A330 named "V. Vysotsky," at 0708 (PPA-Netherlands).

6730.0 DHJ78-German Navy, Nordholz, working "K-1-C," at 1856 (PPA-Netherlands).

6767.5 ATRPMNPK4-Unknown U.S. government or military, calling ATRPMNPK8, ALE at 2219 (Jack Metcalfe-KY).

6804.0 DR56-Combined Endeavor activity, ALE and 110A with SI85, at 0828 (PPA-Netherlands).

6826.0 Unid-Northwest African Maghreb net, Arabic voice at 1829 (Michel Lacroix-France).

6873.0 AL1-Polish military, ALE with AM6 and WA6, at 1911 (PPA-Netherlands).

6873.5 XNT-UK DHFCS mobile, calling XSS (control, Forest Moor), also on 8182, ALE at 1914 (PPA-Netherlands).

6940.0 UL40-Algerian military, calling UL53, similar on 8094 and 8080, ALE at 1901 (Boender-Netherlands).

6942.5 K12-Dutch military, calling KNCS, ALE at 1616 (Boender-Netherlands).

6944.0 JCI-Saudi Arabian military, calling RFI; also on 7590, 7990, 8045, 8172, 9106, 9120, and 9160; ALE at 1918 (PPA-Netherlands).

6945.0 Quantum-Polish military, female voice in Polish, at 0937 (Lacroix-France).

7377.0 239-G06, null message "239 00000," with an E11 program (576/00) running in the background of the same signal, at 2000 (MPJ-UK).

7453.0 Talon 81-USN P-8A, clear and secure with Pax River (Patuxent River, MD), at 1615 (Metcalfe-KY).

7527.0 SAR-COTHEN remote transmitter, Limestone, FL, ALE sounding at 0305 (PPA-Netherlands).
7535.0 SESEF Norfolk-USN, VA testing various radio modes for hours with multiple vessels, still going at 1651 (Metcalfe-KY).
7560.0 92-Singapore Navy, possibly vessel *Vigour*, calling 72 (*Stalwart*), ALE at 1844 (PPA-Netherlands).
7566.0 Y4YS-Combined Endeavor activity, calling P8H3, ALE at 1504 (PPA-Netherlands). RCV-Russian Navy, Sevastopol, Ukraine, calling RFH70 and listening on 5322, CW at 1854 (PPA-Netherlands).
7814.3 PL5-Moroccan military, calling A2, also on 8980, ALE at 1949 (PPA-Netherlands).
7931.0 257-Russian Intelligence (M12), CW callup "257 14518 61," then message in 5-figure groups, ended "000 000," at 1820 (MPJ-UK).
7932.0 BSERKERHQALE-Possible U.S. military, working ALLNIGHHQALE, ALE at 0049 (Metcalfe-KY).
7961.0 AAA-Israeli Air Force, Tel Aviv, ALE and voice with K35, at 0404 (PPA-Netherlands).
7963.0 ICI05-Italian Coast Guard, Reggio Calabria, working IGNM, rescue vessel CP271, at 1739 (PPA-Netherlands).
7970.0 823199-Unknown Kyrgyzstan net, calling 820699, ALE at 1909 (Boender-Netherlands).
7978.0 OL1-Polish military, calling ZA5, similar on 10150, ALE at 1546 (Boender-Netherlands).
8113.0 VMW-Australian BOM, Wiluna, weather for Queensland, at 1756 (PPA-Netherlands).
8132.0 BP23-German Federal Police patrol boat *Bad Dueben*, calling BPLEZS (control, Cuxhaven), ALE at 1805 (PPA-Netherlands).
8414.5 002371000-Olympia Radio, Greece, DSC to 247311800, Italian flag bulker *Asti Snug*, at 1753 (PPA-Netherlands).
8419.0 WLO-ShipCom, AL, weather in Sitor-A, at 2045 (Agnelli-FL).
8423.0 SVO-Olympia Radio, Greece, CW ID in Sitor-A marker, at 0200 (Agnelli-FL).
8424.0 SVO-Olympia Radio, Sitor-B news in Greek, at 2205 (MPJ-UK).
8425.5 XSG-Shanghai Radio, China, CW ID in Sitor-A markers, also on 8433 and 8436, at 2223 (MPJ-UK).
8840.0 *Alamo*-Out-of-band fishing vessel, working fishing vessel *Alabama Slammer*, at 2230 (Agnelli-FL).
8891.0 Iceland Radio-NAT-D, Iceland, working N990LC (Lear Jet bizjet), at 1816 (PPA-Netherlands).
9019.0 NW1-Likely U.S. military "Nightwatch" airborne command post, working BGD (unknown) in ALE, at 1756 (Metcalfe-KY).
9129.5 T1Z244-U.S. Army 244th Aviation Brigade, Fort Dix, NJ, ALE sounding, also on 10680 and 12129, at 1628 (Metcalfe-KY).
9150.0 Unid-CW callup 434/36 and numbers in 5-figure groups (M03), ended TTT (000), at 1300 (PPA-Netherlands).
9314.0 HIJ-Probable U.S. government net control station, back after a year, sounding in ALE, at 1537 (Metcalfe-KY).
10150.0 XPU-UK DHFCS, calling XSS, ALE at 1750 (PPA-Netherlands).
10343.0 124-M12, CW callup "124 1" and message, at 1830 (MPJ-UK).
10543.0 RCV-Russian Navy, Sevastopol, Ukraine, calling RGV82, CW at 1753 (PPA-Netherlands).
10588.0 FR7FEM002-FEMA Region 7, MO, ALE link with with FC8FEM, Region 8 communications, CO; then voice as WGY907 working WGY908 for a signal check and a phone patch, at 1537 (Metcalfe-KY).
10723.0 Unid-Iranian military, phase-shift-keyed databursts at 1810 (PPA-Netherlands).
10871.7 D-Russian Navy cluster beacon (MX), Odessa/Sevastopol, parallel on 16331.7, CW ID at 2133 (MPJ-UK).
10871.9 S-MX, Severomorsk, parallel on 16331.9, CW ID at 2134 (MPJ-UK).
10872.0 C-MX, Moscow, parallel on 16332.0, CW ID at 2135 (MPJ-UK).
11017.0 X8QU-Possible Russian military, repeating call sign in CW for several minutes, at 0232 (Filippi-NJ).
11108.5 Shepherd-Unknown military station, radio check with Canine, then went to 110A data mode, at 1941 (Metcalfe-KY).
11111.0 STAT22-Tunisian government, calling STAT151, also on 16285, ALE at 0828 (Boender-Netherlands).
11114.0 KB1-Georgian military, calling ZEN, ALE at 0847 (Boender-Netherlands).
11175.0 Mainsail-USAF collective HFGCS ground call, 27-character EAM at 1556, rebroadcast at 1603 (Jeff Haverlah-TX).
11209.0 10D-Unknown agency, busy frequency with 2BED, 4BED, FRS, and IS1, ALE at 1748 (MPJ-UK).
11226.0 CRO-USAF, Croughton, UK, ALE text exchange with ICZ, Sigonella Air Base, Italy, at 1113 (Boender-Netherlands).
11256.0 ETK4-Ethiopian airlines LDOC, Addis Ababa, selcalling ET-AOR, a B787, at 1930 (PPA-Netherlands).
11285.0 Singapore Radio-Regional air control, working Malaysian 16, at 1740 (PPA-Netherlands).
11300.0 Tripoli-African/Indian Ocean air control, Libya, working Blue Panorama 9837, at 0732 (PPA-Netherlands).
11318.0 ZJ1111-Probable test flight of new aircraft or radio, HFDL with Santa Cruz ground station, Bolivia, using flight number RFTEST, at 0720 (PPA-Netherlands).
11401.0 Unid-Probable French military, Thales Skymaster 8-tone MFSK ALE, at 1857 (PPA-Netherlands).
11429.6 L11-Chinese military, calling A86, also on 11434.7, ALE at 1810 (PPA-Netherlands).
11430.0 NT9P-Unknown Russian or CIS government or intelligence, raised K4MT in CW, then 5-figure-group traffic in RTTY (50/500), at 1815 (PPA-Netherlands).
11435.0 938-M12, CW callup "938 938 938 1" and message, at 1830 (PPA-Netherlands).
11474.0 VHU-Australian military, Humpty Doo, sending in independent-sideband with Australian FSK in both sidebands, also on 15858, at 1724 (PPA-Netherlands).
11484.0 Unid-Russian Intelligence direction finding net, short CW transmission at 1812 (PPA-Netherlands).
11530.0 Unid-Probable Cuban "hybrid" numbers station (HM01), sane transmitter with same hum and noise as other transmissions, but otherwise dead air for an hour, starting at 2257 (Stegman-CA).
11534.0 Unid-Unknown CIS station, 50/500 FSK but not RTTY, at 0745 (PPA-Netherlands).
11635.0 Unid-Cuban "hybrid" (HM01) in progress, alternating 5-figure voice identifiers and digital file transfers, at 0816 (PPA-Netherlands). HM01, alternating AM voice and data, in progress at 1830 (Agnelli-FL).
11847.0 REA4-Russian Air Force headquarters, Moscow, FSK idler at 1202 (PPA-Netherlands).
12110.0 2014-Turkish Red Crescent, calling 2016, ALE at 0754 (Boender-Netherlands).
12122.0 Unid-Two probable U.S. Army Corps of Engineers stations doing voice checks, then LRP1 called NWK1 in ALE, at 1605 (Metcalfe-KY).
12464.0 RMC99-Russian Navy vessel *Evgeny Khorov*, encrypted 5-figure-group message to RIW, who is on 14556, at 1216 (PPA-Netherlands).
12577.0 005030001-Austrialian Maritime Rescue Coordination Centre, Charleville/Wiluna, DSC to 565306000, Singapore flag bulker *Hudson Bay* (9V8784), at 0635 (PPA-Netherlands).
12590.5 KLB-ShipCom, WA, CW ID in Sitor A marker, at 0224 (Filippi-NJ).
12603.5 SVO-Olympia Radio, Greece, long Sitor-B news bulletin in Greek, at 2122 (MPJ-UK).
12613.0 XSQ-Guangzhou Radio, China, CW ID in Sitor A marker, at 1212 (Filippi-NJ).
12629.0 TAH-Istanbul Radio, Turkey, Sitor-A autotelex command protocol with unknown vessel, then disconnected, sent warble tone, and went back to idler with CW ID, at 2100 (MPJ-UK).
12654.0 TAH-Istanbul Radio, Turkey, CW ID in possible Sitor-A selcal, at 0223 (Filippi-NJ).
12843.0 HLO-Seoul Radio, South Korea, CW marker, listening on 12 MHz, at 1235 (Filippi-NJ).
12916.0 HLF-Seoul Radio, CW marker, listening on 12 MHz, at 2113 (MPJ-UK).
12923.0 HLW2-Seoul Radio, CW listening marker, at 2111 (MPJ-UK).
12935.0 HLG-Seoul Radio, CW listening marker, at 2115 (MPJ-UK).
13101.0 GWPWF33-Brazilian Navy, Fortaleza, calling GWPWRM, Frigate *Rademaker*, ALE at 0218 (Filippi-NJ).
13110.0 WLO, female computer voice with weather and standing by for calls, parallel on 13152, at 1311 (Filippi-NJ).
13276.0 "04"-HFDL ground station, Riverhead, NY, double-slot uplinks to OD-MED (Middle East Airlines A330), VP-BGH (Nordwind Airlines A321), N331UP (United Parcel Service B767 freighter), and SP-LRD (LOT Polish Airlines B787), at 1935 (PPA-Netherlands).
13321.0 "08"-HFDL ground station, Johannesburg, South Africa, uplink to 5Y-KYB (Kenya Airways B737 flight KQA533), at 1738 (PPA-Netherlands).
13433.0 HKI2-Finnish MFA, Helsinki, working RIA, embassy in Riyadh, Saudi Arabia, at 1602 (MPJ-UK).
13455.0 985-E11a, callup "985/10" and 5-figure-group message, at 1810 (MPJ-UK).
13499.0 10111-Moroccan DGSE (intelligence), working 1314, also on 16240 and 18765, ALE at 1555 (MPJ-UK).
13927.0 AFACU-USAF MARS, VA, phone patch for Air Mobility Command transport Reach 583, at 1933. AFA7HS-USAF MARS, KS, patch for Reach 583 to Dyess AFB Base Operations, at 1947 (Allan Stern-FL).
14372.0 344-M12, CW callup "344 1" and message, at 1300 (MPJ-UK).
14540.0 RJE56-Russian Navy, Moscow, working RJH25, CW at 0912 (PPA-Netherlands).
14550.0 C3-Moroccan Army, calling N4, ALE at 1517 (MPJ-UK).
14780.0 GWPWZ33-Brazilian Navy, Rio de Janeiro, calling GWPWSP, Aircraft Carrier *Sao Paulo*, ALE at 2114 (Boender-Netherlands).
15867.0 OPB-U.S. Drug Enforcement Administration OPBAT Service Center, Bahamas, calling J08, USCG MH-60J Jayhawk #6008, COTHEN ALE at 2006 (Boender-Netherlands).
15876.0 40011-Brazilian Army, calling 41011, at 1834 (Boender-Netherlands).
15915.0 228-E11, null-message callup "228/00," at 1540 (MPJ-UK).
16073.0 Unid-Egyptian MFA, Cairo, selcalling 33318 in Codan chirp bursts, at 1646 (PPA-Netherlands).
16283.5 KVX50-U.S. Department of State, calling KWB48, also on 16283.5, ALE at 0546 (Boender-Netherlands).
16806.5 NMF-USCG, Boston, MA, Sitor-B gale warnings for the Hudson area, then Navtex format bulletins for European waters, at 1653 (PPA-Netherlands).
16809.0 WLO, CW ID in Sitor A marker, at 1721 (Filippi-NJ).
16927.0 Unid-likely WPG, IN, using their strange chirpy audio mode, at 1333 (PPA-Netherlands).
16971.0 JSC-Kyodo News, Kagoshima, Japan, FAX newspaper in Japanese at 60 lines/minute, at 0116 (Stegman-CA).
17095.0 WHL-Augtec KielRadio node, FL, Pactor-I idler and CW ID every 3 minutes, at 1625 (PPA-Netherlands).
17207.5 HEB47-Bern Radio, Switzerland, Pactor-I idler and CW ID as "HEB" every 3 minutes, at 1623 (PPA-Netherlands).
17362.0 WLO-ShipCom, AL, female machine voice with weather, at 1611 (PPA-Netherlands).
17952.0 New York-NAT-E, NY, selcal CR-DF to PH-AHQ, (Arkefly B767 flight 369) then passed a weather warning, at 1541 (PPA-Netherlands).
17967.0 N609FE-Federal Express MD-11 freighter, flight FX5606, HFDL position for Al Muharraq, Bahrain, at 1300 (PPA-Netherlands).
18525.0 Unid-North Korean MFA, Pyongyang, traffic in 600/600 FSK, parallel on 20412, at 0810 (Eddy Waters-Australia).
19060.0 CLP3-Probable Cuban embassy, Moscow, calling CLP1, probable Cuban MFA, Havana, CW at 1404 (PPA-Netherlands).
21955.0 "17"-HFDL ground station, Canarias. Canary Islands, uplink to RFTEST, at 1216 (PPA-Netherlands).

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Digital Digest Guide to Keeping it Simple

In this final edition of Digital Digest, I'll take a look some HF digital users that can still be heard today with simple receiving and decoding equipment.

❖ The Radio

Fortunately, with today's technology, finding a radio with the bare necessities of digital decoding such as good tuning accuracy, sensitivity, selectivity, stability, 100 Hz tuning steps and line-level audio output, shouldn't be either too difficult or need to break the bank.

If you're old-fashioned and only comfortable with hardware, along with real buttons and real knobs, some great starter radios would be the Alinco SR8T and Icom R75. If you already have an amateur HF transceiver, most modern radios can be pressed into service since most include general coverage receivers.

If you're ready to leap into the world of computer-controlled "black box" radios and SDRs (Software Defined Receivers), there is the WinRadio series, RFSpace series, Bonito RadioJet, Microtelecom Perseus, Ten-Tec RX340 and Icom PCR1500 among others with a wide spectrum of features, capabilities and price.

❖ The Decoder

One can still build a very capable arsenal of tools with good coverage of more exotic digital systems through a combination of free and modestly priced packages such as these:

PC-ALE: the granddaddy of the MIL-188-141A ALE (Automatic Link Establishment) decoders has been free since the beginning and opens up a whole world of diplomatic, military, humanitarian aid and intelligence networks. Works only on Windows operating systems.

MARS-ALE: after development of the original PC-ALE ceased, radio amateurs continued to add to its capabilities and features, like decoding of MIL-188-110A 2400 bd high-speed modems. Free. Works only on Windows operating systems.

PC-HFDL: Access the world of transoceanic aviation communications using ARINC's HF DataLink system for position reporting and text messaging. Paid. Works only on Windows operating systems.

Sigmira: A great way to get going with STANAG4285 2400 bd modem decoding, and reach many naval and other military stations around the world. Free. Works only on Windows operating systems.

MultiMode: Long the only serious decoder choice for Apple's OS X operating system, this package continues to provide good coverage of a number of digital modes including ALE. Paid.

MultiPSK: A amateur radio oriented package but supports a massive amount of different systems, including ALE and MIL-188-110A high speed modems. Free and Paid versions. Works only on Windows operating systems.

Rivet: An unusual decoder written in the Java programming language and supporting a number of unique, mainly Russian military and intelligence modes, this package fills a gap in capabilities not offered by even the high-end products. Works on any operating system that supports the Java runtime system.

Of course, if you have the financial means and a thirst for even more modes and more complex analysis tools with which to break down signals, the professional decoders from Hoka (Code300), WaveCom (W-Code) and Shoc (go2) will prove a great investment. It also goes without saying that some software defined radio manufacturers such as WinRadio and Bonito also provide digital decoder packages but their selection of modes tends to be quite limited.

❖ The Stations

Once you've finished setting up and are ready to go, here are some easy catches with which to test your new gear. Unless otherwise indicated, frequencies quoted are always center of data.

Weather

The German Weather Service transmission from Pinneberg remains one of the few Baudot RTTY stations on HF today. Try 3855, 4583, 7646, 10100.8, 11039, 14467.3 & 15988 kHz and set the decoder to 50 bd and 425 Hz shift.

Naval Channel Availability

A number of navies continue to use Baudot RTTY on HF to signal occupancy and availability of their radio channels. Most transmissions use 75 bd and 850 Hz shift:

The Dutch Navy from Den Helder, call sign PBB, and Goeree Island, call sign PBC, sends on 2474, 2845, 3765, 4280, 6368.5, 8337.5, 8439, 10840.5 and 12840.5 kHz

The NATO naval station at Monsanto near Lisbon, Portugal uses 3782, 6389, 8551.5, 12823.5 and 16986 kHz

The Italian Navy station in Rome, call sign IDR, has been known to use 4244.7 kHz

The Belgian Navy base at Oostende, call sign OSN, uses 4186, 6413 & 8458 kHz

You can also try your hand at decoding the CARB transmissions that have converted to STANAG4285, as in the examples below:

The Canadian Forces station in Halifax, call sign CFH, uses Baudot (ITA2 or 5N1) coding, 75 bps and long interleave setting in its transmissions on 5095.2, 10943.2 and 15918.2 kHz (USB)

The Portuguese Navy station, call sign CTA, uses Baudot (ITA2 or 5N1) coding, 600 bps and long interleave setting on 12704.5, 14631, 16586.2, 17127.2, 19743, 22210 kHz (LSB)

Egyptian Diplomatic Service

In what must be one of the longest-running HF-based diplomatic operations, MFA Cairo continues to be heard using SITOR-A for some short messages and operator chatter, along with SITOR-B for some specially encrypted messages. While their traffic is "in the clear" it uses an Arabic character set called ATU-80.

Fortunately, this text can easily be converted to pseudo-English using character substitution which usually helps identify the MFA or the embassy being heard. Utility Monitoring Central's profile of the service, provides a list of known words and translations for the embassy names. Here is a list of recently used channels:

9067.7, 10223.7, 11034.7, 14556.7, 14923.7, 16011.7, 16223.7, 16523.7, 16667.7, 17416.7, 18716.7, 19101.7, 19346.7, 19823.7 & 20126.7 kHz

Cuban Diplomatic Service

MFA Havana and its embassies have recently returned to HF and use the venerable amateur radio-developed PSK31 system. Scheduled contacts usually take place between 1600 and 1700 UTC and are sent in the clear in Spanish. The embassies in Harare, Zimbabwe and Kiev, Ukraine have been heard.

Frequencies to try include 19051.8, 19151.8 & 19251.8 kHz. Take care to tune very carefully and enable the decoder's AFC (Automatic Frequency Control) as PSK31 signals are extremely narrow and the MFA and Embassy are usually offset by a few tens of Hz, enough to lose the signal.

U.S. Air Force

The U.S. Air Force operates an extensive, worldwide ALE network that can be heard day and night anywhere in the world. All major air force bases and aircraft can be heard very regularly, as can follow-on phone patches and data, though this is always encrypted. Try the following frequencies:

2805, 3059, 3068, 3137, 4490, 4721, 4724, 5684, 5708, 6685, 6715, 6721, 6761, 7632, 7840, 8965, 8992, 9019, 9025, 9026, 9027, 9057, 11175, 11226, 11250, 13209, 13215, 15016, 15043, 18000, 18003, 20031, 20631, 23337 & 27870 kHz (USB)

Before signing off, I'd like to say a heartfelt thank you to everyone who has read the column, emailed or written letters, and for all the excellent questions and comments I've received in 15 years of writing. A reminder that you can email digital.*digest.archives@gmail.com* to keep abreast of plans for the e-book archives of this column. Thank you, good DX, 73 AR SK.

RESOURCES

Utility Monitoring Central - **www.chace-ortiz.org/umc**
PC-ALE & F6CTE ALE Decoder - **hflink.com/software**
MARS-ALE Decoder Software - **www.n2ckh.com**
Black Cat Systems Multimode - **www.blackcatsystems.com/software**
PC-HFDL Software - **www.chbrain.dircon.co.uk**
Sigmira Software - **www.saharlow.com/technology/sigmira**
F6CTE MultiPSK Software - **f6cte.free.fr**
Rivet Decoder - **borg.shef.ac.uk/rivet**

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NT0Z Signing Off

It's hard to believe that this is actually the last issue of *Monitoring Times*. Although I've only been writing this column since January of 2012, it seems like a much longer tenure because I've had such a positive association with *MT* and Grove Enterprises since I started writing about radio in 1988. In my career, which includes writing for dozens of non-ham publications, I've experienced the best and the worst of the publishing process, and I can easily say that *MT* (and its sister publication, *Satellite Times*, which burned swiftly, but brightly, in the 1990s) is a *class act* that will be greatly missed.

From a writer's perspective, most publications can't match *MT*'s professionalism and decorum, but whatever magic the Grove's and the rest of the staffers brought to the mix goes even further. Although I've never been to Brasstown, never rag-chewed with Larry Van Horn in person (only on the phone or on the air) – heck, I don't recall ever meeting *anyone* at *MT* face to face – I felt like family from day one: supported, respected and appreciated. That can't happen by accident, so thank you!

It's been a privilege to write about amateur radio in these pages for each of the past 24 months, to meet and interact with readers, answer questions, provide resources, you name it. And if present progress continues, with a little luck, our exploration of amateur radio will continue in the pages of *The Spectrum Monitor* (see details about the new publication elsewhere in "What's New" in this issue), where the column will be reborn as Amateur Radio Insight. If you'd like to reach me in the interim, send your e-mail to *kirk@cloudnet.com* or *nt0z@stealthamateur.com.*

Thanks again, and 73.—*NT0Z*

❖ "Gray Areas" in Amateur Radio Regulation, Practice and Enforcement

As everyone knows, U.S. citizens are obligated by law to pay federal income taxes every year, and the vast majority do just that. But, if you think the matter is settled, 100 years after adoption of the sixteenth amendment, which created the personal income tax, you'd be wrong.

Since Day One, various tax protest organizations have been passionately opposing the federal government's authority to tax citizens in the manner to which it's become accustomed. You may have heard about "fringe elements" proferring "fringe arguments" (and, like Gordon Kahl, occasionally getting gunned down by federal agents in shootouts in North Dakota and Arkansas), but compelling arguments against the present system and its legality are also supported by former IRS investigators (including former Criminal Investigation Division Special Agent Joseph Banister) and a variety of Ivy League law professors and legislators (the most prominent is probably former Texas legislator and presidential candidate Ron Paul). Having just finished my 2012 tax returns as I write this, I am again reminded of the sheer magnitude and confusion contained in the 20-volume, 13,500-page Title 26 of the US Code of Federal Regulations!

In a different, yet similar, gray area, several states are wrestling with recent laws that legalized the recreational use of marijuana. In at least one state, legal use requires its purchase from licensed vendors, which means that "unlicensed" marijuana is still technically illegal. Law enforcement personnel are caught in the middle, however, and as the state finalizes its plans and procedures establishing licensed vendors, police are generally not prosecuting recreational users despite the fact that licensed marijuana is not yet officially available.

Another state has "decriminalized" recreational marijuana, although its technically still "illegal" and, by tacit agreement, users aren't likely to be charged if they're in possession of small amounts. But they could be charged if police or prosecutors choose to, for whatever reason. The federal government considers any recreational marijuana use in these states to be illegal.

In these jurisdictions, recreational use of marijuana is legal, decriminalized and illegal, all at the same time, depending on who you ask, the mood they happen to be in at the time, who's arresting you, or who's prosecuting you!

The schizophrenic gray areas that plague tax and criminal law also have amateur radio counterparts. Sure, Title 47, which mostly details amateur radio regulations, isn't nearly as "Alice in Wonderland" as Title 26, but whenever you're dealing with entrenched bureaucracies that are driven by politics, money and special interests, there are bound to be plenty of gray areas. Plus, the amateur community itself is home to dozens of special interests (generally a good thing) and has a long history of self-policing and "gentlemen's agreements" about how, where and when to operate.

To add spice to the mix, many of our conventions don't necessarily align with FCC rules and intentions and, like the new marijuana laws, are often selectively enforced if enforced at all. This month, let's peel back the curtain a bit and see if a wizard awaits within. As gray areas, these topics may be controversial, with hams coming down on all sides of any particular argument. I present just a few here for your perusal, and I'm not officially taking sides. Similarly, I'm also not exhaustively researching every last legal, procedural, historic and practical nubbin. So please, no hate mail!

❖ The "Minimum Power" Rule

With no listed exceptions other than for life-saving emergency communications, FCC rules clearly state that amateur stations must use "the minimum power necessary to carry out desired the communications."

What? Who actually does that? Even as a lifelong QRP operator I've rarely stepped my power down during a QSO to determine the minimum power necessary to facilitate the QSO. And, when I did, it was while in contact with other QRPers who were similarly curious.

Like many QRP ops, I assume that my up-front use of 5-10 W output in a 100-1500 W environment presupposes compliance. A careful reading of the rule at face value, however, seems to indicate that power-reduction should be a part of *every* QSO. At a minimum, stations that use high-powered amplifiers for *every* QSO would seem to be violating FCC rules during *every* QSO!

As with many rules, however, this one seems destined to fail because it doesn't define "desired communications." Ostensibly, desired communications means the lowest signal levels required to exchange any and all necessary information. But, if I were cited for violating this rule (which probably hasn't happened to anyone) I would simply state that I desired "40-dB-over-S9 communications" with the other station, justifying my use of any output power up to the maximum allowed.

There's a "reasonably assumed" meaning of "desired communications" and there's an operator's self-described meaning of "desired communications," and the FCC rule doesn't differentiate and isn't clear. Welcome to bureaucracy! These rule distinctions, however clear to you or me, are small consolation if the bureaucracy in question fines you, confiscates your stuff, imprisons you or guns you down in the street! I'm just saying!

❖ Up, Up and Away!

Everybody loves balloons, right? Especially kids and those who are young at heart. And as hams, who hasn't thought of including some kind of ham radio payload to play around with during the course of the flight? For those of us unfortunate enough not to have worked for NASA or the National Weather Service, super-fun amateur radio balloons might be the next best thing. Or not! There are a few potential problems with this scenario, one that is carried out by individuals and clubs on a regular basis.

First, the FCC frowns on unattended transmitters that can't be turned off, especially those at towering heights. It's one thing to fire up an unattended, low-power beacon on the ground, where signals are significantly attenuated by objects, terrain and local weather conditions

(fox-hunter style). It's quite another to power up a beacon at 30,000 or 70,000 feet, where the signal footprint may easily cover hundreds or even thousands of square miles! The interference potential, though ultimately low, is much greater, whether yours is a beacon, an APRS reporter, a video cam or a "flying repeater."

Depending on frequencies, devices, power levels and geography, the FCC almost always insists that you have the ability to "turn the transmitter off" at any point after launch, an afterthought on many backyard radio balloon launches. Telecommand from the ground is the name of the game!

Another afterthought on many casual balloon launches is coordination with the Federal Aviation Administration (FAA). Depending on the size and composition of your balloon and its proximity to airports or other government installations, the FAA generally insists that you coordinate, "get permission" and comply with any necessary rules *prior to launch*.

The chances that your ham radio balloon might get sucked into an engine and cause the crash of a jetliner are remote, indeed, but not zero. It's much more likely that your balloon might present a mysterious and unresponsive radar signature to air traffic controllers, potentially disrupting flight operations and needlessly annoying and endangering people on airplanes.

The composition of your balloon might raise hackles, too, even if it's not technically prohibited. If you happened to use a large mylar-coated balloon, for example, and it happens to encounter a high-voltage power line during ascent or descent, a resulting flash-over might take down the power grid for miles around. It's not likely, but it has happened, and you don't want to be a part of the next incident.

If your balloon is really successful, other unforeseen situations might develop. For example, if you launch in one country and your balloon winds up flying over another, your payload, which may not have appropriate provisions for remote shut-down, may continue transmitting on frequencies that are unauthorized in your new "host country." Or, the country that owns the airspace in question might not have a reciprocal operating agreement with your country, or may not allow amateur radio at all. Oops. International incident!

Amateur radio balloon launches are seemingly innocent and lots of fun, but even if they're brightly colored, balloons always seem to come in various shades of gray!

❖ Remote Station Operation

The Internet, now pervasive and mature, enables operators from around the country and around the world to remotely operate ham radio stations. This is a great way to enjoy ham radio from condos, apartments and locations from which it's impossible or prohibitive to put up a typical station or antenna. But this ability, nifty though it may be, is shrouded in gray (or may clearly violate existing rules).

If you hold a U.S. Extra-class ticket, let's say, and you set up a remote station at a friend's nearby farm (same state, same country), it's almost impossible to mess things up short of non-hams at the remote location "using" your equipment. But if done properly, you can safely transmit on all bands using any and all modes. With a remote station in the boonies, your ham operations don't bother anyone, and nobody from your townhouse association is the wiser. So far, so good.

But what if a friend who holds a lesser-class license wants to log onto your remote station to work DX? Are you present at your station to act as a proper control operator? Probably not. Is your friend signing his call sign or yours? It might make a big difference! And what if a ham friend from Germany wants to use your remote station to hear what the bands actually sound like from the States? If he's just listening, you're probably okay. But if he transmits, maybe not. Are you present as control operator? That might be a factor. And if your friend is from a country without any type of reciprocal agreement, or one that doesn't allow amateur radio at all, you might potentially be in big trouble. Or none at all, because some of these shades of gray haven't really been tested yet.

❖ Working OSCAR 7

Here's an innocent rules conundrum. OSCAR 7, our oldest working amateur satellite, launched some 40 years ago, is still functioning on a limited basis, and although you can work other stations through the satellite, merely doing so probably violates FCC rules. The amateur satellite service used different uplink and downlink frequencies back in the day, and the back-from-the-dead bird can't QSY to accommodate modern equivalents! Innocent, but still gray, satellite scofflaws!

❖ Public Safety Comms

Many hams rally around the sentiment that one of the prime reasons for the existence of amateur radio is its ability to provide emergency communications and, by logical and spiritual extension, a pool of trained communicators in times of war, etc. Although the latter is probably the farthest thing from the modern, post-WWII FCC/military agenda (most hams wouldn't even recognize modern military comms practices or comm equipment), there's no doubt that amateur radio help is needed and appreciated during communications emergencies. The challenge is, much of what we do as hams to prepare for these emergencies probably runs counter to FCC rules and intent and is deeply immersed in the gray zone.

One huge point of controversy is the vast amount of communication support municipalities and organizations get from "amateur radio emergency communicators." Years ago it was enough to safely avoid the "pay for play" gotcha when providing event communications, emergency or otherwise. Getting paid to provide event support communications was a strict no-no, but everything else was precisely or tacitly okay.

But now, FCC rules and intentions are that hams provide only emergency communications, leaving routine event support and logistics communications to event sponsors. The rules say that any comms and related support services that can be provided by private, non-amateur sources or existing communication infrastructures should *not* be provided by hams. Hams provide *emergency comms*, period.

This present-day reality runs counter to historical practices and promotes a lot of actual and potential rules violations. Plus, it makes it difficult for the hams who are practicing their emergency skills with legitimate intent.

Consider a local marathon, for example. Years ago, without radio amateurs, it was a struggle to provide logistics and safety comms along a large, meandering route. Ham volunteers, stationed here, there, and everywhere, saved the day, providing safety and "other" non-safety comms for event organizers. Today, however, this is almost certainly a rules violation, despite the fact that organizers and hams *want* to provide these services. Modern organizers have ubiquitous and robust cellular and satellite communications networks, backed up by non-amateur voice and data services, available for logistical and coordination comms, and the FCC clearly wants organizers to use them.

For example, if a marathon runner goes off course but is just standing there and there's no emergency, it's probably inappropriate for hams to communicate that fact to race coordinators. If the runner collapses, however, the full force of amateur analog, digital, voice, packet, GPS, video, land and satellite-based resources can be appropriately brought to bear on the situation. Until then, not so much.

Ironically, many articles in ham publications, whether local newsletters or established national magazines, seem to encourage activity in the gray zone of amateur emergency comms. Many local clubs seem to be comfortable there, too, probably because this activity, although technically a violation, has been tacitly "decriminalized" in practice, much like recreational marijuana in certain Western states!

Other gray areas include unattended beacons, including WSPR and automated reverse-beacon operations, the use of proprietary commercial modulation schemes on the amateur bands, certain maritime data-mode practices, double-timing channels on 60 meters, the expression of "acceptable profanity" (have you listened to broadcast TV lately?), defining out-of-band and out-of-band-segment transmissions, and many others.

❖ Actionable Violations

Despite all of these gray areas, it's still pretty difficult to actually be cited for any of these activities. In the post-Riley Hollingsworth era the FCC has earned a certain reputation for being "softer on radio enforcement" – at least in the gray zone. What will put you in direct contention with the agency and, if necessary, the federal justice system, are clear and willful violations such as transmitting on amateur bands without a license, selling non-type-accepted radios and amplifiers, and the biggie: intentionally interfering with government public safety (or military) communications. There's absolutely no gray zone when it comes to these rules!

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How to Chase a Dream

It was 26 years ago this fall that I found myself on the phone talking to Bob Grove, publisher of this magazine. Three years earlier, in 1984, I had installed a ten foot, C-band satellite dish in the backyard and had spent those years exploring a whole new dimension in monitoring. I was calling Bob because, as an *MT* subscriber since its launch in 1982, I thought the magazine needed to cover the fact that this *was* a whole new dimension in monitoring.

I must have worn him down because an hour later he said, "OK, why don't you just write it up and submit it as a feature article. I'll pass it on to Larry Miller (*MT*'s managing editor in those days) and if he likes it, we'll print it."

Chasing Radio Dreams

I had been hooked on radio dating back to 1965 when I was 16 years old and started working part-time as a disc jockey at the local 250 watt AM radio station where I grew up in central Florida. At the start of my senior year, thanks to a work-study program Florida provided for high school juniors and seniors, I was working full time at the station and, by the time I graduated from high school, I was the senior radio announcer on staff (that just shows how great the turnover is in small radio stations).

The station enjoyed a certain notoriety because the general manager was a very young, professional beauty queen, who in 1965 represented Florida in the Miss U.S.A. contest. And, adding to the delight of my teenage mind, she drove a brand new Corvette Stingray. What wasn't there to like about working at *that* radio station?

On the air at WOKA-AM, now an all-gospel station. (Courtesy: Author)

Under the big dish at Turner Broadcasting uplink facility. (Courtesy: Author)

It was also at the start of my senior year in high school that I built a Knight-Kit Star Roamer and spent nights exploring the shortwave bands. I continued to pursue my radio dreams through my college years, listening to shortwave and working at a large FM pubic radio station in Tampa; a small-town, multi-format station in south Georgia, and a commercial FM station in Mobile (one of only two such stations in the city at the time). That station's transmitter and antenna sat atop the First National Bank Building on Mobile's Bienville Square, just above the 35th floor and 23 floors above the station's studios. We had a huge signal. During those years, I honed my editing, news writing and announcing skills and covered formats from country to classical music. There were some extraordinary times over that period.

Having used successively better shortwave receivers in the 20 years of listening between the Knight-Kit days and my call to Bob, I was always looking at new technology. When I attended a satellite TV demonstration in 1982, I was blown away. By today's standards it was pretty crude stuff, but in those days, it was amazing. The price tag, amazing enough by itself, was over $6,000. The dish was not rotatable and changing polarity was done by turning the entire feed horn with a TV antenna rotator.

Dish farm at Shop-At-Home Network in rural eastern Tennessee. They sold a lot of my Satellite TV Sourcebook, back in the day. (Courtesy: Author)

By 1984, more satellites were in place, technology brought the dish size down to 10 feet, fiberglass replaced steel, small servo motors now changed polarity and actuator motors were added to move the dish across the Clarke Belt. The prices had come down too, but even getting the parts and putting it together myself, it still cost more than $1,500 ($3,376 in 2013 money).

When the semi-tractor trailer showed up in the driveway with a four-piece fiberglass dish, mount, an eight-foot long, six-inch diameter steel mounting pole and assorted hardware, including dozens of nuts and bolts to hold the four pieces of fiberglass together, I was overwhelmed. Luckily, the driver helped me unload the dish (over 500 pounds by itself) and I was left to contemplate the installation.

For the next few years I wore out at least one heavy-duty actuator motor moving that massive dish back and forth across the Clarke Belt searching for unusual signals. It turned out that many of the devices used by hams and other radio hobbyists of the time were also used by TVRO enthusiasts (most early TVRO experimenters were hams) including wide-band digitally tuned scanners and early digital data decoders. Some of the "hidden" signals were radio Teletype signals, used by international press bureaus, and national radio networks, whose signals were intended for affiliate radio stations, but were nonetheless transmitted in the clear.

Everything, in those days, was analog and unencrypted. The video channels, audio subcarriers, even very narrow-band Single Channel Per Carrier (SCPC) signals were analog and in the clear. With surprisingly simple equipment, backyard listeners had access to virtually every radio network, TV network, cable-TV channel, sports network, commercial-free music service and a growing number of AM, FM and shortwave radio stations uplinked via satellite for cable or network re-distribution. There were other signals, too, such as early Teletext and computer data feeds that used the Vertical Blanking Interval (VBI) on the analog signal of

A life-long fiddler's dream come true: on stage at the Ryman Auditorium. Too bad I hadn't brought my fiddle. Circa 1991, before renovations, my wife and I were the only tourists in the building, everyone else was at Opryland. (Courtesy: Author)

Turner Broadcasting System's transponder. The Clark Belt was a monitor's paradise.

❖ A Column and a Career are Born

Months after I submitted my article (by now we were half-way into 1988), I contacted Larry Miller to see what had happened to the article because I hadn't seen it in any of the subsequent issues of *MT.* He told me that it would be in the July issue and that they had decided to make the subject of satellite-TV a monthly column and that the deadline for the August issue had passed and I was already late for my first column!

By the time that first column appeared, my youngest daughter and I had gotten our Novice ham tickets and worked diligently to upgrade the next year to Technician and General class license. I was keen to join the 20 meter TVRO net, a weekly gathering of backyard satellite TV hobbyists that saw dozens of check-ins each week during its peak popularity.

By 1995 my daughter and I upgraded to Advanced Class. She had just graduated from college and had a couple of weeks before an internship would take her to Michigan. We had come a long way from 1988 and our Novice exams and the countless hours sending CW back and forth at the kitchen table on an MFJ code practice oscillator. Later the next year she would enter the Peace Corps where she was stationed in Nicaragua for two and a half years. She found a disused Drake TR-4 station at a nearby Catholic mission that she brought back to the air with tubes I had sent her by mail. We had a CW sked on 20 meters until the station went down for good. By 1999 I upgraded to Extra Class in order to beat the deadline for the disappearance of CW from the amateur exam. I was determined to pass that 20 wpm test!

Flashback to 1990. My *MT* column had gotten the attention of the publisher of *Satellite Entertainment Guide* (SEG), a Canadian-based monthly satellite-TV guide, sold throughout North America, with a circulation of over 120,000 paid subscribers. The editor wanted me to do feature articles and maintain their transponder, channel and audio subcarrier lists, which I did for the next ten years. It turns out I was the only person on the staff who actually had a big dish. Throughout this period I continued to write columns and features for *MT* as well as columns and features for the shorter lived *Satellite Times*, which was also a Grove publication and whose managing editor was Larry Van Horn.

During those years the Groves hosted their famous *MT* conventions, first in Knoxville and later in Atlanta. The conventions were well attended with 500 or more stalwart *MT* subscribers showing up to enjoy presentations by all of the magazine staff members. Each year there were famous guest speakers at the convention banquet finale, among the most memorable of which was Joe Adamov, a voice we all knew well from his days at Radio Moscow. His was a riveting presentation. It turns out that those conventions were our only chance to actually meet readers face-to-face and everyone of us thoroughly enjoyed those times.

The Atlanta conventions were the most fun. Held in the CNN Tower, tours of CNN facilities and other media adventures provided high monitoring entertainment for all. Once, on the way back to Virginia, my wife and I decided to pay a visit to the Turner Broadcasting uplink facilities which could easily be seen from I-85 going north. The site was a massive array of huge satellite dishes and microwave towers. We drove to the main building and simply knocked on the door. The Chief Engineer there was a little puzzled as he opened the secure door. I explained who I was and, it turned out, he was an *MT* subscriber. So, he gave us a quick tour of the place, which was an overwhelming wonderland of TV RF gear. Since we were "unauthorized personnel," it wasn't long before our host got the call from downtown Atlanta to turn us out in quick order.

We also enjoyed going to the national satellite-TV conventions held in Nashville, in those days. That's where I first met Bob Heil K9EID in person. We had talked often on the 20 meter TVRO net and on various other occasions, but here he was demonstrating the latest in home theater technology, years before the concept became routine home decor. We met dozens of great folks in the satellite TV business at those conventions, many mom and pop businesses, bringing satellite TV to rural America.

Meanwhile, the publisher of SEG launched two other publications with over 400,000 subscribers each, *Dish Entertainment Guide* and *Direct Guide* and eventually bought *Satellite Orbit.* I wrote columns, features and answered readers questions for all of those magazines. It turns out that those were the halcyon days of the big dish and it was fun while it lasted. By 2006, with diminished big dish subscribers, the publisher turned *Orbit* into an online-only publication and reduced staff to the bare essentials, there was no need for someone who actually had a satellite dish.

Luckily, shortly after that, I had attracted the attention of the editors at *Consumers Digest* where I became a contributing editor, covering shortwave radios, table-top radios, WiFi radios, hand-held two-way radios and GPS devices in a number of feature articles stretching into this year. I also landed a temporary job at the University of Virginia School of Law as a writer/editor, in their communications department. That job was supposed to last three months while the communications director was on maternity leave, but turned into a 14 month stint, during which I wrote more than three dozen articles, some of which were reprinted in *UVA Lawyer* magazine. I had also taken over the *Communications* column at *MT* and began to write more monthly features in addition to this column, the *Beginner's Corner*.

By the summer of 2009 *MT* managing editor, Rachel Baughn, asked me to take over the duties of features editor while she wound down her illustrious career at *MT* which spanned three decades. Last year, with Rachel's retirement pending, the Groves asked me to become the managing editor, which brings me to this final issue of *Monitoring Times*.

And, while this is the last issue of *MT* you'll ever read, my hope is to be able to bring the spirit and standard of *MT* forward into an all-digital print world with the January 2014 issue of *The Spectrum Monitor*. I hope you'll join me at **www.thespectrummonitor.com**.

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Christmas on the Shortwave Bands

December means yet another year is about to come to a close. It is also a festive time, with both Christmas and New Year programming well in evidence. December also means that a new year, 2014 is upon us, and with it many new challenges, opportunities and new beginnings. As many of you will know, this is the last edition of this magazine. Almost 8 years to the day since I first did my first work for Monitoring Times, let's shine the Programming Spotlight one last time, on festive and seasonal programming. We'll also look at some of the best of the best in international broadcasting in 2013, and then we'll gaze into the crystal ball and see what the future might hold for international broadcasting.

Christmas is a special time of year for many of us. It brings the promise of lots of good radio programming to entertain and inform during this festive period. This is perhaps my favorite time of the year to listen to shortwave broadcasters.

The **BBC** has featured two programs for many years, which have become real listener favorites. The first is the *Festival of Nine Lessons and Carols*. The program is always heard at 1500 UTC on Christmas Eve. Transmitted live from King's College, Cambridge it always opens with the carol *Once in Royal David's City.* With the exception of 1930, it has been "on the wireless" every year since 1928. Sometime in the 1930s the BBC World Service added it as well. It is estimated that it has a worldwide audience in the millions. (The program is also carried on domestic networks in the US (NPR), New Zealand (Radio National) and the UK (BBC Radio 3)

The *Queen's Christmas Message* is another Christmas Day tradition from the **BBC World Service.** Heard at 1500 UTC on the 25th, it is the one time each year that the Queen addresses the Commonwealth and the World. King George V was the first monarch to make such a broadcast, leading to one of the funnier anecdotes in Canadian broadcasting. The broadcast was timed so that as many people as possible around the world, could tune in. The shortwave broadcast was picked up and retransmitted domestically in Canada. This meant it was heard very early in the morning in Western Canada. This led to an angry letter from an elderly lady in Regina, who chastised the CBC for making the King get up so early!

While we are in Canada, another Christmas Eve tradition involves the **CBC** program *As It Happens*. On Christmas Eve (or the weeknight closest to Christmas Eve) As It Happens broadcasts messages from Canadian Forces personnel serving around the world. Over the years this has included such diverse locations as Afghanistan, Cyprus, Croatia, Bermuda (!), Golan Heights, NORAD in Colorado Springs and Canadian Forces Base Alert in the far north. It is a very touching program. It then concludes with an annual reading from the late Allan (Fireside Al) Maitland of the haunting Christmas story "The Shepherd" about a fighter pilot lost over the English Channel, who is guided home by a veteran World War II pilot... or is he...

Now that the CBC Northern Quebec Service is gone, try for this on **CKZN** shortwave. Try 6160 kHz at 2230 UTC. Also try the domestic network, NPR and CBC.ca (times vary).

On New Years' Eve don't forget to follow the event around the world. Fewer shortwave signals are available to do this now, but my three favorites should still be there. Listen to **Radio Australia** on 9580 kHz, before and after midnight Melbourne time (1100 UTC Dec 31). Nobody parties like Australia. At 2000 UTC Dec 31, literally Midnight in Moscow, Russian services of **Golos Rossii** should be audible (as this is written Summer frequencies are still posted, so I am unsure of the proper frequency). Just before midnight, President Putin will address the nation. Finally seek out the **BBC World Service** at 0000 UTC, for me truly the start of the New Year, and the one time of the year you can listen to Big Ben ring twelve times.

In 2013, as many stations continued to leave shortwave, a few stand out as the best of the best. Kudos to **Radio New Zealand** International. A tiny country, this broadcaster continues to punch above its weight. **China Radio International** now dominates the bands, often heard on several frequencies at a time. As mentioned before, it ain't Chairman Mao's radio station any more. Then there is **Radio Australia.** Perhaps the ideal public broadcaster in the world now. They get it. It's a great mix of information and entertainment. And while they continue to broadcast, the **Voice of Greece** continues to offer some of the best music around.

Perhaps radio veteran Victor Goonetilleke sums it up best: "As a serious DXer I miss the International Broadcasters that have gone off the air, but I am more or less devastated every time a small domestic station goes off the air, because they are the stations that bring us the real country, its people and music. As long as they are on the air, my hobby heart will be kept beating. Not that I don't miss Radio Netherlands, Radio Sweden, Radio Norway and so many others...as a serious DXer I grew up with them and for the most part I am who I am because of them for the vast information and also the friends worldwide who they brought me."

Our hobby is evolving. Probably faster than many of us would wish for but that is the reality. As many stations leave the airwaves, it is presenting an opportunity to hear more exotic, and smaller stations that didn't get through past the 500kW blow torches. Frequencies in Equatorial Guinea and other exotic places are starting to be reported again. It is a great time to be a Dxer, and a great opportunity to hear music and programming from all parts of the world!

As we turn off the *Programming Spotlight* for the last time, I have to say a few thank yous. I want to thank Bob Grove, for giving me the opportunity to bring you this column each month. It is an honor just to be associated with Grove Enterprises. I want to thank Rachel Baughn and Ken Reitz for not only being very excellent editors, but also for being my friends. I want to thank my colleague, Gayle Van Horne and all the column editors here for their support, encouragement and friendship. Grove Enterprises is more than just a company, it truly is a family. And last but certainly not least, I want to thank you dear reader. Thank you for giving me the opportunity to educate, to inform and occasionally to entertain you each month. I hope it has been as fun for you as it has been for me.

Shortwave radio is not going anywhere. And neither am I. While *Monitoring Times* may be ending its run, I will still be around. Exciting new opportunities lie ahead in 2014. As always you can contact me on Facebook. You can also contact me through my website doghousecharlie.com E-mail can be sent to programming_matters@yahoo.ca And hey, I even do my own internet radio show on Radio Scooter International! (The Radio Time Capsule, heard UTC Mondays from 0000-0400 UTC).

In the 1950s, the radio show my Dad was on, ended with the song Highways are Happy Ways (When they Lead the Way to Home). Here's hoping all your highways are happy ways. Cheers!

THE QSL REPORT
VERIFICATIONS RECEIVED BY OUR READERS

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New Projects for the Radio Hobbyist

Thanks to all who have read, written, or contributed to this column. I have corresponded with many amazing people from my association with *Monitoring Times*. It has been a pleasure to meet many of you at our former *MT* conventions.

Though I am involved in many outside activities, I plan to continue my work in the radio hobby. Look for continued radio-related postings on my Shortwave Central blog at **http://mt-shortwave.blogspot.com/** You are also welcome to follow me on Twitter at: Gayle Van Horn @ QSLRptMT for last minute tips or breaking news. If you would like to contribute your hobby news, QSLs, or shortwave logs for the blog, please send them to *gaylemt@brmemc.net*. This address will remain in use.

I will continue to publish the by-hour, multilingual frequency guide, renamed the *International Shortwave Broadcast Guide* and published by Teak Publishing. This is an exciting development for Larry and I, and we hope you will take advantage of this new source to complement your listening time. For complete in-depth details, please refer to this month's "What's New" column. Look for continued announcements on our blogs as we expand our publishing projects.

Kind regards to all, and I hope to hear from you again.

Gayle Van Horn W4GVH

BRAZIL

Rádio Educação Rural De Tefé, 4925.24 kHz. Full data QSL card, signed by Thomas Schwamborn. Received in 32 days for a Portuguese report and mint stamps. Station address: Praça Santa Tereza, 283 69470-000 Tefé, AM Brasil (Frank Hillton, Charleston, SC) Website: **www.radioruraltefe.com** Email: *rert@osite.com.br*

Rádio Inconfidência, 15190 kHz. Full data QSLs in 21 months, for multiple reports by postal mail and email from Marco Antônio P. Coelho, Técnico. Station address: Av Raja Gabáglia, 1666-Gutierrez, 30441-194 Belo Horizonte, Brasil ((Artur Fernandez Llorella/HCDX) Website:**www.inconfidencia.com** Email: *inconfidencia@inconfidencia.com.br* (or) *diretoria@inconfidencia.com.br*

GERMANY

Vechte Welle/Delux FM 3985 kHz, via Radio 700. Full data QSL and station info sheet. Received in five weeks. QSL address: Ems-Vechte-Welle, z.H.d., Mathias Volta, Halle IV, Kaiserstrasse 10a, D-49809 Lingen, Germany. (Llorella)

MEDIUM WAVE

Hungary-Dankó Rádió, 1251 kHz AM. Full data verification letter, signed by Miklós Kenderessy, Director Technical Department. Received in one month for an AM report. Station address: Kunigunda útja 64, H-1037 Budapest. (Llorella)

Morocco-Radio Melilla 1485 kHz AM. Station stamp and seal noted with "reception ok" on original report, signed by Antonia Ramos Pelaez, Directora. Received in 594 days from original Spanish report with mint stamps. Station address: Muella Ribera s/n, E-52005 Melilla, Morocco *aramos@prisaradio.com*. (Al Munick, PA/HCDX) If using the NASWA Country List, this station counts as Spanish Morocco.

USA-KSEY, 1230 kHz AM. Full data *Cowboy Boot/Horseback Rider* card, signed by James T. Pogue, QSL Manager. Received in 69 days for a SASE (used), plus KH2AR ham card. QSL was for a DX Test. QSL address: Box 3777, Memphis, TN 38173-0777 (Bill Wilkins, Springfield, MO) Station is licensed to serve Seymour, Texas and broadcast a sports talk format to the greater Wichita Falls, Texas. Sister station is KSEY-FM **www.radioksey.com**.

WQQK643, 1700 kHz AM. Received a *City of Happy Valley* folding card, signed by Edith Foteff, Community Liaison. Received in 150 days for an AM report. QSL address: 16000 SE Misty Drive, Happy Valley, OR 97086. MW QSL # 3,037 (Patrick Martin, Seaside, OR) This is a community service radio station **www.ci.happy-valley.or.us**. The WQQK call sign is actually licensed by the FCC to a microwave service in Shenandoah, Virginia.

WTAD, 930 kHz AM. Original reception report returned with "Confirmed" written at bottom, signed by Michael J. Moyers Sr., VP/General Manager. Received in six days for an AM report, address label (used) and $1.00 US. Station address: 329 Maine St., Quincy, IL 62301 (Wilkins).

PAPUA NEW GUINEA

Wantok Radio Light, 7325 kHz. Personal letter signed by Dorish Asang, (Administration Receptionist) Mr. Alois Ok, (Business Manager) and Joel Dopo (RF Technician), plus a full data QSL card. Received in 183 days for an MP3 CD of recorded programming, and

return mint postage. QSL address: P.O. Box 1273, Port Moresby, National Capital District, Papua New Guinea (Patrick Robic, Austria/ WWDXC Top News).

ROMANIA

Radio City-The Station of the Cars 7290 kHz via Tigandesti, Romania. Full data E-QSL which included a two page history and information on the station. Received in 20 minutes for an English report to *citymorecars@yahoo.com*. (Gayle Van Horn, NC) The station's DJ presents an oldies based format of European off-shore tunes, cruising music, album tracks, hits from the U.S. and more.

UTILITY

Croatia-MRCC Rijeka 2187.5 kHz. Full data ship card and prepared QSL verified. Received in 47 days after follow up. QSL address: Ministry of the Sea, Transport and Infrastructure, Harbour Master's Office Rijeka, Senjsko pristaniste 3, Croatia (Andy/UDXF)

Czech Rep.-NDB "L" Praha/Liboc 372 kHz. Full data verification letter, signed by Jan Bernatzik. Photo of the transmitter and stickers enclosed. Received in 11 days for a utility report. QSL address: Air Navigation Services of Czech Republic, Administration ANS, Navigacni 787, 25261 Jenec, Czech Republic (Robic).

NDB "CK" Prerov 441 kHz. Full data verification letter, signed by 1LT Jan Zak, Frequency Manager. Received in 18 days. QSL address: National Radio Frequency Agency (NAFRA CZE), Ministry of Defence-1341, 16001 Praha 6, Czech Republic (Robic) Email: *nafra@army.cz*

Italy-NDB "FOG"340 kHz. Prepared QSL card signed by Giuliano Nardini and stamped as verified. Received in 11 days. QSL address: ENAV S.p.A., NAAV Foggia, Aeroporto Gino Lisa, Viale degli Aviatoria, 71100 Foggia, Italy (Robic).

USA-AFS9AZ, 14411 kHz. Full data Emergency Operations Center card, Papago Military Reservation, unsigned. Received in 22 days for utility report and SASE (used). Verification was for 2013 MARS Armed Forces Day Crossband test. Station address: AFS9AZ, Atten: Paul Swietek, 5427 E. Broadway Ave., Apache Junction, AZ 85119-9307 (Wilkins).

NPD, 7476.5 kHz LSB. Partial data Naval Support Activity Mid-South card, signed by A. H. Hillard. Received in 62 days for a SWL report and a SASE (used). QSL was for the 2013 Armed Forces Day Crossband test. Station address: Atten: Mr. A.H. Hilliard, 4237 Bacon St., Memphis, TN 38128 (Wilkins).

How to Use the Shortwave Guide

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af

① ② ⑤ ③ ④ ⑥ ⑦

CONVERT YOUR TIME TO UTC

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all ***dates***, as well as times, are in UTC; for example, a show which might air at 0030 UTC ***Sunday*** will be heard on ***Saturday*** evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Not all countries observe Daylight Saving Time, not all countries shift at the same time, and not all program scheduling is shifted. So if you do not hear your desired station or program, try searching the hour ahead or behind its listed start time.

FIND THE STATION YOU WANT TO HEAR

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

If a broadcast is not ***daily***, the days of broadcast⑤ will appear in the column following the time of broadcast, using the following codes:

Codes	
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

CHOOSE PROMISING FREQUENCIES

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

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

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

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

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

Mode used by all stations in this guide is AM unless otherwise indicated.

MT MONITORING TEAM

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Additional Contributors to This Month's Shortwave Guide:

Thank You to …

BCL News; Cumbre DX; DSW-CI/DX Window; Hard-Core DX; DX Mix News; WWDX Club/Top News. George Baxter/R Australia; Greece; Georgi Bancov/Balkan DX; Ivo Ivanov, Bulgaria; Sean Gilbert UK/WRTH; Wolfgang Bueschel, Stuttgart, Germany.

SHORTWAVE BROADCAST BANDS

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

Note 1	Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
Note 2	Broadcasters can use this frequency range on a (NIB) non-interference basis only.
Note 3	WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007
Note 4	WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

"MISSING" LANGUAGES?

A **FREE** download to MTXpress subscribers, the online MTXtra Shortwave Guide is 115+ pages of combined language schedules, sorted by time. Call **1-800-438-8155** or visit ***www.monitoringtimes.com*** to learn how.

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000	0030		Egypt, R Cairo	9965na		
0000	0030		USA, VO America	7430va	9790va	12015va
			17820va			
0000	0035		Vanuatu, R Vanuatu	3945do	7260do	
0000	0043		India, AIR/Natl Channel		9425do	9470do
0000	0045		India, AIR/External Svc		9690as	9705as
			11710as	13605as		
0000	0045	DRM	India, AIR/External Svc		11645as	
0000	0056		Romania, R Romania Intl		9700na	11955na
0000	0100		Anguilla, University Network		6090ca	
0000	0100		Australia, ABC/R Australia		9660va	12080pa
			15240va	15415va	17750pa	17795pa
			19000va	21740va		
0000	0100		Australia, NT VL8A Alice Springs			4835do
0000	0100		Australia, NT VL8K Katherine		5025do	
0000	0100		Australia, NT VL8T Tennant Creek			4910do
0000	0100		Canada, CFRX Toronto ON		6070do	
0000	0100		Canada, CFVP Calgary AB		6030do	
0000	0100		Canada, CKZN St Johns NF		6160do	
0000	0100		Canada, CKZU Vancouver BC		6160do	
0000	0100		China, China R International		6020as	6075as
			6180as	7350as	7415as	9570na
			11790as	11885as	13750as	15125as
0000	0100	1st fa	Finland, Scandinavian Weekend R			6170eu
0000	0100		Germany, HCJB Germany		3995eu	7365eu
0000	0100	Sun	Germany, Mighty KBC Radio		7375eu	
0000	0100		Germany, R 6150	6070eu		
0000	0100		Guatemala, R Verdad		4055do	
0000	0100		Guyana, VO Guyana		3290do	
0000	0100		Honduras, R Luz y Vida		3250do	
0000	0100		India, AIR/Imphal	4775do		
0000	0100		India, AIR/Kohima	4850do		
0000	0100		India, AIR/Mumbai	4840do		
0000	0100		India, AIR/Port Blair		4760do	
0000	0100		Malaysia, RTM/Kajang		5965do	6050do
0000	0100		Malaysia, RTM/Traxx FM		7295do	
0000	0100		Mexico, R Educacion		6185do	
0000	0100		Micronesia, V6MP/Cross R/Pohnpei			4755as
0000	0100		New Zealand, R New Zealand Intl			15720pa
0000	0100	DRM	New Zealand, R New Zealand Intl			17675pa
0000	0100		Papua New Guinea, Wantok R Light			7325do
0000	0100		Solomon Islands, SIBC		9545do	
0000	0100		Spain, R Exterior de Espana		6055na	
0000	0100		Thailand, R Thailand World Svc		15275na	
0000	0100		UK, BBC World Service		5970as	6195as
			7320as	9410as	9740as	11750as
			12095as	15335as	15755as	`7685as
0000	0100		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
0000	0100	smtwh	USA, Overcomer Ministry		7490na	
0000	0100		USA, Overcomer Ministry		3185na	
0000	0100		USA, WBCQ Monticello ME		7490na	9330na
0000	0100	fas	USA, WBCQ Monticello ME		5110na	
0000	0100		USA, WEWN/Irondale AL		11520af	
0000	0100	twhfas	USA, WHRI Cypress Crk SC		5920va	
0000	0100		USA, WINB Red Lion PA		9265am	
0000	0100		USA, WRMI Miami FL		9955am	
0000	0100		USA, WTWW Lebanon TN		5085sa	5830na
0000	0100		USA, WWCR Nashville TN		4840eu	5935af
			6875eu	7520ca		
0000	0100	irreg	USA, WWRB Manchester TN		3185na	3215na
0000	0100	Sun/irreg	USA, WWRB Manchester TN		5050na	
0015	0100		India, AIR/Chennai	4920do		
0020	0100		India, AIR/Hyderabad		4800do	
0020	0100		India, AIR/Thiruvananthapuram		5010do	
0025	0100		India, AIR/Aizawl	5050do		
0025	0100		India, AIR/Bhopal	4810do		
0025	0100		India, AIR/Jaipur	4910do		
0025	0100		India, AIR/Jeypore	5040do		
0030	0100		India, AIR/Srinagar	4950do		
0030	0100	twhfa	Serbia, International R Serbia		9685na	
0030	0100		USA, VO America	9325va	15290va	
0030	0100		USA, WHRI Cypress Crk SC		7315ca	

0100 UTC - 8PM EST/ 7PM CST / 5PM PST

0100	0115asm		Australia, HCJB Global Australia			15400as
			17760as			
0100	0115	Sat/Sun	Canada, Bible VO Broadcasting			9490as
0100	0130	Sun	Serbia, International R Serbia		9685na	
0100	0130		Vietnam, VO Vietnam/Overseas Svc			12005na
0100	0200		Anguilla, University Network		6090ca	
0100	0200		Australia, ABC/R Australia		9660va	12080pa
			15160pa	15240va	15415va	17750pa
			17795pa	19000va		
0100	0200		Australia, NT VL8A Alice Springs			4835do
0100	0200		Australia, NT VL8K Katherine		5025do	
0100	0200		Australia, NT VL8T Tennant Creek			4910do
0100	0200		Canada, CFRX Toronto ON		6070do	
0100	0200		Canada, CFVP Calgary AB		6030do	
0100	0200		Canada, CKZN St Johns NF		6160do	
0100	0200		Canada, CKZU Vancouver BC		6160do	
0100	0200		China, China R International		6020as	6175eu
			6180as	9410eu	9470eu	9535as
			9570na	9580na	9675eu	11870as
			15125as	15785as		
0100	0200		Cuba, R Havana Cuba		5040ca	6000na
			6165na			
0100	0200	1st fa	Finland, Scandinavian Weekend R			6170eu
0100	0200		Germany, HCJB Germany		3995eu	7365eu
0100	0200	Sun	Germany, Mighty KBC Radio		7375eu	
0100	0200		Germany, R 6150	6070eu		
0100	0200		Guatemala, R Verdad		4055do	
0100	0200		Guyana, VO Guyana		3290do	
0100	0200		Honduras, R Luz y Vida		3250do	
0100	0200		India, AIR/Aizawl	5050do		
0100	0200		India, AIR/Bhopal	4810do		
0100	0200		India, AIR/Chennai	4920do		
0100	0200		India, AIR/Gangkok		4835do	
0100	0200		India, AIR/Hyderabad		4800do	
0100	0200		India, AIR/Imphal	4775do		
0100	0200		India, AIR/Jaipur	4910do		
0100	0200		India, AIR/Jeypore	5040do		
0100	0200		India, AIR/Kohima	4850do		
0100	0200		India, AIR/Mumbai	4840do		
0100	0200		India, AIR/Port Blair		4760do	
0100	0200		India, AIR/Srinagar	4950do		
0100	0200		India, AIR/Thiruvananthapuram		5010do	
0100	0200		Malaysia, RTM/Kajang		5965do	6050do
0100	0200		Malaysia, RTM/Traxx FM		7295do	
0100	0200		Mexico, R Educacion		6185do	
0100	0200		Micronesia, V6MP/Cross R/Pohnpei			4755as
0100	0200		New Zealand, R New Zealand Intl			15720pa
0100	0200	DRM	New Zealand, R New Zealand Intl			17675pa
0100	0200		Papua New Guinea, Wantok R Light			7325do
0100	0200		Solomon Islands, SIBC		9545do	
0100	0200		Taiwan, R Taiwan Intl		11875as	
0100	0200		UK, BBC World Service		9500as	12095as
			15310as			
0100	0200		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
0100	0200		USA, Overcomer Ministry		3185na	
0100	0200	smtwhf	USA, Overcomer Ministry		7490na	
0100	0200		USA, VO America	7430va	9780va	15205as
0100	0200		USA, WBCQ Monticello ME		7490na	9330na
0100	0200	fas	USA, WBCQ Monticello ME		5110na	
0100	0200		USA, WEWN/Irondale AL		11520af	
0100	0200	twhfa	USA, WHRI Cypress Crk SC		5920va	
0100	0200		USA, WHRI Cypress Crk SC		9860na	
0100	0200		USA, WINB Red Lion PA		9265am	
0100	0200		USA, WRMI Miami FL		9955am	
0100	0200	irreg	USA, WRNO New Orleans LA		7506na	
0100	0200		USA, WTWW Lebanon TN		5085sa	5830na
			9479na			
0100	0200		USA, WWCR Nashville TN		3215eu	4840na
			5935af	7520ca		
0100	0200	irreg	USA, WWRB Manchester TN		3185na	3215na
0100	0200	Sun/irreg	USA, WWRB Manchester TN		5050na	
0100	0200		Vanuatu, R Vanuatu	7260do		
0128	0200		India, AIR/Leh	4660do		
0130	0200	twhfas	Albania, R Tirana	9850va		
0130	0200		India, AIR/Chennai/FM Gold		7270do	
0130	0200	twhfa	USA, VO America	9820va		
0130	0200	mtwhf	USA, WRMI/R Slovakia Intl relay			9955am
0140	0200		Vatican City State, Vatican R	11730as		15470as
0145	0200	f	Australia, HCJB Global Australia			17760as

0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0215	f	Australia, HCJB Global Australia			17760as
0200	0215		India, AIR/Bhopal	4810do		
0200	0215		India, AIR/Hyderabad		4800do	
0200	0215		India, AIR/Imphal	4775do		
0200	0215		India, AIR/Srinagar	4950do		
0200	0215		India, AIR/Thiruvananthapuram		5010do	
0200	0230		Thailand, R Thailand World Svc		15275na	
0200	0230		USA, WRMI/R Prague relay		9955am	
0200	0245		India, AIR/Chennai	4920do		
0200	0300		Anguilla, University Network		6090ca	
0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC/R Australia		9660va	12080pa
			15160pa	15240va	15415va	17750pa
			17795pa	19000va		
0200	0300		Australia, NT VL8A Alice Springs			4835do
0200	0300		Australia, NT VL8K Katherine		5025do	
0200	0300		Australia, NT VL8T Tennant Creek			4910do
0200	0300		Canada, CFRX Toronto ON		6070do	
0200	0300		Canada, CFVP Calgary AB		6030do	
0200	0300		Canada, CKZN St Johns NF		6160do	
0200	0300		Canada, CKZU Vancouver BC		6160do	
0200	0300		China, China R International		11770as	13640as
0200	0300		Cuba, R Havana Cuba		6000na	6165na
0200	0300		Egypt, R Cairo	9720na		

0200	0300	1st fa	Finland, Scandinavian Weekend R		6170eu
0200	0300		Germany, HCJB Germany	3995eu	7365eu
0200	0300		Germany, R 6150 6070eu		
0200	0300		Guatemala, R Verdad	4055do	
0200	0300		Guyana, VO Guyana	3290do	
0200	0300		Honduras, R Luz y Vida	3250do	
0200	0300		India, AIR/Aizawl 5050do		
0200	0300		India, AIR/Chennai/FM Gold	7270do	
0200	0300		India, AIR/Gangkok	4835do	
0200	0300		India, AIR/Jaipur 4910do		
0200	0300		India, AIR/Jeypore 5040do		
0200	0300		India, AIR/Kohima 4850do		
0200	0300		India, AIR/Leh 4660do		
0200	0300		India, AIR/Mumbai 4840do		
0200	0300		India, AIR/Port Blair	4760do	
0200	0300		Malaysia, RTM/Kajang	5965do	6050do
0200	0300		Malaysia, RTM/Traxx FM	7295do	
0200	0300		Mexico, R Educacion	6185do	
0200	0300		Micronesia, V6MP/Cross R/Pohnpei		4755as
0200	0300		New Zealand, R New Zealand Intl		15720pa
0200	0300	DRM	New Zealand, R New Zealand Intl		17675pa
0200	0300		Papua New Guinea, Wantok R Light		7325do
0200	0300		Philippines, R Pilipinas Overseas Svc		11880me
			15285me 17820me		
0200	0300		Solomon Islands, SIBC	9545do	
0200	0300		South Korea, KBS World R	9580sa	9690as
0200	0300		UK, BBC World Service	15310as	17790as
0200	0300		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
0200	0300		USA, Overcomer Ministry	3185na	
0200	0300	smtwhf	USA, Overcomer Ministry	7490na	
0200	0300		USA, WBCQ Monticello ME	7490na	9330na
0200	0300	fas	USA, WBCQ Monticello ME	5110na	
0200	0300		USA, WEWN/Irondale AL	11520af	
0200	0300		USA, WHRI Cypress Crk SC	5920va	7315ca
			9860na		
0200	0300		USA, WINB Red Lion PA	9265am	
0200	0300		USA, WRMI Miami FL	9955am	
0200	0300	irreg	USA, WRNO New Orleans LA	7506na	
0200	0300		USA, WTWW Lebanon TN	5085sa	5830na
0200	0300		USA, WWCR Nashville TN	3215eu	4840na
			5890ca 5935af		
0200	0300	irreg	USA, WWRB Manchester TN	3185na	3195na
0200	0300	Sun/irreg	USA, WWRB Manchester TN	5050na	
0200	0300		Vanuatu, R Vanuatu 7260do		
0215	0230		Nepal, R Nepal 5005do		
0215	0300		Myanmar, Myanma R	9731do	
0225	0300		India, AIR/Bhopal 7430do		
0225	0300		India, AIR/Hyderabad	7420do	
0225	0300		India, AIR/Imphal 7335do		
0225	0300		India, AIR/Srinagar 6110do		
0230	0300		India, AIR/Delhi 4870do		
0230	0300		India, AIR/Thiruvananthapuram 7290do		
0230	0300		Myanmar, Myanma R	5985do	
0230	0300		Vietnam, VO Vietnam/Overseas Svc		12005na
0245	0300		Zambia, Zambia Natl BC	5915do	6165do
0255	0300	Sun	Swaziland, TWR Africa	3200af	

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0310		India, AIR/Delhi 6030do		
0300	0320		Vatican City State, Vatican R	15460as	
0300	0325	Sun	Swaziland, TWR Africa	3200af	
0300	0330		Egypt, R Cairo 9720na		
0300	0330		India, AIR/Delhi 4870do		
0300	0330		Myanmar, Myanma R	5985do	
0300	0330		Philippines, R Pilipinas Overseas Svc		11880me
			15285me 17820me		
0300	0330		Vatican City State, Vatican R	7360af	9660af
0300	0355	mtwhf	South Africa, Channel Africa	3345af	5980af
0300	0356		Romania, R Romania Intl	7350na	9645na
			17800as		
0300	0356	DRM	Romania, R Romania Intl	15340as	
0300	0400		Anguilla, University Network	6090ca	
0300	0400		Australia, ABC/R Australia	9660va	15160pa
			15415va 17750va	21725va	
0300	0400		Australia, NT VL8A Alice Springs		4835do
0300	0400		Australia, NT VL8K Katherine	5025do	
0300	0400		Australia, NT VL8T Tennant Creek		4910do
0300	0400		Canada, CFRX Toronto ON	6070do	
0300	0400		Canada, CFVP Calgary AB	6030do	
0300	0400		Canada, CKZN St Johns NF	6160do	
0300	0400		Canada, CKZU Vancouver BC	6160do	
0300	0400		China, China R International	9690am	9790na
			11770as 13750as	15110as	15120as
			15785as		
0300	0400		Clandestine, R Miraya	11560af	
0300	0400		Cuba, R Havana Cuba	6000na	6165na
0300	0400	1st fa	Finland, Scandinavian Weekend R		6170eu
0300	0400		Germany, R 6150 6070eu		
0300	0400		Guatemala, R Verdad	4055do	
0300	0400		Guyana, VO Guyana	3290do	
0300	0400		Honduras, R Luz y Vida	3250do	
0300	0400		India, AIR/Aizawl 5050do		
0300	0400		India, AIR/Bhopal 7430do		
0300	0400		India, AIR/Chennai 7380do		
0300	0400		India, AIR/Chennai/FM Gold	7270do	
0300	0400		India, AIR/Gangkok	4835do	
0300	0400		India, AIR/Hyderabad	7420do	
0300	0400		India, AIR/Imphal 7335do		
0300	0400		India, AIR/Jaipur 4910do		
0300	0400		India, AIR/Kohima 4850do		
0300	0400		India, AIR/Leh 4660do		
0300	0400		India, AIR/Mumbai 4840do		
0300	0400		India, AIR/Srinagar 6110do		
0300	0400		India, AIR/Thiruvananthapuram 7290do		
0300	0400		Malaysia, RTM/Kajang	5965do	6050do
0300	0400		Malaysia, RTM/Traxx FM	7295do	
0300	0400		Mexico, R Educacion	6185do	
0300	0400		Micronesia, V6MP/Cross R/Pohnpei		4755as
0300	0400		New Zealand, R New Zealand Intl		15720pa
0300	0400	DRM	New Zealand, R New Zealand Intl		17675pa
0300	0400		Oman, R Sultanate of Oman	13600af	
0300	0400		Papua New Guinea, Wantok R Light		7325do
0300	0400		Solomon Islands, SIBC	9545do	
0300	0400		Taiwan, R Taiwan Intl	15320as	
0300	0400		Turkey, VO Turkey 6165as	9515va	
0300	0400		UK, BBC World Service	12095as	15365as
0300	0400		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
0300	0400		USA, Overcomer Ministry	3185na	
0300	0400	twhfa	USA, Overcomer Ministry	5890na	
0300	0400		USA, VO America 4930af	6080af	9885af
0300	0400		USA, WBCQ Monticello ME	7490na	9330na
0300	0400		USA, WEWN/Irondale AL	11520af	
0300	0400		USA, WHRI Cypress Crk SC	7385na	9825eu
0300	0400		USA, WRMI Miami FL	9955am	
0300	0400	irreg	USA, WRNO New Orleans LA	7506na	
0300	0400		USA, WTWW Lebanon TN	5085sa	5830na
0300	0400		USA, WWCR Nashville TN	3215eu	4840na
			5890ca 5935af		
0300	0400	irreg	USA, WWRB Manchester TN	3185na	3195na
0300	0400	Sun/irreg	USA, WWRB Manchester TN	5050na	
0300	0400		Vanuatu, R Vanuatu 7260do		
0300	0400		Zambia, Zambia Natl BC	5915do	6165do
0315	0400		India, AIR/Port Blair	4760do	
0315	0400	mtwhfa	India, AIR/Port Blair	7390do	
0315	0400	Sun	India, AIR/Port Blair	4760do	
0330	0400		Iran, VOIRI/VO Justice	13650eu	15470eu
0330	0400		Vietnam, VO Vietnam/Overseas Svc		6175na

0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400	0401		India, AIR/Gangkok	4835do	
0400	0415		India, AIR/Kohima 4850do		
0400	0415	Sat	India, AIR/Port Blair	4760do	
0400	0427		Iran, VOIRI/VO Justice	13650eu	15470eu
0400	0430	mtwhfa	India, AIR/Chennai 7380do		
0400	0430		India, AIR/Chennai/FM Gold	7270do	
0400	0430		India, AIR/Jaipur 4910do		
0400	0430	Sun	India, AIR/Leh 4660do		
0400	0430		India, AIR/Thiruvananthapuram 7290do		
0400	0430		USA, WHRI Cypress Crk SC	7385na	
0400	0435	mtwhfa	India, AIR/Jeypore 5040do		
0400	0445	Sun	India, AIR/Jeypore 5040do		
0400	0447	mtwhfa	India, AIR/Bhopal 7430do		
0400	0455	mtwhf	South Africa, Channel Africa	3345af	
0400	0457		Germany, Deutsche Welle	9470af	12045af
0400	0457		North Korea, VO Korea	7220as	9445as
			9730as 11735ca	13760sa	15180sa
0400	0458		New Zealand, R New Zealand Intl		15720pa
0400	0458	DRM	New Zealand, R New Zealand Intl		17675pa
0400	0500		Anguilla, University Network	6090ca	
0400	0500		Australia, ABC/R Australia	9660va	12080pa
			15160pa 15240va	15415va	15515va
			17750pa 17840pa	21725va	
0400	0500		Australia, NT VL8A Alice Springs		4835do
0400	0500		Australia, NT VL8K Katherine	5025do	
0400	0500		Australia, NT VL8T Tennant Creek		4910do
0400	0500		Canada, CFRX Toronto ON	6070do	
0400	0500		Canada, CKZN St Johns NF	6160do	
0400	0500		Canada, CKZU Vancouver BC	6160do	
0400	0500		China, China R International	13750as	15120as
			15785as 17730va	17855va	
0400	0500		Clandestine, R Miraya	11560af	
0400	0500		Cuba, R Havana Cuba	6000na	6165na
0400	0500	1st fa	Finland, Scandinavian Weekend R		6170eu
0400	0500		Germany, Deutsche Welle	9810af	
0400	0500		Germany, R 6150 6070eu		
0400	0500		Guatemala, R Verdad	4055do	
0400	0500		Guyana, VO Guyana	3290do	
0400	0500	Sun	India, AIR/Chennai 7380do		
0400	0500	Sun	India, AIR/Hyderabad	7420do	
0400	0500	Sun	India, AIR/Imphal 7335do		
0400	0500	Sun	India, AIR/Port Blair	7390do	
0400	0500		India, AIR/Srinagar 6110do		

0400	0500		Malaysia, RTM/Kajang	5965do	6050do
0400	0500		Malaysia, RTM/Traxx FM	7295do	
0400	0500		Mexico, R Educacion	6185do	
0400	0500		Micronesia, V6MP/Cross R/Pohnpei		4755as
0400	0500		Papua New Guinea, Wantok R Light		7325do
0400	0500		Solomon Islands, SIBC	9545do	
0400	0500		UK, BBC World Service	11940af	12095as
			15365as	15420af	
0400	0500	DRM	UK, BBC World Service	3955eu	
0400	0500		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
0400	0500		USA, Overcomer Ministry	3185na	5890na
0400	0500		USA, VO America 4930af	4960af	6080af
			9885af	12025af	
0400	0500		USA, WBCQ Monticello ME	9330na	
0400	0500		USA, WEWN/Irondale AL	11520af	
0400	0500		USA, WHRI Cypress Crk SC	9825me	
0400	0500		USA, WRMI Miami FL	9955am	
0400	0500		USA, WTWW Lebanon TN	5085sa	5830na
0400	0500		USA, WWCR Nashville TN	3215eu	4840na
			5890ca	5935af	
0400	0500	irreg	USA, WWRB Manchester TN	3185na	
0400	0500		Vanuatu, R Vanuatu 7260do		
0400	0500		Zambia, Zambia Natl BC	5915do	6165do
0400	0500	irreg	Zimbabwe, VO Zimbabwe	4828af	
0430	0500		India, AIR/Kohima 6065do		
0430	0500	Sat/Sun	India, AIR/Thiruvananthapuram	7290do	
0430	0500	mtwhf	Swaziland, TWR Africa	3200af	
0430	0500		USA, VO America 4930af	4960af	6080af
			12025af		
0455	0500	irreg	Nigeria, VO Nigeria	15120eu	
0459	0500		New Zealand, R New Zealand Intl		11725pa
0459	0500	DRM	New Zealand, R New Zealand Intl		11675pa

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500	0501		India, AIR/Srinagar 6110do		
0500	0505	Sat	India, AIR/Hyderabad	7420do	
0500	0510		India, AIR/Kohima 6065do		
0500	0527		Germany, Deutsche Welle	5905af	9470af
0500	0530	Sun	India, AIR/Bhopal 7430do		
0500	0530	Sun	India, AIR/Jaipur 4910do		
0500	0530		Japan, R Japan/NHK World	5975as	11970af
0500	0530		Vatican City State, Vatican R	11625af	13765af
0500	0557		North Korea, VO Korea	13650as	15105as
0500	0600		Anguilla, University Network	6090ca	
0500	0600		Australia, ABC/R Australia	9660va	12080pa
			13630pa	15240va	15415va 15515va
			17750pa	21725va	
0500	0600		Australia, NT VL8A Alice Springs		4835do
0500	0600		Australia, NT VL8K Katherine	5025do	
0500	0600		Australia, NT VL8T Tennant Creek		4910do
0500	0600		Bhutan, Bhutan BC Svc	6035do	
0500	0600		Canada, CFRX Toronto ON	6070do	
0500	0600		Canada, CKZN St Johns NF	6160do	
0500	0600		Canada, CKZU Vancouver BC	6160do	
0500	0600		China, China R International	11710af	11895as
			15465as	15350as	17505va 17730va
			17855va		
0500	0600		Clandestine, R Miraya	11560af	
0500	0600		Cuba, R Havana Cuba	6010na	6060na
			6125am	6165na	
0500	0600	1st Sat	Finland, Scandinavian Weekend R		5980eu
0500	0600		Germany, Deutsche Welle	9800af	15275af
0500	0600		Germany, R 6150 6070eu		
0500	0600		Guatemala, R Verdad	4055do	
0500	0600		Guyana, VO Guyana	3290do	
0500	0600	Sat/Sun	India, AIR/Thiruvananthapuram	7290do	
0500	0600		Malaysia, RTM/Kajang	5965do	6050do
0500	0600		Malaysia, RTM/Traxx FM	7295do	
0500	0600		Mexico, R Educacion	6185do	
0500	0600		Micronesia, V6MP/Cross R/Pohnpei		4755as
0500	0600	DRM	New Zealand, R New Zealand Intl		11675pa
0500	0600	irreg	Nigeria, VO Nigeria	15120af	
0500	0600		Papua New Guinea, Wantok R Light		7325do
0500	0600		Solomon Islands, SIBC	9545do	
0500	0600	mtwhf	South Africa, Channel Africa	7230af	
0500	0600	mtwhf	Swaziland, TWR Africa	4775af	
0500	0600	Sat/Sun	Swaziland, TWR Africa	3200af	4775af
0500	0600		Swaziland, TWR Africa	9500af	
0500	0600		UK, BBC World Service	3255af	5875af
			6005af	6190af	7355af 11945af
			15420af		
0500	0600	DRM	UK, BBC World Service	3955eu	
0500	0600		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
0500	0600		USA, Overcomer Ministry	3185na	5890na
0500	0600		USA, VO America 4930af	6080af	12025af
			15580af		
0500	0600		USA, WBCQ Monticello ME	9330na	
0500	0600		USA, WEWN/Irondale AL	11520af	
0500	0600		USA, WHRI Cypress Crk SC	9825me	
0500	0600		USA, WRMI Miami FL	9955am	
0500	0600		USA, WTWW Lebanon TN	5085sa	5830na
0500	0600		USA, WWCR Nashville TN	3215eu	4840na
			5890ca	5935af	
0500	0600	irreg	USA, WWRB Manchester TN	3185na	
0500	0600		Vanuatu, R Vanuatu 7260do		
0500	0600		Zambia, Zambia Natl BC	5915do	6165do
0500	0600	irreg	Zimbabwe, VO Zimbabwe	4828af	
0515	0530		Rwanda, R Rep Rwandaise	6055do	
0525	0600		Vanuatu, R Vanuatu 3945do		
0530	0556		Romania, R Romania Intl	9700eu	17760pa
			21500pa		
0530	0556	DRM	Romania, R Romania Intl	11875eu	
0530	0557		Germany, Deutsche Welle	9800af	
0530	0600	irreg	Congo Dem Rep, R Kahuzi	6210do	
0530	0600		Germany, Deutsche Welle	15275af	
0530	0600	Sun	India, AIR/Hyderabad	7420do	
0530	0600		India, AIR/Mumbai 7240do		
0530	0600		Nigeria, FRCN Abuja	7275do	
0530	0600		Thailand, R Thailand World Svc	17770eu	
0535	0547		New Zealand, R New Zealand Intl		15720pa
0548	0600		New Zealand, R New Zealand Intl		11725pa
0555	0600		Mali, ORTM/R Mali	5995do	

0600 UTC - 1AM EST / 12AM CST / 10PM PST

0600	0627		Germany, Deutsche Welle	15275af	
0600	0630		Germany, Deutsche Welle	15440af	17800af
0600	0630	Sat/Sun	India, AIR/Thiruvananthapuram	7290do	
0600	0655	mtwhf	South Africa, Channel Africa	7230af	15255af
0600	0657		North Korea, VO Korea	7220as	9445as
			9730as		
0600	0700		Anguilla, University Network	6090ca	
0600	0700		Australia, ABC/R Australia	9660va	11945va
			12080pa	13630pa	15240va 15415va
			17750pa	21725va	
0600	0700		Australia, NT VL8A Alice Springs		4835do
0600	0700		Australia, NT VL8K Katherine	5025do	
0600	0700		Australia, NT VL8T Tennant Creek		4910do
0600	0700		Bangladesh, Bangla Betar/Home Svc		4750as
0600	0700		Canada, CFRX Toronto ON	6070do	
0600	0700		Canada, CFVP Calgary AB	6030do	
0600	0700		Canada, CKZN St Johns NF	6160do	
0600	0700		Canada, CKZU Vancouver BC	6160do	
0600	0700		China, China R International	11710af	11870me
			15140me	15350as	17505va 17710as
0600	0700		China, VO the South China Sea	13660as	
0600	0700	irreg	Congo Dem Rep, R Kahuzi	6210do	
0600	0700		Cuba, R Havana Cuba	6010na	6060na
			6125am	6165na	
0600	0700	1st Sat	Finland, Scandinavian Weekend R		5980eu
0600	0700	wa/irreg	Germany, Hamburger Lokalradio		7265eu
0600	0700		Germany, R 6150 6070eu		
0600	0700		Guyana, VO Guyana	3290do	
0600	0700		India, AIR/Chennai 7380do		
0600	0700		India, AIR/Hyderabad	7420do	
0600	0700		India, AIR/Imphal 7335do		
0600	0700		India, AIR/Mumbai 7240do		
0600	0700		Malaysia, RTM/Kajang	5965do	6050do
0600	0700		Malaysia, RTM/Traxx FM	7295do	
0600	0700		Mali, ORTM/R Mali	5995do	
0600	0700		Micronesia, V6MP/Cross R/Pohnpei		4755as
0600	0700	DRM	New Zealand, R New Zealand Intl		9890pa
0600	0700		New Zealand, R New Zealand Intl		11725pa
0600	0700		Nigeria, FRCN Abuja	7275do	
0600	0700	irreg	Nigeria, VO Nigeria	15120af	
0600	0700		Papua New Guinea, R Central	3290do	
0600	0700		Papua New Guinea, R East New Britain		3385do
0600	0700		Papua New Guinea, R Vanimo	3205do	
0600	0700		Papua New Guinea, R Western	3305do	
0600	0700		Papua New Guinea, Wantok R Light		7325do
0600	0700		Russia, VO Russia 21800pa	21820pa	
0600	0700	DRM	Russia, VO Russia 11830eu		
0600	0700		Solomon Islands, SIBC	9545do	
0600	0700		Swaziland, TWR Africa	4775af	6120af
0600	0700		UK, BBC World Service	6005af	6190af
			7355af	9860af	12095af 15105af
			15420af	17640af	
0600	0700	DRM	UK, BBC World Service	5875eu	7325eu
0600	0700		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
0600	0700		USA, Overcomer Ministry	3185na	5890na
0600	0700		USA, VO America 6080af	12025af	15580af
0600	0700		USA, WBCQ Monticello ME	9330na	
0600	0700		USA, WEWN/Irondale AL	11520af	
0600	0700		USA, WHRI Cypress Crk SC	9825me	
0600	0700		USA, WRMI Miami FL	9955am	
0600	0700		USA, WTWW Lebanon TN	5085sa	5830na
0600	0700		USA, WWCR Nashville TN	3215eu	4840na
			5890ca	5935af	
0600	0700	irreg	USA, WWRB Manchester TN	3185na	
0600	0700		Vanuatu, R Vanuatu 3945do	7260do	
0600	0700		Zambia, Zambia Natl BC	5915do	6165do
0600	0700	irreg	Zimbabwe, VO Zimbabwe	4828af	

0615	0700	Sat	USA, WHRI Cypress Crk SC	9825me		
0630	0645	mtwhfa	Vatican City State, Vatican R	15595me		
0630	0700		Germany, Deutsche Welle	15440af	17800af	
0630	0700		India, AIR/Bhopal	7430do		
0630	0700	mtwhfa	India, AIR/Imphal	7335do		
0630	0700		India, AIR/Jaipur	7325do		
0630	0700	Sun	India, AIR/Leh	6000do		
0630	0700		India, AIR/Srinagar	6110do		
0630	0700		India, AIR/Thiruvananthapuram	7290do		
0630	0700		Vatican City State, Vatican R	13765af	15570af	
0657	0700		Germany, TWR Europe	6105eu		

0700 UTC - 2AM EST / 1AM CST / 11PM PST

0700	0730		Myanmar, Myanma R	5985do		
0700	0735		Vanuatu, R Vanuatu	7260do		
0700	0745	Sat/Sun	Canada, Bible VO Broadcasting		5945eu	
0700	0750		Austria, TWR Europe	7400eu		
0700	0750		Germany, TWR Europe	6105eu		
0700	0758		New Zealand, R New Zealand Intl		11725pa	
0700	0758	DRM	New Zealand, R New Zealand Intl		9890pa	
0700	0800		Anguilla, University Network	6090ca		
0700	0800		Australia, ABC/R Australia	7410va	9475as	
			9660va	9710va	11945va	12080pa
			13630pa	15240va		
0700	0800		Australia, NT VL8A Alice Springs		4835do	
0700	0800		Australia, NT VL8K Katherine	5025do		
0700	0800		Australia, NT VL8T Tennant Creek		4910do	
0700	0800		Bangladesh, Bangla Betar/Home Svc		4750as	
0700	0800	irreg	Cameroon, CRTV/R Buea	6005do		
0700	0800		Canada, CFRX Toronto ON	6070do		
0700	0800		Canada, CFVP Calgary AB	6030do		
0700	0800		Canada, CKZN St Johns NF	6160do		
0700	0800		Canada, CKZU Vancouver BC	6160do		
0700	0800		China, China R International	11895as	13660as	
			13710eu	15350as	15465as	17480va
			17490eu	17540as	17710as	
0700	0800		China, Xizang PBS	4905do	4920do	6025do
			6110do	6130do	6200do	9490do
			9580do			
0700	0800	irreg	Congo Dem Rep, R Kahuzi	6210do		
0700	0800	1st Sat	Finland, Scandinavian Weekend R		5980eu	
0700	0800	wa/irreg	Germany, Hamburger Lokalradio		7265eu	
0700	0800		Germany, R 6150	6070eu		
0700	0800		Guyana, VO Guyana	3290do		
0700	0800		India, AIR/Aizawl	7295do		
0700	0800		India, AIR/Bhopal	7430do		
0700	0800		India, AIR/Chennai	7380do		
0700	0800		India, AIR/Hyderabad	7420do		
0700	0800		India, AIR/Imphal	7335do		
0700	0800		India, AIR/Jaipur	7325do		
0700	0800		India, AIR/Jeypore	6040do		
0700	0800		India, AIR/Kohima	6065do		
0700	0800		India, AIR/Leh	6000do		
0700	0800		India, AIR/Mumbai	7240do		
0700	0800		India, AIR/Port Blair	7390do		
0700	0800		India, AIR/Srinagar	6110do		
0700	0800		India, AIR/Thiruvananthapuram	7290do		
0700	0800		Malaysia, RTM/Kajang	5965do	6050do	
0700	0800		Malaysia, RTM/Traxx FM	7295do		
0700	0800		Mali, ORTM/R Mali	5995do		
0700	0800		Micronesia, V6MP/Cross R/Pohnpei		4755as	
0700	0800		Nigeria, FRCN Abuja	7275do		
0700	0800		Papua New Guinea, R Central	3290do		
0700	0800		Papua New Guinea, R East New Britain		3385do	
0700	0800		Papua New Guinea, R Northern	3345do		
0700	0800		Papua New Guinea, R Vanimo	3205do		
0700	0800		Papua New Guinea, R Western	3305do		
0700	0800		Papua New Guinea, Wantok R Light		7325do	
0700	0800		Russia, VO Russia	13785as	17500as	21800pa
			21820pa			
0700	0800	DRM	Russia, VO Russia	11830eu		
0700	0800		Solomon Islands, SIBC	5020do	9545do	
0700	0800	mtwhf	South Africa, Channel Africa	9625af		
0700	0800		Swaziland, TWR Africa	4775af	6120af	
			9500af			
0700	0800		UK, BBC World Service	6190af	11770af	
			12095af	13660af	15400af	15420af
			17640af	17830af		
0700	0800	DRM	UK, BBC World Service	5875eu	7325eu	
0700	0800		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
0700	0800		USA, Overcomer Ministry	3185na		
0700	0800	sm	USA, Overcomer Ministry	5890na		
0700	0800		USA, WBCQ Monticello ME	9330na		
0700	0800		USA, WEWN/Irondale AL	11520af		
0700	0800		USA, WRMI Miami FL	9955am		
0700	0800		USA, WTWW Lebanon TN	5085sa	5830na	
0700	0800		USA, WWCR Nashville TN	3215eu	4840na	
			5890ca	5935af		
0700	0800	irreg	USA, WWRB Manchester TN	3185na		
0700	0800		Vanuatu, R Vanuatu	3945do		
0700	0800		Zambia, Zambia Natl BC	5915do	6165do	
0730	0800		Australia, HCJB Global Australia		15490pa	
0730	0800		Sudan, VO Africa/Sudan R	9505af		
0759	0800		New Zealand, R New Zealand Intl		9700pa	
0759	0800	DRM	New Zealand, R New Zealand Intl		9890pa	

0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0830		Australia, HCJB Global Australia		15490pa	
0800	0830		Australia, NT VL8A Alice Springs		4835do	
0800	0830		Australia, NT VL8K Katherine	5025do		
0800	0830		Australia, NT VL8T Tennant Creek		4910do	
0800	0830		Sudan, VO Africa/Sudan R	9505af		
0800	0900		Anguilla, University Network	6090ca		
0800	0900		Australia, ABC/R Australia	5995as	7410va	
			9475as	9580pa	9710va	11945va
			12080pa	15240va		
0800	0900		Bangladesh, Bangla Betar/Home Svc		4750as	
0800	0900		Bhutan, Bhutan BC Svc	6035do		
0800	0900	irreg	Cameroon, CRTV/R Buea	6005do		
0800	0900		Canada, CFRX Toronto ON	6070do		
0800	0900		Canada, CFVP Calgary AB	6030do		
0800	0900		Canada, CKZN St Johns NF	6160do		
0800	0900		Canada, CKZU Vancouver BC	6160do		
0800	0900		China, China R International	11620as	11895as	
			13710as	15350as	15465as	17480va
			17490eu	17540as		
0800	0900	irreg	Congo Dem Rep, R Kahuzi	6210do		
0800	0900	1st Sat	Finland, Scandinavian Weekend R		6170eu	
0800	0900	Sat/Sun	Germany, Mighty KBC Radio	6095eu		
0800	0900		Germany, R 6150	6070eu		
0800	0900		Guyana, VO Guyana	3290do		
0800	0900		India, AIR/Aizawl	7295do		
0800	0900		India, AIR/Bhopal	7430do		
0800	0900		India, AIR/Chennai	7380do		
0800	0900		India, AIR/Imphal	7335do		
0800	0900		India, AIR/Jaipur	7325do		
0800	0900		India, AIR/Jeypore	6040do		
0800	0900		India, AIR/Kohima	6065do		
0800	0900		India, AIR/Leh	6000do		
0800	0900		India, AIR/Mumbai	7240do		
0800	0900		India, AIR/Port Blair	7390do		
0800	0900		India, AIR/Srinagar	6110do		
0800	0900		India, AIR/Thiruvananthapuram	7290do		
0800	0900	Sat	Italy, IRRS Shortwave	9510va		
0800	0900		Malaysia, RTM/Kajang	5965do	6050do	
0800	0900		Malaysia, RTM/Traxx FM	7295do		
0800	0900		Mali, ORTM/R Mali	9635do		
0800	0900		Micronesia, V6MP/Cross R/Pohnpei		4755as	
0800	0900		New Zealand, R New Zealand Intl		9700pa	
0800	0900	DRM	New Zealand, R New Zealand Intl		9890pa	
0800	0900		Nigeria, FRCN Abuja	7275do		
0800	0900	irreg	Nigeria, VO Nigeria	15120af		
0800	0900	mtwhfs	Palau, T8WH/World Harvest R	9930as		
0800	0900		Papua New Guinea, R Central	3290do		
0800	0900		Papua New Guinea, R East New Britain		3385do	
0800	0900		Papua New Guinea, R Northern	3345do		
0800	0900		Papua New Guinea, R Vanimo	3205do		
0800	0900		Papua New Guinea, R Western	3305do		
0800	0900		Papua New Guinea, Wantok R Light		7325do	
0800	0900		Russia, VO Russia	13785as	17500as	21800pa
			21820pa			
0800	0900	DRM	Russia, VO Russia	9850eu	11830eu	
0800	0900		Solomon Islands, SIBC	5020do	9545do	
0800	0900	mtwhf	South Africa, Channel Africa	9625af		
0800	0900	Sun	South Africa, SA Radio League	7205af	17660af	
0800	0900		South Korea, KBS World R	9570as		
0800	0900		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
0800	0900		USA, Overcomer Ministry	3185na	5890na	
0800	0900		USA, WBCQ Monticello ME	9330na		
0800	0900		USA, WEWN/Irondale AL	11520af		
0800	0900	mtwhfs	USA, WHRI Cypress Crk SC	11565pa		
0800	0900		USA, WRMI Miami FL	9955am		
0800	0900		USA, WTWW Lebanon TN	5085sa	5830na	
0800	0900		USA, WWCR Nashville TN	3215eu	4840na	
			5890ca	5935af		
0800	0900	irreg	USA, WWRB Manchester TN	3185na		
0800	0900		Vanuatu, R Vanuatu	3945do		
0800	0900		Zambia, Zambia Natl BC	5915do	6165do	
0815	0830		Nepal, R Nepal	5005do		
0830	0900		Australia, NT VL8A Alice Springs		2310do	
0830	0900		Australia, NT VL8K Katherine	2485do		
0830	0900		Australia, NT VL8T Tennant Creek		2325do	
0830	0900		India, AIR/External Svc	7250as	7340as	
			9595as	11620as		
0850	0900	smtwhf	Singapore, TWR Asia	15200as		

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900	0920		India, AIR/Chennai	7380do		
0900	0930		India, AIR/Leh	6000do		
0900	0930		Mongolia, VO Mongolia	12085as		

0900	0930	smtwhf	Singapore, TWR Asia	15200as	
0900	0931		India, AIR/Bhopal 7430do		
0900	0931		India, AIR/Jaipur 7325do		
0900	0931		India, AIR/Port Blair	7390do	
0900	0945		India, AIR/Jeypore 6040do		
0900	1000		Anguilla, University Network	6090ca	
0900	1000		Australia, ABC/R Australia	5995as	9580pa
			11945va		
0900	1000		Australia, NT VL8A Alice Springs		2310do
0900	1000		Australia, NT VL8K Katherine	2485do	
0900	1000		Australia, NT VL8T Tennant Creek		2325do
0900	1000		Bangladesh, Bangla Betar/Home Svc		4750as
0900	1000	irreg	Cameroon, CRTV/R Buea	6005do	
0900	1000		Canada, CFRX Toronto ON	6070do	
0900	1000		Canada, CFVP Calgary AB	6030do	
0900	1000		Canada, CKZN St Johns NF	6160do	
0900	1000		Canada, CKZU Vancouver BC	6160do	
0900	1000		China, China R International	11620as	13790as
			15270eu	15350as	17490eu 17570eu
			17650pa	17750as	
0900	1000	irreg	Congo Dem Rep, R Kahuzi	6210do	
0900	1000	1st Sat	Finland, Scandinavian Weekend R		6170eu
0900	1000	Sat/Sun	Germany, Mighty KBC Radio	6095eu	
0900	1000		Germany, R 6150 6070eu		
0900	1000		India, AIR/Aizawl 7295do		
0900	1000		India, AIR/External Svc	7250as	7340as
			9595as	11620as	
0900	1000		India, AIR/Imphal 7335do		
0900	1000		India, AIR/Mumbai 7240do		
0900	1000		India, AIR/Port Blair	7390do	
0900	1000		India, AIR/Srinagar 6110do		
0900	1000		India, AIR/Thiruvananthapuram	7290do	
0900	1000		Malaysia, RTM/Kajang	5965do	6050do
0900	1000		Malaysia, RTM/Traxx FM	7295do	
0900	1000		Mali, ORTM/R Mali	9635do	
0900	1000		Micronesia, V6MP/Cross R/Pohnpei		4755as
0900	1000	3rd Sun	Netherlands, XVRB/Music Museum		6045eu
0900	1000	DRM	New Zealand, R New Zealand Intl		9890pa
0900	1000		New Zealand, R New Zealand Intl		9700pa
0900	1000		Nigeria, FRCN Abuja	7275do	
0900	1000	irreg	Nigeria, VO Nigeria	9690af	
0900	1000		Palau, T8WH/World Harvest R	9930as	
0900	1000		Papua New Guinea, R Central	3290do	
0900	1000		Papua New Guinea, R East New Britain		3385do
0900	1000		Papua New Guinea, R Northern	3345do	
0900	1000		Papua New Guinea, R Vanimo	3205do	
0900	1000		Papua New Guinea, R Western	3305do	
0900	1000		Papua New Guinea, Wantok R Light		7325do
0900	1000		Russia, VO Russia 21800va	21820va	
0900	1000	DRM	Russia, VO Russia 9850eu	11830eu	
0900	1000		Solomon Islands, SIBC	5020do	9545do
0900	1000	mtwhf	South Africa, Channel Africa	9625af	
0900	1000		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
0900	1000		USA, Overcomer Ministry	3185na	5890na
0900	1000		USA, WBCQ Monticello ME	9330na	
0900	1000		USA, WEWN/Irondale AL	11520af	
0900	1000	Sun	USA, WHRI Cypress Crk SC	11565pa	
0900	1000		USA, WRMI Miami FL	9955am	
0900	1000		USA, WTWW Lebanon TN	5085sa	5830na
0900	1000		USA, WWCR Nashville TN	4840na	5890ca
			5935af	15825eu	
0900	1000	irreg	USA, WWRB Manchester TN	3185na	
0900	1000		Vanuatu, R Vanuatu 3945do		
0900	1000		Zambia, Zambia Natl BC	5915do	6165do
0905	0910		Pakistan, R Pakistan	11580eu	15800eu
0930	1000	fs	China, VO the Strait	6115do	
0930	1000	Sun	Italy, IRRS Shortwave	9510va	
0930	1000		Saudi Arabia, BSKSA/External Svc		15250af

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000	1000		USA, KNLS Anchor Point AK	9655as	
1000	1020	mtwhf	Singapore, TWR Asia	11840pa	
1000	1030	Sun	India, AIR/Thiruvananthapuram	7290do	
1000	1030		Japan, R Japan/NHK World	9625as	9695as
1000	1030	Sat	Singapore, TWR Asia	11840pa	
1000	1030		Vietnam, VO Vietnam/Overseas Svc		9840as
			12020as		
1000	1031	Sun	India, AIR/Bhopal 7430do		
1000	1035		India, AIR/Mumbai 7240do		
1000	1057		North Korea, VO Korea	11710ca	11735as
			13650as	15180sa	
1000	1058		New Zealand, R New Zealand Intl		9700pa
1000	1058	DRM	New Zealand, R New Zealand Intl		9890pa
1000	1100		Anguilla, University Network	11775ca	
1000	1100		Australia, ABC/R Australia	5995as	9580pa
			12065pa		
1000	1100		Australia, NT VL8A Alice Springs		2310do
1000	1100		Australia, NT VL8K Katherine	2485do	
1000	1100		Australia, NT VL8T Tennant Creek		2325do
1000	1100		Bangladesh, Bangla Betar/Home Svc		4750as
1000	1100	irreg	Cameroon, CRTV/R Buea	6005do	
1000	1100		Canada, CFRX Toronto ON	6070do	
1000	1100		Canada, CFVP Calgary AB	6030do	
1000	1100		Canada, CKZN St Johns NF	6160do	
1000	1100		Canada, CKZU Vancouver BC	6160do	
1000	1100		China, China R International	11610as	11620as
			11635as	13590as	13620as 13720as
			13790pa	15190as	15210pa 15350as
			17490eu		
1000	1100	irreg	Congo Dem Rep, R Kahuzi	6210do	
1000	1100	1st Sat	Finland, Scandinavian Weekend R		6170eu
1000	1100	Sat/Sun	Germany, Mighty KBC Radio	6095eu	
1000	1100		Germany, R 6150 6070eu		
1000	1100		India, AIR/External Svc	7270as	13605as
			13695pa	15030as	15410as 17510pa
			17895pa		
1000	1100		India, AIR/External Svc	7250as	7340as
			9595as	11620as	
1000	1100		India, AIR/Kohima 4850do		
1000	1100		India, AIR/Srinagar 6110do		
1000	1100	irreg	Indonesia, VO Indonesia	9526pa	
1000	1100	Sun	Italy, IRRS Shortwave	9510va	
1000	1100		Malaysia, RTM/Kajang	5965do	6050do
1000	1100		Malaysia, RTM/Traxx FM	7295do	
1000	1100		Mali, ORTM/R Mali	9635do	
1000	1100		Micronesia, V6MP/Cross R/Pohnpei		4755as
1000	1100		Nigeria, FRCN Abuja	7275do	
1000	1100	irreg	Nigeria, VO Nigeria	9690af	
1000	1100		Papua New Guinea, R Central	3290do	
1000	1100		Papua New Guinea, R East New Britain		3385do
1000	1100		Papua New Guinea, R Northern	3345do	
1000	1100		Papua New Guinea, R Vanimo	3205do	
1000	1100		Papua New Guinea, R Western	3305do	
1000	1100		Papua New Guinea, Wantok R Light		7325do
1000	1100		Russia, VO Russia 11530as	12030as	
1000	1100	DRM	Russia, VO Russia 9850eu		
1000	1100		Saudi Arabia, BSKSA/External Svc		15250af
1000	1100		Solomon Islands, SIBC	5020do	9545do
1000	1100	mtwhf	South Africa, Channel Africa	9625af	
1000	1100		UK, BBC World Service	6195as	9740as
			15285as	17660as	21660as
1000	1100	Sat/t	UK, BBC World Service	17760as	
1000	1100	mf	UK, BBC World Service	17705as	
1000	1100	wa	UK, BBC World Service	17840as	
1000	1100		USA, AFN/AFRTS 4319usb	5765usb	12759usb
			13362usb		
1000	1100		USA, Overcomer Ministry	3185na	5890na
1000	1100		USA, WBCQ Monticello ME	9330na	
1000	1100		USA, WEWN/Irondale AL	11520af	
1000	1100	Sun	USA, WHRI Cypress Crk SC	11565pa	
1000	1100	Sun	USA, WINB Red Lion PA	9265am	
1000	1100		USA, WRMI Miami FL	9955am	
1000	1100		USA, WTWW Lebanon TN	5085sa	5830na
1000	1100		USA, WWCR Nashville TN	4840na	5890ca
			5935af	15825eu	
1000	1100	irreg	USA, WWRB Manchester TN	3185na	
1000	1100		Vanuatu, R Vanuatu 3945do		
1000	1100		Zambia, Zambia Natl BC	5915do	6165do
1030	1100		India, AIR/Gangkok	4835do	
1030	1100		India, AIR/Imphal 4775do		
1030	1100		India, AIR/Port Blair	4760do	
1030	1100		Iran, VOIRI 21505va	21640va	
1059	1100		New Zealand, R New Zealand Intl		9700pa
1059	1100	DRM	New Zealand, R New Zealand Intl		9890pa

1100 UTC - 6AM EST / 5AM CST / 3AM PST

1100	1105		Pakistan, R Pakistan 11580eu	15800eu	
1100	1115	mwh	Australia, HCJB Global Australia		15400as
1100	1127		Iran, VOIRI 21505va	21640va	
1100	1130	Sun	Canada, Bible VO Broadcasting		21480as
1100	1130		India, AIR/External Svc	7250as	7340as
			9595as	11620as	
1100	1130	f/DRM	Japan, R Japan/NHK World	9760eu	
1100	1130	Sat/DRM	South Korea, KBS World R	9760eu	
1100	1130		Vietnam, VO Vietnam/Overseas Svc		7285as
1100	1156		Romania, R Romania Intl	15210eu	15430eu
			17510eu	17670af	
1100	1200		Anguilla, University Network	11775ca	
1100	1200		Australia, ABC/R Australia	5995as	6080as
			6140as	6150va	9475as 9580pa
			12065pa	12085pa	
1100	1200	DRM	Australia, ABC/R Australia	12080pa	
1100	1200		Australia, NT VL8A Alice Springs		2310do
1100	1200		Australia, NT VL8K Katherine	2485do	
1100	1200		Australia, NT VL8T Tennant Creek		2325do
1100	1200		Bangladesh, Bangla Betar/Home Svc		4750as
1100	1200	irreg	Cameroon, CRTV/R Buea	6005do	
1100	1200	Sat	Canada, Bible VO Broadcasting		21480as
1100	1200		Canada, CFRX Toronto ON	6070do	
1100	1200		Canada, CFVP Calgary AB	6030do	
1100	1200		Canada, CKZN St Johns NF	6160do	
1100	1200		Canada, CKZU Vancouver BC	6160do	
1100	1200		China, China R International	5955as	11660as
			11795as	13650as	17490eu

1100	1200	irreg	Congo Dem Rep, R Kahuzi	6210do		
1100	1200	1st Sat	Finland, Scandinavian Weekend R			6170eu
1100	1200	Sat/Sun	Germany, Mighty KBC Radio	6095eu		
1100	1200		Germany, R 6150	6070eu		
1100	1200		India, AIR/Gangkok	4835do		
1100	1200		India, AIR/Imphal	4775do		
1100	1200		India, AIR/Jeypore	5040do		
1100	1200		India, AIR/Kohima	4850do		
1100	1200		India, AIR/Port Blair	4760do		
1100	1200		India, AIR/Srinagar	6110do		
1100	1200		India, AIR/Thiruvananthapuram	5010do		
1100	1200	Sun	Italy, IRRS Shortwave	9510va		
1100	1200		Malaysia, RTM/Kajang	5965do		6050do
1100	1200		Malaysia, RTM/Traxx FM	7295do		
1100	1200		Mali, ORTM/R Mali	9635do		
1100	1200		Micronesia, V6MP/Cross R/Pohnpei			4755as
1100	1200		New Zealand, R New Zealand Intl			9700pa
1100	1200	DRM	New Zealand, R New Zealand Intl			9890pa
1100	1200		Nigeria, FRCN Abuja	7275do		
1100	1200	irreg	Nigeria, VO Nigeria	9690af		
1100	1200		Papua New Guinea, R Central	3290do		
1100	1200		Papua New Guinea, R East New Britain			3385do
1100	1200		Papua New Guinea, R Northern	3345do		
1100	1200		Papua New Guinea, R Vanimo	3205do		
1100	1200		Papua New Guinea, R Western	3305do		
1100	1200		Papua New Guinea, Wantok R Light			7325do
1100	1200		Russia, VO Russia	11530as	12030as	15670as
1100	1200	DRM	Russia, VO Russia	9850eu		
1100	1200		Saudi Arabia, BSKSA/External Svc			15250af
1100	1200		Solomon Islands, SIBC	5020do		9545do
1100	1200	mtwhf	South Africa, Channel Africa	9625af		
1100	1200		Taiwan, R Taiwan Intl	7445as		9465as
1100	1200		UK, BBC World Service	6195as		9740as
			15285as	17660as		
1100	1200	mf	UK, BBC World Service	17705as		
1100	1200	wa	UK, BBC World Service	17840as		
1100	1200	Sat/t	UK, BBC World Service	17760as		
1100	1200		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1100	1200		USA, Overcomer Ministry	3185na		
1100	1200	twhfa	USA, Overcomer Ministry	5890na		
1100	1200		USA, WBCQ Monticello ME	9330na		
1100	1200		USA, WEWN/Irondale AL	11520af		
1100	1200	Sun	USA, WHRI Cypress Crk SC	7315ca		
1100	1200	Sun	USA, WINB Red Lion PA	9265am		
1100	1200		USA, WRMI Miami FL	9955am		
1100	1200		USA, WTWW Lebanon TN	5085sa		5830na
1100	1200		USA, WWCR Nashville TN	4840na		5890ca
			5935af	15825eu		
1100	1200	irreg	USA, WWRB Manchester TN	3185na		
1100	1200		Vanuatu, R Vanuatu	3945do		
1100	1200		Zambia, Zambia Natl BC	5915do		6165do
1115	1145	f	Canada, Bible VO Broadcasting			21480as
1120	1200		India, AIR/Srinagar	4950do		
1130	1145	asm	Australia, HCJB Global Australia			11700as
1130	1145	f	USA, Eternal Good News	15525as		
1130	1200		Guatemala, R Verdad	4055do		
1130	1200		India, AIR/Aizawl	5050do		
1130	1200		India, AIR/Bhopal	4810do		
1130	1200		India, AIR/Jaipur	4910do		
1130	1200		India, AIR/Leh	4660do		
1130	1200	f	Vatican City State, Vatican R	17590me		21560me
1130	1200		Vietnam, VO Vietnam/Overseas Svc			9840as
			12020as			
1150	1200		USA, Overcomer Ministry	9930sa		

1200 UTC - 7AM EST / 6AM CST / 4AM PST

1200	1215		India, AIR/Srinagar	6110do		
1200	1227		Saudi Arabia, BSKSA/External Svc			15250af
1200	1230		Japan, R Japan/NHK World	9695af		11740as
1200	1230		Vanuatu, R Vanuatu	3945do		
1200	1259		New Zealand, R New Zealand Intl			9700pa
1200	1300		Anguilla, University Network	11775ca		
1200	1300		Australia, ABC/R Australia	6080as		6140as
			6150va	9475as	9580pa	12065pa
			12085pa			
1200	1300	DRM	Australia, ABC/R Australia	5995as		
1200	1300		Australia, NT VL8A Alice Springs			2310do
1200	1300		Australia, NT VL8K Katherine	2485do		
1200	1300		Australia, NT VL8T Tennant Creek			2325do
1200	1300		Bangladesh, Bangla Betar/Home Svc			4750as
1200	1300	irreg	Cameroon, CRTV/R Buea	6005do		
1200	1300		Canada, CFRX Toronto ON	6070do		
1200	1300		Canada, CFVP Calgary AB	6030do		
1200	1300		Canada, CKZN St Johns NF	6160do		
1200	1300		Canada, CKZU Vancouver BC	6160do		
1200	1300		China, China R International	6010as		9460as
			9600as	9645as	9730as	11650as
			11660as	11690va	11980as	13645as
			13650eu	17490eu	17630eu	
1200	1300	irreg	Congo Dem Rep, R Kahuzi	6210do		
1200	1300		Ethiopia, R Ethiopia/Natl Svc	9705do		
1200	1300	1st Sat	Finland, Scandinavian Weekend R			6170eu
1200	1300	Sat/Sun	Germany, Mighty KBC Radio	6095eu		
1200	1300		Germany, R 6150	6070eu		
1200	1300		Guatemala, R Verdad	4055do		
1200	1300		India, AIR/Aizawl	7295do		
1200	1300		India, AIR/Bhopal	4810do		
1200	1300		India, AIR/Chennai	4920do		
1200	1300		India, AIR/Gangkok	4835do		
1200	1300		India, AIR/Imphal	4775do		
1200	1300		India, AIR/Jaipur	4910do		
1200	1300		India, AIR/Jeypore	5040do		
1200	1300		India, AIR/Kohima	4850do		
1200	1300		India, AIR/Leh	4660do		
1200	1300		India, AIR/Port Blair	4760do		
1200	1300		India, AIR/Srinagar	4950do		
1200	1300		India, AIR/Thiruvananthapuram	5010do		
1200	1300		Malaysia, RTM/Kajang	5965do		6050do
1200	1300		Malaysia, RTM/Traxx FM	7295do		
1200	1300		Mali, ORTM/R Mali	9635do		
1200	1300		Nigeria, FRCN Abuja	7275do		
1200	1300	irreg	Nigeria, VO Nigeria	9690af		
1200	1300	Sat/Sun	Palau, T8WH/World Harvest R	9930as		
1200	1300		Papua New Guinea, R Central	3290do		
1200	1300		Papua New Guinea, R East New Britain			3385do
1200	1300		Papua New Guinea, R Fly	3915do		5960do
1200	1300		Papua New Guinea, R Northern	3345do		
1200	1300		Papua New Guinea, R Vanimo	3205do		
1200	1300		Papua New Guinea, R Western	3305do		
1200	1300		Papua New Guinea, Wantok R Light			7325do
1200	1300		Russia, VO Russia	11530as	15670as	
1200	1300		Solomon Islands, SIBC	5020do		9545do
1200	1300		UK, BBC World Service	5820as		5840as
			6195as	9740as	11750as	
1200	1300	ws	UK, BBC World Service	5875as		
1200	1300		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1200	1300		USA, KNLS Anchor Point AK	7355as		
1200	1300	mtwhf	USA, Overcomer Ministry	9980na		
1200	1300		USA, Overcomer Ministry	3185na		9930sa
			9980na	17750me		
1200	1300		USA, VO America	7575va	9510va	12075va
			12150va			
1200	1300		USA, WBCQ Monticello ME	9330na		
1200	1300		USA, WEWN/Irondale AL	15610eu		
1200	1300		USA, WHRI Cypress Crk SC	9795am		
1200	1300		USA, WRMI Miami FL	9955am		
1200	1300		USA, WTWW Lebanon TN	5085na		5830na
1200	1300		USA, WWCR Nashville TN	7490af		9980ca
			13845na	15825eu		
1200	1300	irreg	USA, WWRB Manchester TN	3185na		
1200	1300		Zambia, Zambia Natl BC	5915do		6165do
1215	1300		Egypt, R Cairo	17870as		
1230	1245	smtwhf	Australia, HCJB Global Australia			15340as
1230	1300		Bangladesh, Bangla Betar	15105as		
1230	1300		India, AIR/Mumbai	4840do		
1230	1300		South Korea, KBS World R	6095as		
1230	1300		Thailand, R Thailand World Svc	9390as		
1230	1300		Turkey, VO Turkey	15450va		
1230	1300		Vietnam, VO Vietnam/Overseas Svc			9840as
			12020as			

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300	1330		Egypt, R Cairo	17870as		
1300	1330		Japan, R Japan/NHK World	15735as		
1300	1330		Turkey, VO Turkey	15450eu		
1300	1357		North Korea, VO Korea	9435na		11710na
			13760eu	15245eu		
1300	1400		Anguilla, University Network	11775ca		
1300	1400		Australia, ABC/R Australia	5940as		6150va
			9475as	9580pa	9965pa	12065pa
			12085pa			
1300	1400	DRM	Australia, ABC/R Australia	5995as		
1300	1400		Australia, NT VL8A Alice Springs			2310do
1300	1400		Australia, NT VL8K Katherine	2485do		
1300	1400		Bangladesh, Bangla Betar/Home Svc			4750as
1300	1400	irreg	Cameroon, CRTV/R Buea	6005do		
1300	1400		Canada, CFRX Toronto ON	6070do		
1300	1400		Canada, CFVP Calgary AB	6030do		
1300	1400		Canada, CKZN St Johns NF	6160do		
1300	1400		Canada, CKZU Vancouver BC	6160do		
1300	1400		China, China R International	5955as		9570na
			9730as	9760pa	9765va	9870as
			11660as	11760pa	11980as	13610eu
			13755as	17630eu		
1300	1400	irreg	Congo Dem Rep, R Kahuzi	6210do		
1300	1400	1st Sat	Finland, Scandinavian Weekend R			6170eu
1300	1400	Sat/Sun	Germany, Mighty KBC Radio	6095eu		
1300	1400		Germany, R 6150	6070eu		
1300	1400		Guatemala, R Verdad	4055do		
1300	1400		India, AIR/Aizawl	7295do		
1300	1400		India, AIR/Bhopal	4810do		
1300	1400		India, AIR/Chennai	4920do		

1300	1400		India, AIR/Gangkok	4835do	
1300	1400		India, AIR/Imphal	4775do	
1300	1400		India, AIR/Jaipur	4910do	
1300	1400		India, AIR/Jeypore	5040do	
1300	1400		India, AIR/Kohima	4850do	
1300	1400		India, AIR/Leh	4660do	
1300	1400		India, AIR/Mumbai	4840do	
1300	1400		India, AIR/Port Blair	4760do	
1300	1400		India, AIR/Srinagar	4950do	
1300	1400		India, AIR/Thiruvananthapuram	5010do	
1300	1400	irreg	Indonesia, VO Indonesia	9526as	
1300	1400		Malaysia, RTM/Kajang	5965do	6050do
1300	1400		Malaysia, RTM/Traxx FM	7295do	
1300	1400		Mali, ORTM/R Mali	9635do	
1300	1400		New Zealand, R New Zealand Intl		6170pa
1300	1400		Nigeria, FRCN Abuja	7275do	
1300	1400	irreg	Nigeria, VO Nigeria	9690af	
1300	1400		Papua New Guinea, R Central	3290do	
1300	1400		Papua New Guinea, R East New Britain		3385do
1300	1400		Papua New Guinea, R Fly	3915do	5960do
1300	1400		Papua New Guinea, R Northern	3345do	
1300	1400		Papua New Guinea, R Vanimo	3205do	
1300	1400		Papua New Guinea, R Western	3305do	
1300	1400		Papua New Guinea, Wantok R Light		7325do
1300	1400		Russia, VO Russia	12030as	15670as
1300	1400	DRM	Russia, VO Russia	9850eu	
1300	1400		Solomon Islands, SIBC	5020do	9545do
1300	1400		South Korea, KBS World R	9570as	15575na
1300	1400		Tajikistan, VO Tajik	7245va	
1300	1400		UK, BBC World Service	5820as	5840as
			6195as	9740as	15310as 17790as
1300	1400	ws	UK, BBC World Service	5875as	
1300	1400		USA, AFN/AFRTS	4319usb	5765usb 12759usb
			13362usb		
1300	1400		USA, KJES Vado NM	11715na	
1300	1400		USA, Overcomer Ministry	9370na	9930sa
			15205eu	17750me	
1300	1400	Sat/Sun	USA, VO America	7575va	9510va 12075va
			12150va		
1300	1400		USA, WBCQ Monticello ME	9330na	
1300	1400		USA, WEWN/Irondale AL	15610eu	
1300	1400	Sat/Sun	USA, WHRI Cypress Crk SC	9795am	9840na
1300	1400		USA, WRMI Miami FL	9955am	
1300	1400		USA, WTWW Lebanon TN	9930sa	
1300	1400		USA, WTWW Lebanon TN	9479na	9930sa
1300	1400		USA, WWCR Nashville TN	7490af	9980ca
			13845na	15825eu	
1300	1400	irreg	USA, WWRB Manchester TN	9370na	
1300	1400		Zambia, Zambia Natl BC	5915do	6165do
1320	1400		India, AIR/Natl Channel	9425do	9470do
1330	1345	f	Australia, HCJB Global Australia		15340as
1330	1400	f	Clandestine, JSR Shiokaze	6020as	
1330	1400		India, AIR/External Svc	9690as	11620as
			13710as		
1330	1400		Vietnam, VO Vietnam/Overseas Svc		9840as
			12020as		

1400 UTC - 9AM EST / 8AM CST / 6AM PST

1400	1425	mtf	Singapore, TWR Asia	15190as	
1400	1430	f	Clandestine, JSR Shiokaze	6020as	
1400	1430		Japan, R Japan/NHK World	11705af	15735as
1400	1430		Laos, Lao National R	6130as	
1400	1430	h	Singapore, TWR Asia	15190as	
1400	1430		Thailand, R Thailand World Svc	9950as	
1400	1435	sw	Singapore, TWR Asia	15190as	
1400	1445	Sun	USA, Pan Am Broadcasting	15205as	
1400	1500		Anguilla, University Network	11775ca	
1400	1500		Australia, ABC/R Australia	5940as	5995as
			9475as	9580pa	9965pa 12065pa
			12085pa		
1400	1500		Australia, NT VL8A Alice Springs		2310do
1400	1500		Australia, NT VL8K Katherine	2485do	
1400	1500		Australia, NT VL8T Tennant Creek		2325do
1400	1500		Bangladesh, Bangla Betar/Home Svc		4750as
1400	1500	irreg	Cameroon, CRTV/R Buea	6005do	
1400	1500	Sun	Canada, Bible VO Broadcasting		17495as
1400	1500		Canada, CFRX Toronto ON	6070do	
1400	1500		Canada, CFVP Calgary AB	6030do	
1400	1500		Canada, CKZN St Johns NF	6160do	
1400	1500		Canada, CKZU Vancouver BC	6160do	
1400	1500		China, China Natl R/CNR11	4905do	4920do
			6130do		
1400	1500		China, China R International	5955as	9765va
			9870as	11665me	11675as 11765as
			13710eu	13740na	17630eu
1400	1500	irreg	Congo Dem Rep, R Kahuzi	6210do	
1400	1500	1st Sat	Finland, Scandinavian Weekend R		5980eu
1400	1500	wa/irreg	Germany, Hamburger Lokalradio		7265eu
1400	1500	Sat/Sun	Germany, Mighty KBC Radio	6095eu	
1400	1500		Germany, R 6150	6070eu	
1400	1500		Guatemala, R Verdad	4055do	
1400	1500		India, AIR/Aizawl	7295do	
1400	1500		India, AIR/Bhopal	4810do	
1400	1500		India, AIR/Chennai	4920do	
1400	1500		India, AIR/External Svc	9690as	11620as
			13710as		
1400	1500		India, AIR/Gangkok	4835do	
1400	1500		India, AIR/Imphal	4775do	
1400	1500		India, AIR/Jaipur	4910do	
1400	1500		India, AIR/Jeypore	5040do	
1400	1500		India, AIR/Kohima	4850do	
1400	1500		India, AIR/Leh	4660do	
1400	1500		India, AIR/Mumbai	4840do	
1400	1500		India, AIR/Natl Channel	9425do	9470do
1400	1500		India, AIR/Port Blair	4760do	
1400	1500		India, AIR/Srinagar	4950do	
1400	1500		India, AIR/Thiruvananthapuram	5010do	
1400	1500		Malaysia, RTM/Kajang	5965do	6050do
1400	1500		Malaysia, RTM/Traxx FM	7295do	
1400	1500		Mali, ORTM/R Mali	9635do	
1400	1500		Mexico, R Educacion	6185do	
1400	1500		New Zealand, R New Zealand Intl		6170pa
1400	1500		Nigeria, FRCN Abuja	7275do	
1400	1500	irreg	Nigeria, VO Nigeria	9690af	
1400	1500		Oman, R Sultanate of Oman	15140eu	
1400	1500		Papua New Guinea, R Central	3290do	
1400	1500		Papua New Guinea, R East New Britain		3385do
1400	1500		Papua New Guinea, R Northern	3345do	
1400	1500		Papua New Guinea, R Vanimo	3205do	
1400	1500		Papua New Guinea, R Western	3305do	
1400	1500		Papua New Guinea, Wantok R Light		7325do
1400	1500		Russia, VO Russia	4960va	9900me 11530as
			12030as	15670as	
1400	1500		Solomon Islands, SIBC	5020do	9545do
1400	1500		South Korea, KBS World R	9640as	
1400	1500		UK, BBC World Service	11890as	15310as
1400	1500	DRM	UK, BBC World Service	5845as	
1400	1500		USA, AFN/AFRTS	4319usb	5765usb 12759usb
			13362usb		
1400	1500		USA, KJES Vado NM	11715na	
1400	1500		USA, Overcomer Ministry	9370na	9655eu
			9930sa	9980na	13810me
1400	1500	Sat	USA, Overcomer Ministry	15420na	
1400	1500	mtwhf	USA, VO America	7575va	12150as 15490as
1400	1500		USA, VO America	4930af	6080af 15580af
1400	1500		USA, WBCQ Monticello ME	9330na	
1400	1500	Sat	USA, WBCQ Monticello ME	15420na	
1400	1500		USA, WEWN/Irondale AL	15610eu	
1400	1500	Sun	USA, WHRI Cypress Crk SC	9795am	9840na
			21600af		
1400	1500		USA, WINB Red Lion PA	13570am	
1400	1500		USA, WJHR Intl Milton FL	15550usb	
1400	1500	Sat/Sun	USA, WRMI Miami FL	9955am	
1400	1500		USA, WTWW Lebanon TN	9479sa	9930sa
1400	1500		USA, WTWW Lebanon TN	9479na	9930sa
1400	1500		USA, WWCR Nashville TN	7490af	9980ca
			13845na	15825eu	
1400	1500	irreg	USA, WWRB Manchester TN	9370na	
1400	1500		Zambia, Zambia Natl BC	5915do	6165do
1415	1430		Nepal, R Nepal	5005do	
1415	1430	mtwhfa	USA, Pan Am Broadcasting	15205as	
1415	1500		India, AIR/External Svc	9910as	11670as
1420	1455		Swaziland, TWR Africa	6025af	
1430	1500	Sat	Canada, Bible VO Broadcasting		17495as
1430	1500		India, AIR/Delhi	4870do	
1430	1500	Sun	Palau, T8WH/World Harvest R	15550as	

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1530		Australia, ABC/R Australia	5940as	5995as
			7240as	9475as	9965pa 12065pa
			12085pa		
1500	1530		Australia, HCJB Global Australia		15340as
1500	1530		India, AIR/Delhi	4870do	
1500	1530		India, AIR/External Svc	9910as	11670as
1500	1530	Sun	Italy, IRRS Shortwave	15190va	
1500	1530		Vietnam, VO Vietnam/Overseas Svc		7285as
			9840as	12020as	
1500	1550		New Zealand, R New Zealand Intl		6170pa
1500	1557		North Korea, VO Korea	9435na	11710na
			13760eu	15245eu	
1500	1600		Anguilla, University Network	11775ca	
1500	1600		Australia, NT VL8A Alice Springs		2310do
1500	1600		Australia, NT VL8K Katherine	2485do	
1500	1600		Bangladesh, Bangla Betar/Home Svc		4750as
1500	1600		Bhutan, Bhutan BC Svc	6035do	
1500	1600	irreg	Cameroon, CRTV/R Buea	6005do	
1500	1600		Canada, CFRX Toronto ON	6070do	
1500	1600		Canada, CFVP Calgary AB	6030do	
1500	1600		Canada, CKZN St Johns NF	6160do	
1500	1600		Canada, CKZU Vancouver BC	6160do	
1500	1600		China, China R International	5955as	6095me
			7325as	7395as	9720me 9800as
			9870as	13640eu	13740na 15245eu
1500	1600	irreg	Congo Dem Rep, R Kahuzi	6210do	

1500	1600	1st Sat	Finland, Scandinavian Weekend R			5980eu
1500	1600		Germany, R 6150	6070eu		
1500	1600		Guatemala, R Verdad	4055do		
1500	1600		India, AIR/Aizawl	7295do		
1500	1600		India, AIR/Bhopal	4810do		
1500	1600		India, AIR/Chennai	4920do		
1500	1600		India, AIR/Gangkok	4835do		
1500	1600		India, AIR/Imphal	4775do		
1500	1600		India, AIR/Jaipur	4910do		
1500	1600		India, AIR/Jeypore	5040do		
1500	1600		India, AIR/Kohima	4850do		
1500	1600		India, AIR/Leh	4660do		
1500	1600		India, AIR/Mumbai	4840do		
1500	1600		India, AIR/Natl Channel	9425do	9470do	
1500	1600		India, AIR/Port Blair	4760do		
1500	1600		India, AIR/Srinagar	4950do		
1500	1600		India, AIR/Thiruvananthapuram	5010do		
1500	1600		Malaysia, RTM/Traxx FM	7295do		
1500	1600		Mali, ORTM/R Mali	9635do		
1500	1600		Mexico, R Educacion	6185do		
1500	1600		Nigeria, FRCN Abuja	7275do		
1500	1600	irreg	Nigeria, VO Nigeria	15120af		
1500	1600		Papua New Guinea, R Northern	3345do		
1500	1600		Papua New Guinea, R Vanimo	3205do		
1500	1600		Papua New Guinea, R Western	3305do		
1500	1600		Papua New Guinea, Wantok R Light			7325do
1500	1600		Russia, VO Russia	4960va	6185as	9900me
1500	1600		Solomon Islands, SIBC	5020do	9545do	
1500	1600	mtwhf	South Africa, Channel Africa	9625af		
1500	1600		UK, BBC World Service	7565as	9410as	
			9735as	11675as	11890as	12095as
			15420af			
1500	1600	DRM	UK, BBC World Service	5845as		
1500	1600		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1500	1600		USA, KNLS Anchor Point AK	9920as		
1500	1600		USA, Overcomer Ministry	9370na	9655eu	
			9955ca	9980na	13810me	
1500	1600		USA, VO America	4930af	6080af	7540va
			7575va	12150va	15490as	15580va
			17895va			
1500	1600		USA, VO America	6140as	9400as	9760as
1500	1600		USA, WBCQ Monticello ME	9330na		
1500	1600	Sat	USA, WBCQ Monticello ME	15420na		
1500	1600		USA, WEWN/Irondale AL	15610eu		
1500	1600		USA, WHRI Cypress Crk SC	17510eu		
1500	1600		USA, WINB Red Lion PA	13570am		
1500	1600		USA, WJHR Intl Milton FL	15550usb		
1500	1600	Sat/Sun	USA, WRMI Miami FL	9955am		
1500	1600		USA, WTWW Lebanon TN	9479na	9930sa	
1500	1600		USA, WTWW Lebanon TN	9479na	9930sa	
1500	1600		USA, WWCR Nashville TN	9980ca	12160af	
			13845na	15825eu		
1500	1600	irreg	USA, WWRB Manchester TN	9370na		
1500	1600		Zambia, Zambia Natl BC	5915do	6165do	
1525	1555	Sat/Sun	Swaziland, TWR Africa	6025af		
1530	1545		India, AIR/External Svc	9910as		
1530	1550	smtwhf	Vatican City State, Vatican R	11850af	15110as	
1530	1550	smtwhf/DRM	Vatican City State, Vatican R	17550as		
1530	1600		Australia, ABC/R Australia	5940as	5995as	
			7240as	9475as	11880pa	12085pa
1530	1600	DRM	Belgium, The Disco Palace	15775as		
1530	1600	Sat	Canada, Bible VO Broadcasting			17600as
1530	1600	smtwa	Germany, AWR Europe	15335as		
1530	1600		Iran, VOIRI	13780va	15515va	
1530	1600		Mongolia, VO Mongolia	12015as		
1530	1600		Myanmar, Myanma R	5985do		
1530	1600	Sat	Vatican City State, Vatican R	11850as	15110as	
			17550as			
1551	1600		New Zealand, R New Zealand Intl			7330pa
1551	1600	DRM	New Zealand, R New Zealand Intl			6135pa

1600 UTC - 11AM EST / 10AM CST / 8AM PST

1600	1615		Pakistan, R Pakistan	7510eu		
1600	1627		Iran, VOIRI	13780va	15515va	
1600	1630		Australia, ABC/R Australia	9580pa		
1600	1630	DRM	Belgium, The Disco Palace	15775as		
1600	1630		India, AIR/Aizawl	7295do		
1600	1630		Indonesia, AWR Asia/Pacific	15360as		
1600	1630		Myanmar, Myanma R	5985do		
1600	1630	Sun	Palau, T8WH/World Harvest R	15505as		
1600	1630		Vietnam, VO Vietnam/Overseas Svc			7220me
			7280eu	9550me	9730eu	
1600	1650	DRM	New Zealand, R New Zealand Intl			6135pa
1600	1650		New Zealand, R New Zealand Intl			7330pa
1600	1657		North Korea, VO Korea	9890va	11645va	
1600	1700		Anguilla, University Network	11775ca		
1600	1700		Australia, ABC/R Australia	5940as	5995va	
			7240as	9475as	11880pa	12085pa
1600	1700		Australia, NT VL8A Alice Springs			2310do
1600	1700		Australia, NT VL8K Katherine	2485do		
1600	1700		Bangladesh, Bangla Betar/Home Svc			4750as
1600	1700		Bhutan, Bhutan BC Svc	6035do		
1600	1700	irreg	Cameroon, CRTV/R Buea	6005do		
1600	1700		Canada, CFRX Toronto ON	6070do		
1600	1700		Canada, CFVP Calgary AB	6030do		
1600	1700		Canada, CKZN St Johns NF	6160do		
1600	1700		Canada, CKZU Vancouver BC	6160do		
1600	1700		China, China R International	6060as	7235as	
			9570af	11900af	11940eu	11965eu
			13760eu	15250va		
1600	1700		China, Xizang PBS	4905do	4920do	6025do
			6110do	6130do	6200do	7255do
			7385do			
1600	1700		Clandestine, R Dialogue	12105af		
1600	1700	irreg	Congo Dem Rep, R Kahuzi	6210do		
1600	1700		Egypt, R Cairo	15345af		
1600	1700	irreg	Ethiopia, R Ethiopia/Intl Svc	7235va	9560va	
1600	1700	1st Sat	Finland, Scandinavian Weekend R			5980eu
1600	1700		Germany, R 6150	6070eu		
1600	1700		Guatemala, R Verdad	4055do		
1600	1700		India, AIR/Bhopal	4810do		
1600	1700		India, AIR/Chennai	4920do		
1600	1700		India, AIR/Imphal	4775do		
1600	1700		India, AIR/Jaipur	4910do		
1600	1700		India, AIR/Jeypore	5040do		
1600	1700		India, AIR/Kohima	4850do		
1600	1700		India, AIR/Leh	4660do		
1600	1700		India, AIR/Mumbai	4840do		
1600	1700		India, AIR/Natl Channel	9425do	9470do	
1600	1700		India, AIR/Port Blair	4760do		
1600	1700		India, AIR/Srinagar	4950do		
1600	1700		India, AIR/Thiruvananthapuram	5010do		
1600	1700		Malaysia, RTM/Kajang	5965do	6050do	
1600	1700		Malaysia, RTM/Traxx FM	7295do		
1600	1700		Mali, ORTM/R Mali	9635do		
1600	1700		Nigeria, FRCN Abuja	7275do		
1600	1700		Papua New Guinea, Wantok R Light			7325do
1600	1700		Russia, VO Russia	4960va	6035as	6185as
			9490as			
1600	1700		Solomon Islands, SIBC	5020do	9545do	
1600	1700		South Korea, KBS World R	9515eu	9640as	
1600	1700		Taiwan, R Taiwan Intl	6180as	15485as	
1600	1700		UK, BBC World Service	3255af	6190as	
			7565as	9410as	9910as	11675as
			11890as	12095af	15420af	17640af
			17830af			
1600	1700	DRM	UK, BBC World Service	5845as		
1600	1700		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1600	1700		USA, Overcomer Ministry	9370na	9955ca	
			9980na			
1600	1700	Sat	USA, Overcomer Ministry	15420na		
1600	1700		USA, VO America	4930af	6080af	15580af
1600	1700		USA, VO America	11915va	13570af	15470va
			17895va			
1600	1700		USA, WBCQ Monticello ME	9330na		
1600	1700	Sat	USA, WBCQ Monticello ME	15420na		
1600	1700		USA, WEWN/Irondale AL	15610eu		
1600	1700		USA, WHRI Cypress Crk SC	21630af		
1600	1700		USA, WINB Red Lion PA	13570am		
1600	1700		USA, WJHR Intl Milton FL	15550usb		
1600	1700	Sat/Sun	USA, WRMI Miami FL	9955am		
1600	1700		USA, WTWW Lebanon TN	9479sa	9930sa	
1600	1700		USA, WTWW Lebanon TN	9479na	9930sa	
1600	1700		USA, WWCR Nashville TN	9980ca	12160af	
			13845na	15825eu		
1600	1700	irreg	USA, WWRB Manchester TN	9370na		
1600	1700		Zambia, Zambia Natl BC	5915do	6165do	
1600	1700	irreg	Zimbabwe, VO Zimbabwe	4828af		
1615	1630		Vatican City State, Vatican R	15595me		
1630	1700	mwf	Indonesia, AWR Asia/Pacific	15360as		
1630	1700	m	South Africa, SA Radio League	3230af		
1630	1700		Turkey, VO Turkey	15520as		
1630	1700	mtwhf	USA, VO America	11905af		
1630	1700	mtwhf	USA, VO America/S Sudan in Focus			9490af
			11655af	13870af		
1651	1700		New Zealand, R New Zealand Intl			730pa
1651	1700	DRM	New Zealand, R New Zealand Intl			6135pa

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1710	irreg	Congo Dem Rep, R Kahuzi	6210do		
1700	1715		Bangladesh, Bangla Betar/Home Svc			4750as
1700	1715	tf	Canada, Bible VO Broadcasting			15215me
1700	1730		Australia, ABC/R Australia	5995va	9500va	
			9580pa	11880va	12085pa	
1700	1730	h	Canada, Bible VO Broadcasting			15215me
1700	1730		India, AIR/Mumbai	4840do		
1700	1730	m	South Africa, SA Radio League	3230af		
1700	1730		Turkey, VO Turkey	15520as		
1700	1730		Vietnam, VO Vietnam/Overseas Svc			9625eu
1700	1739		India, AIR/Chennai	4920do		

1700	1739		India, AIR/Srinagar	4950do		
1700	1740		India, AIR/Jeypore	5040do		
1700	1741		India, AIR/Jaipur	4910do		
1700	1742		India, AIR/Bhopal	4810do		
1700	1745	DRM	New Zealand, R New Zealand Intl			6135pa
1700	1745		New Zealand, R New Zealand Intl			7330pa
1700	1755	mtwhf	South Africa, Channel Africa	15235af		
1700	1756	DRM	Romania, R Romania Intl	9535eu		
1700	1756		Romania, R Romania Intl	11740eu		
1700	1800		Anguilla, University Network	11775ca		
1700	1800		Australia, NT VL8A Alice Springs			2310do
1700	1800		Australia, NT VL8K Katherine	2485do		
1700	1800	Sat/Sun	Canada, Bible VO Broadcasting			15215me
1700	1800		Canada, CFRX Toronto ON	6070do		
1700	1800		Canada, CFVP Calgary AB	6030do		
1700	1800		Canada, CKZN St Johns NF	6160do		
1700	1800		Canada, CKZU Vancouver BC	6160do		
1700	1800		China, China R International	6090as	6140as	
			6165me	7235as	7265af	7410as
			7420as	9570as	9695eu	11900af
			13570eu	13760eu		
1700	1800		Clandestine, SW R Africa	4880af		
1700	1800		Egypt, R Cairo	15345af		
1700	1800	1st Sat	Finland, Scandinavian Weekend R			5980eu
1700	1800		Germany, R 6150	6070eu		
1700	1800		Guatemala, R Verdad	4055do		
1700	1800		India, AIR/Natl Channel	9425do		9470do
1700	1800		Malaysia, RTM/Kajang	5965do		6050do
1700	1800		Malaysia, RTM/Traxx FM	7295do		
1700	1800		Mali, ORTM/R Mali	9635do		
1700	1800		Mexico, R Educacion	6185do		
1700	1800		Nigeria, FRCN Abuja	7275do		
1700	1800		Papua New Guinea, Wantok R Light			7325do
1700	1800		Russia, VO Russia	4960va	6035as	6185as
			9420as			
1700	1800	DRM	Russia, VO Russia	9820as		
1700	1800		Solomon Islands, SIBC	5020do		9545do
1700	1800	Sat/Sun	Swaziland, TWR Africa	3200af		
1700	1800		Taiwan, R Taiwan Intl	15690af		
1700	1800		UK, BBC World Service	3255af		
			6190 f	6195as	9410as	12095af
			15400af	15420af	17795af	
			17830af			
1700	1800	DRM	UK, BBC World Service	5845as		
1700	1800		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1700	1800		USA, Overcomer Ministry	9370na		9955ca
1700	1800	Sat/Sun	USA, Overcomer Ministry	9980na		
1700	1800		USA, VO America	6080af	11795af	15580af
			17895af			
1700	1800		USA, WBCQ Monticello ME	9330na		15420na
1700	1800		USA, WEWN/Irondale AL	15610eu		
1700	1800		USA, WHRI Cypress Crk SC	21630af		
1700	1800		USA, WINB Red Lion PA	13570am		
1700	1800		USA, WJHR Intl Milton FL	15550usb		
1700	1800	Sat/Sun	USA, WRMI Miami FL	9955am		
1700	1800		USA, WTWW Lebanon TN	9479na		9930sa
1700	1800		USA, WWCR Nashville TN	9980ca		12160af
			13845na	15825eu		
1700	1800	irreg	USA, WWRB Manchester TN	9370na		
1700	1800		Zambia, Zambia Natl BC	5915do		6165do
1700	1800	irreg	Zimbabwe, VO Zimbabwe	4828af		
1720	1740	Sat/Sun	USA, VOA/Studio 7	4930af		5940af
			15455af			
1730	1800		Australia, ABC/R Australia	5995va		6080as
			9475as	9500va	9580pa	11880va
1730	1800		Philippines, R Pilipinas Overseas Svc			9915me
			11720me	15190me		
1730	1800		Sudan, VO Africa/Sudan R	9505af		
1730	1800	mtwh	USA, VOA/Studio 7	4930af		5940af
			15455af			
1730	1800		Vatican City State, Vatican R	11625af		13765af
			15570af			
1745	1800		Bangladesh, Bangla Betar	7250eu		
1745	1800		India, AIR/External Svc	7550eu		9445va
			9950eu	11580af	11670eu	11935af
			13695af	17670af		
1745	1800	mtwhf	Swaziland, TWR Africa	3200af		
1746	1800		New Zealand, R New Zealand Intl			9615pa
1746	1800	DRM	New Zealand, R New Zealand Intl			7330as

1800 UTC - 1PM EST / 12PM CST / 10AM PST

1800	1815	Sat	Canada, Bible VO Broadcasting			9430me
			11855as			
1800	1830		Japan, R Japan/NHK World	9590af		11885af
1800	1830		Sudan, VO Africa/Sudan R	9505af		
1800	1830		USA, VO America	6080af	15580af	17895af
1800	1830	Sat/Sun	USA, VO America	4930af		
1800	1830	f	USA, VOA/Studio 7	4930af		5940af
1800	1836		New Zealand, R New Zealand Intl			9615pa
1800	1836	DRM	New Zealand, R New Zealand Intl			7330pa
1800	1857		North Korea, VO Korea	13760eu		15245eu
1800	1900		Anguilla, University Network	11775ca		
1800	1900	mtwhf	Argentina, RAE	15345eu		
1800	1900		Australia, ABC/R Australia	6080as		9475as
			9580pa	9710va	11880pa	
1800	1900		Australia, NT VL8A Alice Springs			4835do
1800	1900		Australia, NT VL8K Katherine	2485do		
1800	1900		Bangladesh, Bangla Betar	7250eu		
1800	1900	Sat/Sun	Canada, Bible VO Broadcasting			15215me
1800	1900	Sun	Canada, Bible VO Broadcasting			6130eu
1800	1900		Canada, CFRX Toronto ON	6070do		
1800	1900		Canada, CFVP Calgary AB	6030do		
1800	1900		Canada, CKZN St Johns NF	6160do		
1800	1900		Canada, CKZU Vancouver BC	6160do		
1800	1900		China, China R International	6175eu		9600eu
			13760eu			
1800	1900		Clandestine, SW R Africa	4880af		
1800	1900	1st Sat	Finland, Scandinavian Weekend R			6170eu
1800	1900		Germany, R 6150	6070eu		
1800	1900		Guatemala, R Verdad	4055do		
1800	1900		India, AIR/External Svc	7550eu		9445va
			9950eu	11580af	11670eu	11935af
			13695af	17670af		
1800	1900		India, AIR/Natl Channel	9425do		9470do
1800	1900	fas	Italy, IRRS Shortwave	7290va		
1800	1900		Kuwait, R Kuwait	15540va		
1800	1900		Malaysia, RTM/Kajang	5965do		6050do
1800	1900		Malaysia, RTM/Traxx FM	7295do		
1800	1900		Mali, ORTM/R Mali	5995do		
1800	1900		Mexico, R Educacion	6185do		
1800	1900		Nigeria, FRCN Abuja	7275do		
1800	1900	irreg	Nigeria, VO Nigeria	7255af		
1800	1900		Papua New Guinea, Wantok R Light			7325do
1800	1900		Philippines, R Pilipinas Overseas Svc			9915me
			11720me	15190me		
1800	1900		Russia, VO Russia	4960va	9900va	
1800	1900		South Korea, KBS World R	7275eu		
1800	1900	Sat/Sun	Swaziland, TWR Africa	3200af		
1800	1900		Swaziland, TWR Africa	9500af		
1800	1900		Taiwan, R Taiwan Intl	6155eu		
1800	1900		UK, BBC World Service	3255af		6190af
			7375as	11810af	12095af	15400af
			15420af	17795af		
1800	1900		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1800	1900	mtwhf	USA, Overcomer Ministry	9980na		
1800	1900	Sat	USA, Overcomer Ministry	9955ca		
1800	1900	Sun	USA, Overcomer Ministry	9370na		9955ca
1800	1900		USA, Overcomer Ministry	9700eu		
1800	1900		USA, WBCQ Monticello ME	9330na		15420na
1800	1900		USA, WEWN/Irondale AL	15610eu		
1800	1900		USA, WHRI Cypress Crk SC	9840na		21630af
1800	1900		USA, WINB Red Lion PA	13570am		
1800	1900		USA, WJHR Intl Milton FL	15550usb		
1800	1900	Sat/Sun	USA, WRMI Miami FL	9955am		
1800	1900		USA, WTWW Lebanon TN	9479na		9930sa
1800	1900		USA, WWCR Nashville TN	9980ca		12160af
			13845na	15825eu		
1800	1900	irreg	USA, WWRB Manchester TN	9370na		
1800	1900		Zambia, Zambia Natl BC	5915do		6165do
1800	1900	irreg	Zimbabwe, VO Zimbabwe	4828af		
1815	1845	Sun	Canada, Bible VO Broadcasting			9430me
1825	1900		Vanuatu, R Vanuatu	3945do		
1830	1845	Sat	Canada, Bible VO Broadcasting			6130eu
1830	1845		Rwanda, R Rep Rwandaise	6055do		
1830	1900	Sun	Canada, Bible VO Broadcasting			9635as
1830	1900	irreg/DRM	Nigeria, VO Nigeria	15120af		
1830	1900		Serbia, International R Serbia	6100eu		
1830	1900		South Africa, AWR Africa	11840af		
1830	1900		Turkey, VO Turkey	9785eu		
1830	1900		USA, VO America	4930af	15580af	
1830	1900	mtwhf	USA, VOA/Studio 7	5940af		15455af
1837	1900		New Zealand, R New Zealand Intl			9615pa
1837	1900	DRM	New Zealand, R New Zealand Intl			9630pa
1845	1900	irreg	Guinea, RTV Guinee	7125do		

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1915	Sun	Canada, Bible VO Broadcasting			9635as
1900	1930		Germany, Deutsche Welle	11800af		11865af
			15275af			
1900	1930		Philippines, R Pilipinas Overseas Svc			9915me
			11720me	15190me		
1900	1930		Turkey, VO Turkey	9785eu		
1900	1930		USA, VO America	4930af	9850af	15580va
1900	1930		Vietnam, VO Vietnam/Overseas Svc			7280eu
			9730eu			
1900	1945		India, AIR/External Svc	7550eu		9445eu
			9950eu	11580af	11670eu	11935af
			13695af	17670af		
1900	1950		New Zealand, R New Zealand Intl			9615pa
1900	1950	DRM	New Zealand, R New Zealand Intl			9630pa

SHORTWAVE GUIDE

1900	1957		North Korea, VO Korea	7210af	9875va	
			11635va	11910af		
1900	2000		Anguilla, University Network	11775ca		
1900	2000		Australia, ABC/R Australia	6080as	9500va	
			9710va	11660va	11880va	
1900	2000		Australia, NT VL8A Alice Springs		4835do	
1900	2000		Australia, NT VL8K Katherine	2485do		
1900	2000		Canada, CFRX Toronto ON	6070do		
1900	2000		Canada, CFVP Calgary AB	6030do		
1900	2000		Canada, CKZN St Johns NF	6160do		
1900	2000		Canada, CKZU Vancouver BC	6160do		
1900	2000		China, China R International	7295va	9435af	
			9440af			
1900	2000		Egypt, R Cairo	15290af		
1900	2000	1st Sat	Finland, Scandinavian Weekend R		6170eu	
1900	2000		Germany, Deutsche Welle	7340af	11865af	
1900	2000		Germany, R 6150	6070eu		
1900	2000		Guatemala, R Verdad	4055do		
1900	2000		India, AIR/Natl Channel	9425do	9470do	
1900	2000	irreg	Indonesia, VO Indonesia	9526eu		
1900	2000		Kuwait, R Kuwait	15540eu		
1900	2000		Malaysia, RTM/Kajang	5965do	6050do	
1900	2000		Malaysia, RTM/Traxx FM	7295do		
1900	2000		Mali, ORTM/R Mali	5995do		
1900	2000		Micronesia, V6MP/Cross R/Pohnpei		4755as	
1900	2000		Nigeria, FRCN Abuja	7275do		
1900	2000	irreg	Nigeria, VO Nigeria	7255af		
1900	2000		Papua New Guinea, R Central	3290do		
1900	2000		Papua New Guinea, R East New Britain		3385do	
1900	2000		Papua New Guinea, R Northern	3345do		
1900	2000		Papua New Guinea, R Vanimo	3205do		
1900	2000		Papua New Guinea, R Western	3305do		
1900	2000		Papua New Guinea, Wantok R Light		7325do	
1900	2000		Solomon Islands, SIBC	5020do	9545do	
1900	2000	mtwhf	Spain, R Exterior de Espana	9665eu	11615af	
1900	2000		Swaziland, TWR Africa	3200af		
1900	2000		Thailand, R Thailand World Svc	9390eu		
1900	2000		UK, BBC World Service	3255af	6190af	
			11810af	12095af	15400af	15420af
			17795af			
1900	2000		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
1900	2000	mtwhfa	USA, Overcomer Ministry	9955ca		
1900	2000		USA, Overcomer Ministry	9370na	9700eu	
			9980na	11850af		
1900	2000		USA, VO America	7485va		
1900	2000		USA, WBCQ Monticello ME	15420na		
1900	2000	at	USA, WBCQ Monticello ME	7490na		
1900	2000		USA, WEWN/Irondale AL	15610eu		
1900	2000		USA, WHRI Cypress Crk SC	9840na	21630af	
1900	2000		USA, WINB Red Lion PA	13570am		
1900	2000		USA, WJHR Intl Milton FL	15550usb		
1900	2000	Sat/Sun	USA, WRMI Miami FL	9955am		
1900	2000		USA, WTWW Lebanon TN	9479na	9930sa	
1900	2000		USA, WWCR Nashville TN	9980ca	12160af	
			13845na	15825eu		
1900	2000	irreg	USA, WWRB Manchester TN	9370na		
1900	2000		Vanuatu, R Vanuatu	3945do		
1900	2000		Zambia, Zambia Natl BC	5915do	6165do	
1900	2000	irreg	Zimbabwe, VO Zimbabwe	4828af		
1905	1920	Sat	Mali, ORTM/R Mali	9635do		
1930	2000		Iran, VOIRI	9400eu	9715eu	11750af
			11885af			
1930	2000		South Africa, RTE R Worldwide	5820af		
1930	2000	Sun	USA, Pan Am Broadcasting	9515af		
1930	2000		USA, VO America	4930af	15580as	
1951	2000	DRM	New Zealand, R New Zealand Intl		11675pa	

2000 UTC - 3PM EST / 2PM CST / 12PM PST

2000	2020	tf	Belarus, R Belarus	7255eu	11730eu	
2000	2027		Iran, VOIRI	9400eu	9715eu	11750af
			11885af			
2000	2030	mtwhfa	Albania, R Tirana	7465va		
2000	2030		Australia, ABC/R Australia	6080as	9500va	
			9580pa	11650va	11660pa	12080pa
			15515va			
2000	2030		Egypt, R Cairo	15290af		
2000	2030	Sat/Sun	Swaziland, TWR Africa	3200af		
2000	2030		USA, VO America	4930af	15580af	
2000	2030		Vatican City State, Vatican R	11625af	13765af	
2000	2057		Germany, Deutsche Welle	11865af		
2000	2100		Anguilla, University Network	11775ca		
2000	2100		Australia, NT VL8A Alice Springs		4835do	
2000	2100		Australia, NT VL8K Katherine	2485do		
2000	2100		Australia, NT VL8T Tennant Creek		2325do	
2000	2100		Canada, CFRX Toronto ON	6070do		
2000	2100		Canada, CFVP Calgary AB	6030do		
2000	2100		Canada, CKZN St Johns NF	6160do		
2000	2100		Canada, CKZU Vancouver BC	6160do		
2000	2100		China, China R International	5960eu	5985af	
			7285eu	7295va	9440af	
2000	2100	f	Clandestine, JSR Shiokaze	6075as		
2000	2100		Cuba, R Havana Cuba	11760am		
2000	2100	1st Sat	Finland, Scandinavian Weekend R		6170eu	
2000	2100		Germany, R 6150	6070eu		
2000	2100		Guatemala, R Verdad	4055do		
2000	2100		India, AIR/Natl Channel	9425do	9470do	
2000	2100		Kuwait, R Kuwait	15540eu		
2000	2100		Malaysia, RTM/Kajang	5965do	6050do	
2000	2100		Malaysia, RTM/Traxx FM	7295do		
2000	2100		Mali, ORTM/R Mali	5995do		
2000	2100		Mexico, R Educacion	6185do		
2000	2100		Micronesia, V6MP/Cross R/Pohnpei		4755as	
2000	2100		New Zealand, R New Zealand Intl		11725pa	
2000	2100		Nigeria, FRCN Abuja	7275do		
2000	2100		Papua New Guinea, R Central	3290do		
2000	2100		Papua New Guinea, R East New Britain		3385do	
2000	2100		Papua New Guinea, R Northern	3345do		
2000	2100		Papua New Guinea, R Vanimo	3205do		
2000	2100		Papua New Guinea, R Western	3305do		
2000	2100		Papua New Guinea, Wantok R Light		7325do	
2000	2100		Solomon Islands, SIBC	5020do	9545do	
2000	2100		UK, BBC World Service	11810af	12095af	
			15400af			
2000	2100		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
2000	2100		USA, Overcomer Ministry	9370na	9700eu	
			11775af	11850af		
2000	2100	mtwhfa	USA, Overcomer Ministry	9955ca		
2000	2100	Sat/Sun	USA, Overcomer Ministry	9980na		
2000	2100		USA, WBCQ Monticello ME	15420na		
2000	2100	mtwhf	USA, WBCQ Monticello ME	7490na		
2000	2100		USA, WEWN/Irondale AL	15610eu		
2000	2100	Sun	USA, WHRI Cypress Crk SC	17510va		
2000	2100		USA, WINB Red Lion PA	13570am		
2000	2100		USA, WJHR Intl Milton FL	15550usb		
2000	2100	Sat/Sun	USA, WRMI Miami FL	9955am		
2000	2100		USA, WTWW Lebanon TN	9479na	9930sa	
2000	2100		USA, WWCR Nashville TN	9980ca	12160af	
			13845na	15825eu		
2000	2100	irreg	USA, WWRB Manchester TN	9370na		
2000	2100		Vanuatu, R Vanuatu	3945do	7260do	
2000	2100		Zambia, Zambia Natl BC	5915do	6165do	
2000	2100	irreg	Zimbabwe, VO Zimbabwe	4828af		
2020	2100		Belarus, R Belarus	7255eu	11730eu	
2030	2045		Thailand, R Thailand World Svc	9390eu		
2030	2056	DRM	Romania, R Romania Intl	9800eu		
2030	2056		Romania, R Romania Intl	11745na	11975eu	
			13800na			
2030	2100		Australia, ABC/R Australia	9500va	9580pa	
			11650va	11660va	11695va	12080pa
			15515va			
2030	2100		Turkey, VO Turkey	7205va		
2030	2100		USA, VO America	4930af	6080af	15580af
2030	2100	Sat/Sun	USA, VO America	4940af		
2030	2100		Vietnam, VO Vietnam/Overseas Svc		7220me	
			7280eu	9550eu	9730eu	
2045	2100		India, AIR/External Svc	7550eu	9445eu	
			9910pa	11620pa	11670eu	11740pa
2045	2100	DRM	India, AIR/External Svc	9950eu		
2051	2100	DRM	New Zealand, R New Zealand Intl		17675pa	

2100 UTC - 4PM EST / 3PM CST / 1PM PST

2100	2130		Australia, NT VL8A Alice Springs		4835do	
2100	2130		Australia, NT VL8K Katherine	2485do		
2100	2130		Australia, NT VL8T Tennant Creek		2325do	
2100	2130		Austria, AWR Europe	11955af		
2100	2130		Serbia, International R Serbia	6100eu		
2100	2130		South Korea, KBS World R	3955eu		
2100	2130		Turkey, VO Turkey	7205va		
2100	2150		New Zealand, R New Zealand Intl		11725pa	
2100	2150	DRM	New Zealand, R New Zealand Intl		17675pa	
2100	2157		North Korea, VO Korea	13760eu	15245eu	
2100	2200	irreg	Angola, Angolan Natl R	7217af		
2100	2200		Anguilla, University Network	11775ca		
2100	2200		Australia, ABC/R Australia	9500va	9660va	
			11650va	11695va	12080pa	13630pa
			15515va	21740va		
2100	2200		Belarus, R Belarus	7255eu	11730eu	
2100	2200		Canada, CFRX Toronto ON	6070do		
2100	2200		Canada, CFVP Calgary AB	6030do		
2100	2200		Canada, CKZN St Johns NF	6160do		
2100	2200		Canada, CKZU Vancouver BC	6160do		
2100	2200		China, China R International	5960eu	7205af	
			7285eu	7325af	7415eu	9600eu
2100	2200		Egypt, R Cairo	11890eu		
2100	2200	1st fa	Finland, Scandinavian Weekend R		6170eu	
2100	2200		Germany, Deutsche Welle	11800af	11865af	
			12070af			
2100	2200		Germany, R 6150	6070eu		
2100	2200		Guatemala, R Verdad	4055do		

2100	2200		India, AIR/External Svc		7550eu	9445eu
			9910pa	11620pa	11670eu	11740pa
2100	2200	DRM	India, AIR/External Svc		9950eu	
2100	2200		India, AIR/Natl Channel		9425do	9470do
2100	2200		Malaysia, RTM/Kajang		5965do	6050do
2100	2200		Malaysia, RTM/Traxx FM		7295do	
2100	2200		Mali, ORTM/R Mali		5995do	
2100	2200		Mexico, R Educacion		6185do	
2100	2200		Micronesia, V6MP/Cross R/Pohnpei			4755as
2100	2200		Nigeria, FRCN Abuja		7275do	
2100	2200		Papua New Guinea, R Central		3290do	
2100	2200		Papua New Guinea, R East New Britain			3385do
2100	2200		Papua New Guinea, R Northern		3345do	
2100	2200		Papua New Guinea, R Vanimo		3205do	
2100	2200		Papua New Guinea, R Western		3305do	
2100	2200		Papua New Guinea, Wantok R Light			7325do
2100	2200		Solomon Islands, SIBC		5020do	9545do
2100	2200	Sat/Sun	Spain, R Exterior de Espana		9570af	9660eu
2100	2200	mtwhf	UK, BBC World Service		9915af	11810af
			12095af			
2100	2200		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
2100	2200		USA, Overcomer Ministry		9370na	9700eu
			9955ca	9980na	11775af	15390sa
			15620na			
2100	2200		USA, VO America	6080af	15580af	
2100	2200	Sun	USA, WBCQ Monticello ME		7490na	
2100	2200		USA, WEWN/Irondale AL		15610eu	
2100	2200	Sun	USA, WHRI Cypress Crk SC		17510va	
2100	2200	m	USA, WINB Red Lion PA		9265am	
2100	2200		USA, WJHR Intl Milton FL		15550usb	
2100	2200	Sat/Sun	USA, WRMI Miami FL		9955am	
2100	2200		USA, WTWW Lebanon TN		9479na	9930sa
2100	2200		USA, WWCR Nashville TN		6875eu	9350af
			9980ca	13845na		
2100	2200	irreg	USA, WWRB Manchester TN		3215na	9370na
2100	2200		Vanuatu, R Vanuatu		3945do	
2100	2200		Zambia, Zambia Natl BC		5915do	6165do
2100	2200	irreg	Zimbabwe, VO Zimbabwe		4828af	
2125	2200		Vanuatu, R Vanuatu		3945do	7260do
2130	2200		Australia, NT VL8A Alice Springs			4835do
2130	2200		Australia, NT VL8K Katherine		5025do	
2130	2200		Australia, NT VL8T Tennant Creek			4910do
2151	2200		New Zealand, R New Zealand Intl			15720pa
2151	2200	DRM	New Zealand, R New Zealand Intl			17675pa

2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2230		India, AIR/External Svc		9910pa	11620pa
			11670eu	11740pa		
2200	2230	DRM	India, AIR/External Svc		9950eu	
2200	2245		Zambia, Zambia Natl BC		5915do	6165do
2200	2256		Romania, R Romania Intl		7430eu	9540eu
			9790as	11940as		
2200	2300		Anguilla, University Network		6090ca	
2200	2300		Australia, ABC/R Australia		9660va	9855as
			11695va	12080pa	13630pa	15240va
			15145va	15515va	21740va	
2200	2300		Australia, NT VL8A Alice Springs			4835do
2200	2300		Australia, NT VL8K Katherine		5025do	
2200	2300		Australia, NT VL8T Tennant Creek			4910do
2200	2300		Canada, CFRX Toronto ON		6070do	
2200	2300		Canada, CFVP Calgary AB		6030do	
2200	2300		Canada, CKZN St Johns NF		6160do	
2200	2300		Canada, CKZU Vancouver BC		6160do	
2200	2300		China, China R International		9590as	
2200	2300		Egypt, R Cairo	9965eu		
2200	2300	1st fa	Finland, Scandinavian Weekend R			6170eu
2200	2300		Germany, R 6150	6070eu		
2200	2300		Guatemala, R Verdad		4055do	
2200	2300		Guyana, VO Guyana		3290do	
2200	2300		India, AIR/Natl Channel		9425do	9470do
2200	2300		Malaysia, RTM/Kajang		5965do	6050do
2200	2300		Malaysia, RTM/Traxx FM		7295do	
2200	2300		Mali, ORTM/R Mali		5995do	
2200	2300		Mexico, R Educacion		6185do	
2200	2300		Micronesia, V6MP/Cross R/Pohnpei			4755as
2200	2300		New Zealand, R New Zealand Intl			15720pa
2200	2300	DRM	New Zealand, R New Zealand Intl			17675pa
2200	2300		Nigeria, FRCN Abuja		7275do	
2200	2300		Papua New Guinea, R Central		3290do	
2200	2300		Papua New Guinea, R East New Britain			3385do
2200	2300		Papua New Guinea, R Northern		3345do	
2200	2300		Papua New Guinea, R Vanimo		3205do	
2200	2300		Papua New Guinea, R Western		3305do	
2200	2300		Papua New Guinea, Wantok R Light			7325do
2200	2300		Russia, VO Russia	9465ca		
2200	2300		Solomon Islands, SIBC		5020do	9545do
2200	2300		South Korea, KBS World R		11810eu	
2200	2300		Turkey, VO Turkey	9830va		
2200	2300		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
2200	2300	mtwhf	USA, Overcomer Ministry		9955ca	9980na
2200	2300		USA, Overcomer Ministry		9370na	15390sa
			15620na			
2200	2300	smtwh	USA, VO America	5915va	7480va	7575va
			12150va			
2200	2300		USA, WBCQ Monticello ME		7490na	
2200	2300		USA, WEWN/Irondale AL		15610eu	
2200	2300	Sat/Sun	USA, WHRI Cypress Crk SC		11775eu	
2200	2300	Sat/Sun	USA, WRMI Miami FL		9955am	
2200	2300		USA, WTWW Lebanon TN		9479na	9930sa
2200	2300		USA, WWCR Nashville TN		6875eu	9350af
			9980ca	13845na		
2200	2300	irreg	USA, WWRB Manchester TN		3215na	9370na
2200	2300		Vanuatu, R Vanuatu		3945do	7260do
2220	2300		India, AIR/Srinagar		4950do	
2230	2300		Indonesia, AWR Asia/Pacific		15320as	
2230	2300		USA, VO America	5820va	7460va	9570va
2245	2300		India, AIR/External Svc		9690as	9705as
			11710as	13605as		
2245	2300	DRM	India, AIR/External Svc		11645as	

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000		Anguilla, University Network		6090ca	
2300	0000		Australia, NT VL8A Alice Springs			4835do
2300	0000		Australia, NT VL8K Katherine		5025do	
2300	0000		Australia, NT VL8T Tennant Creek			4910do
2300	0000		Canada, CFRX Toronto ON		6070do	
2300	0000		Canada, CFVP Calgary AB		6030do	
2300	0000		Canada, CKZN St Johns NF		6160do	
2300	0000		Canada, CKZU Vancouver BC		6160do	
2300	0000		China, China R International		5915as	5990ca
			7350eu	7410as	11690as	11790as
			11955as			
2300	0000		Cuba, R Havana Cuba		11880af	
2300	0000		Egypt, R Cairo	9965na		
2300	0000	1st fa	Finland, Scandinavian Weekend R			6170eu
2300	0000		Germany, R 6150	6070eu		
2300	0000		Guatemala, R Verdad		4055do	
2300	0000		Guyana, VO Guyana		3290do	
2300	0000		India, AIR/External Svc		6055as	9690as
			9705as	11710as	13605as	
2300	0000	DRM	India, AIR/External Svc		11645as	
2300	0000		India, AIR/Natl Channel		9425do	9470do
2300	0000		Malaysia, RTM/Kajang		5965do	6050do
2300	0000		Malaysia, RTM/Traxx FM		7295do	
2300	0000		Mali, ORTM/R Mali		5995do	
2300	0000		Mexico, R Educacion		6185do	
2300	0000		Micronesia, V6MP/Cross R/Pohnpei			4755as
2300	0000		New Zealand, R New Zealand Intl			15720pa
2300	0000	DRM	New Zealand, R New Zealand Intl			17675pa
2300	0000		Papua New Guinea, R Central		3290do	
2300	0000		Papua New Guinea, R East New Britain			3385do
2300	0000		Papua New Guinea, R Northern		3345do	
2300	0000		Papua New Guinea, R Vanimo		3205do	
2300	0000		Papua New Guinea, R Western		3305do	
2300	0000		Papua New Guinea, Wantok R Light			7325do
2300	0000		Russia, VO Russia	9465ca		
2300	0000		Solomon Islands, SIBC		5020do	9545do
2300	0000		UK, BBC World Service		3915as	6195as
			7490as	9740as	9890as	11850as
			12010as			
2300	0000		USA, AFN/AFRTS	4319usb	5765usb	12759usb
			13362usb			
2300	0000		USA, Overcomer Ministry		9370na	
2300	0000		USA, VO America	5895va	7480va	7575va
			12150va			
2300	0000		USA, VO America	5820va	7460va	9490va
			11840va			
2300	0000		USA, WBCQ Monticello ME		7490na	
2300	0000	Sat/Sun	USA, WBCQ Monticello ME		5110na	
2300	0000		USA, WEWN/Irondale AL		15610eu	
2300	0000	Sat/Sun	USA, WHRI Cypress Crk SC		11775eu	
2300	0000	smtwhf	USA, WHRI Cypress Crk SC		7315ca	
2300	0000	m	USA, WINB Red Lion PA		9265am	
2300	0000		USA, WTWW Lebanon TN		9479na	9930sa
2300	0000		USA, WWCR Nashville TN		6875eu	9350af
			9980ca	13845na		
2300	0000	irreg	USA, WWRB Manchester TN		3215na	9370na
2300	0000		Vanuatu, R Vanuatu		3945do	7260do
2300	2305		Nigeria, FRCN Abuja			7275do
2300	2315		India, AIR/Srinagar		4950do	
2300	2330		Australia, ABC/R Australia		9660va	9855as
			11695va	12080pa	15240va	15415va
			17795pa	19000va	21740va	
2300	2355		India, AIR/Port Blair		4760do	
2330	0000		Australia, ABC/R Australia		9660va	9855as
			12080pa	15240va	15415va	17750va
			17795pa	19000va	21740va	
2330	0000	Sat/Sun	Indonesia, AWR Asia/Pacific		17650as	
2330	0000		Vietnam, VO Vietnam/Overseas Svc			9840as
			12020as			
2355	0000		India, AIR/Mumbai		4840do	

SHORTWAVE GUIDE

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My Finale is Where I Started

After 30 plus years, thousands of words, and hundreds of columns here in the pages of *Monitoring Times*, it is hard to believe I am now typing my last few words for this historic publication. It has been a fascinating experience to have a front row seat on communications, technology and the many advancements in the radio hobby by serving on the staff of this publication.

MT has been a publication like no other and has had no equal. All sorts of the radio monitoring disciplines have been covered in the pages of this full spectrum magazine over its lifetime, but there is one area in particular, that I have been directly involved that got me started writing for in *MT* – Space.

Monitoring Times has had a long history with articles devoted to monitoring space related topics. I am fortunate to have next to me Vol. 1, No. 1, published in January/February 1982, which had a feature article on page one by Bob Grove titled *Space Shuttle Communications Monitoring*.

In August/September 1983, I had penned my first feature article for this magazine on monitoring satellites. By February 1984, I was introduced as the new *Signals from Space* columnist for *Monitoring Times*. Back then, I shared the pages of *MT* with legends such as John Santosusso, Don Schimmel, Norm Schrein, James R. Hay, Bert Huneault, Tom Williamson, Fred Maia, Mike Edelson, Richard Arland, the always intriguing Havana Moon (Bill Godbey), and, of course, Bob Grove. Many of these writers are no longer with us, but their legacy will live on in all the monitors who cut their teeth in the radio hobby thanks to their columns.

In any radio hobby magazine of that era, I was proud to be the only writer who covered the topic of utility satellite monitoring. My *MT* gig led to a book, *Communications Satellites*, a five year stint as the Managing Editor of *Satellites Times* magazine, and many columns on this subject.

So, since this is my finale in *MT*, I thought I would come back full circle and write about the one subject that brought me to this party in the pages of *Monitoring Times* over 30 years ago – Satellite Monitoring.

❖ U.S. Military UHF Satellite History

Satellite monitoring, and in particular, military satellite monitoring has dramatically changed over these many years. New technology, brought new developments and wider bandwidths, and that forced satellite operations higher in frequency. But, even though some things change, other things remain constant.

In the early years of this magazine, a favorite topic to write about was the UHF military satellites launched by the United States military.

And, while clear communications is not as plentiful today as it was in the 1980s, there are many more satellites in orbit today that cover the 225-380 MHz spectrum than in any time before.

The UHF spectrum allocated for U.S. Military satellite communications is located at the boundary between the Very High Frequency (VHF) and UHF frequency bands. Uplink frequencies are located at the lower end of the UHF band (292 to 317 MHz) while downlink frequencies are

located at the upper end of the VHF band (243 to 270 MHz).

Military UHF satellites contain a mixture of 5-kHz and 25-kHz bandwidth channels, each using an independent transponder. The transponders are unprocessed (they do not demodulate the data), simply filtering, frequency translating and amplifying the received signal. The use of unprocessed transponders has allowed UHF SATCOM users to take advantage of improved modulation techniques that have been developed since the original UHF satellites were launched. While twenty years ago a 25-kHz bandwidth transponder was often used at only 2400 bps, today they can be used at rates as high as 56,000 bps.

LES-3 was launched in 1965 on a Titan 3C launch vehicle. The purpose of this 35-pound satellite was to characterize the UHF band for military operations. LES-8 and 9 were launched together in 1976. These l000-pound satellites were three-axis stabilized using momentum wheels, pulsed plasma thrusters for station keeping, and were powered by a radio isotropic 238 Plutonium power generator.

Three MARISAT satellites were launched in 1976 on Delta 2914 launch vehicles to provide interim operational capability while waiting for FLTSAT availability. Each satellite carried three transponders: two 25-kHz transponders and one 500-kHz transponder. The 500-kHz transponder was designed to accommodate a jam-resistant frequency-hop communication service. Designed for a service life of five years, the satellites were deactivated in 1996 after over 19 years of service.

Beginning in 1978, eight FLTSAT satellites were launched on Atlas Centaurs, but only six achieved proper orbits. Each satellite carried twenty-four transponders: twelve 5-kHz transponders, ten 25-kHz transponders, one 500-kHz transponder, and a 25-kHz transponder using an SHF uplink and a UHF downlink. Seven of the 5-kHz transponders contained onboard processing to accommodate a jam-resistant frequency-hop communication service used by the Air Force. The transponder with the SHF uplink was designed for use by the Navy Fleet Broadcasting service and contains onboard processing for a jam-resistant spread-spectrum uplink. FLTSATs 7 and 8 carry Fleet EHF Packages (FEPs). FLTSATs 7 and 8 are still in use providing operational communication services.

For a short time Congress mandated the use of leased rather than purchased satellites. While the Navy continued to work on a new generation of tactical/strategic tri-service satellites, five LEASAT satellites were launched using the Space Shuttle. One satellite failed early and one had to be repaired by a Shuttle crew while still in its initial parking orbit. These satellites provided a minimum capability for extending the service life of the FLTSAT constellation. Each satellite carried thirteen transponders: five 5-kHz transponders, six 25-kHz transponders, one 500-kHz transponder,

and one 25-kHz transponder using an SHF uplink and a UHF downlink. The last Leasat launched is still being used by the Australian Defense Forces.

The newest constellation, the UHF Follow-On satellites are operating over each of the four satellite coverage areas. UFO-l was launched in 1993 on the first commercially built Atlas, but was placed into an improper orbit. The following ten launches were successful, providing a complete constellation.

Each satellite pair operating together provides seventy-eight transponders: forty-two 5-kHz transponders, thirty-four 25-kHz transponders, and two 25-kHz transponders using an SHF or EHF uplink and a UHF downlink. The portion of the frequency spectrum that was formally allocated to the 500-kHz transponders is now allocated to additional 5-kHz and 25-kHz transponders. UFOs 4-6 also carry Low Data Rate (LDR) EHF packages while UFOs 7-10 carry an enhanced EHF package. UFOs 8-10 carry a Ka-Band Global Broadcast System GW broadcast package.

The UFO satellites are 23,500 miles high in slightly elliptical geostationary orbits, and begin life inclined 6 degrees off the equator. The four coverage areas are centered over the continental United States, the Atlantic Ocean, the Indian Ocean, and the Pacific Ocean. The UFOs are the fifth generation of UHF satellites.

Other U.S. satellites, including Package D, DSCS and MILSTAR, carry UHF transponders, as do satellites owned or leased by our allies.

❖ What's in Orbit Today?

There are a lot more military satellites in orbit today then there were in 1983 when I wrote my first MT column. Table one is my latest list of geostationary military communications satellites and many of these have UHF downlinks that can be heard on even the simplest of equipment. Like any other form of utility type monitoring, patience is a virtue, and if you are patient some clear communications can be heard.

You can get my latest frequency list to monitor these satellites on my blog at **http://mt-milcom.blogspot.com/**.

❖ Farewell to *MT*, but I will still be around.

While *MT* may be going away, I won't be. Several years ago Gayle Van Horn and I started a small publishing business – Teak Publishing. Now that we won't be published in *MT* anymore, we plan to go ahead with our plans to expand our publishing business online. We currently have several projects in the works and these will all be published through Amazon.com's e-book services.

We will also continue to be very active on the Internet. You can see my latest e-book announcements, military news, frequency lists (including satellite frequencies) and a lot more on my *Milcom Monitoring Post* blog at **http://mt-milcom.blogspot.com/**.

This blog has proven to be a very popular source of military information and frequencies on the Internet since it was first put up in May 1996, and now has had over two million visitors. I also maintain a twitter feed for real time intercepts and late breaking information using **@MilcomMP**.

Finally, to all the hundreds of friends I have made thanks to these pages and the hundreds more who have contributed to my *MT* columns in the last 30 years I want to say thank you. It has been a blast. So for the last time in *MT* – 73 all and good hunting from Brasstown.

TABLE ONE:

MT Milcom Military Communication Geostationary Satellites

SSC	Name	Longitude	Notes
20776	Skynet 4C (UK)	1.0°W	UHF/SHF transponders
38466	SDS 3-F7 (USA 236)	9.9°W	UHF downlinks
36108	WGS-3 (USA-221)	11.7°W	No known UHF downlinks
20253	FLTSATCOM F8 (USA-46)	15.2°W	Bandplans Bravo/Charlie UHF transponders
33055	Skynet 5C (UK)	17.8°W	UHF (9) and X-band (15) transponders
23967	UFO-F7 EHF (USA-127)	22.3°W	Bandplan Papa UHF transponders
26695	Skynet 4F (UK)	34.1°W	UHF/SHF transponders
22988	Milstar 1-F1/DFS 1 (USA-98)	39.0°W	UHF spread spectrum transponder
27875	DSCS III-F14/B6 (USA-170)	51.9°W	No known UHF downlinks
27711	Milstar 2-F4/DFS 6 (USA-169)	90.0°W	UHF spread spectrum transponder
23467	UFO-F4 EHF (USA-108)	99.4°W	Bandplan Oscar UHF transponders
23589	UFO-F5 EHF (USA-111)	99.4°W	Bandplan November UHF transponders
23696	UFO-F6 EHF (USA-114)	105.1°W	Bandplan Quebec UHF transponders
22915	DSCS III-F8/B10 (USA 97)	111.9°W	No known UHF downlinks
25019	DSCS III-F10/B13 (USA-135)	129.7°W	No known UHF downlinks
27691	DSCS III-F13/A3 (USA 167)	135.3°W	No known UHF downlinks
26948	SDS 3-F3/NRO L-12 (USA-162)	140.8°W	UHF downlinks
23712	MILSTAR 1-F2 (USA-115)	150.0°W	UHF spread spectrum transponder
38093	MUOS-1	176.6°W	Multiple UHF downlinks
32258	WGS-1	174.8°E	No known UHF downlinks
25258	UFO-F8 (USA-138)	170.9°E	Bandplan Papa UHF transponders
27831	Optus C1 (Australia)	156.0°E	UHF transponders, X- and Ka-band
26715	Milstar 2-F2/DFS-4 (USA-157)	151.0°E	UHF spread spectrum transponder
23628	DSCS III-F9/B7 (USA-113)	149.3°E	No known UHF downlinks
26052	DSCS III-F11/B6 (USA-148)	103.6°E	No known UHF downlinks
29398	Feng Huo 2/Zhongxing 22A (China)	101.4°E	UHF downlinks and C-band transponder
17181	FLTSATCOM F7 (USA-20)	99.8°E	UHF downlinks
26635	SDS 3-F2/NRO L-10 (USA-155)	92.0°E	UHF downlinks
22009	DSCS III-F6/B12 (USA-82)	88.4°E	No known UHF downlinks
20963	SDS 2-F2 (USA-67)	75.2°E	UHF downlinks
39234	GSAT 7/Rukmini (India)	74.1°E	First Indian military comsat: UHF and C-band (3), S-band (1) and Ku-band (4) transponders
38098	Intelsat 22	72.0°E	UHF payload for the Australian Defense Force
25967	UFO-F10 (USA-146)	71.9°E	Bandplan November UHF transponders
20410	Leasat F5	71.6°E	Bandplan Whiskey (AFSATCOM) / Zulu (Fleet Relay) Australian Defense Force uses this satellite
28917	UFO-F11 (USA-174)	71.2°E	Bandplan Quebec UHF transponders
37377	SDS 3-F6/NRO L-27 (USA-227)	69.7°E	UHF downlinks
35943	ComsatBw 1 (Germany)	63.0°E	UHF (5) and SHF (4) transponders
34713	WGS-2	60.2°E	No known UHF downlinks
26575	DSCS III-F12/B11 (USA-153)	56.4°E	No known UHF downlinks
23132	UFO-F3 (USA-104)	53.0°E	UHF transponders: Bandplan unknown
39034	Skynet 5D	52.6°E	Nine UHF and 15 X-band transponders
26694	SICRAL 1A (Italy)	37.0°E	UHF (3), EHF/Ka-band (1) and SHF (5) transponders
22921	NATO 4B (USA-98)	35.0°E	Encrypted X-band, UHF and C-band
25639	Skynet 4E (UK)	32.5°E	UHF/SHF transponders
27168	Milstar 2-F3/DFS-5 (USA-164)	29.9°E	UHF spread spectrum transponder
22787	UFO-F2 (USA-95)	29.4°E	Bandplan Oscar UHF transponders
32294	Skynet 5B (UK)	24.4°E	UHF (9) and X-band (15) transponders
36582	ComsatBw 2 (Germany)	13.2°E	UHF (5) and four SHF (4) transponders
34810	SICRAL 1B (Italy)	11.9°E	UHF (3), one EHF/Ka-band (1) and SHF (5) transponders
30794	Skynet 5A (UK)	6.0°E	UHF (9) and 15 X-band (15) transponders

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A Fed Files Surveillance Operation

As I have mentioned previously, my work takes me all over the country. Many of the cities I end up in offer some interesting monitoring targets, as in federal installations or facilities, and other locations simply offer great monitoring due to the location. I often have to squeeze time in during brief stays in hotel rooms to get out the scanners and listen. Sometimes I am lucky and have some off time with a rental car to stake out a high spot from which to monitor the local action.

All this travel gives me some great opportunities monitoring things at various locations, not just at home. For one example, see the September 2012 *Monitoring Times* and my Southern Nevada Radio Safari. But it often seems like I spend more time monitoring the frequency bands everywhere except my home base in the Portland, Oregon area. I thought it might be time to concentrate on the federal monitoring opportunities at home for a while and see what's new.

Federal monitoring in the Pacific Northwest has fundamentally changed over the last six years due to the arrival of the federal Integrated Wireless Network (IWN). I have written about the IWN in several *Fed Files* columns, so I won't rehash all the details. In a nutshell, the IWN is a wide area, VHF, P-25, digital trunked radio system that currently covers Oregon and Washington states as well as the Washington, D.C. area. The system was originally developed by the Justice Department, which continues to operate the IWN, despite the cutoff of further expansion of the trunked system due to budget constraints. See the July 2012 issue of *Monitoring Times* for more details on the IWN system in operation.

When the IWN trunked system arrived, it meant almost all of the Justice Department agencies, such as the Federal Bureau of Investigation (FBI), U.S. Marshals (USMS), the Bureau of Alcohol, Tobacco, Firearms & Explosives (BATFE) and the Drug Enforcement Administration (DEA), all switched from their traditional, conventional radio channels to this new digital system. In addition, the Department of Justice mandated that all of their agencies utilizing IWN should encrypt their radios full time.

While it might seem that the IWN meant an end to interesting federal monitoring, it actually gave a lot of us radio geeks a new set of monitoring targets. While we might not be able to listen to what was being said, it became a challenge to map out how this system was set up, where the different trunked sites were located, what frequencies were used at each of these sites, and what trunked talk groups are utilized by which federal agencies. And, a few users are not using encryption full time, so it does leave the possibilities of catching some clear traffic.

There have been several monitoring targets that I have wanted to spend some time on in my home area, so I decided to tackle several of these radio systems in one location, Portland International Airport (PDX). One target is a new 380 MHz, P-25 trunked radio system that recently popped up at the Oregon Air National Guard Base, located at the Portland International Airport. This system went on the air in late July of 2013, but has had no apparent users since being turned on. I wanted to give the system some additional logging time using PRO96COM analysis software. Here is the system information as reported by the PRO96COM program:

System ID: 00A
WACN: 92195
Tower Number (Hex): T0101
00-0012, 380.0750 MHz
00-0044, 380.2750 MHz
00-0228, 381.4250 MHz
00-0312, 381.9500 MHz
00-0834, 385.2125 MHz

This new trunked system is reporting that it is capable of operating as an APCO-P25 Phase II system. These types of trunked systems have been showing up in the 700/800 MHz public safety arena for a couple of years now, and since this Phase II system utilizes Time Domain Multiple Access (TDMA) voice channels, none of our current P-25 digital scanners will work with this system, (only the GRE PSR-800 will receive a Phase II system). However, at this time no voice traffic has been monitored to confirm whether or not the system is truly set up as a TDMA system. If it does turn out to be a Phase II system, I believe this will be the first federal or military trunked system confirmed as using this type of voice channel.

The second monitoring target was the new FBI headquarters building and how they are utilizing the federal IWN trunked radio system. The new FBI building was finished in early 2013, and is located on the eastern edge of the Portland airport property. I suspected that since there is an IWN trunked site at the airport, that the FBI radios in and around the headquarters building must be using that site. I wanted to analyze the radio affiliations and traffic on the IWN trunked site to provide some clues as to what talk groups and radio ID's the FBI was using.

The third monitoring target was the TSA at the Portland airport. They have had some unusual changes in their radio system over the last few years, and I hadn't been hearing much from them on their usual channels lately, so I thought it might be a good time to keep an ear on their frequencies as well.

I was able to book a room at a hotel located adjacent to the airport property using my acquired membership points, one of the advantages of traveling a lot. This would provide a better and more comfortable location than parked in my vehicle for a couple of hours at a time, and would not arouse the interest of the airport police, although they have never hassled us radio listeners while parked in the cell phone waiting area at the Portland airport.

The hotel I chose offered something they called a "conference" style room. It was a two-room suite that featured a large meeting table, several chairs and a whiteboard in one part of the suite, along with a bedroom, bath and other amenities. I decided the large table would provide an excellent platform for the multiple radios and laptops I would be setting up for this scanning festival.

Once in the room, I set up my scanners and computers. Two radios were dedicated to

decoding the P25 trunking control channels of the systems I was interested in. Three other radios were doing some searching duties as well as scanning some known channels for activity. This hotel setup also allowed me to field-test some new electronic devices that will hopefully aid in the federal scanning hobby. I brought along my RF Explorer, a small, hand-held spectrum analyzer that I have been using for a few months in my television production work. It allowed me to monitor a wide range of radio spectrum and look for activity in real time. I will have more on this later in the column.

So what did this whole operation reveal? Unfortunately it was not as earth shattering as I had imagined. I was able to confirm a few frequencies that I cannot hear from my house, and found some new frequencies active, so it did pay off. As of this column's deadline, the military 380 MHz P-25 trunked radio system is still sitting idle, broadcasting its control channel with no users heard yet. Base operations continue to utilize their half-dozen or so conventional P25 simplex channels, all encrypted.

The FBI Portland Office is still somewhat of a mystery as far as radio emissions go, but then I kind of figured that was going to be the case. The building itself is interesting in that there are no roof top antennas visible, with the exception of a satellite dish on a smaller building in the back. I did note that my assumption that the FBI would utilize the IWN Site 15 at the airport appears to be incorrect. Most of the activity on the IWN nearest to the airport appears to be on Site 23. This makes sense in that IWN site 15 is a small capacity site, with only 3 frequencies assigned. Site 23 has much more capacity and probably covers a larger geographical area, so it would be logical that the FBI radios might affiliate to that site initially.

Here is a summary of what frequencies were heard during this operation. Unless otherwise noted, all frequencies are narrowband FM, PL is the CTCSS squelch tone, N is the P-25 Network Access Code (NAC) and CSQ is carrier squelch:

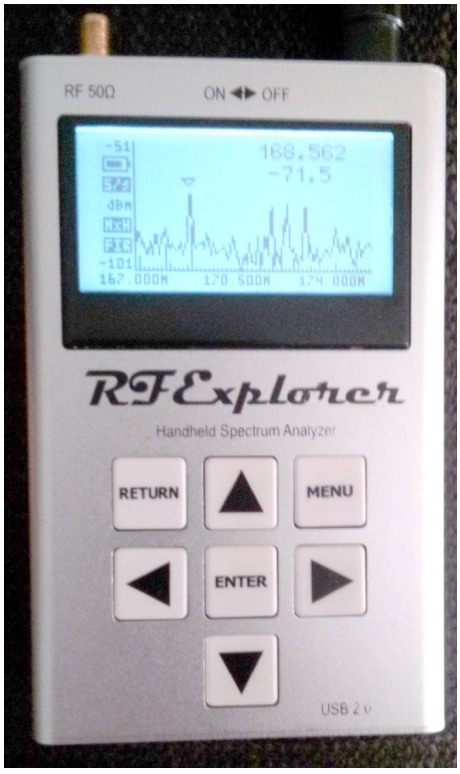
162.3250, N2293 – US Coast Guard NET 111
162.8125, N715 – IWN trunked site, input frequency
164.8750, 114.8 PL – Mt. Hood National Forest, input to 169.95
165.2375, N001 – Customs & Border Protection, NET 1
166.7125, 127.3 PL – National Cemetery Administration, Willamette National Cemetery
167.4625, N715 – IWN trunked site 15
167.6125, N718 – IWN trunked site 23
167.8625, CSQ – VA Medical Centers, paging data
168.8250, N715 – IWN trunked site 15
168.8375, N001 – TSA (new frequency found on this project)
168.8500, N718 – IWN trunked site 23
169.3000, N001 – TSA (input to 172.9)
169.3000, 131.8 PL – TSA checkpoint (analog with voice inversion)
169.3875, N004 – TSA (new frequency found on this project)
169.4125, N715 – IWN trunked site 15
169.6500, CSQ – US Postal Service, Airport Postal Facility
169.9500, 127.3 PL – Mt. Hood National Forest
170.5250, 162.2 PL – Mt. Hood National Forest
170.7875, N718 – IWN site 23
170.9875, N718 – IWN site 23
171.3125, N718 – IWN site 23
171.4375, N718 – IWN site 23
172.1500, N001 – TSA
172.5250, CSQ – Bonneville Power Administration
172.9000, N001 – TSA repeater
406.4250, N555 – US Forest Service link
407.0000, N112 – Federal Protective Service
408.2000, N107 – Federal Protective Service, Region 10
409.4375 – VAMC Vancouver Transportation (TRBO digital mode)
409.5750, CSQ – Data
410.1000, CSQ – NOAA link to VHF weather transmitter
410.5750, CSQ – NOAA link to VHF weather transmitter
413.3000, N399 – Portland Air National Guard base, fire & crash response
413.6000, CSQ – FAA wind shear data
414.3250, CSQ – Link to VAMC paging channel
417.2000, N107 – Federal Protective Service, input to 408.2

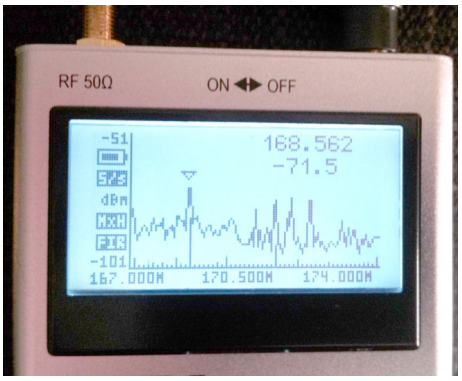
I will post any updates to these radio systems on the Fed Files blog page, **http://mt-fedfiles.blogspot.com**

❖ Using the RF Explorer

As mentioned earlier, I have started carrying a new tool in my bag of monitoring devices, a hand-held spectrum analyzer. I first came across this device when doing television productions with a large number of wireless microphones and wireless intercom setups. The audio technicians in charge of this gear had been using a number of low-cost solutions to try and monitor the RF bands that their equipment was operating in for potential interference. While this hand-held analyzer would never replace a $25k professional spectrum analyzer, it does remarkably well in most day-to-day operations. The model that I have also displays 2.4 GHz Wi-Fi systems.

In my case, I have been very successful in tracking down transmitter locations by simply programming in the suspect frequency in the analyzer and watching the RF levels in the display as we drove around the area. It is much easier to see the changes in the signal level on





this type of device than simply using a signal strength meter on a scanner. I have also been surprised at how useful this in checking out antennas. I found that I can program a particular frequency or band into the RF Explorer and watch the overall signal levels and noise floor as I try different receive antennas, feed lines or tunable filters. It is nice to be able to actually see evidence of what you are doing.

If you are interested in the RF Explorer, you can check out their web site: **www.rfexplorer.com.** I have no affiliation with the sellers of this device, but I am simply a satisfied customer who can recommend it.

❖ A Fond Farewell

As you know this is the last issue of *Monitoring Times* magazine, and thus the last Fed Files column. I want to thank Bob Grove for giving me the opportunity to contribute a small part to the great magazine that he founded and published. Thanks also to Rachel Baughn and Ken Reitz, the editors that I worked under during my tenure with the magazine. Both of them taught me a great deal about the art of writing a magazine column. Additional thanks to Robert Wyman, good friend and former *MT* writer who helped me make my first few columns readable and hopefully informative. And thanks especially to The Chief, Larry Van Horn, who asked me to take over this column back in 2004, when there was serious consideration to dropping it completely. I also appreciate the support that I have received over the years from the readers of *Monitoring Times* magazine.

But, have no fear, this is not "goodbye" but just, "see you later." The driving force behind *Monitoring Times* will be available in a new format, as an on-line publication called *The Spectrum Monitor*. Many of the writers and editorial staff will be involved with this project, including myself. You can check out all of the details on this new project at the web site, **www.thespectrummonitor.com**

I am also developing my own web site at **www.thefedfiles.com**. I am hoping to set up a system to share federal frequency files and database information there in the future, and to become a one-stop shop for federal monitoring information. In addition, the Fed Files blog page will continue to be updated with frequencies and news in the federal communications world, and I now have a Twitter account for breaking federal frequencies and activities. The Twitter account is *@The FedFiles* and you can always email me at a new address, *cparris@thefedfiles.com*

Brian Wood, W0DZ
www.dzkit.com

A Fond Look Back...and Ahead

Since this is a quarterly column and *MT* is ceasing publication with this issue, it will be my final column. I have enjoyed trying to give you informative articles on a wide variety of topics and I sincerely hope you've enjoyed reading them. In these columns, I have written about Software-Defined Radio (SDR), rig control (including writing your own VB software to do it yourself); the SETI at Home program; how to write your own logging software using MySQL; shortwave listening from your car; how microprocessors control radios internally; tools for testing transmitter emissions; SO2R, DIY PCs, and HD AM/FM Radio. I've also reviewed the RFSpace SDR-IQ, Silicon Pixels' Chromasound Audio DSP software, DXLab-Suite and Ham Radio Deluxe. Whew!

History of Computers and Radio

The nature of computers is changing. In the 70s, it was a hobbyist's domain. We built our own computers, we built kits, and we used cassette tapes to load the software into 64 kB of memory (if we were lucky), using DOS and CP/M operating systems utilizing TV sets with 16 lines of 40 characters for display.

Those were the days of the MITS Altair, IMSAI 8080, The Digital Group system, Heathkit H8 and H89, Radio Shack TRS-80, Commodore PET, VIC-20 and C-64, Sinclair ZX-80, Atari 400 and 800, and many more. In the 80s, the IBM PC ushered in the beginning of the consumer PC, with many companies creating models that were IBM PC compatible, notably the HP Vectra. Apple began in this era, creating a second path, oriented more toward the creative arts.

The 90s brought a big shakeup that caused many companies to merge or fold. It also brought the modern era of Microsoft Windows, Apple O/S and Linux. The Internet got rolling too, changing the game for the entire world by the end of the millennium.

Today, we find ourselves using Android and iPhone cell phones to interface to our radios and to the Internet. Although the many PC applications we've used for over a decade are still in use, we may be moving to an era where the app resides in the "cloud" and the devices we keep at home and in our pockets are much simpler.

Computers of all kinds have found their way inside virtually all modern electronic devices, especially amateur radio equipment. One thing seems certain – the computer in one form or another will be with us for a long time. We may find that physical interfaces like USB give way to built-in Bluetooth or other wireless controls, but we should still be able to remotely control our radios from computing devices for the foreseeable future.

While we programmed computers in BASIC or FOCAL or FORTRAN or assembly language with the goal of, say, making a text-based game that could do a long range sensor scan or use the code "xyzzy" to move out of a dangerous area in Adventure, today's youth create elaborate 3-D graphics to fight ferocious creatures or terrorists, save damsels in distress or move from level to level in a game requiring lots of creativity.

Computer graphics have gotten very life-like and will no doubt eventually reach the point where movies will no longer need paid actors at all and you won't be able to tell that the characters are all generated by computer graphics! Imagine this: entirely new episodes of Star Trek could be created, using the original actors' synthesized voices and computer generated versions of Kirk, Spock, McCoy and the rest of the cast. That should usher in a whole new host of legal issues: does an actor get royalties from a movie made with a synthesized version of his or her voice and a lifelike representation of his or her persona? You can bet the Screen Actors' Guild will want to say yes!

Can androids be far behind? It doesn't seem too far-fetched to think that the science-fiction notions of Asimov's three laws, android rights (egad, really? We haven't even gotten human rights down yet!), and Big Brother watching our every move are all that far away. As Lee Adama said in the final episode of *Battlestar Galactica*, "Break the cycle. We leave it all behind and start over. No more computers, no more technology. Just all of us, in this place, starting a new life." How many of us have wished for that, eh? Return to a simpler time. But, it is probably not to be. The computer is just too useful. It is humbling to think that every cell in our bodies is a computer running a DNA "program." Diseases are being cured by editing those programs!

It is, of course, still possible for some cataclysmic event like an EMP to destroy our electronic infrastructure, returning us to simpler times not by our own choosing. Part of amateur radio is the emergency preparedness aspect. Having run a retail amateur radio store for four years, I can attest to how many people are getting into the hobby not as I did, to experience the awe and mystery of radio and electronics, but to have a way to stay in touch with family and friends in the event of a major emergency.

Changing Spectrum Landscape

Starting in the 70s, Japanese radios from Kenwood, Yaesu and ICOM dominated the market as Surface Mount Technology and automation made radios cheaper to buy than build. Our government allowed products to be imported and sold at prices below the parts cost for their American counterparts.

It's happening again with China. For example, Japanese VHF handhelds are currently selling for around $500, but Chinese equivalents, which are getting better and better with each new design, are selling for $50 or less! As a manufacturer, I can tell you that American companies would be hard-pressed to sell an empty chassis for $50. Is this fair? I don't think so, but there's certainly no push to change anything. I am a big advocate of free enterprise, but the playing field is not even close to level.

Radio is changing too, from analog to digital and from shortwave to VHF, UHF and above. More and more people on this planet will require more and more bandwidth to handle more and more phones, and that means higher frequencies, more data compression and faster movement of data. Shortwave broadcasts are fading out in favor of Internet broadcasting, CW is slowly but surely disappearing everywhere but the ham bands, and there's talk that the sun may be ready to go into another "Maunder Minimum," which means we might have to endure several decades with very few sunspots. That would not bode well for shortwave communications nor for amateur radio, at least as we have known it for the last 100 years.

If I seem to be waxing political, it is with good reason. The FCC has been run by non-scientific people for quite a while now, and they have been making decisions that impact the quality of amateur radio by allowing, for example, Broadband over Power Line experiments all over the United States. Such systems have constantly been proven to cause RFI on HF, but requests to limit them have fallen on deaf ears. Fortunately, such systems tend to collapse on their own.

The ARRL has been very proactive in Congress, trying valiantly to remind senators and representatives that amateur radio is a national resource, especially in times of emergency. After all, the best computer and radio interfaces in the world won't matter if the FCC decides to eliminate amateur radio. Like freedom, it requires constant vigilance.

I know this all sounds like doom and gloom, but it doesn't need to be. I've been a ham for 48 years, and every year I have heard the suggestion that ham radio is dying, but it manages to survive and is even growing at a healthy pace again! In the 60s (and even before), the lament was that appliance operators had taken over and that no one built their own equipment any more. How untrue that was! Thousands of us built Heath, Eico, Dynaco, Knight, Hammarlundand other kits. Many built projects from the League's *Radio Amateur's Handbook*, at a time before the Internet existed, when finding parts was much harder than it is today.

Looking to the Future

Today, kits have started to make a comeback, with offerings from my company (DZKit), Elecraft, MFJ, Ten-Tec and others. As long as somebody wants to know what makes things tick, as long as that spark is still there, there will always be room for kits and homebrew projects. The technology may change, the parts may get smaller, but the yearning to do-it-yourself will never die.

Ellie and "Rip" Van Winkle, who formed and help run the Boulder Amateur Radio Club Jr. organization (BARC Jr.) like to say that to get youth interested in electronics and ham radio, you have to get to them before the "fumes" do – the car fumes and the perfumes! In other words, middle school and early high school are perfect times to teach youth about this fascinating hobby. They have done amazing things with kids, and it gives one faith in our future to see technically-literate kids moving out into the world. Many are home-schooled, a red flag for our public education system.

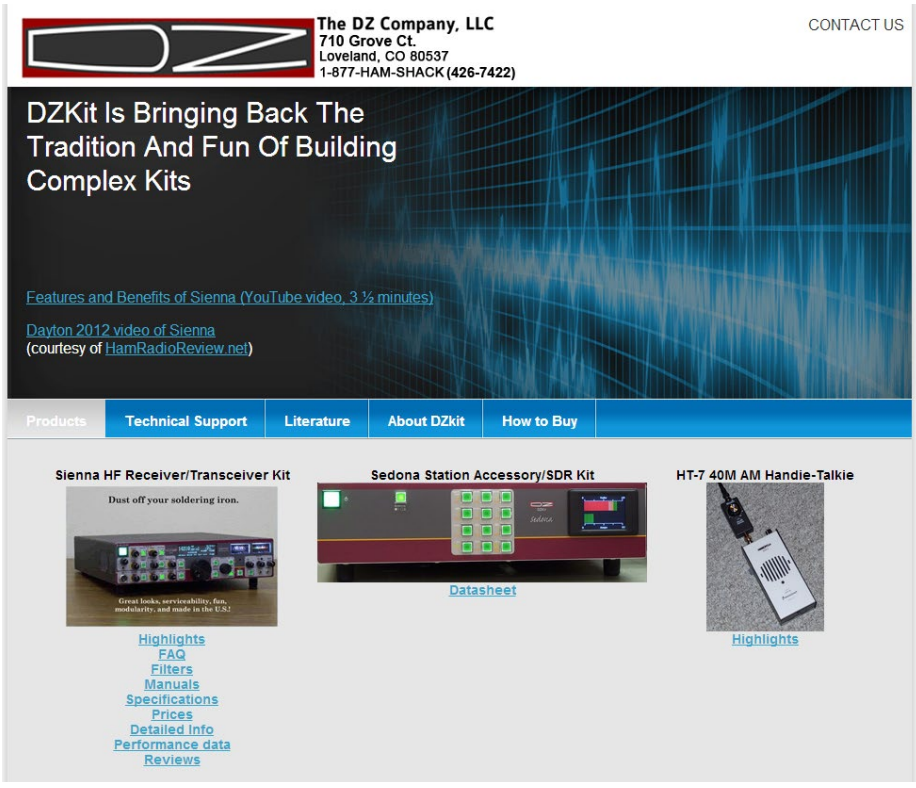
Since this column is supposed to be about computers and radio, let me add something about that specifically before I ride off into the sunset. The Software-Defined Radio (SDR) seems to be the wave of the future. As an electrical engineer I must confess to being annoyed at this transition. I write software too, but electronics is more fun, and getting radio signals into the software domain as fast as possible so you can write buggy code to make a radio and then support it forever with bug fixes and feature enhancements just doesn't light my fire! Nevertheless, in this column I've tried to clear up some confusion about just what "SDR" means, and I want to take one more stab at it. First, it does not mean that you can download new control firmware into the radio. Almost all modern radios can do this whether they are all digital or all analog. The purest definition is that the radio spectrum is sampled at a high rate and then fed into a microprocessor, where software algorithms perform mixing, demodulation, filtering and noise reduction, and then output the decoded signal to a digital-to-analog converter that drives a speaker. For transmitting, the process is reversed. (Of course, you can't make RF power amplifiers in software, so that part still has to be done with real electronics!)

The point is that the traditional RF components that have been used for decades to make radios (diode ring mixers, LC filters, noise blankers, oscillators) are replaced with software. Examples of radios that do this are those made by Flexradio and RFSpace, and the Elecraft KX3. Elecraft's K3 is referred to in the ARRL *Handbook* as an SDR, but technically it is not. It employs digital signal processing at its IF for noise reduction, but it is a traditional analog radio otherwise.

Note that almost all true SDR's do not provide a physical front panel, opting instead to use the required PC to implement a soft front panel. There's no reason why an SDR can't have a "real" front panel though. The controls could be fed into any PC input port and made to work just like a soft front panel. But, real front panels are very expensive. For example, the DZKit Sienna offers an optional front panel for $699. This is mostly due to the vacuum fluorescent display ($175), analog meters ($40 each), tuning encoders ($60 each), knobs ($40), sheet metal ($25) and polycarbonate overlay ($15). Then there are pots, screws, standoffs, cables, you name it! It adds up.

It's no wonder manufacturers of true SDRs don't want to be bothered by that kind of stuff. I maintain that most hams prefer twiddling knobs, flipping switches and looking at backlit meters than clicking mice and watching LED bar graphs. But I could be wrong. Today's youth have been brought up on video games and PCs the way my generation was brought up on TV. So perhaps all that will change. I hope not though. There's something magical about turning on a radio by actually turning a knob, and then finessing the controls by hand to extract a weak signal from the noise or get rid of unwanted interference.

On my way to Dayton this year, I stopped at a rest area and the car next to me had a bunch of antennas all over it so I introduced myself. The owner proudly showed me his SDR, power supply, Ethernet router and a bunch of other peripherals in the back seat. He walked me to the passenger seat and showed me how he could control it wirelessly from his PC laptop with an attached headset. I watched him fumble around for five minutes, trying to get the right drop-down menu to set the mic gain and turn on the headphones in order to dial a frequency. I couldn't help but say that it would have taken only a few seconds to do that with a real front panel. It would seem that by making humans an extension of the computer, we spend more time tweaking menus than getting on the air! Maybe that's why the bands are open but no one's on.



Last Word

I'd like to add a personal note. On July 7, I suffered a heart attack. Fortunately, I recognized the symptoms (crushing chest pain radiating into my left arm, sweating), chewed on some aspirin (which is supposed to thin the blood, and is recommended if you think you are having an attack), and I got to the hospital within 12 minutes. The doctors said those two things probably saved my heart from damage. They ended up putting two stents in two blocked arteries in two separate operations, each of which took all of 10 minutes. I was awake during the procedures, and as an engineer, I couldn't help but be amazed at the medical artistry that unfolded before my eyes, made possible by fast computers, low-radiation X-rays, tiny tubes and inflatable balloons that can be fished through blood vessels safely, and precision placement of chrome-platinum stents by skilled hands.

I had had a complete physical just a few months prior, and it showed normal cholesterol, normal EKG, normal BP and normal blood chemistry. I eat right and exercise, don't smoke and am not overweight, so this was a shock to the doctors as well as me! I implore all of you reading this to take care of your health. Choose low salt, low fat, low carb diets, exercise, eat fruits and vegetables, cut out fast food completely, especially soda pop and fries, and don't smoke! Medical science can do amazing things, but it's very expensive. Please, take care of yourselves. We need all the shortwave listeners and hams we can get!

I also want to thank Bob Grove for having provided one of the only shortwave listening resources in the world for so long. I wish him a long, happy and well-deserved, retirement. I'd also like to thank *MT* Managing Editor, Ken Reitz, for putting up with all my formatting mistakes as I tried to get this column easier for him to edit! Finally, I'd love to hear from those of you who have enjoyed my column over the past four years. Please write to me at **w0dz@dzkit.com**.

Kevin O'Hern Carey, WB2QMY
kevincarey@monitoringtimes.com

Logging On

With the winter longwave season now in high gear, this seems like a good time to discuss logging your DX catches. A good log can help you spot changes in the band and allow you to gauge current conditions by checking what has been heard in the past. A log also provides a tangible record of your best DX, something that can be gratifying to review in the "off season," when longwave may be in the doldrums. A logsheet is a time-tested way to chart your DXing progress, so this month we'll discuss how to make one that suits the special needs of the longwave DXer.

A log doesn't have to be anything fancy. You can make up a ruled sheet, and run photocopies of it as needed. Or, for those wishing to go first class, a log can be kept on a computer using a spreadsheet or word processing program. This has the added advantage of letting you sort the log into different formats (by ID, frequency, or date, for example), and also allows easy sharing of your log with others via e-mail.

What categories should your log contain? Just as with shortwave logs, it's important to show the date, time, frequency, ID, signal strength and location of the station heard. But that's pretty much where the similarity ends. There are some additional categories that should be considered for the LW DXer…

Serial No.—Many beacon chasers like to assign a sequential number to each log entry. This makes it easy to keep track of your total loggings at a glance and provides a convenient reference point when searching for a specific entry later on.

ID Pitch—The two tone pitches you'll hear from most navigation beacons are 1020 Hz and 400 Hz. Traditionally, U.S. beacons use the 1020 Hz tone and Canadian beacons use the 400 Hz tone. There are exceptions to the rule, however, where just the opposite is true, and these are considered somewhat rare catches – all the more reason to have it down on paper! If you're really advanced and have a way to actually *measure* the tone frequency from a station, you'll see that not all tones are exactly on 1020 or 400 Hz, but may vary slightly. Some listeners enjoy charting these differences and putting them in their logs.

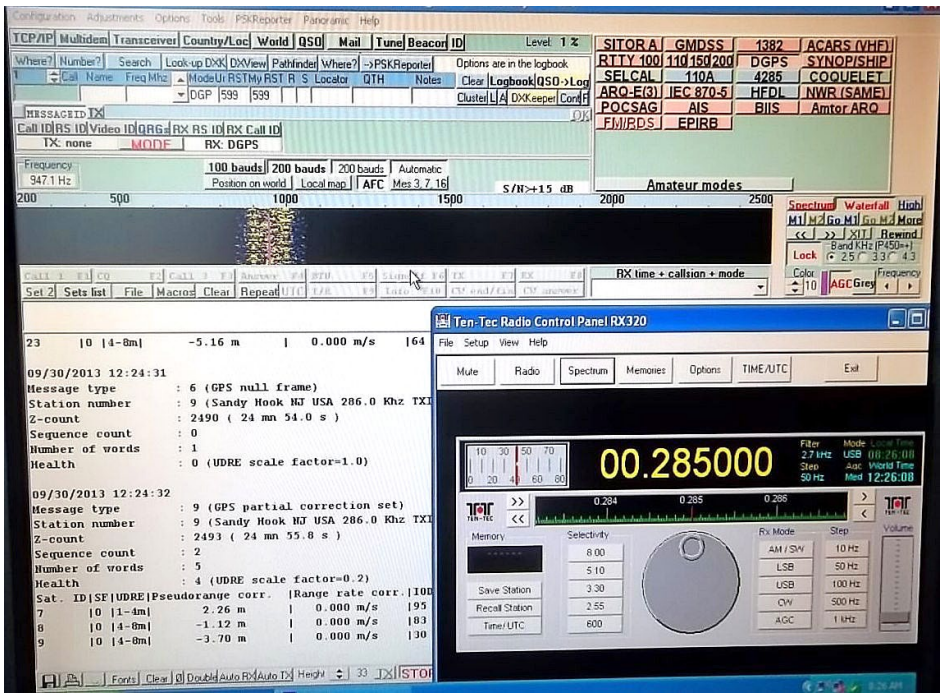
Distance—The airline distance in miles (or kilometers) from your station to the beacon site is very useful information for DXing. One technique for determining rough distance is to have a map posted in your shack with your location marked by a thumbtack. Attached to the thumbtack is a movable strip of paper that has been marked off in miles (or kilometers) for quick measurement. There are also online resourcesthat will give a more precise measurement of distance. One such tool can be found at **www.indo.com/distance**/.

Beacon Power—To put a logging in the right perspective, it's helpful to know the transmitting power of the station. For instance, hearing a 2,000-watt beacon 500 miles away may be fairly routine, but pulling in a 25-watt beacon at that distance would certainly be a good catch by any standards. Showing the power in your log can help put things in the proper context.

Service—In this space, you could have a code letter to signify the type of station you heard: **A**=aeronautical, **P**=private, **L**=lowfer experimenter,**B**=broadcaster, etc.

IDs per minute—This is the number of *complete* identifications that are sent by a beacon in one minute. This is, in effect, the "fingerprint" of the station. It can be very helpful to include this information in a verification letter as proof of reception.

Remarks—A space should be left to note special information about a logging such as whether or not the transmission included a voice message (now a rarity, except in Alaska), ID errors, local WX conditions at the time of reception, QSL information, and so on. An excellent website for determining the location and other details about a beacon can be found at: **www.classaxe.com/dx/ndb/rna**/.



Here is a screenshot of MultiPSK decoding of DGPS, which provides quite a bit of information. The registered version costs about $42. (Photo courtesy of Mario Filippi N2HUN)

❖ Mailbag&Loggings

Carl Schmidt WA8ZTZ (MI) sent some recent loggings and photos of his King Radio KR-80 ADF receiver, a radio intended for mounting in an aircraft using a standard 3 1/8" instrument hole. He notes that many beacons heard at his location are Canadian, and the locations can go by various names, including English, French, Indian (native) and with various spellings. He finds it interesting to locate them on a map, which often requires some research and provides a good geography and history lesson! A sampling of his logs (greater than 100 miles distance) appears below.

Beacon Loggings from MI

kHz	ID	Location
254	5B	Summerside, PEI
350	DF	Deer Lake, NF
360	PN	Port Menier, QC
390	JT	Stephenville, NF
391	MA	Maniitsoq, GRLD
396	YPH	Port Harrison/Inukjuak, QC

Richard PalmerW7KAM(MO) sent an extensive list of loggings from his location in Missouri. For these intercepts he used an Icom R-75, Clifton Z1501active antenna, and a Timewave DSP-599zx audio processor. A selection of his logs are shown below

Beacon Loggings from MO

kHz	ID	ST/PR	Location
200	UAB	BC	Anahim Lake
201	BV	OK	Bartleville
344	JA	FL	Jacksonville
344	TKH	LA	Tallulah
374	EE	MN	Alexandria
380	BBD	TX	Brady
382	MW	IL	Marion
388	AM	FL	Tampa
391	DDP	PR	San Juan
410	GDV	MT	Glendive
414	OOA	IA	Oskaloosa

❖ Building "Helper Loops"

In the July issue, Joe Majewski WA1WRH (NH) was searching for information on a compact LF "helper" loop to place near his portable, air-coupled LF receivers. I was able to point Joe toward a commercially made unit, the Q-Stick by Radio Plus+, which is described at **www.dxtools.com/QStick.htm**. I use one of these

Here's the sign my wife made for me upon me joining the MT staff in 1991! (Photo courtesy of Kevin O. Carey)

antennas with a Sony 2010 receiver and find it quite effective.

Another loop fan, John Stoll (NY), wrote with helpful details on building these types of loops using ferrite rods. John writes:

"Here is how to make a 'helper loop' for your LW portable: Buy two ferrite rods. I purchased two of them from eBay, which were 8" long. The diameter of these rods is 7/16 inch. I did *not* 'math out' the type of rod, this is merely what I found and bought. Obtain a roll of wire, 24 to 30 gauge will work, then wind the wire around the rods one rod at a time. I did 11 turns of wire per inch for the entire rod. Do *not* cut the wire when you finish the first rod. I used 1-inch wide paper tape to hold things as I was starting to wind or at certain points in winding, since it is easy to remove later, yet holds things in place so you don't need multiple hands to hold everything. The easy way to wind on a rod is to not start exactly at the end, but to tape the wire to the rod an inch or so in from the end, leaving 10 inches or more sticking out straight along the rod. After winding the rest of the rod and taping the end to keep it from unraveling, go back to your starting point, remove the paper tape, and then wind back to the end of the rod. Now tape the end.

"After winding the first rod completely, I then take the roll of wire, bring the wire down to the starting point of the first rod, and now start winding the second rod. Complete that to the end, again winding 11 turns to the inch. When done, again tape the end to keep things wound tight, and you may now unroll another 12 inches or so and cut the wire. Bring that end down to a variable capacitor. I used one from a transistor radio. The cap had a value of around 300 pf, and when I finally 'tuned' it, it was about halfway meshed. The other end of the cap goes to your original wire end for the first rod. I taped the two wired rods together so the wire ends of the two combined rods each connect to the cap. If you don't have a signal generator, then tune your portable to a signal on LF, bring the two rods close to the internal rod inside the radio case, and then try to 'tune' the cap. With mine, I can start with no heard signals, and bring signals up to about 60% of the signal strength meter on my Grundig Eton G3 portable. Nice improvement.

"The loop shown in the picture was thrown together out of common materials, just to show how to crank one out for yourself. No pre-planning or designing was done. I do have to shorten the wiring, and put it in some sort of tubular (non-conductive) case. For my G3, if I move my loop in front of the LCD display, I lose *all* stations regardless of strength, and hear nothing but hash noise generated by the LCD panels. If I move the loop to the back where the internal loop is, all of a sudden, I get a huge improvement, but it has to be right up against the case.

"Perhaps the induced signal would have been better if I wound the wire around both rods at the same time, as if both rods were really one. Honestly, this is why I used tape to hold things together, as I can undo/redo things for experimentation. When I finally get a working model, the glue gun will come out. Perhaps I need better rods, or more or less wire. Either way, I have a working model right now. Perhaps I can improve it, but right now it makes a very noticeable improvement.

"So my experiment was a success. Positives: Cheap, reliable, small. Negatives: The loop must be pressed directly against the case by the internal rod antenna. It isn't good enough to create a 'hot zone,'as with a Select-A-Tenna used on the AM Broadcast Band. I have portables which can be six inches away from the Select-A-Tenna, not even parallel to it, and see a great signal improvement. However, the Select-A-Tenna is also a much larger unit, so creating that 'hot zone' to place the portable in may require a larger device. Creating an LF version of that antenna would be nice! For now, give this homebrew loop a try. We aren't talking about a lot of time, effort or expense. I hope your results are as good or better than mine!"

Many thanks John. I hope many of our readers will give this a try. As you note, the most important thing is to start experimenting and see what kind of results you get. Also, I like the advice about not making things too permanent right away, as it allows one to more easily "tweak" the design and try new ideas.

In a follow-up note, John passed along this additional information and tips:

Two longer ferrite rods are shown in the photo above (purchased later), and they are wound in series.

The wire used was Litz, 220/44, also obtained on eBay. Litz wire is made up of separately insulated strands, and can be especially effective for use at lower RF frequencies. However it is more challenging to prepare for soldering due to the multiple strands it contains. He dipped the ends of his wire in drain cleaner for 10 minutes, then rinsed *thoroughly*. Conventional solid wire would work well, too, and is more easily obtained.

Indoor reception with a ferrite loop may be a challenge due to electrical interference. If reception is noisy, try to find a spot outdoors, away from buildings and electrical systems.

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The Battery Set Era

What would be a good subject for a column that will be my last one in *Monitoring Times*? Last month we finished the Echophone project and there's hardly any point in starting a new restoration now! So it occurred to me to go back over previous columns that discussed the first radios used to regularly receive broadcast programs in the home. Why is that? Well because if you think about it, it represents the beginning of something new. And that's exactly what's going to happen to the old "Radio Restorations" column.

It will be reborn as "Adventures in Radio Restoration" in *The Spectrum Monitor*, a new on-line magazine edited and produced by Ken Reitz, currently managing editor of the soon-to-disappear *Monitoring Times*. Interested? To find out more, go to Ken's new web site at **www.thespectrummonitor.com**

❖ Crystal Receivers

I'll bet if I were to ask you to name the earliest type of broadcast receiver to be widely used in the nation's living rooms, you would immediately say, "Must be the crystal set." A picture comes to mind of dad fiddling with the cat's whisker adjustment, intently listening through earphones glued to his head, while the rest of the family listens through extra earphones or looks on.

The truth is that, while the earphones and intent listening are definitely part of the picture, the cat's whisker and crystal are not. The galena crystal, along with other forms of semiconductor detectors (such as carborundum, zincite and platinum/acid [electrolytic]), date to an earlier era of radio communications, the era before World War I.

Back then, there was no radio broadcasting (that is diffusion of entertainment or information to the general public). The radio transmissions were point-to-point communications, mostly marine, commercial and military. Home crystal set users were individuals, much like present-day *MT* readers, who wanted either to listen in on the broadcasts or communicate with some of the stations. (Back then those with amateur transmitters were not prohibited from contacting non-ham stations.)

But the radio communications landscape had changed dramatically by about 1920 thanks to the technological advances made during World War I. Especially important were the developments in vacuum tube technology and the availability of great numbers of tubes, at low prices, on the war surplus market.

The improved tube technology not only facilitated the transmission of voice and music, but also made it possible to receive the transmissions reliably and with simple equipment. The result: during the early 1920s there began an explosion of broadcast stations, including many in attics and garages, all sending out programs to the private listener.

❖ The Regenerative Receiver

Some young hobbyists and families with limited budgets were still tuning in these programs with crystal sets. But the more serious listeners were gravitating to vacuum tube radios using a simple, but powerful, circuit devised by legendary radio inventor Edwin Armstrong.

In Armstrong's basic *regenerative* circuit, a single tube served both as detector and amplifier (the latter was a function that could not be performed by the crystal detector or any of its relatives).

But the astonishing performance of the Armstrong circuitry lay in its feedback arrangement. Part of the tube's output was coupled back into the input. The result was that the received signal could be amplified over and over again, resulting in tremendous gain.

In the earliest regenerative sets, the degree of feedback was controlled by changing the relative positions of two coils, one in the output circuit and one in the input. The closer together the two coils, the greater the degree of feedback.

With the coils too close together, the tube would go into oscillation, emitting a radio signal that would interfere with other radios in the neighborhood and create an ear-splitting howl in the earphones. The idea was to reduce the feedback (regeneration) until it was just below this point, resulting in maximum amplification of the received signal.

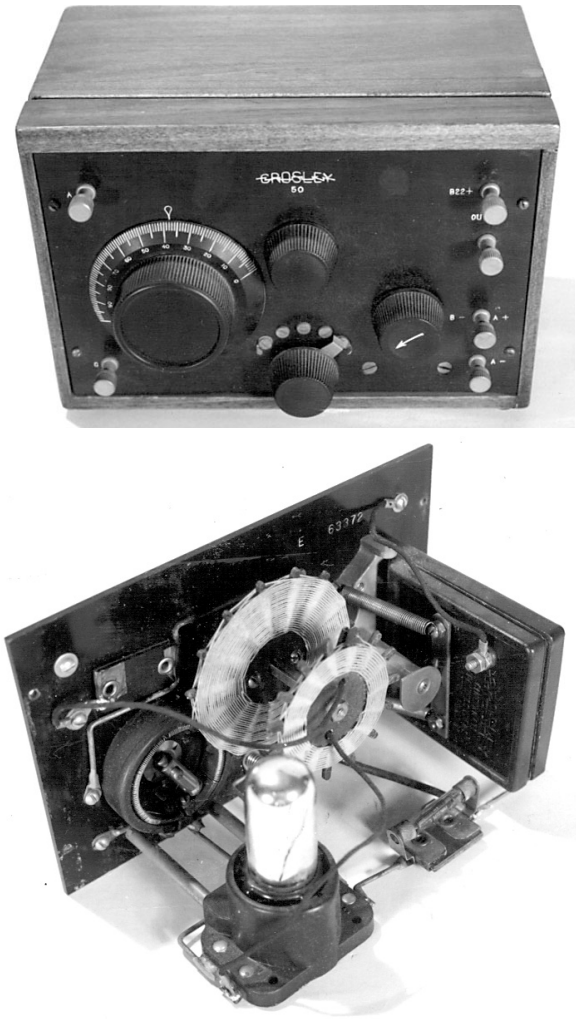
The regenerative circuit extracted so much performance from a single tube that many of the early 1920s factory and home-built sets had just one. A typical example was the Crosley 50. I've included both interior and exterior views of this set. Notice the two pancake coils that controlled regeneration. They can be brought closer or farther apart by pulling of pushing on a front panel knob.

Crosley 50s are still quite common at radio meets because they were originally manufactured and sold in such great quantities. I saw one sell, without tube, for about $50.00 at a recent auction.

The tube is an important issue because it can cost in the high double digits to replace the rare type 11 or 12 that belongs in the set. If there is a tube installed in a "50" you are considering purchasing, check it carefully. Make sure it is the correct type (you may find the socket occupied by a much less costly 01-A that is wrong for the radio), and that the filament is good. Filaments blew out easily, especially when inexperienced users connected the batteries incorrectly.

❖ Firing up a Crosley "50"

Unlike the later, more elaborate, battery sets that were designed to use an auto-type "A" battery to light their filaments and two or more large "B" batteries to supply plate voltage, the Crosley 50 is very easy to power. Use a flashlight "D" cell, or perhaps a couple of them in parallel, to energize the 1 1/2-volt filament. Three 9-volt transistor batteries in series will



Two views of the Crosley 50. Front panel controls (clockwise from left) are: Tuning dial, regeneration control, battery voltage control and coil tap selector.

do for plate voltage. If you're a purist, add a series resistor to drop the 27 volts down to 22 or 23.

Connect the antenna, ground, batteries and headset. (The headset has to be a high impedance unit, not a modern hi-fi type. Vintage sets of the correct 2000-ohm impedance are readily and inexpensively available at radio meets). Turn the battery rheostat to the minimum (fully counterclockwise) position and pull the regeneration control all the way out so that the coils are as close together as possible.

Now slowly advance the battery control until the set comes to life with a rushing or howling noise. Push in the regeneration until the noise stops, then pull it back until you hear a pop or howl that signals the onset of regeneration. Slowly push it in again until the noise just stops. Now you are ready to tune for stations.

To understand the tuning procedure, take a look at the tuning capacitor (upper right in interior photo). One of the two plates is fixed, the other is spring-loaded and moved in and out by an eccentric cam controlled by the large front-panel knob. Called a "book capacitor," it has a very limited capacity range compared to the modern variable capacitors we're all familiar with.

For that reason, the tuning coil is tapped so that more or fewer turns can be placed in the circuit depending on the position of the front-panel tap switch. In this way, the broadcast band is spread out in segments, each accessed at a different position of the tap switch.

❖ The "Three Dialer" Era

The little regenerative receivers in common use at the dawn of broadcast listening in the early 1920s could squeeze a tremendous amount of performance out of a couple of tubes and a few components. But later in the decade, the simple regen radios began to be replaced by a type known as TRF (tuned radio frequency) sets, otherwise known as "three-dialers," because of the three prominent knobs used to tune in stations.

The TRF sets were really quite inefficient compared to the regenerative models. They required three tubes, two of them successively amplifying the received signal and the third detecting it (converting it to audio), to accomplish what the regen radio could do with one tube.

However, the Westinghouse Company had purchased the regenerative patent rights from inventor Edwin Armstrong and was rigidly controlling licensing. Would-be manufacturers wishing to cash in on the 1920s radio craze needed circuitry with rights that were easier to acquire. Enter, the three-dialer!

In addition to the three tubes needed to match regen performance, the TRF sets invariably had the two additional tubes needed to operate a loudspeaker. It didn't make much sense to operate a power-hungry, three-tube circuit that would provide only earphone volume. It was better to add the extra tubes and gain a powerful selling point.

Though it was a little more clumsy to tune in stations with three dials instead of one, the tuning process was a lot smoother and more

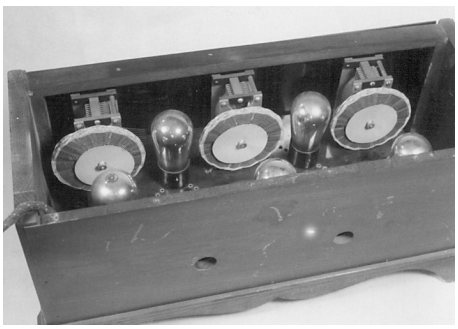
The three-dialer's five tubes provided decent sensitivity and selectivity as well as power to drive the horn speakers of the era.

forgiving than that of a regenerative set. The latter could easily break into oscillation and squealing if the controls were mishandled, sometimes radiating a signal that would interfere with reception all over the neighborhood.

Another advantage of the TRF over the regen turned out to be those extra tuned circuits that were needed to bring in the signal. They happened to provide extra selectivity that became very desirable as the broadcasting industry expanded and the radio dial became more crowded.

But while the one-tube regenerative sets could be operated from a few dry batteries, the five (or sometimes more!)-tube, three-dialers required much more power, particularly to light their filaments. Power to light the row of glaringly bright 01-A tubes usually came from a rechargeable auto-type 6-volt battery. Plate and grid bias (as necessary) voltages generally came from dry batteries as before, though more and larger ones were required.

And so, the coffin-shaped three-dialer with its horn speaker, external batteries, and tangle of interconnecting wires began to dominate the living rooms of comfortable middle-class homes. For awhile, the equipment was enough of a status symbol to overcome the disadvantages of its "Frankenstein's Laboratory" appearance and the damage to carpets and floorboards from accidentally spilled battery acid. But towards the end of the decade, this approach to radio reception had become obsolete.



The TRF circuitry required the use of three r.f. coils, each tuned by a separate variable capacitor.

The expense and inconvenience of dealing with multiple heavy batteries stimulated radio inventors and manufacturers to come up with alternatives. The first response was the development of "battery eliminators." These were plug-in units that took the place of batteries in battery sets.

Most common were the "B-eliminators" that replaced the dry batteries that supplied the various plate voltages. Also available were the more bulky and expensive units that replaced the storage "A" batteries that lit the tube filaments.

Though this equipment eliminated the necessity for replacing and/or charging batteries, it didn't improve the aesthetics of the parlor radio corner. They sat under the table in place of the batteries and were connected to the radio by the original tangle of wires.

But by the end of the 1920s, significant electrical and mechanical innovations had dramatically upgraded the convenience and appearance of the living-room radio. The development of vacuum tubes that could be lit by alternating current made it possible to power radios directly from the AC line using compact circuitry that could be built right into the radio cabinet. And, methods of ganging tuning capacitors via belts and pulleys made it possible to replace the three tuning dials with a single one.

Gone too were the control knobs used to keep filament voltage constant as the "A" battery slowly became discharged. The filaments were now operated from constant voltages derived from the city mains. The radio panel which formerly bristled with tuning knobs and rheostats now required only three controls: on-off, tuning and volume.

The old three-dialers were relegated to the attic or basement, replaced by new sets with a squarer footprint to accommodate the built-in power supply and (usually) a metal cabinet instead of wood. The latter change was probably prompted by the need to better dissipate the heat from the internal power supply circuitry.

The era of the battery set was over!

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ANTENNA TOPICS

Dan Farber, AC0LW
danfarber@monitoringtimes.com

We Had A Good Run...of Ladder Line

Welcome back my friends, to the show we thought would never end…I've enjoyed being your antenna columnist for the last four years. Along the way, we've talked about stealth, tuners, balanced vs. unbalanced feed, various ground issues, reviewed a few products, studied the history and development of a number of antennas. Seems like I was just getting started.

I think the best part of the experience (yes, even better than seeing myself in print) has been the feedback, questions, and thanks that I have gotten from all of you faithful readers. For one thing, I can tell that folks actually read the column! I've gotten good, sharp questions, requests for advice on a particular setup, suggestions for future columns, even ones along the theme of, "Thanks to your article on oddball antennas, I'm inspired to get one up and get on HF." I sincerely doubt that any of this is due to some overwhelming skill I may have as a writer; but I am and have always been enthused about antennas, and maybe some of that came across. Let me share just a few examples:

John N8ZYA, so enjoyed my column on stealth antennas, with Isotron prominently featured, that he wrote to tell me of his successes with Isotrons *indoors*…and to say that I had inspired him to try an indoor wire antenna for the lower bands.

Judy W1ORO, had a series of good questions for me about dipole heights above ground. When we resolved those she had more good questions about loop construction.

Bill liked my stealth ideas so much that he sent me this nice picture of his roof-mounted RF Systems DX500 active antenna, with a sun-powered LED lamp on top as a disguise!

Robert KC9KXI, responded to my loop antenna construction project with numerous sharp questions about feedline, a tuning capacitor for the loop, and general construction details.

Those were just a few of the e-mails and letters I have received. Many have been on the theme of, "I was despairing due to antenna restrictions, but you've given me the courage to put up a stealth antenna and get on the air." Or, the nice letters that say things like, "I love your antenna column. The whole magazine is great. Keep up the good work!"

Don't get me wrong – I'm not trying to toot my own horn here, just reacting in gladness to the realization that our faithful readers really do read and enjoy our columns, and sometimes get some use out of them. That's what has made it all worthwhile; to see that my enthusiasm for antennas affecting others, too, and maybe encourages them to try a new idea or put up something stealthy.

❖ A Few of my Favorite Things

I think my favorite of the antennas I've written about in this column was the rain gutter antenna I featured in my very first appearance here. Yes, the "rain gutter antenna" is something of an urban legend, but often such legends contain grains of truth. Fed as a random wire, my second-floor gutter loaded up on most bands (not on 17 or 12) and worked DX as well as any antenna I've used. And for stealth, it's hard to beat a normal, permanently-attached feature of the house—like a rain gutter!

My big dipole has been my "go-to" antenna for some time now. I wrote here about my adventures putting up the 102 foot dipole using the E-Z Hang system, and how its length and ladder-line feed allow me to effortlessly access every band between 3.5 and 54 MHz. As a bonus, I can also feed it as a "T-vertical" and transmit effectively on 160 meters. And, it has for some years now survived what passes for weather here in Kansas, which means that all of you that live in areas of *normal* weather can consider it for your own location!

I enjoyed testing and reviewing the Chameleon V1 vertical in these pages. It was unusual for me to buy, rather than build, an antenna, but I wanted to be a well-rounded antenna columnist and try to help you, the readers, decide whether to purchase a particular product. Predictably, I was both pleased and disappointed by the little vertical; but I should have realized that asking this little eight-foot whip to work well on 80 meters was asking too much. It did give a creditable account of itself on many of the higher bands; and its portability and ease of setup were impressive.

Bill Bowers' photo of his rooftop stealth antenna. (Courtesy: Bill Bowers)

I also had fun describing the line of antennas made by Isotron. I've heard so many of these on the air, and seen so much skepticism from those unfamiliar with them, that I felt I must jump in there and sing their praises. They are certainly stealthy and space-saving antennas, and perhaps more to the point, they don't *look* like antennas, which may help keep the Antenna Gestapo from busting them.

I was surprised by reader response to my homemade low-frequency listening loop antenna; I received more letters and e-mails about it than any other antenna I wrote about. My readers, an intelligent and perceptive bunch, had a number of excellent questions about construction, procedure, and additional circuitry.

❖ And, Finally…

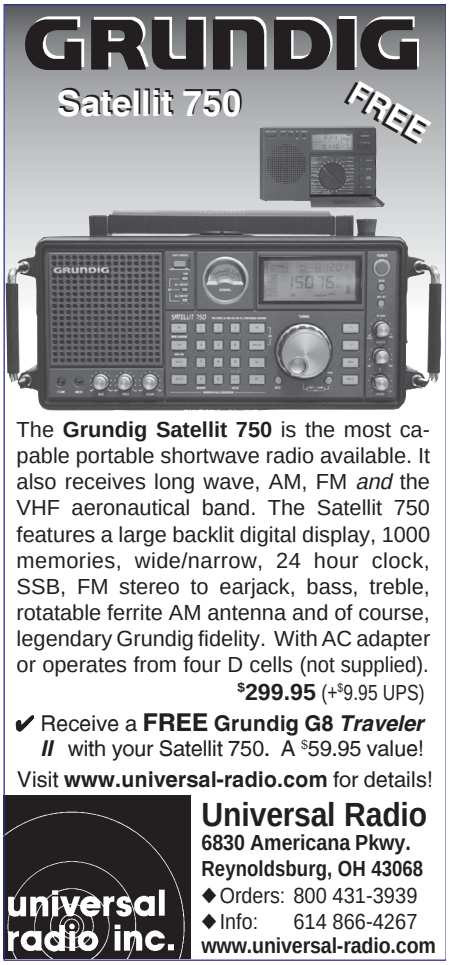
My deepest and most heartfelt gratitude and appreciation go to Bob Grove and his family, for creating this great magazine in the first place, for keeping it bright and shiny and flourishing for so long, and for bringing this neophyte writer on board to scribble about antennas. I hope that in the few years that I've written for your magazine, Bob, that I didn't embarrass you too often or make the mag look silly. I know well that I joined a crew of great writers. I hope that here and there I wrote well enough to be a proud part of the group.

A special place in my heart will always be held by Rachel Baughn, who was the managing editor who first hired me, based on a freelance article I had submitted. From the beginning Rachel was kind, helpful, and patient, walking this novice writer through the process of writing for a real magazine. She helped me, she encouraged me, she advised me, she was always my friend. I will never forget her. I hope that dealing with me didn't make her ongoing "semi-retirement" at the time too stressful.

Ken Reitz replaced Rachel as managing editor. He has been the archetypal boss, alternately growling, pleading, encouraging and suggesting, whatever it takes to get the best from his writers. He kicked me out of my complacency more than once and made me write my best. I look forward to continuing to work with him in the digital pages of *The Spectrum Monitor.*

And, I have only admiration for the stable of great writers I was privileged to work with here at *Monitoring Times.* At first, I was somewhat intimidated, they all wrote so well and knowledgeably on their topics, but I gradually came to feel like my antenna column might sometimes be as good as the stellar work they always turned out. I hope to continue to work with some of them in the future, too. I have avidly read all of the other columns in the magazine and hoped that I could one day bring to my column the same degree of enthusiasm and skill.

But, of course, the real kudos go to you, the readers, without whom there'd have been no ongoing magazine! You've obviously been a devoted and faithful group, and whatever success we've achieved as writers, as a magazine, is due to you, the buyers and reader of *MT*! Thank you all, from the bottom of my heart. I hope to see all of you again, either through the written word and illustrations, or on the various bands. 73, everyone—stay safe—keep fighting antenna oppression—and *happy operating!*



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http://americanbandscan.blogspot.com

AM Improvement, Part 3

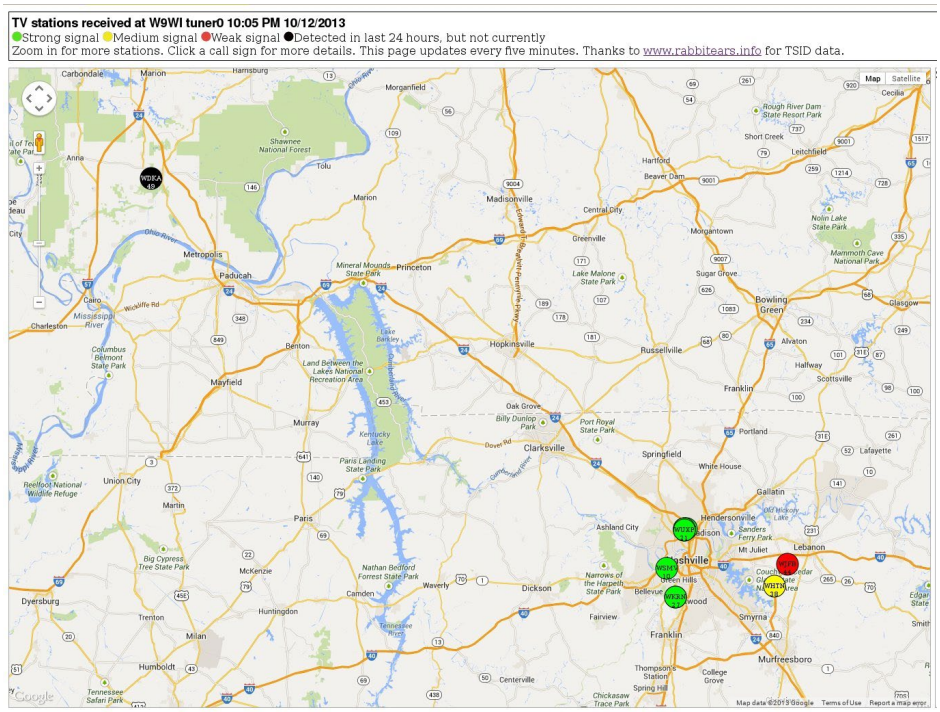
You've seen quite a bit in this column about FCC Commissioner Ajit Pai's AM improvement initiative. In early October, Commissioner Mignon Clyburn moved this initiative from a bunch of talk to a formal proposal. As Murphy's Law would seem to require, the partial shutdown of the U.S. government then intervened. As of deadline, we have not yet seen the text of this proposal. We do, however, have Commissioner Clyburn's comments at the NAB Radio Show.

Four of Commissioner Clyburn's proposals would make it easier for AM stations to move to new transmission sites. Many AM stations have found the land under their towers is worth more than the station itself. Or, stations are leasing land for their towers, and the landowner has decided to sell the land for development. Unfortunately, moving an AM station's transmitter is far more difficult than moving to a new house. Indeed, it's far more difficult than moving an FM station's transmitter.

Each U.S. radio station is expected to provide service to a "principal community," also called a "city of license." The term, "service" means programming addressing the needs of that community, and it means providing a way for citizens of that community to comment on the stations' operation. It also means the station must provide a strong signal to that community.

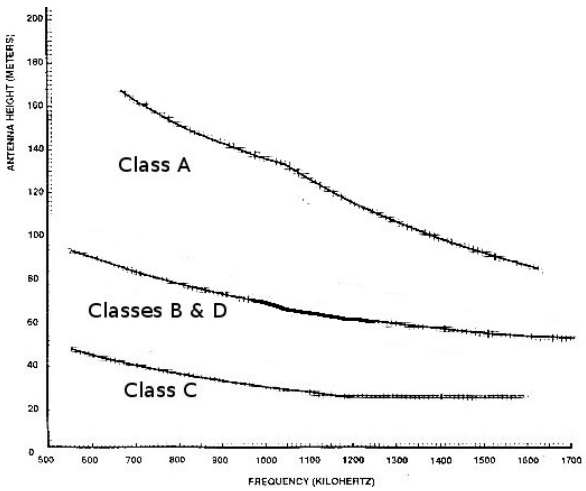
This strong signal can be difficult enough to provide from an AM station's existing site. AM stations are "shoehorned in." Often, if the tower is moved, power must be reduced to avoid interfering with another station on the same frequency. Frequently, the station just barely covered its principal community at the old site. Reducing power may make adequate coverage impossible.

Making this even more difficult is something called the "ratchet rule." When an AM station makes technical changes, it must reduce the amount of interference it causes to other stations. Generally, this means a power reduction. But again, if the station was just barely covering its principal community with the old power, a power reduction will make that coverage impossible.



Automatic TV-DX scan for my location near Nashville. (Courtesy: rabbitears.info)

The antenna used by an AM station must provide a minimum strength of signal across the principal community, but it must also do so with at least some minimum efficiency. This efficiency can be tied directly to the height of the tower(s), and this height is specified in a chart in the FCC regulations. For example, for most stations operating on 1000 kHz, the tower(s) must be at least 70 meters tall. (that's about 230 feet.) This minimum height can often be a problem. Local authorities may not be willing to permit any tower taller than 60 meters. Or, the station may need to share towers with a station on 1300kHz, whose tower only needs to be 62 meters tall.



Minimum AM tower heights by frequency. (Courtesy: fcc.gov, edited by D. Smith)

Clyburn proposes to reduce the minimum signal an AM station must provide across its principal community. She proposes to repeal the ratchet rule. (I can still hear broadcast engineers cheering!) And, she proposes to reduce the minimum required efficiency of AM transmitting antennas, allowing stations to use shorter towers.

Last month, you read about an explosion of FM "translator" stations. These low-power stations rebroadcast the signals of other stations. Recent changes in the rules allow AM stations to be rebroadcast on FM over these "translators," and AM stations have been busily taking advantage of this new option.

You also read that applications for new translators are only accepted during "filing windows," and that the last such window was held ten years ago. AM stations that wish to use a translator must buy that translator from some third party, unless the AM licensee had the forethought to apply for a translator which they would not be allowed to use under the rules as they existed at the time!

Clyburn proposes to hold a special FM translator filing window. Only AM stations would be allowed to file, and each AM station would be allowed to request only one translator.

Some observers have misinterpreted this point, believing that the FCC will provide a FM frequency for every AM station. Again, I haven't seen the actual Notice of Proposed Rulemaking yet, but nothing I've read about Commissioner Clyburn's remarks suggests that the FCC believes every AM station will get a translator. Many stations will be disappointed.

In practice, I believe this special filing window will result in a very small number of new FM relays. The FCC is still working through thousands of translator applications filed in 2003. Once they finish with those, they will handle a filing window for new LPFM stations. By the time those two sets of applications have seen action, there will be few if any available frequencies for new FM translators.

A final proposal will make it easier for AM stations to employ a technology called "Modula-

tion Dependent Carrier Level," or "MDCL." This technology makes AM transmitters more efficient by reducing the amount of power transmitted when the station "isn't saying anything," or when the programming is quieter. MDCL has little effect on interference between stations. Implementing MDCL usually requires installing a transmitter of recent manufacture, something most smaller stations can't afford.

I think the FCC is going in the wrong direction here. As I've said enough times to be monotonous, I believe the AM band contains far too many stations. Most of these proposals will only serve to prop up AM stations that would otherwise fail, and go silent. In my opinion, we should allow these stations to fail. It would open more space for the survivors.

❖ Suspended Operation

At my deadline, the partial shutdown of the U.S. federal government is still in progress. The FCC is not immune to the closure. Only 2% of Commission staff remains on the job. These people are handling emergency situations or providing security for Commission facilities.

The FCC website has been suspended. Most pages return a very simple set of links to shutdown information. In particular, the CDBS database used to look up technical information on broadcast stations has been shut down. I can only speculate, but I would imagine with the Commission's information technology staff on furlough, there is nobody to maintain most of these web servers. There is nobody to watch for "hacker" intrusions or to plug any vulnerabilities found. And there's nobody to deal with any hardware failures.

The shutdown will almost certainly delay the planned LPFM application window. This window had been scheduled for October 15th. There is little chance the government will reopen before that date; even if it does, it will take the FCC several days to get back up to speed. I suspect the LPFM window will happen sometime in early November.

Commissioner Clyburn's Notice of Proposed Rulemaking ("NPRM") for AM improvement was written before the shutdown, but it was never released to the public. I've seen the comments she made at the NAB Radio Convention shortly before the shutdown. I suspect the NPRM will be released shortly after the government restarts.

Dozens of more routine filings are made at the FCC every week. These, too, are on hold. A public notice just before the shutdown states any filing that was required to be made at a date that fell during the shutdown will be due on the first day after the government reopens. We'll see how well that works. I think we're going to see a few very busy days.

❖ Automatic TV DX

Trip Ericson runs a fantastic website called **rabbitears.info**. Trip's site contains a wide variety of technical information on over-the-air television stations and related topics. Every TV DXer should have this site bookmarked.

One of the more interesting features is the Live Bandscan. Digital TV tuners are installed at twenty-nine locations in twelve states and Canada. These tuners are continuously scanning all TV channels. Any signals received are reported to a webpage and plotted on a Google Map. The map shows DX openings at a glance. Reception up to 24 hours in the past is mapped.

I installed a tuner at my home in early October. I've been very pleasantly surprised at just how often there is TV DX at this location. Station WDKA at Paducah, Kentucky 120 miles away is in at least briefly every day. Other stations in southern Illinois, western Tennessee, and northern Alabama appear frequently in the scans. The auto-scanner even caught an early-morning 180-mile DX opening to Memphis and a rare signal from southern Indiana.

❖ Goodbye, More or Less

Well, it's over. You're reading the last Broadcast Bandscan in the last issue of *Monitoring Times*. It's been a fun run. It's been an interesting run. We've followed the conversion of TV from analog to digital. We've followed the ups and (mostly) downs of IBOC/HD Radio. We've followed the launch of the LPFM service. We've seen the beginning of the end for AM radio in most of Mexico, and its slow death in much of Canada. We've seen amazing new technology for DXing, including SDRs, automatic scanners, and automatic station identification through RDS and HD Radio.

Thanks to all of you for working with us in this column. You've provided ideas, information, and some pretty darned impressive photographs. You've asked the questions I suspect everyone wanted answered.

Elsewhere in this issue of *Monitoring Times*, you should see information on Ken Reitz's new online publication *The Spectrum Monitor*. I'll be continuing this column (under a slightly different title) in that publication. Please give it a try!

My blog will also continue. See the link in the sidebar (and note that, since I don't know how to rename a blog on Blogger.com, it will continue to be called "American Bandscan!"). Now, good bye, good night, and good luck. 73.

STATION REPORT:

NEW STATIONS

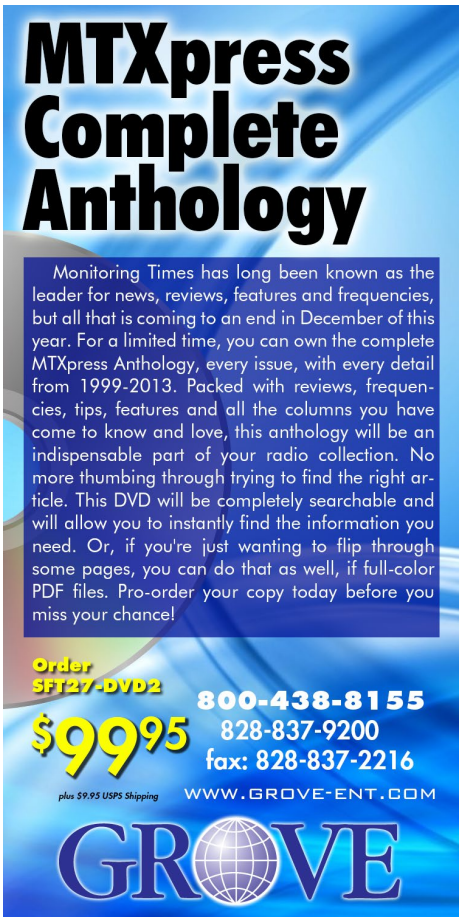
Application filed for new station:
Fairbanks, Alaska 1340 (new) 1,000/1,000 ND

Permit granted for new station:
Blue Diamond, Nevada 1020 (new) 5,000/250 DA-2

New station on the air:
Kihei, Hawaii 740 KCIK 5,000/5,000 ND

Web links for this month's column:

americanbandscan.blogspot.com - My AM DX blog.
www.rabbitears.info/all_tuners - Rabbitears.info's automatic TV DX map
www.thespectrummonitor.com - Ken Reitz's new online magazine
www.radioworld.com/article/engineers-seek-to-ditch-am-%E2%80%98ratchet-clause/2036 - An explanation of the AM "ratchet rule"
www.fcc.gov/document/clyburn-remarks-nab-radio-show-2013 - Commissioner Clyburn's comments on AM improvement



GOODBYE

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La Crosse 2810 Series Wireless Weather Station

Reviewed by Bob Grove W8JHD

Few subjects outside of politics are so eternally discussed as the weather. As radio enthusiasts, we know that the latest forecasts are available for our area in the exclusive 162.400-162.550 MHz band, but it seems that many of us aren't satisfied with merely listening to these reports, and they don't always apply to our locations. The answer is the home weather station.

Many such systems have been manufactured over the years, costing anywhere from a few tens of dollars up into the hundreds. We're going to take a look at the La Crosse 2810, offered in several varieties. More specifically, let's take a look at the WS-2810U-IT, available from many sources including the MFJ Enterprises catalog of electronic products.

For the most part, the various sensors found in low cost competitors are integrated by wires. Since these components are mounted outdoors, the wiring is vulnerable to squirrels and weathering in general.

In comparison, the 2810 is totally wireless, intercommunicating among its remote sensors in the 902-928 MHz low-power signaling band. Sensors may be separated by as much as 200 feet just so long as there are no obstacles in the RF path and elevation is relatively constant among the pieces.

The package is designed to work with Windows XP, Vista, and Windows 7 or 8. A software download is available from the La Crosse website that enables the storage of weather data and creates graphs, synchronizes the time and date, and update user settings and alarms.

So, What do you Get?

The package contains the main display module, a combination wind speed sensor/direction speed sensor (anemometer), a combination thermometer (thermograph)/barometric pressure sensor (barometer), and a rain gauge (hygrometer) which empties itself.

Batteries (AA and C) are not included for the components that require power, but the anemometer unit is run by sunlight. A solar battery charges a non-replaceable, rechargeable battery so that all functions are still fully operational at night.

Additionally, a USB dongle is provided to allow your computer to monitor the system when you aren't near the main display module.

What don't you Get?

Instructions! While a sheet is supplied to assist you in mounting the remote sensors and synchronizing them for startup, no instructions are given to show how to manipulate the many functions of the main module's string of buttons.

For more complete directions, you need to either phone La Crosse or visit their website to download the full instruction manual, detailed setup directions, answers to frequently asked questions, and register the product to invoke its one-year warranty.

Interested readers may wish to do this ahead of time by visiting **www.lacrossetechnology.com/support**.

So, What does it Do?

This weather station really lets you know what's going on:

- Time is shown in selectable 12 or 24 hour format, and can be updated from your computer if the USB dongle is in operation. Date, month, and year are also shown.
- General weather conditions are shown with three icons for sunny, cloudy, or rainy, with a tendency indication to assist in forecasting.
- Temperature is selectable for Celsius or Fahrenheit from -39.8 to +139.8 degrees with minimum and maximum values recorded for indoor and outdoor measurements. Additional temperature indications are given for dew point and wind chill along with time and date.
- Relative humidity percentage is also provided for indoor and outdoor indication.
- Barometric pressure from 27.10 to 31.90 inches of Hg (mercury) also may be displayed in hectoPascals (hPa)
- Wind speed and direction may be displayed in your choice of mph (0-111.8 mph), km/h, m/s, knots, and the Beaufort scale. The direction is calibrated in 16 steps of 22.5 degrees each. A record is kept of maximum wind gust including time and date.
- Rainfall is recorded in inches and millimeters up to 393.6 inches. Other rainfall records include total rain, last hour, last 24 hours, last week, and last month.
- Alarm settings may be custom set for temperature, humidity, wind gust, wind direction, air pressure, 24 hour rain, and storm warning.

The weather station can store up to 1750 sets of weather records with user-selectable intervals from one minute to 24 hours.

The Specs Look Good, but How Well Does it Work?

Very well. By following the brief installation and synchronization steps, the main display came alive. By downloading the instructions, I was able to set all the functions to my personal preferences, and the factory defaults were right on cue for standard readouts.

The La Crosse WS-2810U-IT weather station is available from MFJ Enterprises as their MFJ-198RC for $179.95 plus shipping.

MFJ-2702N Wideband Antenna Switch

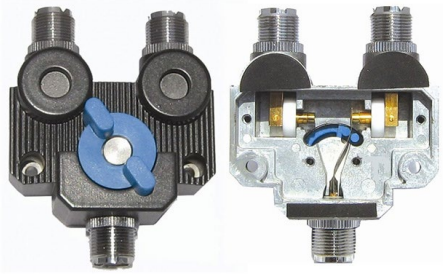
When is a switch not a switch? When it's operating at radio frequencies, and the higher the frequency, the more problematic the switch.

At shortwave frequencies and lower, even a toggle power switch could be called into duty. But at VHF, and worse at UHF, and useless at microwave, everyday AC/DC power switches degrade signal transfer.

Whether used for receiving or transmitting, considerations like contact size, conductor lengths, insulation material, spacing, and metallic housing all play a vital part in proper RF switching design. The higher the frequency, the shorter the wavelength, and as stray conductors begin to approach resonant lengths, SWR (standing waves) starts to climb.

Additionally, close-spaced conductors in poorly designed antenna switches cross-feed signals by radiation. If you are using an antenna for transmitting in one selected switch position, and receiving in another, RF power going through the transmit line can radiate to the unused receiver contact and go right to the receiver, burning out the delicate, solid-state, front end transistors(s).

While antenna switches for 27 MHz CB radios are generally adequate for their prescribed use in the shortwave spectrum and lower, scanner listeners and VHF/UHF ham radio operators face a battle finding just the right antenna



switches, especially for transmitting at high power.

The MFJ-2702N is equipped with type N connectors, designed for applications to at least 3 GHz (3000 MHz). It is designed to safely switch RF power up to 2000 watts at the lower frequencies, and several hundred watts at VHF/UHF.

Configurations may include connecting a transmitter or transceiver to either of two antennas, or selecting either of two antennas to pass signals down to a receiver. Conversely, one antenna can be routed to either of two radios, like a transceiver and a general coverage receiver.

The same switch is also available as a plain MFJ-2702, equipped with SO-239 connectors for applications up to 1 GHz (1000 MHz). Housed in a heavy-duty, one-pound metal casting, both models have admirable specifications.

The 2702 1 GHz model ($42.95) and the 2702N 3 GHz model ($32.95) are available from MFJ Enterprises.

MFJ-1164B AC Line RFI Filter

No one with a receiver can deny that the airwaves are becoming increasingly polluted with electrical interference. Power line arcing, fluorescent light buzzes, switching power supply harmonics, and hash of every description imaginable come in through our antennas.

The situation worsens when local sources of conducted radio frequency interference (RFI) also come right into our rigs through the power cord.

While radiated interference must come in via the antenna connector and is most effectively reduced or eliminated at their sources, conducted interference can be filtered out before it enters the AC power cord on our radio equipment. Such is the job done by MFJ's 1164B AC Line RFI filter.

Featuring four 120 VAC, three-wire outlets securely mounted in an all-metal enclosure, it is capable of providing up to 15 amps per outlet for a total load of 25 amps. That's 3000 watts; more than household wall plugs are capable of delivering in a conventional, 15 amps, 1800 watt, circuit-breaker distribution system.

Inside the case is a heavy-duty circuit board with its husky traces etched to hold three toroid filter coils and associated bypass capacitors for noise reduction. You may not see the reduction on your receiver's S-meter unless it's radiated internally from the power cord to RF components, but you will hear less conducted noise from your speaker if it was present beforehand.

A husky, wing-nut ground lug is provided for safety as well as effective RF earth grounding. In case of overloads or short circuits in powered equipment, a replaceable fuse holder is co-located on the end panel and houses a 30 amp, fast-blow fuse.

The filter measures 11 inches in length and has a flanged rear panel with four screw holes to permit secure fastening to a wall or equipment shelf. A six-foot cord allows attachment to a nearby wall socket.

The MFJ-1164B AC line filter is available for $79.95 directly from MFJ Enterprises and authorized dealers.

MFJ products may be ordered on their website **http://mfjenterprises.com**, by phone (662) 323-5869/ 800-647-1800 or email **mfj-custserve@mfjenterprises.com**.

WiNRADIO APCO P-25 Decoder Software

With the rapid proliferation of digital communications in the government and public safety bands, WiNRADiO has wisely released their version of P-25 decoding software for their G305, G315, and G39DDC receiver. The application is treated as a plug-in option and, when selected, it offers a drop-down box as shown here:

If the drop-down box is superimposed on the main G39 screen display, it disappears when another frequency is chosen. It's best to customize the size of the main display so that the drop-down is positioned in an open spot away from the main display; that way the box remains in view regardless of what frequency is chosen.

The upper left shows the choice of three modes. FM is conventional analog, and APCO is the first level of digital P-25. Since that mode is not considered encryption, it's available on top-end scanning receivers.

It would seem logical that the user would prefer choosing the Auto mode which automatically selects the appropriate demodulation for analog FM or P-25. Although it does do this, there is a momentary burst of digital noise at the beginning of each transmission as the receiver's decoding software analyzes the signal to make its choice. If you are continuing to monitor P-25, it's best to simply check the APCO mode.

Several informational legends are illuminated when signals are received in the P-25 mode. A signal analysis function displays whether it's voice (produced audibly), data (not decoded), a trunking control channel, an unknown form of APCO, whether it's trunking, if it's encrypted, and the manufacturer of the system.

In the APCO mode, there is a brief muting at the end of transmissions to avoid audible noise. It would have been desirable to have the muting at the beginning as well to avoid that digital noise burst heard in the Auto mode, then that mode would be quite useful for changing channels between analog FM and P-25 without the digital noise.

The APCO decoder reveals a number of technical parameters in the digital transmission, including bit error rate (BER), network access code (NAC), talkgroup identification (TGID), source identification (SID), and destination ID (DID). A separate check box allows selection of any of these parameters for squelch control. These signal parameters can be logged automatically if that feature is selected.

❖ The Bottom Line

The sheer volume of data disclosed by the APCO decoder is impressive, and it works well. To order this useful application, visit the WiNRADiO website: **winradio.com**.

MFJ-5004 Professional Function Generator

It seems remarkable that one company can introduce so many radio-related products, but MFJ Enterprises keeps pumping them out. I recently needed an audio frequency generator, so I had a look at the latest MFJ catalog. There I found a "Professional Function Generator," and the price was right.

The MFJ-5004 is capable of generating square, triangle, and sine wave outputs continuously from 1 Hz to 1 MHz. The frequency settings are selected by a decade rotary switch on the front panel and fine-tuning by companion potentiometers.

About the size of a brick, it fits neatly on the test bench. It's powered by 12 volts AC (not DC); that's necessary for the rectifier/filter/regulator circuitry to produce balanced +/-5VDC to the circuitry.

Waveform amplitude is adjusted by a panel pot from 0 to 12 V peak-to-peak, and another control allows adjustment of the DC waveform level from -6 to +6 VDC. Output is accessible from a front-panel BNC connector.

❖ But is it Clean?

Connecting the 5004 to an oscilloscope, I saw extremely symmetrical traces from the lowest to the highest frequencies, and on all three waveforms. The MFJ-5004 Professional Function Generator is available for $149.95 from MFJ Enterprises. Visit their website at www.mfjenterprises.com or phone (800) 647-1800.

Loyd Van Horn, W4LVH
globalnetmt@gmail.com
Twitter: @GlobalnetMT

Reflections of a Global Listener

As a radio hobbyist for nearly all of my life, I grew accustomed to being grouped into a 'niche' that is somewhere between the mainstream and the fringe. Having a magazine like *Monitoring Times* around always helped a bit to make me feel that this hobby I was devoting hours of my life to wasn't really all that 'weird.' Turns out, there were plenty of us out there that shared in the joy of spinning the dials and straining to hear a faint signal through crashes of static.

There are those who tell you that our hobby is a dying one. That the rapid expansion of all things Internet into our lives has made something as barbaric as connecting an antenna to a radio and pulling in analog broadcasts a thing of the past. I have many times in my column shared my feelings on the matter, summarized succinctly with the phrase, "Don't believe the hype."

This is not to say, however, that this Internet thing isn't changing the way we listen to the radio and even chase DX. And, while many in our hobby are late-adapters to this new technology, Internet radio has gone from a niche sub-category of a larger niche to something even the DX hobby was never able to attain – mainstream popularity.

A recent survey by New Jersey-based Edison Research of 3,000 people about their online music consumption has found that Internet radio is now something that the majority of Web users are using. This runs the gamut from Pandora and Spotify to Internet streaming of traditional radio broadcasts through services such as TuneIn and Reciva.

Even more telling, is that more than 80 percent of smartphone users listen to some sort of Internet radio on their mobile devices. This is important, because since the dawn of broadcasting, the struggle has always been to find ways that listeners can take their favorite radio station with them. The increased mobilization and availability of "always-on" Internet connections through wireless services and in-home broadband has helped users to bring their Internet radio into their cars and at work, in addition to at home.

For the past five years, I have had the pleasure of keeping my fellow hobbyists updated with all things Internet radio. We were there together to see the launch of the iPad, to see the proliferation of app-based streaming as a standard feature from an increasing number of automakers, to watch as record labels and radio – both terrestrial and online – duke it out over royalties. That battle is so fierce, it threatened at one point to take online streams of radio stations away from us.

We have watched and listened with amazement as natural disasters, political protests around the world, terrorists attacks and mass shootings have all played out for us live through streaming scanner communications. We listened to those stranded in the dark after Hurricane Sandy reached out in the night to let the world know they were OK.

While some continue to decry Internet Radio as a battering ram, bent on destroying the hobby we love, I see streaming media as an extension of what has always made the radio hobby great.

Think back to when you first fell in love with the radio hobby, what was it that captivated your imagination and attention? Was it chasing after QSL cards? Was it racking up notebooks full of loggings and keeping track of just how many states or countries you had heard?

If you are anything like me, you were in your bed, listening to a bedside radio, and all of the sudden a station that normally wasn't there was coming through your speakers. Suddenly, you realized this familiar device was your doorstep to a wider world that had been hidden from you.

For me, radio was a glimpse into faraway lands I had always dreamed of seeing. It was a chance to put myself into the daily life of someone who looked different than I did and who sounded different than I did, but at that moment, was listening to the same music I was. For me, it made the world seem a little smaller.

Now, with Internet radio and streaming video, everyone can have that same magical moment. You don't need any special knowledge to construct elaborate antennas, spend money on special receivers or have any insight into the mysterious world of propagation. We finally have a chance to share our experiences with the masses. Sure, we are losing some of the uniqueness and specialness we had as pure DXers. But the trade-off is more than worth it.

As a testament to that fact, I will conclude my final column with an example from my own life. Early in my relationship with my wife, Megan, I tried to explain to her the wonderful world of DX. When I could see through the puzzled look on her face that my explanation wasn't landing, I decided on a different approach.

"Name a place, any place in the world," I said. "If you could pick a place to go right now, where would it be?"

"How about Australia?" she asked.

So, I dialed up a radio station in Sydney on my Sangean WiFi radio, and soon the room was filled with the sounds of Australian radio. Her face lit up and I could tell that it was starting to make sense to her.

"Where to next?" I asked.

Australia was followed by Germany, Hawaii, Fiji, Japan, Alaska and Saudi Arabia. With each country, the smile on her face told me that she was feeling that magical moment too. That moment when the world no longer seems too large, when the magic of radio transcends from something familiar to a new glimpse into our shared human existence.

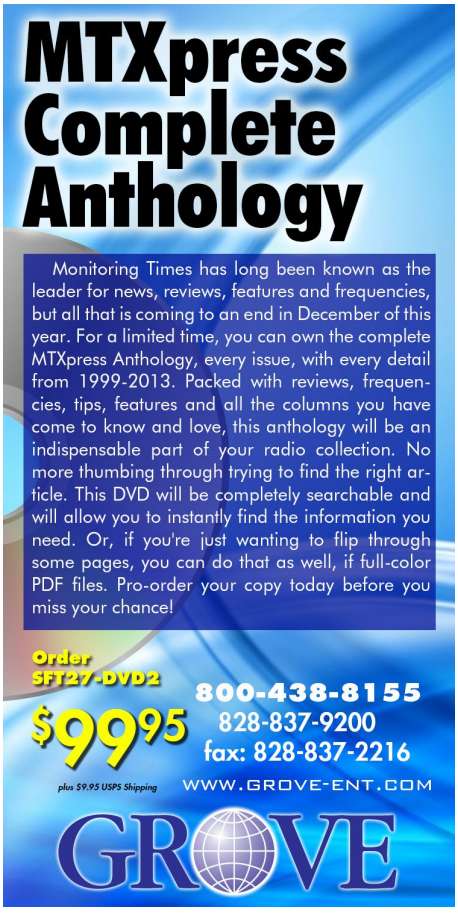
Thank you to all of you that have been regular readers for the past five years. Even more important, I am eternally grateful to all of you that have supported this magazine, and my family, for the past three decades. *Monitoring Times* and I grew up together. My first job was with Grove Enterprises, my first foray into print journalism was a feature that made the cover of *MT* back in 1996.

In the past three decades, my family and I have met some amazing people through *Monitoring Times* and we have so many wonderful memories and stories to take with us. Though the magazine is ending, the spirit of what brought us together will continue on.

So, whether it is from an old vacuum tube boat anchor, a WiFi radio or even your smartphone, continue to seek that magic and connection with the rest of the world. Always remember to pass it on as well, so that the magic will continue to happen for future generations to come.

GlobalNet Links

Internet Radio services becoming more mainstream, survey says - **www.latimes.com/entertainment/envelope/cotown/la-et-ct-pandora-apple-spotify-tunein-20130924,0,4761782.story**



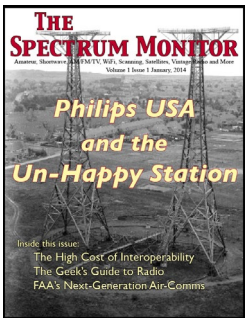
What's NEW

Tell them you saw it in Monitoring Times

Larry Van Horn, New Products Editor

The Spectrum Monitor

The Spectrum Monitor is a monthly electronic magazine that delivers full-spectrum coverage of amateur radio, longwave and shortwave listening, public service scanning, AM/FM/TV broadcasting, satellites, WiFi radio, vintage radio and more. *The Spectrum Monitor* is a follow-on publication to *Monitoring Times* and is not associated with Grove Enterprises or Bob Grove. TSM's columnists and feature writers come directly from the pages of *Monitoring Times*, bringing readers an in-depth look at every segment of the radio frequency spectrum.



Each month TSM readers will get reviews of the latest receivers, antennas, software and accessories needed to explore the spectrum, with tips for beginners and advanced hobbyists alike.

The Spectrum Monitor is available only in PDF format which can be read on any desktop, laptop, iPad®, Kindle® Fire, or other device capable of opening a PDF file. The January 2014 issue will be available for download from **www.thespectrummonitor.com** on December 15, 2013.

Special charter subscriber rate: $20 for twelve issues. After December 15, 2013, annual rate: $24 for twelve issues. Individual monthly issues will be available for $3 each. You can sign up on the magazine's secure website. Mastercard™, VISA™ and Discover™ cards are accepted.

Teak Publishing Announces another New e-Publication

Teak Publishing, owned by *MT* staffers Larry and Gayle Van Horn, is pleased to announce a new Amazon e-publication that will be released in January 2014 – *International Shortwave Broadcast Guide.*

If you are a subscriber to *Monitoring Times*, you are familiar with the English language shortwave broadcast guide, which has been published in the pages of *MT* for the last 20 years by Gayle Van Horn.

Even though *MT* will cease publication with this issue, the *Shortwave Broadcast Guide* will continue. It will now be known as the *International Shortwave Broadcast Guide*, and it will be offered exclusively by Teak Publishing.

Gayle will be offering an expanded version of the printed guide that will now include all language services, and target areas from active worldwide shortwave broadcasters. This new guide will be available via the Amazon e-book service. This one of a kind publication will be published twice a year to correspond to the seasonal shortwave time/frequency changes. Frequency updates between editions will be posted on her Shortwave Central blog at: **http://mt-shortwave.blogspot.com/**.

Listings in *International Shortwave Broadcast Guide* will be by UTC hour, station, language, frequencies, and target areas.

If you enjoy monitoring HF shortwave radio stations, and you miss the monthly listings in *MT*, this new e-book is a must in your reference library.

And, the good news is that you do not even need to own a Kindle reader to read Amazon e-book publications. You can read any Kindle book with Amazon's free reading apps.

There are free Kindle reading apps for the Kindle Cloud Reader, Smartphones (iPhone, iTouch, Android, Windows Phone and Blackberry); computer platforms (Windows XP, Vista, 7 and 8 and Mac); Tablets (iPad, Android and Windows 8), and, of course, all of the Kindle family of readers including the Kindle Fire series. A Kindle e-book allows you to buy your book once and read it anywhere. You can find additional details on these apps by checking out this link to the Amazon website at **www.amazon.com/gp/feature.html?ie=UTF8&docId=1000493771** .

The *International Shortwave Broadcast Guide* by *MT* Frequency Manager, Gayle Van Horn will be available for purchase worldwide from Amazon.com in January 2014. The price for each edition will be $4.99.

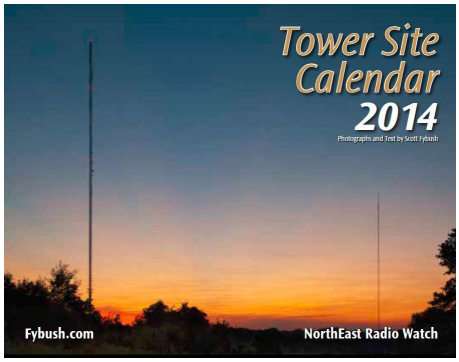
For additional information, monitor the Teak Publishing company Internet blogs – The Military Monitoring Post (**http://mt-milcom.blogspot.com/**) and The Shortwave Central (**http://mt-shortwave.blogspot.com/**) for availability and pricing for this new publication, and additional e-books that are currently in production.

To read her author page on Amazon go to **www.amazon.com/Gayle-Van-Horn/e/B0084MVQCM/ref=sr_ntt_srch_lnk_1?qid=1381765107&sr=8-1**.

Popular Calendar Highlights Broadcast Beauties

Every year, journalist/photographer Scott Fybush goes in search of the prettiest radio and television towers. Yes, you read that right. Prettiest towers.

When he finds them, he tries to get the most artistic photos, incorporating natural landscape, clouds and of course, the sun. He does this every year, and has for more than a decade.



The result? An annual wall calendar that showcases artistic photos of important and historic broadcast tower sites from coast to coast. The 2014 edition is hot off the press.

"Some people may think all radio towers look alike, but the Tower Site Calendar shows every year that that's not the case," says Fybush, who has worked in radio and television news for more than two decades. The calendar began in 2002 as an outgrowth of his weekly industry news column, *NorthEast Radio Watch*, and its offshoot, "Tower Site of the Week," a weekly feature at his fybush.com website.

"It has developed a passionate following in the broadcast engineering community," Fybush says. "Engineers are notoriously underappreciated for the hard work they do. The calendar is one way I can help show some recognition for their design and maintenance of the infrastructure that allows all of us to have easy access to radio, TV and cell phones."

The 2014 edition, now shipping from the Fybush Media store (**http://store.fybush.com/store**) features thematic page designs, durable coil binding and 13 new pictures taken from Fybush's travels all over North America and beyond. Some of the highlights this year:

- The former site of KBRT. This daytime-only AM station broadcast from southern California's Catalina Island until this year, inspiring the popular song "26 Miles."
- The home of Chicago's AM 1160. The four-tower array actually sits in Des Plaines, Illinois.
- WTAG, Worcester Massachusetts. The station, named for its former owner, the Worcester *Telegram* and *Gazette*, celebrates its 90th anniversary in May.
- A master antenna system in Crestwood, Missouri. Built in 1986, the combiner system houses 11 St. Louis stations.
- KFAQ, Tulsa, Oklahoma. The city's oldest surviving radio station (and the station that launched Tulsa native Paul Harvey) is near the old Route 66.

In addition to the photos, the calendar's monthly pages include significant dates in radio and television history, as well as civil and religious holidays.

The 2014 calendars cost $18.50 each ($20 including sales tax for New York State residents) plus $3.50 shipping; and can be purchased by check (payable to "Fybush Media") or money order to 92 Bonnie Brae Avenue, Rochester NY 14618. Orders can also be placed with major credit cards, or online at **www.fybush.com**.

DXtreme Reception Log

DXtreme Software™ has released a new version of its popular logging program for radio monitoring enthusiasts: DXtreme Reception Log — Advanced Edition™ Version 8.0.

Like other logging programs, DXtreme Reception Log lets listeners and DXers log the stations they've heard. But, unlike other logging programs, Reception Log provides advanced functions that can add a new dimension to logging activities.

DXtreme Reception Log includes a Schedule Checker™ facility that lets users import schedules from the Aoki, EiBi, and FCC AM web sites and display that schedule data according to the filter criteria they specify. A list box lets them switch between the three schedules at will. And, depending on the schedule type, users can filter schedule information by band, frequency, station, country, city, state, time of day, language, antenna direction, and target area. Plus they can sort schedule information by most of those filters. When the What's On Now? function is activated, the schedule refreshes automatically at the top of each hour for Aoki and EiBi schedules.

DXtreme Reception Log includes the following advanced functions:

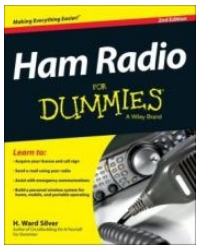
- Creates customized paper and e-mail reception reports; accumulates club report entries for reporting catches and QSLs to clubs and magazines.
- Displays and saves the Solar Flux, A-Index, and K-Index values in effect at the time of reception, and permits users to run performance reports on this information later.
- Retrieves the frequency and mode from supported radios.
- Has an embedded audio facility that lets users create and maintain an audio archive of stations heard.
- Features an integrated QSL Imaging™ facility, which lets users scan and display the physical QSL cards they receive from postal mail and capture and display the electronic QSLs they receive over the Internet.
- Produces reports that track the performance of the user's monitoring station, and lets users FTP those reports to user-provided Web space for remote access.
- Provides support for monitoring Amateur Radio operators. Reception Log can retrieve call sign and address information for monitored hams from optional HamQTH.com, Buckmaster™ HamCall™, and QRZ XML Logbook Data. Plus it can send automatic eQSL requests to monitored hams via www.eQSL.cc, and produce Ham-specific paper and e-mail reception reports.

DXtreme Reception Log includes embedded HTML Procedural Help, context-sensitive What's This? Help, and a Web-based Information Center.

DXtreme Reception Log runs in 32- and 64-bit versions of Microsoft Windows® 8, Windows 7, Windows Vista®, and Windows XP. It retails for $90 worldwide for electronic distribution. Pricing for CD versions and upgrading users is available on our Web site. All prices include lifetime product support by Internet e-mail. For more information visit **www.dxtreme.com**.

Ham Radio for Dummies

Before there was e-mail or Facebook, there was ham radio – used to talk to people around the globe and to communicate during disasters and emergencies. Hams still come to the rescue, but today they can also transmit images, use the Internet, and take advantage of the most powerful private wireless communications capacity in the world. Ready to join the fun?



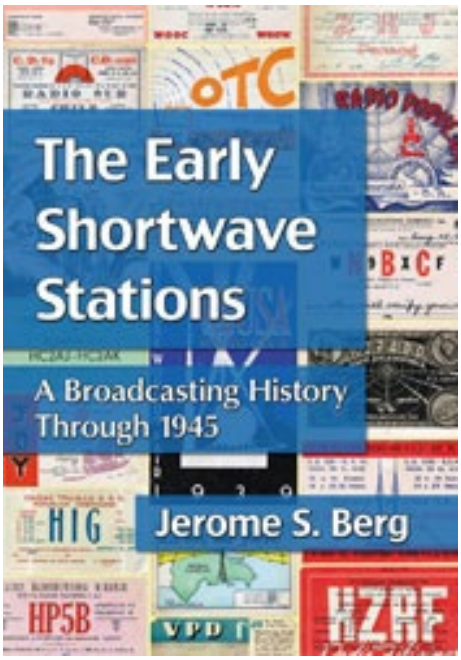
As a ham you can make international friends, train with technology, and assist in emergencies. To introduce you to the world of amateur radio, the second edition of a dummies book called *Ham Radio for Dummies* by H. Ward Silver N0AX is now available. Some of the topics covered by this new edition include:

- Find out what ham radio is all about, explore the technology, and find a group that shares your interests.
- Join the ranks by preparing for the licensing exam, passing the test, and getting your call sign.
- Get a feel for what happens on different bands and learn to tune in a signal on SSB, FM, HF, VHF, and UHF.
- Set up your radio and learn about its many features – memory channels, special filters, hands-free operation, and more
- Learn the difference between casual operating, operating with intent, and operating specialties.
- Find out how to choose equipment, design your ham shack, and set up a station that works.
- Be ready to help your community in case of an emergency or natural disaster.

Whether you're just getting turned on to ham radio or already have your license, *Ham Radio for Dummies*, second edition, helps you with the terminology, the technology, and the "talknology." This new second edition, 384 page, soft-cover book sells for $25. You can order this or any of the dozens of ARRL publications on the organization's website at **www.arrl.org**.

The Early Shortwave Stations - A Broadcasting History Through 1945

In July 1923, less than three years after Westinghouse station KDKA signed on, company engineer Frank Conrad began regular simulcasting of its programs on a frequency in the newly-discovered shortwave range. It was an important event in a technological revolution that would make dependable worldwide radio communications possible for the first time. In subsequent years, countless stations in practically all countries followed suit, taking to shortwave to extend reception domestically or reach audiences thousands of miles away. Shortwave broadcasting would also have an important role in World War II and in the Cold War.



In this, his fourth book on shortwave broadcast history, Jerome S. Berg revisits the period of his earlier work, *On the Short Waves, 1923-1945*, and focuses on the stations that were on the air in those early days. This year-by-year account chronicles the birth and operation of the large international broadcasters, as well as the numerous smaller stations that were a great attraction to the DXers, or long-distance radio enthusiasts, of the time. With more than 100 illustrations and extensive notes, bibliography and index, the book is also a valuable starting point for further study and research.

Berg's early three titles include *On the Short Waves, 1923-1945; Listening on the Short Waves, 1945 to Today* and *Broadcasting on the Short Waves, 1945 to Today.*

The price for *The Early Shortwave Stations* is $45. You can order this 340 page, soft-cover book, or any of his other three titles from McFarland on their website **www.mcfarlandpub.com,** or via their order line 800-253-2187.

And now, it is time to wrap up the last "What's New" column in the pages of *Monitoring Times*. It has been a long run (30-plus years) with this magazine. This is the last column I will pen in *MT* so I want to say, "Thank you!" to all who have support us over these many years.

We will still be around and if you have a new product announcement or something for us to review, we will continue this service on our family of radio-related blogs on the Internet. We have had nearly 3.5 million visitors to these blogs since they started back in May of 2006 and it is an excellent place to announce your product or have us review it.

You can reach us at **teakpub@brmemc.net** or via mail to Teak Publishing, P.O. Box 297, Brasstown NC 28902. You can view our family of blogs at the following URLs:

Btown Monitoring Post - **http://monitor-post.blogspot.com/**
Shortwave Central - **http://mt-shortwave.blogspot.com/**
Milcom Monitoring Post - **http://mt-milcom.blogspot.com/**

You can also send new product announcements to ***The Spectrum Monitor*** magazine via that publication's managing editor – Ken Reitz at **editor@thespectrummonitor.com**.

Books and equipment for announcement or review should be sent to What's New, c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Larry Van Horn, *larryvanhorn@monitoringtimes.com.*

When ordering or inquiring about the products mentioned in this column, be sure to tell them that you saw it in the pages of *Monitoring Times* magazine.

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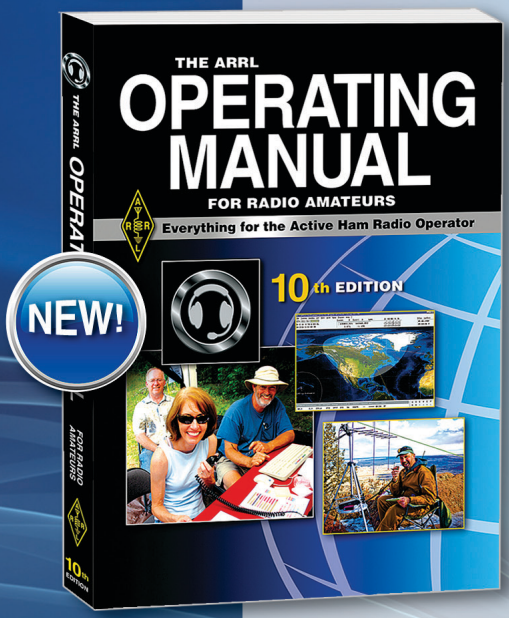

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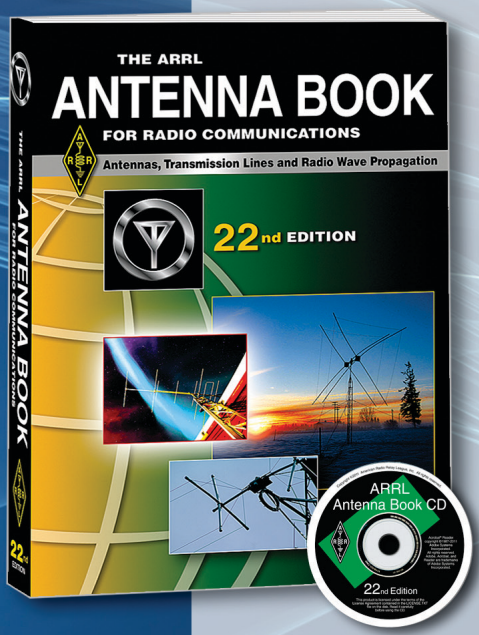

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*System Requirements: Windows® 7, Windows Vista®, or Windows® XP, as well as Macintosh® systems, using Adobe® Acrobat® Reader® software. The Acrobat Reader is a free download at www.adobe.com. PDF files are Linux readable. The ARRL Antenna Book utility programs are Windows® compatible, only. Some utilities have additional limitations and may not be compatible with 64-bit operating systems.

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