POPULAR COMMUNICATIONS

FEBRUARY 2006

America's FM Radio Revolution

• Time Is On Your Side—Every Minute, Every Day pg. 8
• Tech Showcase: Uniden's BCD396T Scanner pg. 20
• New Aurora Evidence! pg. 71

PLUS: All About Fleet Maps • Got Juice? • XEYU Is Back • Programming Software Overview
A TOUGH RADIO FOR A TOUGH WORLD!

The ruggedly-built new FT-1802M brings you Yaesu’s legendary mechanical toughness, along with outstanding receiver performance and crisp, clean audio that will get your message through!

- 50 Watts of RF Power Output.
- Extended Receive: 136 - 174 MHz.
- Keyboard entry of frequencies directly from microphone.
- Illuminated front panel keys for nighttime use.
- 221 Memory Channels with Alpha-numeric labeling.
- Eight Memory Banks for organizing Memory Channels.
- Dedicated 10-channel NOAA Weather Broadcast Channel Bank (U.S. version).
- Adjustable Mic Gain, and Wide/Narrow Deviation & Receiver Bandwidth.
- Built-in CTCSS and DCS Encoder/Decoder circuits.
- Four user-programmable "Soft" keys on microphone, for access to Menu items or front panel key functions.
- Automatic Repeater Shift (ARS), Automatic Power-Off (APO), and Busy Channel Lock-Out (BCLO) features.
- CW Trainer: Practice Morse Code between QSOs!
- Security Password to help prevent unauthorized use.
- One-touch access to Yaesu’s renowned WIRES-II™ Internet Linking System.
The etón E1 XM (originally announced as the Grundig Satellit 900) is the world’s first radio that combines AM, FM, shortwave and XM satellite radio into one ultra high-performance unit. In development for nearly ten years, in collaboration with RL Drake Company and XM Satellite Radio, the E1 is simply the finest full-sized portable in the world. The E1 is an elegant confluence of performance, features and capabilities. The look, feel and finish of this radio is superb. The solid, quality feel is second to none. The digitally synthesized, dual conversion shortwave tuner covers all shortwave frequency. Adjacent frequency interference can be minimized or eliminated with a choice of three bandwidths [7.0, 4.0, 2.5 kHz]. The sideband selectable Synchronous AM Detector further minimizes adjacent frequency interference and reduces fading distortion of AM signals. IF Passband Tuning is yet another advanced feature that functions in AM and SSB modes to reject interference. AGC is selectable at fast or slow. High dynamic range permits the detection of weak signals in the presence of strong signals. All this coupled with great sensitivity will bring in stations from every end of the globe. Organizing your stations is facilitated by 500 user programmable with alpha labeling, plus 1200 user definable country memories, for a total of 1700 presets. You can tune this radio many ways such as: direct shortwave band entry, direct frequency entry, up-down tuning and scanning. Plus you can tune the bands with the good old fashion tuning knob (that has new fashion variable-rate tuning). There is also a the dual-event programmable timer. Whether you are listening to AM, shortwave, FM or XM, you will experience superior audio quality via a bridged type audio amplifier large built in speaker and continuous bass and treble tone controls. Stereo line-level output is provided for recording or routing the audio in to another device such as a home stereo. The absolutely stunning LCD has four levels of backlighting and instantly shows you the complete status of your radio. Many receiver parameters such as AM step, FM coverage, beep, kHz/MHz entry etc., can be set to your personal taste via the preference menu. The E1 has a built in telescopic antenna for AM, shortwave and FM reception. Additionally there is a switchable antenna jack [KOK] for an external antenna. Universal also offers a PL259 to KOK antenna adapter (#1052 $10.95).

The etón E1 XM comes with an AC adapter or may be operated from four D cells (not included). 13.1"L x 7.1"H x 2.3"W Weight: 4 lbs. 3oz.

E1 XM  Order #101 $499.95

Note: The XM antenna (shown above) and XM subscription are sold separately. Activation and monthly subscription fee required for XM. Please visit the Universal Radio website for additional important details.

Universal Radio, Inc.
6830 Americana Pkwy.
Reynoldsburg, Ohio
43068-4113 U.S.A.
800 431-3939 Orders & Prices
614 866-4267 Information
614 866-2339 FAX Line
dx@universal-radio.com

www.universal-radio.com

- Visit our website for more exciting new and used shortwave radios.
- Prices and specs. are subject to change.
- Special offers are subject to change.
- Returns subject to a 15% restocking fee.
- Prices shown do not include shipping.
Contents

POPULAR COMMUNICATIONS
Volume 24, Number 6 February 2006

Features

8 Does Anybody Really Know What Time It Is?
24/7/365, Here's How Time Got On Your Best Side
by Michael A. Lombardi

20 Technology Showcase:
Uniden’s BCD396T Scanner
by Steve Douglass

28 Low—Power FM And Microbroadcasting:
The Latest News Will Surprise You!
by Bruce A. Conti

Columns

24 All About Fleet Maps
38 It’s More Than Ham Radio Volunteers!
42 World News, Commentary, Music, Sports, And Drama At Your Fingertips
46 Got Juice?
48 More On What Lies Below, And Look Ma—Less Noise!
56 Programming Software Overview—Understanding Which Software Package Is Best For You
62 Ready! Set! Communicate!
64 They’re Back...KEYU From Mexico, And Bhutan SW Gets A Cash Boost!
71 New Aurora Evidence, Armageddon, And The Uniden BCD396T
77 Signal Tracing Techniques: Put Your Signal Tracer To Work!
84 N3AVY Is Alive And Well (Thanks To Loyal Friends!)

Departments

4 Tuning In—An Editorial
5 InfoCentral—News, Trends, And Short Takes
6 Our Readers Speak Out—Letters
23 The Pop’Comm Trivia Corner—Radio Fun, And Going Back In Time
27 V.I.P. Spotlight—Congratulations To Walter Schivo Of California!
41 Washington Beat—Capitol Hill And FCC Actions Affecting Communications
44 Power Up—Radios & High-Tech Gear

Visit us on the Web: www.popular-communications.com

On The Cover
Community broadcasters like Kristen (Billi) Hall and Patti Brainard, at the controls of WSLR 96.5 in Sarasota, Florida, are part of a "local" radio revolution sweeping across America. In this month's Broadcast Technology column by Bruce Conti, beginning on page 28, you'll get the latest LPFM (Low-Power FM) news as well as the complete station list! (Photo by Larry Mulvehill)
Tap into secret Shortwave Signals

Turn mysterious signals into exciting text messages with the MFJ MultiReader™!

Plug this self-contained MFJ MultiReader™ into your shortwave receiver's earphone jack. The watch mysterious chirps, whistles and buzzing sounds of RTTY, ASCII, CW and AMTOR (FEC) turn into exciting text messages as they scroll across an easy-to-read LCD display.

You'll read interesting commercial, military, diplomatic, weather, aeronautical, maritime and amateur traffic.

**Eavesdrop on the World**

Eavesdrop on the world's press agencies transmitting unedited late-breaking news in English — China News in Taiwan, Tanjug Press in Serbia, Iraqi News in Iraq — all on RTTY.

Copy RTTY weather stations from Antofagasta, Mali, Congo and many others. Listen to military RTTY passing traffic from Panama, Cyprus, Peru, Capetown, London and others. Listen to hams, diplomatic, research, commercial and maritime RTTY.

Listen to maritime users, diplomats and amateurs send and receive error-free messages using various forms of TOR (Telex-Over-Radio).

**Super Active Antenna**

"World Radio TV Handbook" says MFJ-1024 is a "first-rate easy-to-operate active antenna...quiet...excellent dynamic range...good gain...low noise...broad frequency coverage."

Mount it outdoors away from electrical, tri-band noise for maximum signal, minimum noise. Covers 50KHz-30MHz. Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON/LCD. Switch between two long wires with this tuned indoor active antenna. "World Radio TV Handbook" says MFJ-1020C is a "fine value...fair price...best offering to date...performs very well indeed."

**Active Antenna**

Tuned circuitry minimizes intermod, improves selectivity, reduces noise outside tuned band. Use as a preselector with external antenna. Covers 0.3-30 MHz. Tune, Band, Gain, On/Off/Bypass Controls. Detachable telescoping whip, 5x2x4 in. Use 9 volt battery, 9-18 VDC or 110 VAC with MFJ-1312B, $12.95.

**Compact Active Antenna**

Plug this compact MFJ all band active antenna into your receiver and you'll hear strong, clear signals from all over the world, 300 KHz to 200 MHz, including low, medium, shortwave and VHFs. Detachable 20° telescoping antenna, 9V battery or 110 VAC MFJ-1312B, $12.95. 30x1/4x4 in.

**Eliminate power line noise!**

"World Radio TV Handbook" says MFJ-1024S is a "fine value...fair price...best offering to date...performs very well indeed."

**MFJ Shortwave Headphones**

MFJ-392B Perfect for shortwave radio listening for all modes -- SSB, FM, AM, data and CW. Superb padded headphones and ear cushioned design makes listening extremely comfortable, as MFJ says MFJ-1020C is a "fine value...air tight...performs very well indeed". MFJ-392B with high-quality earphone picks up 50KHz-30MHz. Receives strong, clear signals from all over the world! High-performance driver unit reproduces enhanced communication. Weighs 8 ounces, 9 ft. cord. Handles 450 mW. Frequency response is 100-24,000Hz.

**High-Q Passive Preselector**

"World Radio TV Handbook" says MFJ-1045C is a "fine value...fair price...best offering to date...performs very well indeed."

**High-Q Shortwave Speakers**

MFJ-462B Greatly improves copy on CW and other modes.

**Easy to use, tune and read**

It's easy to use -- just push a button to select modes and features from a menu. It's easy to tune -- a precision tuning indicator makes tuning your receiver easy for best copy.

It's easy to read -- the 2 line 16 character LCD display with contrast adjustment is mounted on a brushed aluminum front panel for easy reading. Copies most standard shifts and speeds. Has MFJ AutoTrak™ Morse code tracking.

Use 12 VDC or use 110 VAC with MFJ-1312B AC adapter, $12.95. 5x2x1/2x5x3/4D inches.

**No Matter What™ Warranty**

You get MFJ's famous one year No Matter What™ limited warranty. That means we will repair or replace your MFJ MultiReader™ (at our option) no matter what for one full year.

**Try it for 30 Days**

If you're not completely satisfied, simply return it within 30 days for a prompt and courteous refund (less shipping). Customer must retain dated proof-of-purchase direct from MFJ. MFJ's high performance PhaseLockLoop™ modem consistently gives 100% solid copy -- even with weak signals buried in noise. New threshold control minimizes noise interference -- great for listening for all bands of the World! High-performance driver unit reproduces enhanced communication. Weighs 8 ounces, 9 ft. cord. Handles 450 mW. Frequency response is 100-24,000Hz.

**MFJ Shortwave Markers**

This MFJ ClearTone™ restores the broadcast quality sound of shortwave listening. Makes copying easier, enhances speech, improves intelligibility, reduces intelligibility, reduces noise, static, hum, 3 in. speaker handles 5Watts, 8 Ohm impedance. 6 foot cord.

**MFJ Shortwave Headphones**

MFJ-392B Perfect for shortwave radio listening for all modes -- SSB, FM, AM, data and CW. Superb padded headphones and ear cushioned design makes listening extremely comfortable, as MFJ says MFJ-1020C is a "fine value...air tight...performs very well indeed". MFJ-392B with high-quality earphone picks up 50KHz-30MHz. Receives strong, clear signals from all over the world! High-performance driver unit reproduces enhanced communication. Weighs 8 ounces, 9 ft. cord. Handles 450 mW. Frequency response is 100-24,000Hz.

**MFJ Shortwave Markers**

This MFJ ClearTone™ restores the broadcast quality sound of shortwave listening. Makes copying easier, enhances speech, improves intelligibility, reduces intelligibility, reduces noise, static, hum, 3 in. speaker handles 5Watts, 8 Ohm impedance. 6 foot cord.
Readiness Roulette—The Game Where No One Wins

One of the strange things about our great country is how easy it is for some folks to never have to worry about getting a new job if they get canned. It seems the higher up the corporate ladder—in either the public or private sector—the easier life becomes. It’s an unwritten rule that a canned Corporate or Washington Big’s salary or job stature will never be less than the previous job.

Today’s classic example is former FEMA director Michael D. Brown on whose shoulders the initial FEMA response to Hurricane Katrina lies. I’m sure by the time I’m finished writing this at least one or two more “big’s” will get fired or resign because of either ineffectiveness or impropriety, and end up in a cushy leather chair in a room with a view, probably making more money than in their previous position! Strange, isn’t it?

When I first heard the news about Brown starting his own disaster preparedness consulting firm, I know I must have looked like a deer in headlights. Did I hear it correctly? Indeed, it’s true, but like they say, life is sometimes stranger than fiction—or something like that. Brown having anything remotely to do with emergency preparedness would be a lot like, for example, the FCC’s former commissioner Kathleen “Broadband Nirvana” Abernathy doing PR for the ARRL. Not in my lifetime—I hope.

Brown told the Rocky Mountain News (he plans on moving back to the Boulder, Colorado area), “If I can help people focus on preparedness, how to be better prepared in their homes and better prepared in their businesses—because that goes straight to the bottom line—then I hope I can help the country in some way.”

Too bad he didn’t think that way in the months preceding Katrina.

Think for a moment how rewarding poor performance works. Suppose you’re one of the folks digging up the road and you goof and accidentally jackhammer right through a huge cable, knocking out phone service for hundreds of thousands of people. Maybe you’re the dispatcher at the local PD and you haven’t the foggiest idea where you just dispatched Car 3; this has happened twice in the past four days because you, like most everyone else, has more going on than the daily work grind. Chances are the fellow that hacked through that cable won’t be promoted or find himself giving a pep talk at the local phone company gala. The dispatcher certainly won’t get nominated to be police chief; he’d be lucky to dispatch little Tonka trucks at his kids’ birthday party!

That’s because we’re just not high enough on the Corporate Ladder. But Brownie was, you see. And apparently he already has “some great clients.” I’m sure in time we’ll see who was brilliant enough to sign on his dotted line.

But if he really wants to cause a stir, here’s an idea for Brownie. In this time of Lucrative Government Contracts, he should consider getting FEMA as a client. Wouldn’t that be a hoot? Now, if you’re laughing, or think that’s a rather dumb idea, it’s really no stranger than we’ve come to expect; after all, if Brown, with no formal emergency management experience could head FEMA and was, for the most part, oblivious to what a major hurricane could do, he could conceivably talk his way into anything. Given what must have been an astonishing job interview at FEMA, it just proves to me that anyone could do the job.

It’s important for our country that we’re prepared; I think most citizens are as prepared as they ever will be—either they’re going to have extra batteries, flashlights, a few weeks of their meds, bottled water, extra shorts and perhaps a small radio or two to stay in touch during an emergency, or they’re not. All the encouragement from Uncle Sam likely won’t motivate Aunt Maude and Uncle Marvin in Arkansas to run out and buy a “go bag” until Marvin gets blown to Montana in a tornado. Maybe, though, if we had real leaders in these Big Positions, not just talking bobble heads, things might be different.

The county has lots of good, grassroots level, boots-on-the-ground leaders. You just have to look hard to find them. Frankly, I don’t think having Michael Chertoff, a former judge and prosecutor as Department of Homeland Security director—overseeing FEMA—is one. Admittedly, I can only base my opinion on what I’ve heard come out of his mouth at press conferences (no, it’s not a case of the nasty media reporting on what he says, but rather listening to his own words). I still hear from agencies that can’t communicate effectively and read reports about the lack of interoperability more than four years after 9/11.

So let’s get down to business. For the next go-round in D.C., I’d like to personally nominate our regular “Homeland Security” columnist, Rich Arland, to head the Department of Homeland Security when Mr. Chertoff steps down to pursue life’s other pleasures. Rich is very much on top of the emergency preparedness situation and always closes his fine column with the statement, “Remember, preparedness is not optional.” You see, by that statement alone he demonstrates he understands how the department should operate.

Change is inevitable, and it seems with how things work today, one day a bureau chief, the next day a high-paid consultant. Anyway, Rich has a solid grip on communications, is a trained volunteer communicator, works well under pressure, is able to put words on paper in a coherent fashion, gets his column in on time, and is always ready and able to answer my questions without any horse hockey. As the next director he could even have his own personalized letterhead, “Ar-Land Is Helping Our Land.”

OK, maybe the personalized letterhead isn’t such a great idea. Maybe you’re thinking Rich is too good—we shouldn’t waste all that talent and experience as a government department head—so perhaps he’s much better putting plans to work and communicating. Besides, he writes a great column, so keeping him as “Homeland Security” columnist for now might make more sense.

But certainly, of all our writers and staff we should be able (Continued on page 82)
Australian Government To Adopt European DAB Standard

Australia’s Minister for Communications, Information Technology and the Arts, Senator Helen Coonan recently announced a framework to guide the introduction of digital radio in Australia. There will be a staged rollout of digital radio in Australia commencing in metropolitan areas as soon as practicable. The government will urge broadcasters to commence trials of digital radio in regional areas, so technical and other issues can be resolved. The government will then consider what financial support is necessary to expand digital radio services to rural and regional Australians.

Under the framework, Australia will implement terrestrial digital radio based upon European Digital Audio Broadcasting (DAB) Standards, also known as Eureka 147. The commercial, national and wide-coverage community broadcasters currently operating in the broadcasting services bands (BSB) in those areas will have the opportunity to participate and will share the available digital spectrum.

Other elements of the framework include dedicated spectrum for the two national broadcasters, a guaranteed minimum level of broadcast capacity to incumbent commercial broadcasters (more spectrum will be available if new services are offered), guaranteed access to the digital platform for wide-area community broadcasters, no simulcast requirement and a first right of refusal to broadcasters to control the multiplex and hold relevant spectrum for a nominal administration cost.

UK Short Wave Magazine To Merge With Radio Active

This month, the long-running UK publication for radio hobbyists, Short Wave Magazine, ceases publication as a separate title and merges with another magazine from the same publisher, Radio Active. The publishers are picking the best bits out of both magazines to create a new title, RadioUser. There isn’t much else known about this at the moment as the publishers are still finalizing all their plans. However, this will not affect the company’s flagship publication, Practical Wireless.

Christian Vision’s CVC Increases DRM Broadcasts

Christian Vision’s media arm, CVC, is increasing the number of broadcast hours on VT Communication’s digital AM transmission platform, which utilizes Digital Radio Mondiale technology. Until recently, CVC was broadcasting one hour a week as part of VT Communications’ AM broadcast pilot service from the UK to Western Europe, which has now been running for over two years. CVC’s new development sees transmissions from mainland Europe into the UK, resulting in an increase to seven hours per week. The new schedule is 1000–1100 UTC daily on 11815 kHz.

Worldspace Goes Terrestrial In UAE And Bahrain

WorldSpace has announced that it has received licenses from the Telecommunications Regulatory Authorities of Bahrain and the United Arab Emirates (UAE) for terrestrial repeater networks. The licenses will enable WorldSpace to deploy mobile satellite radio services in those countries. WorldSpace plans to rollout the mobile services in the first half of this year.

The mobile rollout in these areas is part of WorldSpace’s overall strategy to target additional markets within coverage areas at a minimal incremental cost.

The UAE and Bahrain are attractive markets for WorldSpace services. The UAE has a population of over four million people with a GDP per capita of approximately $17,000 and one million vehicles in service. In particular, Dubai (part of the UAE) is a major international trade and tourist center, drawing over 16 million visitors annually. Bahrain has a population of approximately 700,000 with a GDP per capita of approximately $20,000 and 630,000 vehicles in service.

Mediumwave DRM Tests From Milano Siziano To Begin

According to the Italian press service ASCA, Rai Way (the company which owns the transmitters used by Italian public broadcaster RAI) will soon begin experimenting with DRM via Milano Siziano. Tests will be conducted at nighttime, presumably on the former Radio 2 frequency of 693 kHz. Exact power levels are not mentioned in the report, which says they will be “at low power” adding, however, that will ensure “high quality” and Europe-wide coverage.

DRM conversion of the ex-Radio 2 transmitter has been planned for a long time, according to RAI “insider” Andrea Borgnino. According to the same source, Rai Way began installing DRM equipment in Milan at end of 2004 for tests at the beginning of 2005. Apparently these were postponed to end of 2005/beginning of 2006.

BBC Supporters In Thailand Launch Campaign To Save Thai Service

The Nation newspaper reports that a campaign was launched in Thailand to save the BBC’s Thai service after news broke of a plan to terminate the 65-year-old service. The Nation reports that the BBC World Service will terminate its Thai-language service at the end of the year. The paper, quoting a source in London, reported that the service would be shelved due to cost-cutting measures. The Nation said none of the Thai service staff was aware of the termination.

The BBC is focusing more attention on the World Service in Arabic and had asked the Foreign Office for funding to establish an Arabic language television channel for the Middle East and North Africa. The Foreign Office has approved the plan, but insists that the funding come from existing resources. Besides

(Continued on page 61)
Say It Ain’t So

Dear Editor:

I enjoyed the editorial rant on the problems with FEMA and others regarding Katrina. We saw some of that mess up here in Maine when LIFEFLIGHT of Maine tried to send a chopper down to New Orleans to help out and were refused, yet FEMA had no problem with sending many truckloads of ice to a warehouse in Portland, Maine as they had too much ice in the hurricane area. As far as I know, some of that ice is still sitting in a warehouse in Portland. It cost the city of Portland a lot of Greenstamps for traffic control to keep these trucks coming in and out of the warehouse to avoid major traffic problems.

In the end the Maine Maritime Training Ship, State of Maine went down and acted as a floating hotel and restaurant for people in that area. She’s back home now in Castine and some firefighters from Maine just returned home after being down there in the hurricane area helping people and their fellow firefighters who lost it all.

Don Hallenbeck KME1CW
(Portable Monitor)
Pittsfield, ME (via e-mail)

Burned ‘Em Again

Dear Editor:

I just read your rant in the December 2005 Pop’comm. Ouch! Don’t hold back, Harold, tell us how you really feel! I agree with you, and to prove it I am attaching my own, more technically oriented rant, on the same subject.

I responded to an item I read on “Stupid Scanner Tricks” Yahoo group of which I am a member, and I have included that item as well. Publish as much or as little of it as you feel prudent. I am glad to see you show no mercy to people who don’t deserve any.

Craig, N3TPM

Editor’s Note: Here’s Craig’s well written, common sense approach to solving some of our problems.

From: stupidscannertricks@yahooogroups.com on behalf of Craig Leventhal [eileen@ptd.net]
Sent: Monday, September 19, 2005 6:09 PM
To: stupidscannertricks@yahooogroups.com
Cc: MYSELF
Subject: RE: [SS] U.S. Lack of Unified Emergency Radio System

I am surprised that the engineering team at MA/Com Tyco, didn’t take into account New Orleans vulnerability to floods, when they designed the system. Certainly the local service shops, the people on the ground, could have provided some helpful input to engineering on this matter. Also the criteria for infrastructure components could have been placed outside of the zone protected by the levees and still provided the required coverage. As for interoperability, the city only needed to assign a few extra talkgroups to outside agencies for emergency use, and then hand out additional portable radios as needed. What really surprised me was the comment made by one of the Coast Guard personnel, in which he said that the helicopters could not communicate with the ground (airboat) units because they lacked a common band to operate on. The Coast Guard does have marine VHF channels (156-162 MHz) in all their vehicles, so how hard would it be to issue portable to the ground units? Or better yet, if any of the agencies on the ground are using VHF, why not just add some common channels to their portable radios for communications with the helicopters? Folks, this is not rocket science and it need not cost lots of money. OK so you are saying that the 800 MHz trunked system is off the air and the New Orleans PD’s radios are just a $1000 brick. Well, boys and girls, when the cell phone guys need extra capacity they bring in a C.O.W. (Cellsite On Wheels). These are completely self contained, need no outside power, and some have solar panels to keep the batteries charged and they can be deployed in short order.

M/A-Com Tyco, Motorola, EF Johnson, are you guys listening to this?

Alright so here we are, now what do we do? We turn to ham radio, not for them to relay messages, which all know they do with great efficiency, but for something else pioneered by hams; cross-linking. Connect two or more mobile radios together to form a repeater that, for example, receives on 146.940 VHF and retransmits that signal on 446.940 MHz (UHF). And it works both in both directions! Now substitute 154 MHz (VHF) and 453 MHz (UHF) and you have a cheap solution to an emergency interoperability problem. Now take it one step further; many radio manufacturers make ham radios that are dual-band or even more that can crosslink with the touch of a few buttons. No special modifications needed. Now if only the commercially type accepted version for public safety use could do the same thing, interoperability problems would go away. For those agencies using a tower based system, whether it is a simple repeater or a full blown trunked system, this tragedy should highlight the need for tower sites to be hardened against a worst case scenario like Katrina. These hardening measures could be done over time as system components are replaced or upgraded, so that the cost would not be so overwhelming. In flood prone areas, equipment could be mounted on platforms above the worst known high water levels, and backup power sources could also be added. Taking advantage of natural “high ground” should be maximized. Placing equipment on rooftops of apartment or office buildings should always be considered for critical public safety infrastructure and both battery and generator backup should be used. Lastly, there are several manufacturers that have products in the market that allow radios to be cross-linked by simple plug and play setup. Any public safety official involved in emergency management, should consider acquiring appropriate radio gear for the purpose of cross linking and have it available for any emergency where a connection to a mobile radio could be made and as a backup to their own existing system, just in case. If a cost is a factor, most municipal radio shops have the talent on hand to setup a basic, rapidly deployable, crosslink system, utilizing previous radios that have been pulled out of service or used as spares. There is no excuse for the apparent lack of communications after an emergency, as we have seen here with New Orleans. I know of small portable radio systems that can be connected to a portable computer to provide intra as well as inter agency communications. They run on 12 volt dc power and are the size of a brief case and can be brought on line in less than five minutes! Enough said.

CONTRIBUTING EDITORS

Richard Arland, K7JSZ, Homeland Security
Peter J. Bertini, K1ZJH, Restoration/Electronics
Bruce A. Conti, AM/FM Broadcasts
Joseph Cooper, Computer-Assisted Radio
Tom Keitel, K2AES/WQCU830, Senior Editor
Edith Lennon, N2RRW, Managing Editor
Richard S. Moseson, W2VU, Editorial Director
Gerry L. Dexter, Shortwave Broadcast
Jock Elliot, KB2GOM, Mobile Communications
Steve Douglass, Utility Communications
Richard Fisher KI6SN, Capitol Hill News
Bill Hoefker, KB4ULI, Aviation Communications
Tomas Hood, NW7US, Propagation
Shannon Huntiswell, Classic Radio
Kirk Kleinschmidt, NT6Z, Amateur Radio
Ron McCracken, REACT International
Bill Price, N3AVY, Humor/Communications
Ken Reiss, Technical/Scanning
Allan Stern, Military Monitoring
Bob Sturtevant, KD7KTS, Puzzles and Trivia
Gordon West, WB6NOA, Radio Resources

BUSINESS STAFF

Richard A. Ross, K2MG, Publisher
Arnold Spasato, N2IQO, Advertising Manager
Emily Leary, Sales Assistant
Sal Del Grosso, Accounting Manager
Doris Watts, Accounting Department
Melissa Gilligan, Operations Manager
Cheryl Di Lorenzo, Customer Service Manager
Ann Marie Auer, Customer Service

PRODUCTION STAFF

Elizabeth Ryan, Art Director
Barbara McGowan, Associate Art Director
Dorothy Keahrwieder, Production Manager
Emily Leary, Assistant Production Manager
Hal Keith, Technical Illustrator
Larry Mulvehill, WB2ZPI, Photographer

A publication of
CO Communications, Inc.
25 Newbridge Road
Hicksville, NY 11801-2953 USA

OFFICES: 25 Newbridge Road, Hicksville, NY 11801. Telephone (516) 681-2922. FAX (516) 681-2926. Web Site: http://www.popular-communications.com/ Popular Communications (ISSN 0733-3315) is published monthly by CO Communications, Inc. Periodical Class postage paid at Hicksville, NY and additional offices. Subscription price (payable in U.S. dollars) Domestic—one year $29.95, two years $51.95, three years $74.95, Canada/Mexico—one year $38.95, two years $71.95, three years $104.95. Foreign First Class—$48.95, two years $91.95, three years $134.95. U.S. Government Agencies/Subscriptions to Popular Communications are available to agencies of the United States government, including military services, only on a cash on delivery basis. Requests for quotations, bids, contracts, etc. will be refused and will not be processed or returned.

Printed in the United States of America.

Scan Our Web Site
Bearcat® BCD396T Trunk Tracker IV
Suggested list price $799.95 CEI price $599.95
1,000 Channels • 10 banks • CTCS/D/CS • S Meter Size: 6"w x 6"h x 3.5"h
High Frequency Coverage: 25,000-512,000 MHz., 674,000-775,875 MHz., 794,000-823,967 MHz., 823,967-925,875 MHz., 849,012-867,875 MHz., 894,012-956,000 MHz.
Frequency Accuracy: ±0.005 %
Power Output: 5 watts
Assembled Size: 2 3/4"w x 3 1/2"h x 5 13/16"h
Includes: Owners manual, carry case, rechargeable battery, DC power cord, cigarette lighter power cord, PC programming cable,熊

Bearcat® BC246T Trunk Tracker III
Suggested list price $399.95 CEI price $214.95
Compact professional handheld TrunkTracker III scanner Featuring Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCS/D/CS, Alpha Tagging.
Size: 2.72 Wide x 1.26 Deep x 4.6" High
High Frequency Coverage: 25,000-504,000 MHz., 106,000-174,000,000 MHz., 216,000
224,980,000 MHz., 400,000-512,000,000 MHz., 806,000-833,987 MHz., 849,012-956,000,000 MHz., 1,240,000-1,296,000,000 MHz., 1,300,000-1,370,000,000 MHz.

Visit WWW.USASCAN.COM • 1-800-USA-SCAN
Does Anybody Really Know What Time It Is?

24/7/365, Here's How Time Got On Your Best Side

By Michael A. Lombardi

Occasionally I'll talk to people who can't believe that some radio stations exist solely to transmit accurate time. While they wouldn't poke fun at the Weather Channel or even a radio station that plays nothing but Garth Brooks records (imagine that), people often make jokes about time signal stations. They'll ask "Doesn't the programming get a little boring?" or "How does the announcer stay awake?" There have even been parodies of time signal stations. A recent Internet spoof of WWV contained zingers like "we'll be back with the time on WWV in just a minute, but first, here's another minute."

An episode of the animated PowerPuff Girls joined in the fun with a skit featuring a TV announcer named Sonny Dial who does promos for upcoming time announcements—"Welcome to the Time Channel where we give you up-to-the-minute time, twenty-four hours a day. Up next, the current time!"

Of course, after the laughter dies down, we all realize the importance of keeping accurate time. We live in the era of Internet FAQs, but the most frequently asked question in the real world is still "What time is it?" You might be surprised to learn that time signal stations have been answering this question for more than 100 years, making the transmission of time one of radio's first applications, and still one of the most important. Today, you can buy inexpensive radio-controlled clocks that keep correct by means of this mysterious electrical wave. We might go even still further, and although I do not put it forward as a proposition likely to be carried out in any way, except as an experiment, yet it undoubtedly would be perfectly possible to carry an apparatus in one's pocket, and have our watches automatically set by this electrical wave as we walk about the streets.

A true visionary, Grubb predicted the radio-controlled watch nearly 100 years before it finally appeared! Sharp-eyed readers might quibble that he described a pocket watch rather than a wristwatch, but keep in mind that men's wristwatches didn't appear until a few years later.

The "central distributing clock" that Grubb mentioned wasn't a new idea. Time signals had been distributed by telegraphic code, was broadcast in September 1903 by the United States Naval Observatory (USNO) in Washington, D.C.

The first regularly scheduled time broadcasts began on August 9, 1904, from the Navy Yard in Boston. By the end of 1905, the Navy had transmitted time signals from stations in several other cities, including Norfolk, Newport, Cape Cod, Key West, Portsmouth, and Mare Island in California.

Guglielmo Marconi is usually acknowledged as the inventor of radio, with an impressive list of achievements known to most radio buffs. He used a spark-gap transmitter to successfully send radio signals over a distance of more than one mile in 1895. By 1899 he had transmitted signals across the English Channel, and sent signals across the Atlantic Ocean in 1901.

Surprisingly, in the midst of Marconi's early work, before any radio stations existed, or before the public even completely believed his results, a proposal was made to use the new wireless medium to broadcast time. In November 1898, an optical instrument maker and inventor named Sir Howard Grubb addressed the Royal Dublin Society and proposed the concept of a radio controlled clock. After many years of working with astronomical observatories, Grubb had developed a strong interest in timekeeping. After his talk, he published the following comments:

There is something very beautiful in this action of the "Marconi" wave. In a city supplied with this apparatus we should be conscious as we hear each hour strike that above us and around us, swiftly and silently, this electrical wave is passing, conscientiously doing its work, and setting each clock in each establishment absolutely right, without any physical connection whatsoever between the central distributing clock, and those which it keeps correct by means of this mysterious electrical wave.

We might go even still further, and although I do not put it forward as a proposition likely to be carried out in any way, except as an experiment, yet it undoubtedly would be perfectly possible to carry an apparatus in one's pocket, and have our watches automatically set by this electrical wave as we walk about the streets.

A photograph of the Eiffel Tower, published in 1909 prior to the start of the time broadcasts, which began in May 1910. It shows the small buildings at the base of the tower that housed the radio station equipment.
The three towers of the Arlington Virginia radio station where the NAA time signal originated. The tallest tower reached a height of about 183 meters, or about 14 meters taller than the nearby Washington Monument.

Sending time by radio was a hot technology in the early part of the 20th century, allowing time signals to be distributed everywhere, not just to places with access to the cumbersome landlines used by telegraphs. There were countless benefits to having accurate time available, and railroad planners, ship navigators, military generals, business people, and others quickly became interested in the new technology.

Experimental time signal broadcasts were being tested in Switzerland and France as early as 1904, and patents for wireless time signal systems began arriving in the Swiss Patent Office by 1906, some passing across the desk of a young man named Albert Einstein. By 1907, Canada had begun to broadcast time from station VCS in Halifax, with signals referenced to the clock at St. John’s Observatory.

High Atop The Eiffel Tower

The best known of the early time signal stations was FL in Paris, operated by the French Bureau of Longitude, which launched its signals from high atop the Eiffel Tower. Now one of the world’s most famous monuments, the Eiffel Tower would have probably been demolished had it not proved to be useful as a radio tower. Then the world’s tallest structure, the 312-meter tall tower was built in 1889 to help commemorate the centenary of the French Revolution. However, many Parisians had opposed its construction, and considered it unsightly. As a result, it was scheduled for demolition in 1909, when its 20-year lease finally expired. By 1904, however, the tower had become a station of the new French radio service, considered essential to the country’s defense, and the now famous monument was spared.

The Eiffel Tower time signal broadcasts began on May 23, 1910. The frequency of the original broadcast was near 150 kHz and the radiated power was about 40 kW. Time signals referenced to the clocks at the nearby Paris Observatory were sent twice daily. The signals spanned the Atlantic Ocean, reaching the United States and Canada and serving their intended purpose: to allow ships at sea to correct their marine chronometers.

Soon, many others began decoding the signals to obtain the correct time, including railroad companies, clock makers, jewelers, and others.

By June 1913, a regularly scheduled time service had begun. The frequency, format, and schedule for the time service was repeatedly changed, but the French somehow managed to keep the time service going through World War I and into the 1920s.
Re_Inventing Radio through Innovation

E1XM $500*

The E1XM is the world's first radio to combine AM, FM, Shortwave, and XM Satellite Radio Ready technology into one ultra-high-performance unit.

Features
- XM Satellite Ready Radio/AM/FM/Shortwave
- 1700 station presets
- Digitally synthesized PLL tuner with synchronous detector
- Passband tuning, selectable bandwidth filters and Selectable Single Sideband (SSB) reception
- Dual conversion superheterodyne circuit design
- Stereo line-level audio inputs and outputs and external antenna connections
- Dual Clocks and programmable timers
- Headphone jack
- Built-In Antenna: telescopic antenna for AM, FM and Shortwave reception
- External Antenna Connection for the addition of auxiliary antennas
- Calibrated LCD signal strength meter
- Power Source: 4 "D" Batteries (not included); AC Adapter (included)
- Dimensions: 13"W x 7-1/2"H x 2-1/2"D
- Weight: 4 lb 3 oz.

© Copyright 2006 Elón Corporation. All Rights Reserved.
### E5 $150*

**AM/FM/Shortwave Radio**

The E5 is the world's leading multi-band and Single Side Band (SSB) enabled radio, uniting performance and mobility into one compact unit, and bringing the power of local and world radio into the palm of your hand.

**Features**
- FM-Stereo, AM and full-Shortwave coverage (1711-29999 KHz)
- PLL dual conversion AM/SW circuitry with SSB
- 700 programmable memory presets with memory scan and auto tuning storage (ATS)
- Clock, sleep timer and alarm functions with world zone settings
- Tunes via auto-scan, manual-scan, direct keypad frequency entry and tuning knob
- Internally recharges Ni-MH batteries
- Station name input
- Dimensions: 6-5/8"W x 4-1/8"H x 1-1/8"D
- Weight: 12.2 oz.

† Features are subject to change

### E10 $130*

**AM/FM/Shortwave Radio**

Intelligence meets performance in the E10. With 550 programmable memories, manual and auto scan, precision tuning and alarm clock features, the E10 provides the sophisticated tools for listening to news, sports, and music from around the world. The E10 even allows internal recharging of its Ni-MH batteries (charger and batteries included). With excellent AM, FM, and Shortwave reception, intermediate frequency shift and shortwave antenna trimmer—the E10 gives you the performance you want with the digital ease you deserve.

**Features**
- Shortwave range of 1711 – 29,999 KHz
- 550 programmable memories with memory page customization
- Manual and auto scan, direct keypad frequency entry
- Memory page customization
- Earphones
- Power Source: 4 AA Batteries (included) or AC Adapter (not included)
- Dimensions: 6-5/8"W x 4-1/8"H x 1-1/8"D
- Weight: 12.2 oz.

### E100 $100*

**AM/FM/Shortwave Radio**

The E100 fits full-sized features into your palm or pocket. This little marvel is packed with all the latest radio features you want: digital tuning, 200 programmable memories, digital clock and alarm, plus AM/FM and Shortwave reception. And, it is small enough to fit in your coat pocket.

**Features**
- Shortwave range of 1711 – 29,999 KHz
- 200 programmable memories
- Memory page customization
- Manual and auto scan, direct keypad frequency entry
- Earphones
- Power Source: 2 AA Batteries (included) or AC Adapter (not included)
- Dimensions: 5"W x 3"H x 1-1/4"D
- Weight: 7 oz.
The QSL card sent today to listeners of NIST radio station WWVH which broadcasts from the island of Kauai in Hawaii. Reception has been confirmed in about 60 countries since 1990.

Today, the Eiffel Tower continues to be used as a mast for radio and television antennas.

**Virginia’s NAA**

The American time signal station NAA began broadcasting time in 1913 from Fort Meyers in Arlington, Virginia. NAA used a rotary spark-gap transmitter at a frequency of 125 kHz and an output power of about 54 kW, making it the world’s most powerful station.

The time came by wire from a USNO (US Naval Observatory) clock across the Potomac River, and was said to be accurate to “1/20 of a second” when it reached San Francisco. NAA was built as part of the U.S. Navy’s effort to establish a worldwide communication network. The Arlington Radio Station included three towers, with the tallest tower reaching a height of about 183 meters.

In 1915, engineers from American Telephone & Telegraph (AT&T) used the Arlington towers to send the first successful transoceanic voice communication, sending a message to a fellow American engineer who was listening in the Eiffel tower in Paris. It was only possible to send from west to east, so confirmation that the engineer’s voice was heard was cabled back across the Atlantic.

By 1915, NAA was one of eight stations that made up the USNO’s radio time service. Three stations (Arlington, Key West, and New Orleans) broadcast time controlled by the USNO clock in Washington, D.C.

**How A Radio-Controlled Clock Works**

Radio-controlled clocks contain both a miniature radio receiver and a traditional quartz clock. As a result, a typical WWVB clock contains two tiny quartz oscillators. One is a 32.768 kHz crystal that is used to control the timekeeping, the same type of oscillator you would find in any quartz watch or clock. The other is a 60 kHz crystal used to permanently tune the receiver to one frequency.

The receiver outputs a string of binary ones and zeros to a processing unit that decodes the signal and synchronizes the clock circuitry to the correct time. Because WWVB transmits UTC, the processing unit also applies a time zone correction to convert UTC to local time. This time zone setting is selected by the user, and must be changed if the clock is moved to a different time zone.

Building miniature antennas that work with longwave signals can be a challenge for receiver designers. Many radio-controlled clocks use ferrite loop antennas, consisting of a ferrite bar wrapped with a coil of fine wire, similar to what is found inside an AM radio.

In the case of wristwatches, the length of the ferrite bar is usually about 15 millimeters, and it must be hidden somewhere inside the watch. If the watch has a plastic or ceramic case this isn’t a problem, but a metal case can block the signal. Some watches are partially metal, with the antenna hidden underneath a plastic panel near the connection to the watch band, or under the watch face.

Some radio-controlled clocks now work with more than one station. This usually means that they have more than one oscillator (a 60 KHz oscillator for WWVB and a 40 KHz oscillator for JJY, for example) but typically just one antenna. When a different station is selected, some designs match the antenna circuit to the antenna by varying the capacitance values. The size constraints make it difficult to build an antenna optimized for LF signals, so the goal is simply to get as much of the signal as possible, and to use the local oscillator and signal processing software to pull the time code out of the noise.

Most radio-controlled clocks only try to synchronize at night, because the signal is stronger and easier to receive after the sun goes down. Between synchs, the clock keeps time using its 32.768 kHz oscillator. Typically, the oscillator frequency is within a fraction of a hertz of its assigned value, which means it can keep time to within 1 second for a few days or more. Therefore, one synch per day is enough to make the clock appear to be on the right second, even though it has likely gained or lost a fraction of a second since the last synch. If the signal is not received the clock won’t fail, but simply functions as an “uncontrolled” quartz clock.
### Table 1. HF Time Signal Stations

<table>
<thead>
<tr>
<th>Call Letters</th>
<th>Location</th>
<th>Frequency (MHz)</th>
<th>Language</th>
<th>Continuous Broadcast?</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWV</td>
<td>Fort Collins, Colo</td>
<td>2.5, 5, 10, 15, 20</td>
<td>English</td>
<td>Yes</td>
</tr>
<tr>
<td>WWVH</td>
<td>Kauai, Hawaii</td>
<td>2.5, 5, 10, 15</td>
<td>English</td>
<td>Yes</td>
</tr>
<tr>
<td>CHU</td>
<td>Ottawa, Canada</td>
<td>3.33, 7.335, 14.67</td>
<td>French, English</td>
<td>Yes</td>
</tr>
<tr>
<td>BPM</td>
<td>Lintong, China</td>
<td>2.5, 5, 10, 15</td>
<td>Chinese</td>
<td>The 5 and 10 MHz signals are continuous, but 2.5 and 15 MHz only operate at scheduled times</td>
</tr>
<tr>
<td>HLA</td>
<td>Taejon, Korea</td>
<td>5</td>
<td>Korean</td>
<td>Yes</td>
</tr>
<tr>
<td>LOL</td>
<td>Buenos Aires, Argentina</td>
<td>5, 10</td>
<td>Spanish</td>
<td>No, currently only on from 1100 to 1200 Argentina Standard Time</td>
</tr>
<tr>
<td>YVTO</td>
<td>Caracas, Venezuela</td>
<td>5</td>
<td>Spanish</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Five stations near the Pacific Ocean were used to broadcast the time maintained by a Navy clock at Mare Island. The signals were designed to be easy to decode. All eight stations would begin sending dots at 11:55 a.m., five minutes before noon. The dots were sent one second apart, with no signal sent on the 29th second of each minute, or during the last five seconds of each of the first four minutes. During the last minute before noon, the dots would stop 10 seconds before the end of the minute. A long dash was sent exactly at noon, serving as the on-time marker.

By 1924, NAA had switched to audio transmissions, and moved its operations to 690 kHz on the then new AM broadcast band. The historic Arlington towers were dismantled in 1941 because they were considered a hazard to aircraft approaching the new Washington National Airport.

The USNO’s radio time service was overtaken during World War II by the time broadcasts of the National Bureau of Standards (discussed in the next section), but the NAA callsign lives on. Since 1961 it has been assigned to a megawatt VLF station in Cutler, Maine, that the U.S. Navy uses to communicate with submarines.

### WWV Solves The Frequency Problem

The National Institute of Standards and Technology (NIST), formerly called the National Bureau of Standards (NBS), orig-
Re_inventing Radio through Design and Necessity

**FR250 $50***
Multi-Purpose

Stay informed and prepared for emergencies with this self-powered 3-in-1 radio, flashlight and cell-phone charger — no batteries required.
- AM/FM/Shortwave Radio Reception
- Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

**FR200 $40***
Crank it Up

Without the need for batteries, this self-powered 2-in-1 radio and flashlight helps you stay informed and prepared for emergencies.
- AM/FM/Shortwave Radio Reception
- Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

**FR300 $50***
All-In-One

This all-in-one unit offers functionality and versatility that makes it ideal for emergencies.
- AM/FM/TV-VHF/NICAA Radio Reception
- Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)
- Can be powered from four different sources:
  1. The built-in rechargeable Ni-MH battery that takes charge from the dynamo crank and from an AC adapter (AC adapter not included)
  2. 3 AA batteries (Not included)
  3. The AC adapter alone (AC adapter not included)
  4. The dynamo crank alone, even with no battery pack installed
- Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
- Built-in 2 white LED light source and one flashing red LED
- Dimensions: 6-1/2"W x 5-3/4"H x 2-1/4"D
- Weight: 1 lb. 2 oz.
- Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack
- Available colors: Metallic Blue, Metallic Red, Sand, Yellow

© Copyright 2006 Eton Corporation. All Rights Reserved.
S350 Deluxe $100*
High-Performance Field Radio

For S350 Deluxe devotees, the deluxe mode combines a sporty new exterior with the same unrivaled functionality.

- Highly sensitive analog tuner with digital display
- Large, full range speaker with bass & treble control
- Clock, alarm, and sleep timer
- Built-in antennas and connections for external antennas
- AM/SW Frequency Lock
- Set clock and alarm while radio plays
- Dimensions: 12-1/2" W x 7" H x 3-1/2" D
- Weight: 3 lb. 4 oz.
- Power Source: 4 D or AA Batteries (not included) or AC Adapter (included)
- Available colors: Metallic Red, Black

YB550PE $80*
Digital Expertise

Offering high-tech digital performance and portability, the YB550PE packs performance into a small radio. Palm-sized and only 11 oz, the YB550PE can receive AM, FM, and continuous Shortwave across all 14 international bands.

- Shortwave range of 1711 - 29,995 Khz
- Autoscan, direct keypad, and scroll wheel tuning
- 200 customizable station presets
- Alarm and sleep timer functions
- AC adaptor and supplementary antenna inputs
- Dimensions: 3-1/2" W x 5-3/4" H x 1-1/2" D
- Weight: 10.5 oz.
- Power Source: 3 AA Batteries (included) or AC Adapter (not included)
Table 2. LF Time Signal Stations

<table>
<thead>
<tr>
<th>Call Letters</th>
<th>Location</th>
<th>Frequency (kHz)</th>
<th>Controlling Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWVB</td>
<td>Fort Collins, Colorado, United States</td>
<td>60</td>
<td>National Institute of Standards and Technology (NIST)</td>
</tr>
<tr>
<td>BPC</td>
<td>Lintong, China</td>
<td>68.5</td>
<td>National Time Service Center (NTSC), Chinese Academy of Sciences</td>
</tr>
<tr>
<td>DCF77</td>
<td>Mainflingen, Germany</td>
<td>77.5</td>
<td>Physikalisch-Technische Bundesanstalt (PTB)</td>
</tr>
<tr>
<td>HBG</td>
<td>Prangins, Switzerland</td>
<td>75</td>
<td>Swiss Federal Office of Metrology and Accreditation (METAS)</td>
</tr>
<tr>
<td>JJY</td>
<td>Japan</td>
<td>40 and 60</td>
<td>National Institute of Information and Communications Technology (NICT)</td>
</tr>
<tr>
<td>MSF</td>
<td>Rugby, United Kingdom</td>
<td>60</td>
<td>National Physical Laboratory (NPL)</td>
</tr>
<tr>
<td>RBU</td>
<td>Moscow, Russia</td>
<td>66.67</td>
<td>Institute of Metrology for Time and Space (IMVP)</td>
</tr>
</tbody>
</table>

An aerial photograph of the site shared by WWV and WWVB near Fort Collins, Colorado, taken during the 1990s. The relatively small WWV antennas aren't visible from this angle, but the eight large towers support the massive WWVB antenna array.

WWV began broadcasting in May 1920 from Washington, D.C. at a frequency of 600 kHz. Ironically, the first broadcasts consisted of Friday evening music concerts that lasted from 8:30 to 11:00 p.m. The station's 50 watt signal could be heard about 40 kilometers away.

Other uses of the station followed, but by late 1922, it was decided that the station's purpose would be to transmit standard frequencies that provided a reference signal for other radio broadcasters. By March 1923, WWV was broadcasting frequencies from 125 to 2000 kHz on a monthly or weekly schedule. The accuracy of the transmitted frequency was said to be “better than three-tenths of one per cent.”

During WWV's early days, the transmitter was adjusted to the correct frequency using a wavemeter, which was checked against the national standard immediately before being brought to the station. However, the recently invented quartz oscillator soon became the national standard of frequency.

By 1927, a 50 kHz temperature-controlled quartz oscillator was installed at the station site. During the transmission, the frequency of the transmitter was held manually so that no beat note was audible between the transmitter and the quartz oscillator.

New radio stations were being built across the United States throughout the 1920s, and the radio industry desperately needed a reliable reference standard for frequency. If the new stations couldn’t stay near their assigned frequencies, the airwaves would be unusable. To meet the needs of the fast growing radio industry, WWV was continuously evolving, adding more frequencies, increasing its coverage area, and increasing the accuracy of its standard frequencies, which was reduced to less than 1 part per million by the early 1930s.

It wasn’t until 1937, however, when WWV began to transmit time. Originally, all that was sent were seconds pulses that served as a time interval reference. The pulses were not held in phase with any time reference, because the United States Navy still served as the nation's official radio time broadcaster. This

The interior of a low cost watch controlled by WWVB signals. Note the ferrite bar antenna and two crystal oscillators, one a 32.768 kHz crystal that drives the quartz clock, the other is a 60 kHz crystal that serves as a pre-selector for the time signal. The battery appears to take up more area than the crystals and antenna combined.
changed in June 1944, when the Superintendent of the USNO authorized the synchronization of the WWV time signals to those of the USNO, largely because the Navy had ordered the USNO to cut back time transmissions during World War II. As a result, WWV began sending time messages in telegraphic code every five minutes in October 1945.

The famous voice announcements of time, now known to nearly all who listen to shortwave radio, began on January 1, 1950. By the 1960s, WWV and other time signal stations were controlled by atomic oscillators, and today most stations are referenced to frequency standards accurate to better than 1 part per trillion, although their received accuracy can be much less due to radio propagation noise.

Today's Time Is . . .

WWV moved to its current site in Fort Collins, Colorado, in 1966 and continues to broadcast standard time and frequency information on 2.5, 5, 10, 15, and 20 MHz. A sister station, WWVH, began operation in Hawaii in 1948, adding voice announcements of time in 1964.

Today, WWVH shares all of the WWV frequencies with the exception of 20 MHz, and it is often possible to hear both stations. It's easy to tell the difference, because a man's voice announces the time on WWV, and a woman's voice is used on WWVH. The WWV announcement begins about seven seconds prior to the top of the minute, and the WWVH announcement begins about 15 seconds prior to the top of the minute (lasting for about seven seconds), so the two announcements never overlap.

HF Time Signal Stations: Talking Clocks

WWV and WWVH aren't the only "talking clocks" found on the shortwave bands. The Canadian station CHU is normally an easy catch for U.S. listeners on 3.33, 7.335, and 14.67 MHz, with voice announcements of time made in both French and English. An official source of time in Canada, it is believed that CHU began broadcasting in 1929, and has done so since 1938 using the current call letters. Table 1 lists other HF time stations, most sharing the WWV and WWVH frequencies, which are internationally allocated for standard time and frequency broadcasts. Note that the ranks of the HF time stations have thinned recently, with stations such as IAM in Italy, VNG in Australia, JYY in Japan (the call letters were transferred to the LF station), ATA in India, and BSF in Taiwan all going off the air since 1998.

The HF time stations produce the world's most accurate voice announcements of time. Although some HF time signal stations (including WWV and WWVH) broadcast a time code, nearly all inexpensive radio-controlled clocks receive signals from the LF time signal stations that we'll discuss next. The LF stations lack the bandwidth to send any voice announcements at all, but their time codes are easy to receive indoors and outdoors with small antennas, making them perfectly suited for synchronizing radio-controlled clocks.

LF Time Signal Stations And Those Popular "Atomic" Clocks

Low-cost radio-controlled clocks first appeared in the early 1990s. Today they
WWVB TIME CODE FORMAT

The time code format used by WWVB and now read by millions of radio-controlled clocks. The time code is sent continuously at a rate of 1 bit per second, with a complete time code sent every minute.

are found in retail stores throughout the United States, Asia, and Europe, and millions of units are sold annually. These clocks receive signals in the 40 to 80 kHz range, located in the LF part of the radio spectrum, the same band used by early stations like FL and NAA. Although LF communications is far from a new technology, it remains perfectly suited for time signals, where only a small amount of information is sent and little bandwidth is required.

Sometimes called longwave stations (the wavelength of 60 kHz is 5 kilometers, or more than three miles), LF stations (see Table 2) can cover a wide area with relatively low power. Even more importantly, their signals can be received indoors with simple antennas, because they easily pass through non-metallic buildings and walls. This gives them an edge over other time signals, such as those from the GPS satellites, which are hard to receive indoors.

All LF time signal stations are run by standards laboratories that keep the official time in their respective countries, so the time signal as broadcast is usually exceptionally accurate. The time code sent by the station normally contains the hour, minute, second, date, daylight saving time notification, and other information. All stations use a different time code format, but many radio-controlled clocks now work with more than one station, because the carrier frequencies and modulation schemes are similar. As a result, you can now buy a radio-controlled wristwatch that will synchronize in the United States, Asia, and Europe.

Future products should work in even more places, because in sharp contrast to the HF stations, the number of LF stations is expected to grow. To meet the anticipated demand for radio-controlled clocks, several countries are planning to build new LF time signal stations.

WWVB, Time Source For The United States

Most radio-controlled clocks in the United States are controlled by WWVB, which shares a sprawling 390 acre site with WWV near Fort Collins, Colorado. WWVB continuously broadcasts a 50 kW signal at 60 kHz that is strong enough during the nighttime hours to reach all 50 states. The antenna array is immense, covering about 30 acres and suspended from towers 122 meters tall, but the modulation technique is simple.

Time signals are sent by raising and lowering the power of the carrier frequency. The 60 kHz carrier frequency is locked to a cesium oscillator whose frequency is continuously steered to agree with the national frequency standard located in nearby Boulder, Colorado. A time code generator synchronized to Coordinated Universal Time (UTC) modulates the signal once per second by dropping the carrier power. If full power is restored 0.2 seconds later, it represents a 0 bit; if full power is restored 0.5 seconds later, it represents a 1 bit. A frame marker is sent by dropping the power for 0.8 seconds. The time code
generator signal is sent to the transmitter, which amplifies the signal and sends it to the antenna array.

Although this form of modulation is sometimes called amplitude shift keying, it is more properly referred to as pulse width modulation by reduced carrier transmission. This is because the information contained in the signal is demodulated by looking at the pulse widths (duration) and not by looking at the amplitude. Most LF time signal stations use a similar method to modulate their time code (the one exception is RBU in Moscow which uses an AM subcarrier).

In today’s world of high-speed communications, it’s interesting to note that WWVB sends time at a glacial rate of 1 bit per second (imagine sending an e-mail or fax at that speed!). Even so, a full time code is sent each minute, and the signal requires very little bandwidth to transmit. Technically, the bandwidth requirement is just 5 Hz, but due to the nature of the transmission and antenna system, the station has a bandwidth allocation of 2 kHz, of which about 600 Hz is currently used. Another advantage is that very little processing power is required to keep up with the bits and read the time.

So the next time somebody makes a joke about time signal stations, go ahead and laugh politely. Then inform them that time signal stations have been around for more than 100 years, and that they control millions of clocks that never need to be set. Because after all, many of us now expect our clocks to be on time, all the time, and can envision a day when every clock is “absolutely right,” making the more than century-old vision of Sir Howard Grubb a reality.

Michael Lombardi serves as the quality manager for the NIST Time and Frequency Division, the organization that operates radio stations WWV, WWVH, and WWVB. He can be reached at lombardi@hist.gov.

Suggested Reading


I'm always on the lookout for a new VHF/UHF MILCOM/MILAIR receiver, even though I have several. In particular, I've been in the market for a portable scanner ever since I let my buddy talk me into selling him my venerable Realistic PRO-43. Why not? I thought. He really wants it and my ICOM R-3 works well, has features the PRO-43 doesn't have and it was time to let someone else enjoy that trusty scanner as much as I had.

Funny thing is, after a few months I really began to miss my old PRO-43. It was easy to program, had good audio and was a good all-around scanner. Plus, as much as I liked my ICOM R-3, its slow scan rate left something to be desired.

I was, therefore, very interested when a Uniden press release announced that the arrival on the market of a new scanner, the BCD396T, capable of storing up to 6,000 channels was imminent. I quickly scanned the specifications, which were very impressive, indeed.

But does it receive the all important military frequency bands both on VHF and UHF? Lately portable scanners capable of receiving my two favorite military bands had become rare. No military, no sale was my motto, but fortunately the Uniden BCD396T does!

Here are Uniden's published specs:

- TrunkTracker IV (Motorola APCO 25 Digital, Motorola, EDACS, LTR)
- 6000 Dynamically Allocated Channels
- Close Call RF Capture Technology—Instantly tunes to signals from nearby transmitters
- Fire Tone-Out
- Alpha Tagging
- 100 Quick Key System Access
- Preprogrammed Coverage of over 400 Cities
- Continuous Band Coverage—25 MHz to 1.3 GHz excluding UHF TV and Cellular
- Compact Size
- Audio AGC
- Automatic Digital Threshold Adjustment
- Search with Scan
- DCS/CTCSS Rapid Decode—Instantly detects and displays the subaudible tone so you can quickly determine the system settings.
- S.A.M.E. (Specific Area Message Encoding) Weather Alert—During a NOAA weather or emergency alert, a code for your specific location will alert you to severe conditions in your immediate area.
- PC Control/Programming—Software included.

Although the bells and whistles were quite impressive, in my area (so far) there is no trunking, no APCO 25 digital, and no real need for a 6,000-channel scanner, but what really impressed me were the computer control, Close Call feature (if it worked on the civil and military aviation bands), and the alphanumeric readout. Now except for the Close Call, these are all features my BC-780 has, but it isn't portable so I decided to give the BCD396T a shot.

On opening the box I was surprised by how small the BCD396T is. In fact it was a tad smaller (thinner) then my old PRO-43. It's surprisingly more solid, though, and has the heft of a professional walkie-talkie.

The scanner is supplied with AC adaptor, screw-on SMA-type antenna (and BNC adaptor) rechargeable batteries and a
that it began scanning immediately. It was only seconds before it locked on a local police channel. The audio was a bit heavy on the treble side, but it was clear, not objectionable, and about what you’d expect for a speaker as small as this one is. I’ve read on some forums that the speaker sound was tinny, but I found this was not the case. I would say it was on par with, but considerably louder than, the sound from my PRO-43.

As I read the manual—an intimidating 148 pages—it dawned on me that this was not my father’s scanning radio. Instead the Uniden BCD396T was a rather complicated, but rightly so, communications interception tool that happened to also be a potent scanning radio. In light of this, if you decide to purchase a Uniden BC396T, give yourself some quality alone time (several hours) to get used to the way this scanner works.

Although at first glance it does seem a bit complicated, after a few hours of reading and punching the buttons you’ll find the programming quite intuitive and not as difficult as it first seems.

One of the harder concepts to grasp is Uniden’s channel programming hierarchy of “systems” and “groups,” which on the face seem complicated, but in actuality is straightforward and really quite smart.

**Comparison Test**

After getting the hang of programming (through the key pad not via PC, we’ll save that for later), I was ready to give the BCD396T a comparison test and stacked it up against my BC-780 and ICOM R-3.

Using the same antenna on each scanner I found that the Uniden 396T was a tad more sensitive than either my BC780 or ICOM R-3, especially on VHF and UHF. I did notice that the BCD396T was a bit more sensitive to unwanted noise on the VHF police bands, but entering the proper DCS/PL tones for each channel easily cured this, and since my main interest is military monitoring, this was not a major concern. My guess, however, is that this could be a problem in RF-crowded urban area and on some fre-
The BCD396T fits well in most cell phone and GMRS radio cases. This case, bought at a sporting goods store for $6, even has a side pocket capable of holding a UHF rubber duck antenna.

Frequencies where DP/PL tones are not used, as is the case on some of the low-power car-to-car police frequencies in my area.

As for military mobile (138 to 144 MHz), civil aviation (108 to 136 MHz), and UHF aero band frequencies (225 to 400 MHz), again it was on a par with, if not better than, either my BC-780 or ICOM R-3. This was surprising for a handheld scanner.

I programmed each scanner with the weak VHF/UHF ATIS broadcast from my local airport, located 12 miles away as the crow flies, which I could usually only barely pick up with the squelch totally turned off on the BC-780 and the ICOM R-3. To my surprise the weak ATIS was not only louder on the BCD396T, but also easily broke squelch on both VHF and UHF broadcasts.

Over the next few days I listened to each scanner and became convinced that the BCD396T was slightly better in picking up military communications. Sometimes when I was listening to a UHF aero-comm and it would drop out on one scanner, it would continue for a little while longer on the BCD396T. Although there are some features, like expanded band coverage and television video reception, on my ICOM R-3 that the BCD396T doesn’t have, in my opinion it’s a darned good scanner, and is now doing double duty as a portable and base scanner.

Close Call!

I must admit I was a tad skeptical when I read about the “Close Call” features in the BCD396T manual. I have used several RF close-capture products, such as Optoelectronic’s Scout and Interceptor as well as many frequency counters (marketed as signal sniffers), and have had varying degrees of success. Sometimes they worked flawlessly revealing frequencies I never knew were in use, and sometimes they became so overloaded by FM and TV broadcast emitters that they became deaf as a post and basically useless.

However, as I read on, it became clear that Uniden has put quite a bit of thought and signal intercepting experience into the design of the Close Call technology. For example, to keep from getting overloaded by broadcast emitters, you can customize the Close Call function to skip those frequencies. You can have it only scan a certain band of frequencies, say aircraft, and even permanently lockout offending strong transmitters. You also have the option of automatically storing any Close Call frequency captures into a scanable group (bank) using Close Call while scanning other frequencies or using it on its own. Nice options.

Hooking the scanner up to my mobile antenna, I took the BCD396T (Close Call option selected) for a spin around my local airport to see what it could capture. I’m happy to say Close Call worked as advertised. It easily picked up and displayed both FM and AM signals. I captured two VHF security frequencies that I didn’t know existed, as well as several AM (both civil and military) aircraft frequencies up to a quarter-mile from the transmitting source. My guess is the capture range is dependent on the proximity and the strength of the transmitter in question, but on the whole I was very impressed with Close Call.

Alert!

Another cool feature is that you can set special audible tones to alert you when Close Call finds an active frequency or when a programmed frequency becomes active. Let’s say there’s a frequency in your area that doesn’t have much traffic on it but you still need to be alerted when there’s any radio traffic there. You can set the scanner to alert you with one of several audible tones (from a standard beep to a warble) that will get your attention. Since you can use different tones on different channels, it’s easy to know just by the tone which channel is active.

Well Worth It

In the final analysis, I think the BCD396T is one heck of a great scanner radio for MILCOM and MILAIR reception. Some think it’s a bit pricey at above $500, but I think this feature-packed scanner is well worth the price. A great portable, you’ll find it also could become your main base-scanner.

For more information, contact Uniden at www.uniden.com. Be sure to tell them you read about the new BCD396T in Popular Communications!
Radios were used to conduct remotes. The 1610 AM sent out information on a continuous loop. At 5 watts the 530 station reached between two to five miles depending on weather.

A 1610 kHz AM and 91.7 MHz FM station simulcasted live music, news, interviews, DJs and special programs. Two-way radios were used to conduct remotes. The 1610 AM sent out 5 watts and had a reach of around three miles with enough power to be heard with a small portable receiver. The FM station put out 10 watts and reached out to five or six miles. All this was covered by a special Experimental License granted by the FCC.

All three stations were built by the Scouts who did the antennas on site and the “in front of the mic” work. This was the first time Scouts broadcast, as opposed to transmitted, during a Jamboree.

Q. You’ve said before that the first Police radios were one-way on the AM band. When did the cops get their own frequencies and two-way communications?

A. Shortly after World War II the FCC decreed that all police radio would shift to the VHF frequencies and operate between 150 and 160 MHz. During the War years we’d learned a lot about radio. The new systems, often using ex-military gear were two-way. Lake County, Illinois, claims to be the first to accomplish this. February 1, 1949, they went into service with a 250-foot tower and service building in Libertyville, Illinois. The Radio Department operated 200 radios for all the police and fire agencies in the county at a cost of $10 per agency per month. Anyone know of an earlier system?

Q. Is the Navy able to keep track of foreign military vessels at sea?

A. They sure are. The project is called “White Cloud” and is based on small satellites called Subsatellite Units or SSUs. Working in groups of three or four SSUs from 30 to 240 kilometers apart, they sweep the seas below and each takes a fix on the various vessels. They take their fixes from the communications, air and surface search and weapons control systems on the ships. When each has its fix they compare notes and transmit the information to the Navy’s ground stations. Passing over any one point at sea about 30 times a day they can work out course and direction of about any ship out there. They are thought to be transmitting their signals in the .5 to 10 GHz range but details are understandably hard to find. They have been up there since the early ’70s and were still being deployed through the end of the ’90s. Question is, are “they still up there?” Want to bet they’re not?

Q. Most hams are aware of station K2BSA, the official Boy Scout Ham station. Have they ever done anything with AM or FM broadcasting?

A. Yes they have. Every four years there is a National Jamboree. Naturally K2BSA is there and on the air. In 1989 the National Jamboree was held at Camp A.P. Hill near Bowling Green, Virginia. It attracted Scouts from all over the USA and more than 30 countries. Daily attendance was over 100,000. To help with the crowds a 530 kHz AM station played parking and general information on a continuous loop. At 5 watts the 530 station reached between two to five miles depending on weather.

A 1610 kHz AM and 91.7 MHz FM station simulcasted live music, news, interviews, DJs and special programs. Two-way radios were used to conduct remotes. The 1610 AM sent out 5 watts and had a reach of around three miles with enough power to be heard with a small portable receiver. The FM station put out 10 watts and reached out to five or six miles. All this was covered by a special Experimental License granted by the FCC.

All three stations were built by the Scouts who did the antennas on site and the “in front of the mic” work. This was the first time Scouts broadcast, as opposed to transmitted, during a Jamboree.

Q. How important is communications procedure for the military in a combat situation? Is it really as important as everyone says it is?

A. Well, the enemy really is always listening. The North Vietnamese Peoples Liberation Army had an intercept program going from 1924 until 1975 and probably after that. But it really paid off for one soldier who kept his cool.

Armed Cavalry units often left soldiers on lookout posts at night around their area of encampment, particularly in the field. Because of radio security there would not be any “Outpost 1 reporting. No traffic foolishness. The radioman at the main camp would call the outpost number and the lookout would reply with one click on his mic key if he was OK, twice if he wasn’t. One night a lookout answered with two clicks. When asked if it was safe to transmit by voice he again answered with two clicks. Through a process of clicks on the mic he let Command know that he was in the same place he had been left, was not wounded or injured, could not see the enemy, was in grave danger and needed immediate relief. Fearing an ambush, several tanks, armored vehicles and heavily armed troops were sent out to rescue their endangered comrade. Upon arrival the rescue column found a very frightened lookout still up in a tree with a large tiger licking his boots.
Uniden recently introduced the TrunkTracker III series. While that’s probably not news to anyone anymore, a lot of scanner enthusiasts are still confused about some of the new techniques and setups for this new series of scanners.

If you’re new to scanning, this whole concept of trunking itself can be a bit elusive. This can be complicated by the fact that not all systems are created equal, and different manufacturers have different ways of dealing with the differences between them. To explain a bit about the concept we’ll be focusing on the TrunkTracker III, but the basic concepts apply to other radios as well. Just how you apply the concepts may be completely different, depending on which radio you have.

The first thing you need to do is figure out the type of trunking system you have. Many excellent references, including Police Call available at most Radio Shack stores, may be of some help there. Once that’s determined, you’ll need to do some calculating, or guessing, about how to enter the system into your scanner. Have your owner’s manual handy.

**Trunking Systems**

There are several types of systems out there. LTR systems are used primarily for businesses. Programming an LTR system into your scanner requires that you know all the channels in use, but after that it’s pretty automatic. You then only have to worry about finding the talkgroups that are of interest.

EDACS systems require the frequencies to be entered in order. The system may be in frequency order, but it may not be. If it’s not, good luck, as any random ordering of frequencies will work with a system as long as the system knows what they are. The advantage is that the system and its users all know what the order is, but they may be just as happy if you don’t. Some trial and error may be required before you can start following conversations correctly.

Motorola systems, by far the most common, are usually a bit easier to get into your scanner. The good news here is that most of them are what’s called “type II,” and your scanner can follow a type II system without much fuss. All you need on the TrunkTracker III radios is the control channel and it can find the rest. Pretty slick!

Of course, if there’s a type II, that implies there must have been a type I before. There was, and that’s where things get a bit sticky. Type I systems are a bit older and a bit less sophisticated. The type I system needs something called a fleet map, which is a list of groups that are on the system and shows how the channels are divided between groups. It’s a bit like a code to allow the channels in use to be selected correctly for the right group of listeners at the right time.

Type II systems have a fleet map, too, but it’s really to make them compatible with the older systems. As the type II systems came out, most new radios purchased were type II, but the users of these systems didn’t want to give up their old radios. So Motorola wisely came up with a hybrid system that allowed type I and II systems to coexist within the same system until all the radios could be upgraded. Most systems are type II and any new radios purchased are type II, so this issue will probably go away completely in another few years. But for now there are still some type I systems and some hybrids in use.

**The First Step**

The first thing to do in fleet map programming is to get the radio programmed into the trunked mode. You should have all the frequencies entered, and be able to search the trunked bank, looking for ID numbers. One method to help you determine if you need a custom fleet map is to look at the ID numbers. One method to help you determine if you need a custom fleet map is to look at the ID numbers themselves as you listen to the conversations. If you see lots of numbers, particularly odd ones (those ending in an odd number), it may indicate that you
January 2006 - March 2007
Classic Calendar
Features 15 magnificent, full-color vintage radio images including Collins, Eldico, Hammarlund, WRL, Meissner, National and more!
Order No. CCAL $10.95
Ham Radio Operators Calendar
This year's calendar includes 15 spectacular color images of some of the biggest, most photogenic shacks, antennas, scenerics & personalities.
Order No. CCAL $10.95
McCoy on Antennas
by Lew McCoy, W1ICP
Unlike many technical publications, Lew presents his invaluable antenna information in a casual, non-intimidating way for anyone!
Order No. MCOY $15.95
HR Anthologies
$19.95 ea.
Buy all 4 for only $75
Now you can enjoy collections of the best material published in Ham Radio magazine, conveniently arranged by subject and original publication date. Choose your interest, your time period and choose your anthology!
Homebrewing Techniques .... Order # AHOME
Test Eqpt & Repair Techniques...Order # ATEST
Antennas - 1968 - 1972 .......Order # ANTS1
Antennas - 1973 - 1975 .......Order # ANTS 2
Get all 4 for $75 plus Free shipping ....Order # ASET
W6SAI HF Antenna Handbook
by Bill Orr, W6SAI
Inexpensive, practical antenna projects that work! Guides you through the building of wire, loop, Yagi and vertical antennas.
Order No. W6SAI $19.95
VHF Propagation
A Guide For Radio Amateurs
by Ken Neubeck, WB2AMU & Gordon West, WB6NOA
A comprehensive source-book on VHF propagation by two great authors! Here's a sampling of what you'll find inside:
- Tropo Ducting
- Aurora
- Meteor Scatter
- TEP
- Sporadic-E
- Combo Modes
Order No. VHFProp $15.95
Heathkit - A Guide to the AR Products
by Chuck Penson, WA7ZRE
This greatly expanded Second Edition is a must for collectors and Ham history buffs! Pick up this 298-page volume and you won't be able to put it down!
Order No. HEATHKIT $29.95
The Short Vertical Antenna and Ground Radial
by Jerry Sevick, W2FMI
This small but solid guide walks you through the design and installation of inexpensive, yet effective short HF vertical antennas. Antenna restrictions a problem? This book could keep you on the air!
Order No. SVERT $10.00
6 Mills SPEC Radio Gear
KOREAN WAR TO PRESENT DAY
by MARK FRANCIS, K1OFP
Over 230 pages of operation, modification, and maintenance tips and info, including 200+ illustrations.
Ancillary equipment, useful hints and mods, how to find surplus, and much, much more!
Order No. MILSPEC $27.95
Ham Radio Horizons: The Video
Getting Started in Packet Radio
Order No. VPAC
Getting Started in Ham Radio
Order No. VHFR
Getting Started in Contesting
Order No. VCON
Getting Started in VHF
Order No. VDX
Getting Started in Amateur Satellites
Order No. VSAT
Ham Radio Magazine on CD
Brought to you by CQ & ARRL
Enjoy quick and easy access to every issue of this popular magazine, broken down by years!
Three sets, each containing 4 CDs -
1968-1976 Order No. HRCD1 $59.95
1977-1983 Order No. HRCD2 $59.95
1984-1990 Order No. HRCD3 $59.95
Buy All 3 Sets and Save $29.90!
Order No. HRCD Set $149.95
FREE Shipping & Handling with every $75 purchase!

Name ____________________________
Callsign __________________________
Street Address __________________________
City __________________ State ____________ Zip __________

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item #</th>
<th>Description</th>
<th>Price</th>
<th>Total Price</th>
</tr>
</thead>
</table>

Shipping & Handling: U.S. & Possessions - add $5 for the first item, $2.50 for the second and $1 for each additional item. FREE shipping on orders over $75.00 (merchandise only). Foreign-Calculated by weight and destination and added to your credit card charge

Total __________________

Method of payment
☐ Check
☐ Money Order
☐ Visa
☐ MasterCard
☐ Discover
☐ American Express

Credit Card No. ____________________________ Expiration date __________

CQ Communications Inc., 25 Newbridge Rd., Hicksville, NY 11801/516-681-2922; Fax 516-681-2926
Order Toll-Free 800-853-9797
Talkgroups

Metro

Police: Supervisors
Police: Detectives
Police: Precinct 1
Police: Precinct 2
Police: Traffic
Highways: Supervisors
Highways: Road Crews
Highways: Repairs/Snow
Fire: Supervisors
Fire: North Sector
Fire: West Sector
Fire: South Sector
Fire: East Sector

Under the newer type II systems, talkgroups are the way to get things done. Talkgroups can be created for any group of users, and on some systems they can even be created on the fly as a situation develops. It’s a much more flexible system and your radio is already programmed to deal with it. You’ll only need a custom fleet map if this doesn’t work to follow conversations.

Frequency Of The Month

Each month we ask our readers to let us know what they’re hearing on our “Frequency Of The Month.” Give it a listen and report your findings to me here at “ScanTech.” We’ll pick a name at random from the entries we receive and give the lucky winner a free one-year gift subscription, or extension, to Pop’Comm.

Let’s go back to UHF for this month and have a listen to 450.580. Let me know what you hear. You can send your entry to radioken@earthlink.net, or to Ken Reiss, 9051 Watson Rd. #309, St. Louis, MO 63126. Please include the frequency in the subject line or on the front of the envelope so it can be processed correctly.

need to adjust the fleet map. However, there are times in a type II system when odd numbers will be legitimate, so don’t conclude that you have the wrong fleet map just because of an odd ID or two.

As you watch the ID numbers, listen to the voices. You’ll quickly begin to recognize some of the dispatchers, as well as background sounds or other telltale signs that one particular user is transmitting. Pick one of these that you think is incorrect, and wait for that ID to pop up. If the delay mode is on, or you press hold, you should hear a response. Sometimes, you won’t hear the response, but you’ll hear the first person answer back. This is definitely a sign of an incorrect fleet map.

Another way to look for problems is to start searching again, this time with the delay off, waiting for a transmission that you think is in the “troubled” group. As soon as the transmission ends, hit search again to look for the reply. Here, you may actually have to use your lockouts to block the busier channels or the users that you think are working okay. If the fleet map is correct, you’ll get the same ID number for the reply as for the original transmission. If you don’t, another fleet map setting will probably work better for you.

A Little Math—Very Little!

It’s helpful to note the ID numbers you’re getting, even though they are wrong. If you’re up to a bit of math, you can divide the ID number by 8192 (don’t worry about any decimal fraction) and the number will tell you what “block” the user is in.

Now, we’re ready to experiment. It’s useful to do the early work on this at night when many users of the system are off the air, but eventually you’ll have to check during the day, too, to make sure that you’ve got the whole system under control. If you notice that all the transmissions you’re hearing are coming up with different numbers, even when they appear to be talking to each other, it may be that you have a type I system. If some of them seem to work okay (that is they keep the same ID number for the reply), then you probably have a hybrid system. Either one will require some experimenting at this point. If you can identify transmissions that are correct, it’s worthwhile to do the math (divide the ID by 8192 and drop the decimal part) to determine which blocks you can leave alone. A type II ID is size code 0, and those blocks can be left alone, which will shorten the list of combinations you have to try.

Programming A Fleet Map

Uniden has included several preprogrammed fleet maps. The default map used is for a pure type II system, which is the most common. There are also some “standard” type I and type III maps pre-
As usual, you can write to me at Ken having with trunked systems in your area. To enjoy listening to the trunked system the effort will pay off and you'll be able to take quite a while, so be patient. Sometimes it only takes a few seconds of listening to determine a particular size code is wrong, but it can take quite a while, so be patient. You're likely to have to repeat this procedure often before you come up with an accurate map.

Any block using a type 1 size code will identify on the scanner with a number beginning with that block number. It will make it much easier to tell if a particular block's ID is working or not in this mode. Simply watch for the ID in the block you're testing, and hit hold to see if you can hear the return conversation. It is a much better test if the repeater actually drops before the reply is heard as then the block's ID is working or not in this mode. It will make it much easier to tell if a particular block's ID is working or not in this mode.

You can then choose to select a preprogrammed fleet map (and you should give those a try) or to enter a custom fleet map. If you enter custom, you'll get to select block sizes and codes for each of the eight blocks that make up a system numbered 0–7. At this point, you begin programming the size codes you want for the map. If you've been through the exercise of trying all the built-in maps, you may already have some idea of what does and doesn't work. Select size codes for all the blocks at once, or just set one for the block you're interested in and ignore the rest. You're likely to have to repeat this procedure often before you come up with an accurate map.

Any block using a type 1 size code will identify on the scanner with a number beginning with that block number. It will make it much easier to tell if a particular block's ID is working or not in this mode. Simply watch for the ID in the block you're testing, and hit hold to see if you can hear the return conversation. It is a much better test if the repeater actually drops before the reply is heard as then the controller has to assign a new frequency to the subfleet, and your TrunkTracker will have the opportunity to follow that new assignment. Sometimes it only takes a few seconds of listening to determine that a particular size code is wrong, but it can take quite a while, so be patient.

Once you have a working fleet map, the effort will pay off and you'll be able to enjoy listening to the trunked system and control which groups you listen to.

**Drop Me A Line**

I'd like to know what you're hearing and what luck—or otherwise—you're having with trunked systems in your area. As usual, you can write to me at Ken Reiss, 9051 Watson Rd. #309, St. Louis, MO 63126 or e-mail me at radioken@earthlink.net.

---

**V.I.P. SPOTLIGHT**

Our February Winner: Walter Schivo, KB6BKN, of Novato, California!

Walter Schivo, KB6BKN, of Novato, California tells us,

It warms my heart to see some QSLs in *Pop'Comm* that I've sent in from the past. One was from Radio Denmark; a QSL card I had received from a report I sent on August 17, 1957—yes, long ago, but I remember I was little and had a Hallicrafters S38B. I have just received a Hallicrafters SX43 at Christmas. We were living at my parent's summer house in Forest Knolls, California. I was able to put up a multi-wire antenna with spacers I made with wooden dowels covered in candle wax. The wire was from a 300-foot roll costing a dollar, and fed with 300-ohm twin lead.

About that time I would listen to a ham operator, W6ZUB, who was the fire look-out warden on Mount Barnabe, the second highest peak in Marin County. It was on 1995 AM in the 160 meter band. One day I walked up and met him and this sparked my interest in amateur radio. This was put on hold through college and the military. Later, still having receivers, I was interested in shortwave and amateur radio and obtained my license which I have had for many years.

I enjoy the AM mode of operation and have many classic radios I have restored. I also enjoy 160 and 10-meter AM. My son is also a ham and we have a QTH up on the mountains at 4000 feet and have worked many stations around the world from this prime location. If you visit qrz.com and my callsign you will see one section of the AM station here in my studio. If you check my son's call, KD6GCG, you will see the station up at the mountain location.

---

*Popular Communications* invites you to submit, in about 300 words, how you got started in the communications hobby. Entries should be typewritten, or otherwise easily readable. If possible, your photo should be included.

Each month, we'll select one entry and publish it here. All submissions become the property of *Popular Communications*, and none will be acknowledged or returned. Entries will be selected taking into consideration the story they relate, and if it is especially interesting, unusual or even humorous. We reserve the right to edit all submitted material for length, grammar, and style.

The person whose entry is selected will receive a one-year gift subscription (or one-year subscription extension) to *Popular Communications*. Address all entries to: "V.I.P. Spotlight," *Popular Communications*, 25 Newbridge Road, Hicksville, NY 11801 or e-mail your entry to popularcom@aol.com.
Low-Power FM And Microbroadcasting: The Latest News Will Surprise You!

Have you heard the news? Community service is alive and well on the radio. There's a revolution in public broadcasting going on right now across the dial. Small low-power radio stations are carrying the news of your community and serving the public with programming not found among the big guns, thanks to a relatively new low-power FM service created by the FCC. Meanwhile, alternative broadcasters in big cities are bypassing the FCC in order to serve their local communities. Welcome to the exciting world of low-power radio.

Low-Power FM

A low-power FM (LPFM) broadcast service in the United States was created partially in response to criticism of FCC deregulation that relaxed radio station ownership rules that, by most accounts, diluted local community service across the dial. The service also eliminates many of the construction and operating expenses of a standard broadcast station, which, at greater than 100 watts, are considered prohibitive for a small non-commercial operation, although start-up costs are still in the $10,000 range.

Initially it was proposed that LPFM broadcast stations be allowed on second adjacent frequencies or "channels" of existing broadcast stations. However the proposal was short-circuited by existing "full service" broadcasters concerned about increased interference. The final FCC ruling limited LPFM to within the third adjacent channel, significantly watering down the effectiveness of the service in urban areas where the FM broadcast band is too crowded to accept any new radio stations.

There have been petitions for restoring the original parameters for the service, but for now LPFM broadcasting remains limited to third adjacent channel protection standards, although expansion or strengthening of the service is under consideration by the FCC, at least in terms of protecting LPFM stations already on the air, while also extending the length of construction permits for those in the process of getting there.

Under the current proposal being considered, low-power operation would be allowed to continue in cases where interference is predicted to occur within the 70-dBu contour of a subsequently authorized second or third adjacent full-service FM station. Otherwise, LPFM stations must protect broadcast stations on the same channel, as well as the first, second, and third adjacent. Yet LPFM stations are not protected from interference by other classes of FM stations. Despite the limitations, LPFM has flourished in some areas, with over 600 stations on the air across the United States, perhaps a clear indication of the need for community radio services.

LPFM stations are authorized for non-commercial educational broadcast purposes only, including non-profit community groups, public schools and private universities, government public safety, and transportation organizations. Operation is with an effective radiated power (ERP) of 100 watts or as little as 10 watts, essentially dividing the service into two classes, LP10 and LP100.

The maximum output is defined as 100 watts ERP at 100 feet antenna height above average terrain, providing a service range of approximately 3.5 miles radius. The FCC strongly advises that a construction permit or license be obtained before an LPFM station is constructed or operated, and warns of scams involving the purchase of equipment prior to being issued a license.

An LPFM license is issued free of charge. However the FCC is not accepting new applications at this time, while "mutually exclusive" disputes from earlier application windows are still being resolved. Where one application does not meet the spacing requirements to another application, such applications are mutually exclusive in that both applications cannot be granted if interference is to be avoided, and therefore are being evaluated on a case by case basis. In some cases a license might be shared between conflicting applicants. To keep up with the latest regulatory news visit www.fcc.gov/mb/audio/lpfm/index.html, the FCC webpage dedicated to the LPFM service.

Unlike Anything On Commercial Radio

Expect the unexpected when you tune in to an LPFM radio station. While some might broadcast a community calendar of...
events, town meetings, and various public affairs programs similar to what might be found on a cable television community access channel, others are providing diverse cultural and ethnic entertainment unlike anything on commercial radio. Popular Communications reader Eldon Luoma suggests some favorites:

"94.7 KPIE-LP Dallas, Oregon, is a good example of a community hobby LPFM station started by a retired broadcast engineer. The KPIE-LP website at www.kpie.org is worth a visit to learn more about low power FM from the experiences of Oregon's first low-power FM station. You might also check out 106.7 WEAK-LP Athens, Ohio, owned by Hobby Radio Inc., and 95.5 WOOO-LP Defiance, Ohio, operated by Fort Defiance Youth Radio, Inc. Another unique LPFM station is 97.1 WSAP-LP Dane, Wisconsin, near Madison, owned by the Polka Appreciation Society and featuring polka music programs."

Another station worth a listen is 93.3 WFBQ-LP Flagler Beach, Florida, where "Broadcast Technology" contributor Ron Gitschier has been on the air playing the oldies. "The web-stream is available via www.theblizzard.us," says Ron. "We play about 3800-plus selections in our daily rotation." For a list of stations to try listening in on, check out "Licensed LPFM Radio Stations."

Unlicensed Radio Stations

Despite an explosion of LPFM radio stations on the air and under construction, as mentioned earlier, the largest urban areas across the United States are not included by default. Because the FM broadcast band is already too congested in many cities, there's simply no room for LPFM under the present third adjacent channel protection standards. As a result, some communities have turned to unlicensed "microbroadcast" operations, as allowed according to Part 15 of the FCC rules.

The service range of AM and FM Part 15 transmitters should be no more than 200 feet, typically with a maximum power of 100 milliwatts or 1/10 of a watt. Violation of the rules may result in a maximum $75,000 fine and confiscation of equipment. While some might be illegally operating beyond Part 15 limits, unlike "pirate" broadcasters on shortwave, many of these unlicensed broadcasters justify the risk in believing that they fulfill a need for information, cultural, and ethnic programming in local communities that are otherwise underserved and largely ignored by licensed full-service radio stations. Perhaps nowhere is this more evident than in the Boston, Massachusetts metro area, where a high level of unlicensed broadcast activity exists. Following are the results of monitoring and a follow-up Internet search for low-power and unlicensed AM/FM broadcasts on the air in the greater Boston area. Note the dominance of radio stations serving the Haitian community. Many of these...
<table>
<thead>
<tr>
<th>Call Letters</th>
<th>City</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFBQ-LP</td>
<td>Lake Villa IL</td>
<td>101.5</td>
</tr>
<tr>
<td>WPZM-LP</td>
<td>Galesburg IL</td>
<td>104.3</td>
</tr>
<tr>
<td>WFBB-LP</td>
<td>Mount Pleasant SC</td>
<td>100.3</td>
</tr>
<tr>
<td>WFBU-LP</td>
<td>West Frankfort IL</td>
<td>95.5</td>
</tr>
<tr>
<td>WJIX-LP</td>
<td>Monticello KY</td>
<td>106.3</td>
</tr>
<tr>
<td>WCQW-LP</td>
<td>Dayton OH</td>
<td>107.9</td>
</tr>
<tr>
<td>WCRU-LP</td>
<td>Columbus GA</td>
<td>107.9</td>
</tr>
<tr>
<td>WGLS-LP</td>
<td>Lake Villa IL</td>
<td>101.5</td>
</tr>
<tr>
<td>WJFM-LP</td>
<td>Fairbury IL</td>
<td>95.1</td>
</tr>
<tr>
<td>WJHG-LP</td>
<td>Bloomington IL</td>
<td>103.3</td>
</tr>
<tr>
<td>WJLP-LP</td>
<td>Linwood KS</td>
<td>106.3</td>
</tr>
<tr>
<td>WJLY-LP</td>
<td>challah GA</td>
<td>106.3</td>
</tr>
<tr>
<td>WJLY-LP</td>
<td>challah GA</td>
<td>106.3</td>
</tr>
<tr>
<td>WJMR-LP</td>
<td>Mcintosh FL</td>
<td>96.5</td>
</tr>
<tr>
<td>WGRZ-LP</td>
<td>Melbourne FL</td>
<td>93.1</td>
</tr>
<tr>
<td>WFWA-LP</td>
<td>Cape Girardeau MO</td>
<td>93.9</td>
</tr>
<tr>
<td>WCPL-LP</td>
<td>Merrill Island FL</td>
<td>95.5</td>
</tr>
<tr>
<td>WBFT-LP</td>
<td>Micco FL</td>
<td>108.5</td>
</tr>
<tr>
<td>WFLU-LP</td>
<td>Minds City FL</td>
<td>107.9</td>
</tr>
<tr>
<td>WCMI-LP</td>
<td>Panama City FL</td>
<td>106.9</td>
</tr>
<tr>
<td>WGBW-LP</td>
<td>Port Saint Joe FL</td>
<td>88.5</td>
</tr>
<tr>
<td>WSLR-LP</td>
<td>Sarasota FL</td>
<td>93.1</td>
</tr>
<tr>
<td>WTHA-LP</td>
<td>Seaside FL</td>
<td>107.1</td>
</tr>
<tr>
<td>WCTA-LP</td>
<td>Southpoint FL</td>
<td>107.9</td>
</tr>
<tr>
<td>WJRN-LP</td>
<td>Summerfield FL</td>
<td>95.9</td>
</tr>
<tr>
<td>WZGA-LP</td>
<td>Sumterville FL</td>
<td>93.9</td>
</tr>
<tr>
<td>WHTR-LP</td>
<td>Wakulla County FL</td>
<td>96.9</td>
</tr>
<tr>
<td>WASU-LP</td>
<td>Albany GA</td>
<td>97.9</td>
</tr>
<tr>
<td>WSRD-LP</td>
<td>Albany GA</td>
<td>93.1</td>
</tr>
<tr>
<td>WJTR-LP</td>
<td>Ashburn GA</td>
<td>102.7</td>
</tr>
<tr>
<td>WPPP-LP</td>
<td>Athens GA</td>
<td>100.7</td>
</tr>
<tr>
<td>WDRW-LP</td>
<td>Athens GA</td>
<td>107.9</td>
</tr>
<tr>
<td>WLRN-LP</td>
<td>Atlantic GA</td>
<td>106.9</td>
</tr>
<tr>
<td>WRMR-LP</td>
<td>Augusta GA</td>
<td>100.3</td>
</tr>
<tr>
<td>WAAK-LP</td>
<td>Boynton GA</td>
<td>94.7</td>
</tr>
<tr>
<td>WBFC-LP</td>
<td>Boynton GA</td>
<td>103.7</td>
</tr>
<tr>
<td>WBHS-LP</td>
<td>Brunswick GA</td>
<td>106.7</td>
</tr>
<tr>
<td>WLOI-LP</td>
<td>Calhoun GA</td>
<td>102.9</td>
</tr>
<tr>
<td>WPGC-LP</td>
<td>Canton GA</td>
<td>107.9</td>
</tr>
<tr>
<td>WQGR-LP</td>
<td>Carrollton GA</td>
<td>95.3</td>
</tr>
<tr>
<td>WBLB-LP</td>
<td>Canton GA</td>
<td>96.9</td>
</tr>
<tr>
<td>WBU-LP</td>
<td>Columbus GA</td>
<td>96.1</td>
</tr>
<tr>
<td>WZHB-LP</td>
<td>Douglasville GA</td>
<td>106.3</td>
</tr>
<tr>
<td>WLVN-LP</td>
<td>Fort Valley GA</td>
<td>97.1</td>
</tr>
<tr>
<td>WFVS-LP</td>
<td>Fort Valley GA</td>
<td>104.3</td>
</tr>
<tr>
<td>WENF-LP</td>
<td>Froottown GA</td>
<td>100.5</td>
</tr>
<tr>
<td>WRMH-LP</td>
<td>LaGrange GA</td>
<td>98.9</td>
</tr>
<tr>
<td>WAQA-LP</td>
<td>Morganton GA</td>
<td>94.3</td>
</tr>
<tr>
<td>WJW-LP</td>
<td>St. Simon's Island GA</td>
<td>94.7</td>
</tr>
<tr>
<td>WBYL-LP</td>
<td>Sycamore GA</td>
<td>101.5</td>
</tr>
<tr>
<td>WCRU-LP</td>
<td>Thomaston GA</td>
<td>97.1</td>
</tr>
<tr>
<td>WJGG-LP</td>
<td>Thomasville GA</td>
<td>98.8</td>
</tr>
<tr>
<td>WDSA-LP</td>
<td>Trenton GA</td>
<td>98.7</td>
</tr>
<tr>
<td>KJHL-LP</td>
<td>Honolulu HI</td>
<td>107.3</td>
</tr>
<tr>
<td>KIOM-LP</td>
<td>Kaunakakai HI</td>
<td>98.9</td>
</tr>
<tr>
<td>KJUI-LP</td>
<td>Kula HI</td>
<td>97.3</td>
</tr>
<tr>
<td>KEAO-LP</td>
<td>Wailuku HI</td>
<td>91.5</td>
</tr>
<tr>
<td>KMEI-LP</td>
<td>Kamiah ID</td>
<td>97.3</td>
</tr>
<tr>
<td>KPL-LP</td>
<td>Lewiston ID</td>
<td>94.9</td>
</tr>
<tr>
<td>KRFP-LP</td>
<td>Moscow ID</td>
<td>92.5</td>
</tr>
<tr>
<td>KUMC-LP</td>
<td>Rupert ID</td>
<td>93.9</td>
</tr>
<tr>
<td>KAGF-LP</td>
<td>Tolland ID</td>
<td>105.5</td>
</tr>
<tr>
<td>WPEL-LP</td>
<td>Anioh IA</td>
<td>109.9</td>
</tr>
<tr>
<td>WJHL-LP</td>
<td>Bloomington IL</td>
<td>103.3</td>
</tr>
<tr>
<td>WJHP-LP</td>
<td>Carmi IL</td>
<td>103.3</td>
</tr>
<tr>
<td>WJAF-LP</td>
<td>Centralia IL</td>
<td>101.3</td>
</tr>
<tr>
<td>WLMM-LP</td>
<td>Channahon IL</td>
<td>103.9</td>
</tr>
<tr>
<td>WLBW-LP</td>
<td>Danville IL</td>
<td>107.5</td>
</tr>
<tr>
<td>WCFQ-LP</td>
<td>Du Quoin IL</td>
<td>105.9</td>
</tr>
<tr>
<td>JWHL-LP</td>
<td>Fairbury IL</td>
<td>95.1</td>
</tr>
<tr>
<td>WYCL-LP</td>
<td>Galesburg IL</td>
<td>103.3</td>
</tr>
<tr>
<td>WGRG-LP</td>
<td>Geneseo IL</td>
<td>100.5</td>
</tr>
<tr>
<td>WLGS-LP</td>
<td>Lake Villa IL</td>
<td>101.5</td>
</tr>
<tr>
<td>WQCR-LP</td>
<td>Williamsburg KY</td>
<td>94.5</td>
</tr>
<tr>
<td>WNLW-LP</td>
<td>Williamsburg KY</td>
<td>95.1</td>
</tr>
<tr>
<td>WYAH-LP</td>
<td>Winchester KY</td>
<td>93.7</td>
</tr>
<tr>
<td>KCJN-LP</td>
<td>Alexandria LA</td>
<td>107.9</td>
</tr>
<tr>
<td>KURC-LP</td>
<td>Bastrop LA</td>
<td>95.7</td>
</tr>
<tr>
<td>WTQT-LP</td>
<td>Baton Rouge LA</td>
<td>94.9</td>
</tr>
<tr>
<td>WZEN-LP</td>
<td>Hammond LA</td>
<td>107.9</td>
</tr>
<tr>
<td>KQNQ-LP</td>
<td>Jonesboro LA</td>
<td>95.5</td>
</tr>
<tr>
<td>KZIM-LP</td>
<td>Lafayette LA</td>
<td>92.7</td>
</tr>
<tr>
<td>KELB-LP</td>
<td>Lake Charles LA</td>
<td>100.5</td>
</tr>
<tr>
<td>KEO-LP</td>
<td>Mansfield LA</td>
<td>106.1</td>
</tr>
<tr>
<td>KOU-LP</td>
<td>Monroe LA</td>
<td>93.6</td>
</tr>
<tr>
<td>KOCZ-LP</td>
<td>Opelousas LA</td>
<td>103.7</td>
</tr>
<tr>
<td>KZLC-LP</td>
<td>Pineville LA</td>
<td>95.5</td>
</tr>
<tr>
<td>KQAR-LP</td>
<td>Shreveport LA</td>
<td>107.1</td>
</tr>
<tr>
<td>WGON-LP</td>
<td>Stidell LA</td>
<td>103.7</td>
</tr>
<tr>
<td>WJIZP-LP</td>
<td>Portland ME</td>
<td>105.1</td>
</tr>
<tr>
<td>WWRF-LP</td>
<td>Rockland ME</td>
<td>93.3</td>
</tr>
<tr>
<td>WJIF-LP</td>
<td>Sandestin ME</td>
<td>97.1</td>
</tr>
<tr>
<td>WZRR-LP</td>
<td>Saginaw MI</td>
<td>96.3</td>
</tr>
<tr>
<td>WYRL-LP</td>
<td>Sherwood MI</td>
<td>97.5</td>
</tr>
<tr>
<td>WRNC-LP</td>
<td>Spirit Lake MI</td>
<td>105.3</td>
</tr>
<tr>
<td>WZLJ-LP</td>
<td>Starkville MS</td>
<td>97.5</td>
</tr>
<tr>
<td>WWZC-LP</td>
<td>West Lafayette IN</td>
<td>105.3</td>
</tr>
<tr>
<td>WJIEH-LP</td>
<td>Hart MI</td>
<td>100.5</td>
</tr>
<tr>
<td>WMLY-LP</td>
<td>Marshall MI</td>
<td>93.1</td>
</tr>
<tr>
<td>WQLOS-LP</td>
<td>Mount Pleasant MI</td>
<td>98.9</td>
</tr>
<tr>
<td>WUFS-LP</td>
<td>Muskegon MI</td>
<td>103.7</td>
</tr>
<tr>
<td>WMMT-LP</td>
<td>Muskegon MI</td>
<td>106.1</td>
</tr>
<tr>
<td>WMBC-LP</td>
<td>Norton Shores MI</td>
<td>100.9</td>
</tr>
<tr>
<td>WRDS-LP</td>
<td>Roscommon MI</td>
<td>104.3</td>
</tr>
<tr>
<td>WBSB-LP</td>
<td>St. Louis MI</td>
<td>105.9</td>
</tr>
<tr>
<td>WYRE-LP</td>
<td>Tomahawk MI</td>
<td>107.9</td>
</tr>
<tr>
<td>WAWB-LP</td>
<td>West Branch MI</td>
<td>107.3</td>
</tr>
<tr>
<td>WUSG-LP</td>
<td>Cambridge MD</td>
<td>88.7</td>
</tr>
<tr>
<td>WYSG-LP</td>
<td>Hinkley MN</td>
<td>96.3</td>
</tr>
<tr>
<td>KRRM-LP</td>
<td>Montana ME</td>
<td>96.7</td>
</tr>
<tr>
<td>XKBQ-LP</td>
<td>Moorhead MN</td>
<td>95.9</td>
</tr>
<tr>
<td>WMAL-LP</td>
<td>Moose Lake MN</td>
<td>99.7</td>
</tr>
<tr>
<td>KGHL-LP</td>
<td>Spicer MN</td>
<td>96.9</td>
</tr>
<tr>
<td>WQQRZ-LP</td>
<td>Mt. Saint Louis MO</td>
<td>103.5</td>
</tr>
<tr>
<td>WCWV-LP</td>
<td>Canton MS</td>
<td>100.5</td>
</tr>
<tr>
<td>WQTP-LP</td>
<td>Columbus MS</td>
<td>106.9</td>
</tr>
<tr>
<td>WTRR-LP</td>
<td>Glen MS</td>
<td>97.1</td>
</tr>
<tr>
<td>WIXP-LP</td>
<td>Greenville MS</td>
<td>106.7</td>
</tr>
<tr>
<td>WQID-LP</td>
<td>Hattiesburg MS</td>
<td>105.3</td>
</tr>
<tr>
<td>WQWT-LP</td>
<td>Houston MS</td>
<td>103.7</td>
</tr>
<tr>
<td>WLET-LP</td>
<td>Jackson MS</td>
<td>103.7</td>
</tr>
<tr>
<td>WNNN-LP</td>
<td>Noxapater MS</td>
<td>96.7</td>
</tr>
<tr>
<td>WPWS-LP</td>
<td>Pinney Woods MS</td>
<td>104.3</td>
</tr>
<tr>
<td>WKIU-LP</td>
<td>Tupelo MS</td>
<td>94.9</td>
</tr>
<tr>
<td>KCSW-LP</td>
<td>Canton MS</td>
<td>97.1</td>
</tr>
<tr>
<td>KDNM-LP</td>
<td>Cape Girardeau MO</td>
<td>103.7</td>
</tr>
<tr>
<td>KDNM-LP</td>
<td>Cape Girardeau MO</td>
<td>103.7</td>
</tr>
<tr>
<td>KDNM-LP</td>
<td>Cape Girardeau MO</td>
<td>103.7</td>
</tr>
<tr>
<td>KDNC-LP</td>
<td>Centralia MO</td>
<td>94.9</td>
</tr>
<tr>
<td>KDJT-LP</td>
<td>Corpus Christi TX</td>
<td>107.7</td>
</tr>
<tr>
<td>KRRF-LP</td>
<td>Fulton MO</td>
<td>97.8</td>
</tr>
<tr>
<td>KJBL-LP</td>
<td>Hannibal MO</td>
<td>96.9</td>
</tr>
</tbody>
</table>

**Licensed LPFM Radio Stations**

[Scan Our Web Site](#)
<table>
<thead>
<tr>
<th>Station Code</th>
<th>City, State</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAPP-LP</td>
<td>Westhampton NY</td>
<td>90.7</td>
</tr>
<tr>
<td>WRES-LP</td>
<td>Asheville NC</td>
<td>90.7</td>
</tr>
<tr>
<td>WVPM-LP</td>
<td>Asheville NC</td>
<td>103.5</td>
</tr>
<tr>
<td>WBYJ-LP</td>
<td>Burlington NC</td>
<td>97.9</td>
</tr>
<tr>
<td>WCOM-LP</td>
<td>Chapel Hill NC</td>
<td>103.5</td>
</tr>
<tr>
<td>WD1J-LP</td>
<td>Elizabethtown NC</td>
<td>93.7</td>
</tr>
<tr>
<td>WFWL-LP</td>
<td>Fremont NC</td>
<td>99.3</td>
</tr>
<tr>
<td>WHLZ-LP</td>
<td>Hickory NC</td>
<td>99.3</td>
</tr>
<tr>
<td>WYGL-LP</td>
<td>Hudson NC</td>
<td>92.9</td>
</tr>
<tr>
<td>WSQO-LP</td>
<td>Lenoir NC</td>
<td>100.0</td>
</tr>
<tr>
<td>WJOF-LP</td>
<td>Liberty NC</td>
<td>97.9</td>
</tr>
<tr>
<td>WWTG-LP</td>
<td>Lincoln NC</td>
<td>100.9</td>
</tr>
<tr>
<td>WPTP-LP</td>
<td>Marble NC</td>
<td>95.1</td>
</tr>
<tr>
<td>WHGW-LP</td>
<td>Morgantown NC</td>
<td>100.3</td>
</tr>
<tr>
<td>WFOG-LP</td>
<td>Mt. Airy NC</td>
<td>101.3</td>
</tr>
<tr>
<td>WZNC-LP</td>
<td>Roanoke Rapids NC</td>
<td>95.9</td>
</tr>
<tr>
<td>WDSG-LP</td>
<td>Sanford NC</td>
<td>107.9</td>
</tr>
<tr>
<td>WVEM-LP</td>
<td>Stanely NC</td>
<td>100.5</td>
</tr>
<tr>
<td>WEOM-LP</td>
<td>Thomasville NC</td>
<td>103.1</td>
</tr>
<tr>
<td>WEJR-LP</td>
<td>Bath OH</td>
<td>103.5</td>
</tr>
<tr>
<td>WQOO-LP</td>
<td>Defiance OH</td>
<td>95.5</td>
</tr>
<tr>
<td>WYCF-LP</td>
<td>Defiance OH</td>
<td>104.1</td>
</tr>
<tr>
<td>WINF-LP</td>
<td>Delaware OH</td>
<td>101.9</td>
</tr>
<tr>
<td>WPCO-LP</td>
<td>Fremont OH</td>
<td>105.7</td>
</tr>
<tr>
<td>WJHE-LP</td>
<td>Heath OH</td>
<td>98.7</td>
</tr>
<tr>
<td>WCBV-LP</td>
<td>Lima OH</td>
<td>105.9</td>
</tr>
<tr>
<td>WRTL-LP</td>
<td>Logan OH</td>
<td>106.7</td>
</tr>
<tr>
<td>WCYC-LP</td>
<td>London OH</td>
<td>105.1</td>
</tr>
<tr>
<td>WXLF-LP</td>
<td>Loudonville OH</td>
<td>95.7</td>
</tr>
<tr>
<td>WNGP-LP</td>
<td>Marietta OH</td>
<td>104.5</td>
</tr>
<tr>
<td>WWJZ-LP</td>
<td>Marietta OH</td>
<td>104.5</td>
</tr>
<tr>
<td>WTPS-LP</td>
<td>Napoleon OH</td>
<td>94.1</td>
</tr>
<tr>
<td>WLCI-LP</td>
<td>Nelsonville OH</td>
<td>97.5</td>
</tr>
<tr>
<td>WJFJ-LP</td>
<td>Newark OH</td>
<td>104.3</td>
</tr>
<tr>
<td>WNHY-LP</td>
<td>Newington OH</td>
<td>105.7</td>
</tr>
<tr>
<td>WHRR-LP</td>
<td>Portsmouth OH</td>
<td>96.1</td>
</tr>
<tr>
<td>WRPO-LP</td>
<td>Russell's Point OH</td>
<td>93.5</td>
</tr>
<tr>
<td>WAJB-LP</td>
<td>Wellston OH</td>
<td>92.5</td>
</tr>
<tr>
<td>WUHS-LP</td>
<td>West Union OH</td>
<td>96.9</td>
</tr>
<tr>
<td>WJFZ-LP</td>
<td>Zanesville OH</td>
<td>104.1</td>
</tr>
<tr>
<td>KADB-LP</td>
<td>Ada OH</td>
<td>96.7</td>
</tr>
<tr>
<td>KXBI-LP</td>
<td>Bartlesville OK</td>
<td>101.9</td>
</tr>
<tr>
<td>KLGB-LP</td>
<td>Enid OK</td>
<td>94.3</td>
</tr>
<tr>
<td>KEIF-LP</td>
<td>Enid OK</td>
<td>104.7</td>
</tr>
<tr>
<td>KMRM-LP</td>
<td>McAlester OK</td>
<td>93.3</td>
</tr>
<tr>
<td>KSEP-LP</td>
<td>Brookings OR</td>
<td>99.9</td>
</tr>
<tr>
<td>KBWR-LP</td>
<td>Burns OR</td>
<td>98.1</td>
</tr>
<tr>
<td>KPOL-LP</td>
<td>Canyonville OH</td>
<td>106.9</td>
</tr>
<tr>
<td>KBCC-LP</td>
<td>Cave Junction OR</td>
<td>107.9</td>
</tr>
<tr>
<td>KJBY-LP</td>
<td>Covington OR</td>
<td>100.7</td>
</tr>
<tr>
<td>KPIE-LP</td>
<td>Dallas OR</td>
<td>94.7</td>
</tr>
<tr>
<td>KUMP-LP</td>
<td>Days Creek OR</td>
<td>107.9</td>
</tr>
<tr>
<td>KUOW-LP</td>
<td>Dead Creek OR</td>
<td>93.3</td>
</tr>
<tr>
<td>KITC-LP</td>
<td>Gilchrist OR</td>
<td>106.5</td>
</tr>
<tr>
<td>KLSB-LP</td>
<td>Globe OR</td>
<td>92.3</td>
</tr>
<tr>
<td>KEBR-LP</td>
<td>Harrisburg OR</td>
<td>92.3</td>
</tr>
<tr>
<td>KAZS-LP</td>
<td>Hood River OR</td>
<td>95.1</td>
</tr>
<tr>
<td>KJHS-LP</td>
<td>Madras OR</td>
<td>102.1</td>
</tr>
<tr>
<td>KJIC-LP</td>
<td>McMinneville OR</td>
<td>96.3</td>
</tr>
<tr>
<td>KUMP-LP</td>
<td>Milesburg OR</td>
<td>94.9</td>
</tr>
<tr>
<td>KSHY-LP</td>
<td>Newport OR</td>
<td>94.3</td>
</tr>
</tbody>
</table>

**Licensed LPFM Radio Stations**
Licensed LPFM Radio Stations

<table>
<thead>
<tr>
<th>Call Letters</th>
<th>City, State</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>KYLP-LP</td>
<td>Greenville, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KQAT-LP</td>
<td>Hallsville, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KPIA-LP</td>
<td>Huarteville, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KX2X-LP</td>
<td>Julliard, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KERC-LP</td>
<td>Kermit, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KCYR-LP</td>
<td>Kerrville, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KWSP-LP</td>
<td>Kerrville, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KJHV-LP</td>
<td>Killeen, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KHSP-LP</td>
<td>Killeen, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KDOL-LP</td>
<td>Livingston, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KFLX-LP</td>
<td>Lubbock, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KFFG-LP</td>
<td>Marble Falls, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KACD-LP</td>
<td>Midland, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KNOB-LP</td>
<td>Mineral Wells, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KIUK-LP</td>
<td>Mount Pleasant, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KDXD-LP</td>
<td>Mount Pleasant, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KLNA-LP</td>
<td>Pittsburg, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KOLF-LP</td>
<td>Plainview, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KSAP-LP</td>
<td>Port Arthur, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KCSA-LP</td>
<td>San Angelo, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KCCP-LP</td>
<td>S. Padre Island, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KTRL-LP</td>
<td>Stephenville, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KVVX-LP</td>
<td>Spring Branch, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KVXH-LP</td>
<td>Sulphur Springs, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KRYH-LP</td>
<td>Temple, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KGOD-LP</td>
<td>Tenaha, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KWSA-LP</td>
<td>Waco, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KXZY-LP</td>
<td>Waco, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KVXH-LP</td>
<td>Winfield, TX</td>
<td>92.1</td>
</tr>
<tr>
<td>KLGU-LP</td>
<td>Logan UT</td>
<td>92.1</td>
</tr>
<tr>
<td>KAAJ-LP</td>
<td>Monticello UT</td>
<td>92.1</td>
</tr>
<tr>
<td>KEOZ-LP</td>
<td>St. George UT</td>
<td>92.1</td>
</tr>
<tr>
<td>KWBR-LP</td>
<td>St. George UT</td>
<td>92.1</td>
</tr>
</tbody>
</table>

Pop’Comm February 2006
Survey Questions

I typically do the following with my copy of Pop’Comm:
Read through it and keep it as a reference for a few days
Read through it and keep it only until I get the next issue
Keep it a month or so
Keep it less than a year
Keep it more than a year, but less than three years
Keep it indefinitely in a binder or box
Give it to a friend
Tear out an article or two and keep it for reference

Pop’Comm cover photos that attract my attention the most are (mark no more than three):
Military
Public safety; police and EMS
Firefighter or firefighting photos
Commercial aircraft in flight or runway
Military aircraft, including cockpit photos
Commercial station antennas
Commercial broadcast studios
Disaster photos
Space-related photos (Shuttle, etc.)

Those featuring a person in his or her monitoring shack

Pop’Comm’s covers are:
Interesting and well done
Compare favorably with other radio publications including amateur publications
Not as eye-catching as other radio publications
Much better than other radio publications

I’d like to see more of this coverage in Pop’Comm:
(mark all that are appropriate)
Military monitoring, VHF/UHF
Satellites
Cell phone and other portable electronics
CB
FRS
Antenna construction projects
Shortwave broadcasting
GMRS

My favorite THREE columns/writers are (please write titles/names on card)
The 2006/2007 CQ Classic Radio Calendar features fifteen magnificent full-color vintage radio images including Collins, Eldico, Hammarlund, WRL, Meissner, National and more.

The 2006/2007 CQ Amateur Radio Operators Calendar brings you fifteen spectacular full-color images of some of the biggest, most photogenic Amateur Radio shacks, antennas, personalities and scenes in the country.

All calendars include dates of important Ham Radio events such as major contests and other operating events, meteor showers, phases of the moon, and other astronomical information, plus important and popular holidays. The CQ calendars are not only great to look at, but they’re truly useful, too!

Available directly from CQ or at your local dealer!
stations are running full-scale professional commercial operations and maintain an equally impressive presence on the Web.

530 Radio Planet Compas, Randolph—French Caribbean (www.planetcompas.com).

540 Radio Log, Dorchester—R&B/urban contemporary.

870 unidentified—Classical music days, French Caribbean zouk nights.

1570 WKNM Radio Commercial, Lowell—Off the air? Noted open carrier, driving by studio/xmtr site at 599 Central St.

1620 WPR1268 Leominster—Relays 162.525 MHz WNG575 Pack Monadnock, NOAA Weather.
1630 Zumix Radio, East Boston—202 Maverick St., free-format music; blues, jazz, rock, soul, urban contemporary, anything goes.
1650 WQBE789/WQBOQ732 East Boston—Logan Airport airline terminal assignments and parking info.
1670 Radio Communautaire de Brockton, Brockton—French Caribbean.
1700 Radio Luz/Radio Palabra de Vida, Lawrence—Spanish contemporary Christian music and preaching.
1710 unidentified, Dorchester—French Caribbean, possibly the relocated Radio Nouveaute.
89.3 Radio Planet Compas, Boston—French news/talk, IDs as “Compas FM” (www.planetcompas.com).
91.3 Radio Superstars, Everett—French news/talk, IDs as “W Radio” and “La radio d’information.”
102.9 Choice FM, Dorchester—Boston—Caribbean/African American. “Number one in Boston for Caribbean music.”

A list of Haitian radio stations in the Boston area can be found online at www.hauinc.org/html/community/Media/RadioRadioStations.asp, the Haitian Americans United website. A more comprehensive site with links to Haitian radio in Boston is at www.anselme.homestead.com/radioboston.html.

A special thanks to Boston Area DXers Mark Connelly, Chris Lobdell, and Paul McDonough, along with Rick Levy, Aaron Read, and Jeff Lehmann for their continued input monitoring of unlicensed activity in Boston.

What Are You Hearing?

Of course Boston is only one example of what might be termed “urban discontent” with the state of broadcasting. Other hotbeds of unlicensed activity include New York City, where the Chabad-Lubavitch radio station on 1710 kHz AM is widely heard, and Miami, Florida, where Cuban and Haitian broadcasts abound, especially on FM. If you hear an interesting LPFM or unlicensed radio broadcast, be sure to let us know about it. Then stay tuned right here for continuing coverage in future editions of “Broadcast Technology.” 73 and Good DX!
The face of emergency communications (EmComm) is rapidly changing. The time honored position of the ham radio operator as a traffic handler in times of disaster is rapidly coming to a close. How do I know this? The weekend of October 22-23, 2005, my wife, Tricia, KB3MCT, and I attended the 2nd Annual EmComm Conference at Shimokin Dam, PA, sponsored by the Snyder County RACES/ARES and the Northumberland County ARES groups.

Chris Snyder, NG3F, ARRL Eastern Pennsylvania Section Emergency Coordinator/Snyder County ARES Emergency Coordinator/RACES Officer, and his group put on a tremendous collection of informational forums that spanned the entire weekend. If you live and work in Eastern Pennsylvania and have an interest in emergency communications, this is the place you needed to be. At that conference we came face to face with the future of amateur radio involvement in EmComm, and it is a shocker!

For many years hams have been at the forefront of disaster relief communications furnishing on the spot, real-time tactical communications for disaster response personnel. In addition, during the aftermath, hams traditionally bore the brunt of health and welfare traffic alerting the families and friends of disaster victims as to their status. This picture is changing as we speak. Amateur Radio involvement in EmComm is about to take a dramatic turn and if we do not respond quickly and accept our new roles as system administrators as opposed to radio operators, we will be left in the dust as professional disaster mitigators find new ways to communicate without the ham radio community!

It’s Not April 1, Folks!

No, I am not kidding. What I saw and experienced at the EmComm conference in October was sobering and has me wondering whether or not the Amateur Radio community can actually make the changes needed to keep up with the needs of our served agencies. It seems that in today’s EmComm world, everyone on the disaster site has a walkie-talkie. What often happens, especially in the case of an act of terrorism, is that a federal agency—the FBI or ATF, for example—comes into an area with their own portable trunked radio system; they set it up, and proceed to communicate just fine without restoring to using the ham radio volunteers. These state-of-the-art radio systems are quite advanced, providing great local area coverage, and are secure, so agents on the ground can talk freely without the fear of being overheard by the local news media and scanner enthusiasts. Add to this the fact that most county and state Emergency Management Agency (EMA) groups, along with the state police also have their own portable radio systems, many times they are trunked with portable repeaters, and you get a rough idea of how we hams fit into the picture when it comes to tactical communications: we don’t!

Hams are a stubborn lot and we are so married to our 2 Meter handie-talkies and the National Traffic System (NTS) that we very well may go the way of the dinosaur in the not too distant future. If and when this happens, Amateur Radio will be doomed. It has been our one saving grace that in the past we can respond to emergencies and provide communications under a variety of conditions, using various modes and our unlimited frequencies. Now, however, the new EmComm plan calls for hams to set up systems that will allow professional disaster mitigation personnel to communicate in a real-time manner with their higher headquarters and their field units without having to undergo a learning curve using proven methods like fax and e-mail.

While initially packet radio (remember the ’80s?) was touted to be the “savior” of ham radio in disaster communications, it quickly became clear that packet had a rather steep learning curve and it took a ham radio operator manning a terminal to transmit and receive messages via packet. This was not a good situation, since it added one more layer of protocol to the task of managing communications. Granted, it did provide a modicum of “job security” for the hams, but in reality you could not take the average secretary in an EOC, set that person down at a packet terminal, and expect them to handle traffic without a lot of training. (Packet is a unique digital system offering 100 percent reliable error-free traffic. When you understand how packet works and the various commands necessary to transmit and receive messages, it is a passable EmComm system, even at 1200 baud). However, the average office worker has neither an idea of the packet commands, the unique language encountered when using packet radio nor protocols of traffic handling using NTS message format.

E-mail And The Internet—OK Up To A Point

The ONE thing that almost everyone in a management position CAN and DOES use is e-mail. E-mail has replaced the office memo, “snail mail” and, in many cases the fax machine. E-mail depends upon an Internet connection. Without access to the Internet, all generated e-mail stays within an extremely localized area, limited by the network that the computers are hooked to. If the network has Internet access, all is well, but what happens in the middle of a disaster when the local Dial Central Office (DCO) with its T-1 and T-3 high-speed pipes along with the cell sites all go down? No Internet, that’s what.

We Can Do It!

It now becomes the task of the EmComm personnel to supply Internet connectivity where there is none. An insurmountable task, you say? Not hardly. Enter WinLink, the next generation in emergency communications support.

WinLink is the new standard that meets current Department of Homeland Security (DHS) and EMA standards. In other words, our served agencies have “raised the bar” when it comes to what they want and need for emergency communications.
WinLink can provide end-to-end, user-to-user e-mail with or without Internet connectivity (ISP) via V/UHF radio links.

If you have been involved with EmComm planning you undoubtedly heard the term, “the last mile.” This is the area that is actively affected by the disaster. Nobody knows exactly how big “the last mile” really is until the disaster actually occurs. However, it encompasses the area that has no “normal” communications channels and is essentially cut off from the rest of the world. “The last mile” is where we, the EmComm volunteers have our work cut out for us to furnish the type of communications that our served agencies need to implement the disaster plan and start the recovery process. Today’s disaster professionals are requiring more than simple point-to-point tactical and long-haul radio communications.

In the last couple of years the Federal Communications Commission (FCC) has been pushing the American Radio Relay League (ARRL) to move forward and promote digital modes as opposed to the traditional ham radio menu of FM/CW/Packet/SSB HF communications. They have been coaching the ham radio community to adopt Software-Defined Radios (SDRs) that can be adapted, on the fly with updated software/firmware as needed, to meet specific user requirements. In short, everyone is waiting for the hams to make it into the 21st century. Unfortunately, most of us are still clinging to our time honored traditions of FM voice traffic nets using the antiquated NTS message format to provide our customers with communications during emergencies. The time is rapidly approaching when this will be a thing of the past and should the hams not rise to the occasion and get on board with newer digital technology, we will be relegated to the list of “also rans” in the disaster communications race.

About now you may be asking yourself, why the sudden shift in direction when it comes to the needs of the served agencies? First of all it has not been a sudden shift at all. The handwriting has been on the wall for several years. Secondly, the professional world revolves around the Internet and e-mail. That’s how business is conducted in today’s world. Everyone from the CEO to the janitor knows about and uses e-mail. Huge messages can be passed with ease using e-mail and attachments. Try passing a five page report using the ARRL NTS message format! I think you’ll get the picture pretty quickly.

Our Thinking Needs To Be Retuned

We, the Amateur Radio community, need to be proactive and get on board with digital modes and digital radio systems in order to be players in today’s EmComm world. It’s just that simple. As emergency communicators we have to give our clients what they need to do their jobs. If we don’t then they will find another way to do business and we won’t be in the game any longer.

Let’s talk more about WinLink. WinLink provides Internet access to affected disaster areas by routing e-mail traffic (using e-mail programs like Outlook Express) from the deployed disaster mitigation personnel to an ISP outside the area using V/UHF radio systems. The on-site interface consists of a V/UHF FM radio, some form of digital modem and a terminal or computer. As the e-mail is generated on this terminal it is fired off on a radio link to a participating station mode called a PMBO (participating mail-
I invite your comments and suggestions on this fast-changing scene. You can always write to me at Popular Communications, ATTN: “Homeland Security”, 25 Newbridge Road, Hicksville, NY 11801 or my e-mail address, richard.arland@verizon.net.

**Flight 93**

One of the most fascinating forums that we attended during the recent conference was an overview of the United Airlines Flight 93 crash in Somerset County near Sneadsville, PA in the western part of the state. Richard Lohr, N3VFG, the county EMA coordinator, was the presenter of this forum and it was a real eye-opener.

**Flt 93** was a transcontinental flight, which meant that it was carrying a full fuel load (around 8000 pounds of jet fuel) and a full flight crew. The terrorists waited until after breakfast had been served and the serving carts were secured out of the way to make their move. This happened over the skies of western Pennsylvania.

When the aircraft impacted the ground it was flying inverted and augmented in at over 500 MPH! The impact crater was huge and contained no recognizable debris. Crash recovery crews had to dig down 50 feet to recover airframe wreckage and body parts. When an aircraft hits the ground that fast, carrying that much fuel, nothing survives the impact.

Rich Lohr did indicate that the only piece of personal property they found at the crash site immediately after the incident was the Holy Bible, allegedly opened to the 23rd Psalm!

In the four years since the terrorist act, the remains of all persons on board Flt 93 have been identified, including the terrorists. This alone says something about the professionalism and thoroughness of the forensic staff assigned to the task of finding the remains and identifying them.

Initial response by the local EMA group had the site contained and communications was being provided by EmComm volunteers. Within a couple of hours of the crash, the FBI came on scene and immediately quarantined the site, cordoned it off and placed their mobile trunked, secure radio system on the air. They dismissed the ham radio operators along with the majority of the EMA staff, sighting that this was a terrorist act and therefore a crime scene.

The FBI handled the investigation of the crash site and when they left, they indicated to the EMA folks that they (the FBI) had recovered 95 percent of the debris and left the other 5 percent for them. In reality these figures were reversed! The EMA recovery workers had weeks of digging and sifting wreckage ahead of them. During this time the Red Cross and the Salvation Army were on scene 24/7 to provide food, and a rest area for recovery workers. The gruesome work of recovering the body parts of the 44 passengers, crew, and hijackers onboard Flt 93 took three weeks.

Rich Lohr’s crew set up their Command Post in an old mining building. A mobile CP came from Fayette County EMA along with the Pennsylvania State Police mobile CP. As we arrived on scene, Motorola provided a self-contained comm van that used the Motorola Mascot-I 800 MHz secure trunked radio system. If you’ll notice, there is a decided lack of Amateur Radio participation in this disaster. Daily briefings were held and, finally after two days, the FBI decided it would be in their best interests to start attending these daily briefings so they could keep on top of events.

Recovered body parts were transported to a makeshift morgue at a local National Guard Armory about four miles from the crash site. Here the difficult and time-consuming task of obtaining positive identification of human remains took place. It took almost four years to accomplish, but all 44 people aboard the ill-fated flight were positively identified.

On the 1st anniversary of the crash, (I can’t help remembering this rather pathetic situation), a 150-foot carpet was ordered and placed down so Attorney General John Ashcroft could walk from his limo to a nearby tent to address attendees at the event without getting his shoes dirty! Your tax dollars at work!

Richard Lohr’s forum was well attended and he held everyone spellbound as he recounted the various stages of the recovery process undertaken at the UAL Flt 93 crash site in western Pennsylvania. He and his EMA personnel did a tremendous job in the face of an intimidating task and equally intimidating federal agencies that muscled in and took over.

That’s it for this month, gang. Next month we’ll take another look at the 2nd Annual EmComm Conference held at Shamokin Dam, PA at the end of October. A lot of valuable information was offered, and this stuff needs to be disseminated rapidly in order to be ready when the next terrorist attack happens. Until then, remember our motto: Preparedness is not optional.

---

**TERRORISM FORCES US TO MAKE A CHOICE. WE CAN BE AFRAID. OR WE CAN BE READY.**

**READY**

WWW.READY.GOV

1-800-BE-READY
Capitol Hill And FCC Actions Affecting Communications

FCC Gets Approval For Revised Indecency Complaint Form

The Office of Management and Budget has issued a Notice of Action approving the revised Federal Communications Commission Form 475, General Consumer Complaint Form and new Federal Communications Commission Form 475B, Obscene, Profane, and/or Indecent Material Complaint Form.

“The new FCC Form 475B will enable the Commission to collect detailed data from consumers on the practices of those entities that may air obscene, profane, and/or indecent material by giving consumers an opportunity, for the first time, to use a specific form to file their complaints,” the FCC announced November 1. “Form 475B will be used only for complaints associated with obscene, profane, and/or indecent material.”

According to the Commission, both Form 475 and Form 475B “will significantly improve the informal complaint process for consumers, industry, and Commission staff by minimizing confusion on what information the Commission requires. Use of these forms also will improve the complaint process and the overall quality of the complaints received.”

More information about filing a complaint with the FCC can be found at www.fcc.gov/cgb/complaints.html.

CNCS Extends Grant For Hurricane Communications Volunteers

The Corporation for National and Community Services (CNCS) has extended its grant program for Ham Aid, offering limited reimbursement for out-of-pocket expenses incurred by radio amateurs providing emergency communications in the wake of hurricanes Rita and Wilma. Hurricane Katrina volunteers were initially covered by the grant.

“To date there is adequate funding to support the hundreds of hams who traveled to the Southeast since late August,” the American Radio Relay League’s Mary Hobart, KLMMH, said in the ARRL Letter. The reimbursement procedures are similar to those in place for hurricane Katrina.

In an effort to disperse the funds broadly, Hobart said the reimbursements had been limited to $25 per day for a maximum of four days. The total per radio amateur was set at $100, with one expense reimbursement granted for each hurricane. As of November, the program covered per-diem payouts between September 1 and December 31, 2005. Hobart said there is a possibility the period could be extended.

According to the ARRL Letter, “Hobart says she wanted to allay fears of amateur radio volunteers who believe accepting the money is contrary to FCC Part 97 rules.” While 97.113 prohibits “communications for hire or for material compensation, direct or indirect, paid or promised, except as otherwise provided in these rules,” Hobart said that Ham Aid reimbursements “are not for providing ‘communications’ but to help with such costs as travel, meals, lodging and other necessities.”

The CNCS grant is an extension of the League’s Homeland Security training grant, which has provided certification in emergency communication protocols to nearly 5,500 amateur radio volunteers over the past three years. “These out-of-pocket expenses can be a hardship for some amateur radio volunteers,” Hobart said, pointing out that some of the operators are unemployed or are seniors on fixed incomes. “If we can help one ham to serve where badly needed, that’s what this grant is intended to do,” she said.

For updates and information about the program, visit www.arrl.org/FandES/field/forms/cnsc.

Parts Of ITU Communications Handbook Available On Line

Significant portions of the 2005 Handbook on Emergency Communications by the International Telecommunication Union can be downloaded free from the Internet in English, Spanish, or French, the organization has announced. The handbook was written as a companion text for everyone who is called upon to provide and use telecommunications during disasters and relief efforts.

For more information, visit www.itu.int/ITU-D/emergency_publications.html.

FCC Asked To Consider More Privileges For Radio Newcomers

In response to an FCC Notice of Proposed Rule Making and Order in July 2005, the ARRL is urging the Commission “to provide meaningful operating privileges to entry-level amateur radio licensees, including access to HF (high frequencies) even if the commission doesn’t want to create a new license class.”

“Retaining Morse telegraphy as a requirement for only the Amateur Extra class license, in the ARRL’s view, places Morse telegraphy in a proper, balanced perspective,” the League told the commission on the deadline for comment in October.

“The FCC’s NPRM&O proposed eliminating the 5-word-per-minute code requirement for all amateur radio license classes but denied requests to create a new entry-level class with limited HF privileges,” according to the ARRL Letter.

The ARRL argued that “if the FCC will not create a new Novice class license as the League had suggested in its earlier Petition for Rule Making (RM-10867) in the proceeding, it should modify Technician operating privileges instead,” the ARRL Letter reported. “The present licensing regime limits Technicians to VHF bands and above, leaving newcomers to the amateur service isolated from their peers holding higher class licenses. The Technician class is, for too many, a dead end to what might otherwise be an active, progressive interest in amateur radio, technical self-training and incentive-based educational progress in the many facets of the avocation.”

Under the ARRL plan, Technicians would have telegraphy

(Continued on page 82)
WORLD BAND TUNING TIPS

World News, Commentary, Music, Sports, And Drama At Your Fingertips

This listing is designed to help you hear more shortwave broadcasting stations. The list includes a variety of stations, including international broadcasters beaming programs to North America, others to other parts of the world, as well as local and regional shortwave stations. Many of the transmissions listed here are not in English. Your ability to receive these stations will depend on time of day, time of year, your geographic location, highly variable propagation conditions, and the receiving equipment used.

AA, FF, SS, GG, etc. are abbreviations for languages (Arabic, French, Spanish, German). Times given are in UTC, which is five hours ahead of EST, i.e. 0000 UTC equals 7 p.m. EST, 6 p.m. CST, 4 p.m. PST.

<table>
<thead>
<tr>
<th>UTC</th>
<th>Freq.</th>
<th>Station/Country</th>
<th>Notes</th>
<th>UTC</th>
<th>Freq.</th>
<th>Station/Country</th>
<th>Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>7440</td>
<td>Radio Ukraine Int.</td>
<td></td>
<td>0300</td>
<td>9460</td>
<td>Voice of Turkey</td>
<td></td>
<td>TT</td>
</tr>
<tr>
<td>0000</td>
<td>9435</td>
<td>Democratic Voice of Burma, via Germany</td>
<td>Burmese</td>
<td>0300</td>
<td>9965</td>
<td>Voice of Armenia</td>
<td></td>
<td>Armenian</td>
</tr>
<tr>
<td>0000</td>
<td>9830</td>
<td>Voice of Russia</td>
<td>SS</td>
<td>0300</td>
<td>3240</td>
<td>Trans World Radio, Swaziland</td>
<td></td>
<td>vern</td>
</tr>
<tr>
<td>0000</td>
<td>11690</td>
<td>Radio Viihnius, Lithuania</td>
<td></td>
<td>0300</td>
<td>3345</td>
<td>Channel Africa, South Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0000</td>
<td>17715</td>
<td>Radio Australia</td>
<td></td>
<td>0300</td>
<td>6940</td>
<td>Radio Fana, Ethiopia</td>
<td></td>
<td>Amharic</td>
</tr>
<tr>
<td>0300</td>
<td>5035</td>
<td>Radio Aparecida, Brazil</td>
<td>PP</td>
<td>0300</td>
<td>7215</td>
<td>Trans World Radio via South Africa</td>
<td></td>
<td>unid</td>
</tr>
<tr>
<td>0300</td>
<td>5910</td>
<td>Radio Ukraine Int.</td>
<td></td>
<td>0300</td>
<td>9885</td>
<td>Voice of America Relay, Botswana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>6060</td>
<td>Radio Nacional, Argentina</td>
<td>SS</td>
<td>0300</td>
<td>11815</td>
<td>Radio Brazil Central</td>
<td></td>
<td>PP</td>
</tr>
<tr>
<td>0300</td>
<td>9865</td>
<td>Radio Fanda, USA</td>
<td>Farsi to Iran</td>
<td>0300</td>
<td>4885</td>
<td>Radio Clube do Para, Brazil</td>
<td></td>
<td>PP</td>
</tr>
<tr>
<td>0300</td>
<td>15120</td>
<td>China Radio Int, via Cuba</td>
<td>SS</td>
<td>0400</td>
<td>4930</td>
<td>Voice of America Relay, Botswana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>4052.5</td>
<td>Radio Verdad, Guatemala</td>
<td>SS</td>
<td>0400</td>
<td>4965</td>
<td>The Voice, Zambia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>5900</td>
<td>Radio Brazil Central</td>
<td></td>
<td>0400</td>
<td>5500</td>
<td>Voice of Tigray Revolution (clandestine) to Ethiopia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>6190</td>
<td>Deutschlandsrundfunk, Germany</td>
<td>GG</td>
<td>0400</td>
<td>5865</td>
<td>Voice of Greece</td>
<td></td>
<td>Greek</td>
</tr>
<tr>
<td>0300</td>
<td>7260</td>
<td>Radio Thailand</td>
<td>EE, others</td>
<td>0400</td>
<td>5920</td>
<td>Radio Rossi, Russia</td>
<td></td>
<td>RR</td>
</tr>
<tr>
<td>0300</td>
<td>7355</td>
<td>Vatican Radio</td>
<td>Hindi, etc.</td>
<td>0400</td>
<td>7275</td>
<td>RT Tunisienne, Tunisia</td>
<td></td>
<td>AA</td>
</tr>
<tr>
<td>0300</td>
<td>11800</td>
<td>RAI Int., Italy</td>
<td>II</td>
<td>0400</td>
<td>11690</td>
<td>Radio Okapi, Congo, via South Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>11915</td>
<td>Radio Guacha, Brazil</td>
<td>PP</td>
<td>0400</td>
<td>12080</td>
<td>VOA Relay, Botswana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>6115</td>
<td>Radio Tirana, Albania</td>
<td></td>
<td>0430</td>
<td>4775</td>
<td>Trans World Radio, Swaziland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>3259</td>
<td>Radio Luz y Vida, Honduras</td>
<td>SS</td>
<td>0430</td>
<td>4810</td>
<td>Radio Transcontinental, Mexico</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0300</td>
<td>6065</td>
<td>Radio Sweden, via Canada</td>
<td></td>
<td>0430</td>
<td>5985</td>
<td>RTV Congolaise, Congo</td>
<td></td>
<td>FF</td>
</tr>
<tr>
<td>0300</td>
<td>6140</td>
<td>Radio Lider, Colombia</td>
<td>SS</td>
<td>0430</td>
<td>7205</td>
<td>BBC via South Africa</td>
<td></td>
<td>PP</td>
</tr>
<tr>
<td>0300</td>
<td>9480</td>
<td>Radio Rossi, Russia</td>
<td>RR</td>
<td>0500</td>
<td>4950</td>
<td>Radio Nacional Angola</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>9505</td>
<td>Radio Rebelde, Cuba</td>
<td>SS</td>
<td>0500</td>
<td>11820</td>
<td>Radio New Zealand Int.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>9675</td>
<td>Radio Cancao Nova. Brazil</td>
<td>PP</td>
<td>0500</td>
<td>6185</td>
<td>Radio Eduacion, Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>9737</td>
<td>Radio Nacional Paraguay</td>
<td>SS</td>
<td>0500</td>
<td>7255</td>
<td>Voice of Nigeria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0200</td>
<td>4780</td>
<td>Radio Cultural Coatan, Guatemala</td>
<td>SS</td>
<td>0530</td>
<td>9625</td>
<td>CBC Northern Quebec Service, Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0200</td>
<td>4800</td>
<td>Radio Buenas Nuevas, Guatemala</td>
<td>SS</td>
<td>0530</td>
<td>9685</td>
<td>Channel Africa, South Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0200</td>
<td>4819</td>
<td>La Voz Evangelica, Honduras</td>
<td>SS</td>
<td>0530</td>
<td>5005</td>
<td>Radio Nacional, Equitorial Guinea</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0200</td>
<td>4915</td>
<td>Radio Anhanguera, Brazil</td>
<td>PP</td>
<td>0530</td>
<td>7290</td>
<td>VOA Relay, Sao Tome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0200</td>
<td>5025</td>
<td>Radio Rebelde, Cuba</td>
<td>SS</td>
<td>0600</td>
<td>4760</td>
<td>ELWA. Liberia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0200</td>
<td>9410</td>
<td>BBC Relay, Cyprus</td>
<td></td>
<td>0600</td>
<td>4783</td>
<td>RT Maleme, Mali</td>
<td></td>
<td>FF</td>
</tr>
<tr>
<td>0200</td>
<td>9780</td>
<td>Rep. of Yemen Radio</td>
<td>AA</td>
<td>0600</td>
<td>5885</td>
<td>Vatican Radio</td>
<td></td>
<td>II</td>
</tr>
<tr>
<td>0200</td>
<td>10330</td>
<td>All India Radio</td>
<td>HH</td>
<td>0700</td>
<td>6110</td>
<td>Voz Cristina, Chile</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0210</td>
<td>3279</td>
<td>La Voz del Napo, Ecuador</td>
<td>SS</td>
<td>0700</td>
<td>6115</td>
<td>Radio Union, Peru</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0230</td>
<td>4915</td>
<td>Radio Difusora Macapa, Brazil</td>
<td>PP</td>
<td>0700</td>
<td>6140</td>
<td>Radio Lider, Colombia</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0230</td>
<td>6040</td>
<td>Radio Clube Paranaense, Brazil</td>
<td>PP</td>
<td>0700</td>
<td>6160</td>
<td>CKZN, Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>3240</td>
<td>Radio Misiones Int., Honduras</td>
<td>SS</td>
<td>0700</td>
<td>9525</td>
<td>Star Radio, Liberia, via Ascension Is.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>4780</td>
<td>RTD Djibouri</td>
<td>FF</td>
<td>0700</td>
<td>9885</td>
<td>Radio New Zealand Int.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0300</td>
<td>6040</td>
<td>Radio Monte Carlo, via Canada</td>
<td>AA</td>
<td>0730</td>
<td>9720</td>
<td>Radio Victoria, Peru</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0300</td>
<td>7110</td>
<td>Voice of Ethiopia</td>
<td>Amharic</td>
<td>0800</td>
<td>3290</td>
<td>Voice of Guyana</td>
<td></td>
<td>DD/EE</td>
</tr>
<tr>
<td>0300</td>
<td>7200</td>
<td>Republic of Sudan Radio</td>
<td>AA</td>
<td>0800</td>
<td>5954</td>
<td>Faro del Caribe, Costa Rica</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0300</td>
<td>9345</td>
<td>Kol Israel</td>
<td>HH</td>
<td>0800</td>
<td>6010</td>
<td>Radio Mit. Mexico</td>
<td></td>
<td>SS</td>
</tr>
<tr>
<td>0300</td>
<td>9420</td>
<td>Voice of Greece</td>
<td>Greek</td>
<td>0800</td>
<td>7405</td>
<td>Radio Marti, USA</td>
<td></td>
<td>SS to Cuba</td>
</tr>
<tr>
<td>UTC</td>
<td>Freq.</td>
<td>Station/Country</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>----------------------------------------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0830</td>
<td>4990</td>
<td>Radio Apintei, Suriname</td>
<td>DD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0830</td>
<td>5940</td>
<td>Radio Melodia, Peru</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900</td>
<td>3310</td>
<td>Radio Mosoj Masoki, Bolivia</td>
<td>PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900</td>
<td>5990</td>
<td>Radio Senado, Brazil</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900</td>
<td>6035</td>
<td>La Voz del Guaviare, Colombia</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900</td>
<td>6134</td>
<td>Radio Santa Cruz, Bolivia</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>3925</td>
<td>Radio Nikkei, Japan</td>
<td>JJ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>4747</td>
<td>Radio Huanta, Peru</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>7200</td>
<td>Radio Rossi, Russia</td>
<td>RR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1030</td>
<td>4775</td>
<td>Radio Tarma, Peru</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1030</td>
<td>5040</td>
<td>Voz del Upano, Ecuador</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1030</td>
<td>7260</td>
<td>Voice of Mongolia</td>
<td>vern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1032</td>
<td>9965</td>
<td>KHBN, Palau</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>3220</td>
<td>HCBJ</td>
<td>SS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>4605</td>
<td>RRI-Serui, Indonesia</td>
<td>II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>4905</td>
<td>Xizang PBS, Tibet</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>5020</td>
<td>Solomon Islands Broadcasting Service</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>5446.5</td>
<td>AFN/AFRTS, Florida</td>
<td>USB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>6080</td>
<td>Radio Singapore Int.</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>9405</td>
<td>FEBC, Philippines</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>9440</td>
<td>China Radio Int.</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>9520</td>
<td>Radio New Zealand Int.</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>9750</td>
<td>Voice of Malaysia</td>
<td>MM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>11770</td>
<td>Adventist World Radio, Guam</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>11785</td>
<td>Voice of Indonesia</td>
<td>II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1130</td>
<td>4920</td>
<td>Xiang PBS, Tibet</td>
<td>TT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1130</td>
<td>3385</td>
<td>Radio East New Britain, Papua New Guinea</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>7255</td>
<td>VOA Relay, Thailand</td>
<td>Indo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>7260</td>
<td>Voice of America, Thailand Relay</td>
<td>Indo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>9345</td>
<td>Pyongyang Broadcasting Station, Korea</td>
<td>KK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>9465</td>
<td>Trans World Radio, Guam</td>
<td>unid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>11905</td>
<td>Sri Lanka Broadcasting Co.</td>
<td>Tamil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>9525</td>
<td>Radio Polonia, Poland</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>6020</td>
<td>Radio Australia</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>7220</td>
<td>Voice of Vietnam</td>
<td>RR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>12030</td>
<td>Radio Free Asia, USA, via No. Marianas</td>
<td>VV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>11555</td>
<td>KHR, Hawaii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>12030</td>
<td>BBC via United Arab Emirates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>13685</td>
<td>Voice International, Australia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>15250</td>
<td>Radio Sweden</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>15405</td>
<td>HCJB, Australia</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>21505</td>
<td>BSKSA, Saudi Arabia</td>
<td>AA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>9525</td>
<td>Voice of Indonesia</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>13625</td>
<td>Radio Free Asia, USA, via Northern Marianas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>15350</td>
<td>Voice of Turkey</td>
<td>TT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>15400</td>
<td>YLE/Radio Finland Int.</td>
<td>Finnish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>17870</td>
<td>Radio Japan/NHK via Ascension</td>
<td>JJ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1330</td>
<td>11875</td>
<td>Radio Veritas, Philippines</td>
<td>Hindi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>15430</td>
<td>Golos Rossi</td>
<td>RR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>15140</td>
<td>Radio Sultana, Portugal</td>
<td>PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1430</td>
<td>11600</td>
<td>Radio Slovakia Int.</td>
<td>Slovak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1430</td>
<td>11665</td>
<td>Central Broadcasting System, Taiwan</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1430</td>
<td>11680</td>
<td>Radio Free Asia, USA via Sri Lanka</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1430</td>
<td>11805</td>
<td>VOA Relay, Northern Marianas</td>
<td>CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1430</td>
<td>15100</td>
<td>Radio Pakistan</td>
<td>Urdu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UTC</th>
<th>Freq.</th>
<th>Station/Country</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>11690</td>
<td>Radio Jordan</td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>12020</td>
<td>HCBJ, Ecuador</td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>12115</td>
<td>Radio Liberty, USA via Sri Lanka</td>
<td>unid</td>
</tr>
<tr>
<td>1500</td>
<td>13775</td>
<td>Radio Austria Int.</td>
<td>GG</td>
</tr>
<tr>
<td>1500</td>
<td>17570</td>
<td>RTBF, Belgium, via Germany</td>
<td>FF</td>
</tr>
<tr>
<td>1500</td>
<td>17770</td>
<td>Channel Africa, South Africa</td>
<td></td>
</tr>
<tr>
<td>1530</td>
<td>11530</td>
<td>Voice of Mesopotamia via Moldova</td>
<td>Kurdish</td>
</tr>
<tr>
<td>1530</td>
<td>21600</td>
<td>BSKSA, Saudi Arabia</td>
<td>FF</td>
</tr>
<tr>
<td>1530</td>
<td>21700</td>
<td>Radio Exterior de Espana, Spain</td>
<td>FF</td>
</tr>
<tr>
<td>1534</td>
<td>15235</td>
<td>Vatican Radio</td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>9795</td>
<td>KNLS, Alaska</td>
<td>RR</td>
</tr>
<tr>
<td>1600</td>
<td>11570</td>
<td>Radio Pakistan</td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>11650</td>
<td>Voice of Islamic Rep. of Iran</td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>15435</td>
<td>Emirates Radio, UAE</td>
<td>AA</td>
</tr>
<tr>
<td>1700</td>
<td>17485</td>
<td>Radio Prague, Czech Rep.</td>
<td></td>
</tr>
<tr>
<td>1700</td>
<td>21655</td>
<td>RDP Int., Portugal</td>
<td>PP</td>
</tr>
<tr>
<td>1730</td>
<td>11590</td>
<td>Kol Israel</td>
<td></td>
</tr>
<tr>
<td>1730</td>
<td>15560</td>
<td>Radio Jamhiriya, Libya, via France</td>
<td>AA</td>
</tr>
<tr>
<td>1830</td>
<td>15190</td>
<td>Radio Philippines, Philippines</td>
<td></td>
</tr>
<tr>
<td>1830</td>
<td>15475</td>
<td>Africa No. One, Gabon</td>
<td>FF</td>
</tr>
<tr>
<td>1900</td>
<td>11820</td>
<td>BSKSA, Saudi Arabia</td>
<td>AA</td>
</tr>
<tr>
<td>1930</td>
<td>15345</td>
<td>RTV Moraccine, Morocco</td>
<td>RTV</td>
</tr>
<tr>
<td>1930</td>
<td>11860</td>
<td>Voice of Islamic Rep. of Iran</td>
<td>Farsi</td>
</tr>
<tr>
<td>1930</td>
<td>12005</td>
<td>RT Tunisienne, Tunisia</td>
<td>AA</td>
</tr>
<tr>
<td>1990</td>
<td>15630</td>
<td>Voice of Greece</td>
<td>Greek</td>
</tr>
<tr>
<td>2000</td>
<td>9750</td>
<td>Radio Liberty, USA, via Morocco</td>
<td>Byelorussian</td>
</tr>
<tr>
<td>2000</td>
<td>13675</td>
<td>Vatican Radio</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>17810</td>
<td>Radio Nederland, via Bonaire</td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>11720</td>
<td>VOA Relay, Morocco</td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>9675</td>
<td>IBRA Radio, Sweden via Germany</td>
<td>FF</td>
</tr>
<tr>
<td>2030</td>
<td>11735</td>
<td>Radio Tanzania-Zanzibar</td>
<td>Swahili</td>
</tr>
<tr>
<td>2030</td>
<td>12085</td>
<td>Radio Damascus, Syria</td>
<td></td>
</tr>
<tr>
<td>2100</td>
<td>17680</td>
<td>Voz Cristiana, Chile</td>
<td></td>
</tr>
<tr>
<td>2100</td>
<td>17860</td>
<td>Deutsche Welle, Germany via Rwanda</td>
<td>PP</td>
</tr>
<tr>
<td>2130</td>
<td>9605</td>
<td>BBC Relay, Seychelles</td>
<td></td>
</tr>
<tr>
<td>2130</td>
<td>11975</td>
<td>VOA Relay, Sao Tome</td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>6005</td>
<td>Deutschland Radio, Germany</td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>6180</td>
<td>Radio Nacional Amazonas, Brazil</td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>7450</td>
<td>CS Macedonias, Greece</td>
<td>Greek</td>
</tr>
<tr>
<td>2200</td>
<td>7460</td>
<td>Radio Nacional de la RASD, Algeria</td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>9990</td>
<td>Radio Cairo</td>
<td>AA (cland.)</td>
</tr>
<tr>
<td>2200</td>
<td>11715</td>
<td>All India Radio</td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>11895</td>
<td>Radio Japan/NHK via French Guiana</td>
<td>JJ</td>
</tr>
<tr>
<td>2215</td>
<td>9925</td>
<td>Croatian Radio, via Germany</td>
<td></td>
</tr>
<tr>
<td>2230</td>
<td>5470</td>
<td>Radio Veritas, Liberia</td>
<td></td>
</tr>
<tr>
<td>2230</td>
<td>7125</td>
<td>RTV Guinea, Liberia</td>
<td></td>
</tr>
<tr>
<td>2230</td>
<td>9990</td>
<td>Radio Cairo, Egypt</td>
<td></td>
</tr>
<tr>
<td>2230</td>
<td>15345</td>
<td>Radio Nacional, Argentina</td>
<td></td>
</tr>
<tr>
<td>2245</td>
<td>11755</td>
<td>Radio Canada Int. via Ascension Is.</td>
<td>FF</td>
</tr>
<tr>
<td>2300</td>
<td>4845</td>
<td>Radio Mauritania, Mauritania</td>
<td></td>
</tr>
<tr>
<td>2300</td>
<td>9425</td>
<td>All India Radio</td>
<td></td>
</tr>
<tr>
<td>2330</td>
<td>9855</td>
<td>Radio Kuwait</td>
<td></td>
</tr>
<tr>
<td>2330</td>
<td>5030</td>
<td>RTV Burkina, Burkina Faso</td>
<td></td>
</tr>
<tr>
<td>2330</td>
<td>9575</td>
<td>Radio Medi-Un, Morocco</td>
<td>AA</td>
</tr>
<tr>
<td>2330</td>
<td>9700</td>
<td>Radio Bulgaria</td>
<td></td>
</tr>
<tr>
<td>2330</td>
<td>9875</td>
<td>Radio Vilnius, Lithuania</td>
<td></td>
</tr>
</tbody>
</table>

www.popular-communications.com  February 2006 / POP'COMM / 43
New, Interesting, And Useful Communications Products

New Ameritron Programmable 10-Memory Screwdriver Controller

Ameritron’s SDC-102 lets you save 10 screwdriver antenna positions in memory, and then with a push of a button you can quickly return to any saved position. The up/down buttons let you manually move the antenna to any desired position. A four-digit turns counter with bright LEDs gives you precise antenna positioning.

The book started as a project by Bruce and his wife, Carol in 1971. Through the years its size and coverage of the FM industry has increased. FM has become the most popular radio band, now accounting for over 80 percent of listening in the United States. Technically, the book shows FM (main) stations, translators and boosters, which relay the main stations. It gives power and coverage radii to help take the guesswork out of FM listening. Low-power stations are also shown as are program formats, and slogans used by various stations.

The FM Atlas is $19.95 plus $2.05 shipping from FM Atlas, P.O. Box 336, Esko, MN 55733-0336. American Express, Visa, MasterCard or PayPal orders may be e-mailed to FmAtlas@aol.com.

OtterBox 1910—Protection For The HP iPaq 6500

Otter Products, LLC., introduces the OtterBox 1910, an interactive, waterproof case designed for the HP iPaq 6500. With this case, users have an innovative convergent technology solution; a phone, PDA, keypad, GPS and a rugged device all in one.

The OtterBox 1910 provides access to all major functions on the 6500, including sync/charge, SD Slot, headset jack, and keypad. A clear window on the back allows use of the 6500’s camera and flash through the case. The 6500’s keypad also remains operable with direct push activation through the 1910 and an external stylus holder adds convenience. Retail for the 1910 is $129.95.

The OtterBox 1910 is made through an injection molding process and comprised of a glass-reinforced, polycarbonate shell with a thermoplastic rubber overmolding for added drop-protection. The case meets IP67 and MIL SPEC 810F for dust, water, and drop protection.

Otter Products, founded in 1996, offers technology protection lines for PDAs, iPods, Tablet PCs and other valuables with a 100 percent money back guarantee.

For more information or to purchase an OtterBox 1910 visit www.otterbox.com or call 888-695-8820.

ICP Solar’s New Sunsei Solar Product Line

ICP Solar announces the launch of a new brand, the Sunsei line of solar products. The company says, “ICP's solar cells—the heart of all Sunsei products—deliver 50 percent more power per square—inch than competing solar technologies.”

The new product line from ICP Solar works with a variety of power needs, from storage battery maintenance to providing a completely independent power source. Sunsei products are easy to install, operate in silence, require zero maintenance and deliver clean renewable energy, even under cloudy conditions.

ICP Solar chargers are complemented by tailor-made mounting kits and charge controllers that ensure easy installation and optimal product perfor-
Cobra's New XRS9930 Radar Detector

We've just received word on Cobra's 2006 line of digital radar/laser detectors that feature a full-color Extreme Bright DataGrafix™ display. New circuitry provides the 12 Band Ultra™ models with extended detection range and the most advanced alert times possible.

Key features of the new XRS9930 that has an MSRP of $229.95, include:
- Xtreme Range Superheterodyne® technology provides extra detection and advance warning.
- Full-color, customizable graphic display provides easy-to-read set-up menu, icons, eight-point digital compass and alert screens.
- 12 Band system detects and alerts drivers to two safety, six radar and four laser signals.
- Detects fastest laser and radar guns on the market today, including Pop Mode and new Ku Band radar guns.
- IntelliMute™ technology monitors vehicle’s relative speed and mutes system to prevent false alerts.
- IntelliShield® uses three settings to significantly reduce the number of false signals in crowded urban environments.
- SmartPower™ feature automatically shuts off unit when vehicle's ignition is turned off.
- Exclusive Strobe Alert® and Safety Alert® warn of oncoming emergency vehicles and select road hazards.
- Voice Alert® provides user with clear voice announcement of the specific band detected.
- Provides complete immunity to VG-2 and Spectre-1 radar detector-detectors.

For more information on this new radar detector or other Cobra products, contact Cobra directly at http://cobratelectronics.com/ or call them at 773-889-8870. Please tell them you read about it in Popular Communications.

ICP Solar’s Sunsei Solar Charger SE-1200 protects against battery drain and replaces the daily power consumption of 12V lighting systems and appliances in boats, remote cabins and RVs. Cigarette lighter adaptor, battery clamps, terminal rings, connector wires and mounting hardware are all included.

Klingenfuss’ 2006 Shortwave Frequency Guide

It’s out and hailed by professional radio enthusiasts as a must-have shack resource! The new 2006 Shortwave Frequency Guide is 500 pages and uses the latest computer-to-plate technology; production time is only 10 days.

The new 10th Edition of the Guide includes worldwide broadcast and utility radio stations and has schedules of all clandestine, domestic, and international broadcast stations compiled by a new team of international top experts, assisted by more than 100 experienced collaborators and monitors worldwide.

The Klingenfuss 2006 Shortwave Frequency Guide features a gigantic broadcast frequency list with 9,303 entries and an alphabetical list of stations as well.

For more information on the 2006 Shortwave Frequency Guide, that is priced at 35 EUR, e-mail them at info@klingenfuss.org or visit them online at www.klingenfuss.org.

www.popular-communications.com
Got Juice?

When emergency communicators are called in to staff an evacuation shelter or maybe a field station totally independent of commercial power, we need more than just a handheld and a single 1-amp-hour NiCd internal battery pack. Okay, so your handheld runs on NIMH, then you maybe have 1.5 amp-hours of handheld battery capacity. If you have the new lithium ion battery pack for your handheld, you may have up to 1.8 amp-hours of battery capacity.

Field Experience

The radio operators who returned from hurricane duty all report that it took more than just a single handheld to keep them on the air from their shelter or field operating point. Most reported the need for an occasional 20 or 30 watts of output power, and the utility of a dual-band mobile with variable power output settings. There's just no way you're going to run a mobile off a handheld battery supply!

An excellent battery choice would be the well-constructed, automobile jump-start battery systems boasting up to 17 amp-hours of lead-acid, non-spillable battery capacity, and usually available for under $75. Even with the less expensive $39.95 specials with 12-amp-hour capacity, you are on the air with that mobile radio for at least 24 hours if you monitor with squelch on, talk mainly on the lowest power output, and keep your transmissions short to conserve your car jump-battery capacity.

How Much Juice Do They Have?

Determining just how much capacity these neat jump-start battery systems have is sometimes tough. They're often rated at

This small "minimum" battery is adequate for short periods of time.

This is the emergency communicator's power connection—the Anderson Powerpole.

Here's a major-size 17-amp-hour battery system with a mobile VHF/UHF radio attached.
peak amperage output, which is not helpful in determining actual amp-hour ratings. I usually go by how heavy the battery pack is; there is little question that more amp-hours from a lead-acid battery come from more weight, and an extremely light jump-start battery is probably not going to last very long.

Usually the major discount warehouse stores have a big pile of these vehicle jump-start batteries, all in bright colors, each with a carrying handle. If it’s under $50 and it feels heavy, chances are this will be a great addition to your field radio pack. Look to see if it has an analog voltmeter—if so, all the better. And if you’re in the automotive section of the store, pick up one of those cigarette lighter gooseneck lights, as this will give you illumination when you need to write down something in the log. But keep that light off at all other times, unless it’s a new, sophisticated light-emitting-diode lamp. Popular catalog company Griot’s Garage offers a jump-start battery pack which includes a flexible light-emitting-diode gooseneck light, perfect for illuminating your paperwork, yet frugal current-wise so as to consume only a few milliwatts of power.

These jump-start batteries normally feature a cigarette-lighter receptacle outlet. These are sometimes fused, generally to no less than 10 amps. This means you can safely charge your battery from another vehicle, or run small equipment off your battery for short periods of time. I generally use my socket for charging.

For Higher Demands

To pull large and small amounts of current from the same jump-start battery, I usually connect to the big red and black leads that sometimes sport the big red and black battery terminal alligator clips. You generally won’t need alligator clips in the field, so carefully cut the clips off and solder on the appropriate connectors that will run your mobile radio equipment.

Connectors?

Appropriate connectors? Yes, indeed. I refer to the Anderson Powerpole connectors, which will keep your setup common with other emergency communications. If you don’t think you can work with the little tiny connector contacts and the right tool to get them fastened onto the smaller wires, buy red and black wire kits with the connectors already on them, and carefully solder the smaller wires onto the larger jump-lead red and black wires. I always run an additional fuse in series with the positive, red lead, just in case.

And when you do your Anderson wire additions, be sure to wire in a few spares because someone may come along with charging capabilities and you might need all the incoming juice you can get in a hurry. It’s also possible that someone might need to borrow a little bit of your battery power to run a piece of radio equipment; if they’re equipped with a common Anderson Powerpole connector, they plug right into your battery pack.

My Favorites, And A Few Power Tips

I like the inexpensive automotive jump-start battery packs that have an analog needle movement voltmeter. A quick transmit on high power lets you quickly see how much juice you have left in your battery system. On high power, you might see the needle barely move, telling you that you still have plenty of amps in reserve. But, if on high power you watch the voltmeter dip from 12 volts down to 9 volts, you know you are just about off the air and it’s time for a recharge.

A small solar panel recharges these jump-start batteries quickly. They can be rolled up into a small size if you get the flexible variety, available at most marine stores. Nothing beats charging from the sun!

Finally, resist the urge to constantly keep your jump-start battery on a constant charge. This begins to heat up the chemistry inside the battery pack, and ultimately decreases the life expectancy of your jump-start battery system. Rather, give it a good healthy charge once a month, then run your radio equipment to give it a good healthy discharge, then charge it up again for rapid radio deployment.

Incidentally, if your mobile radio turns on with a soft-touch key, DISCONNECT the mobile radio power plug from the battery because these “soft turn-on” circuits continuously draw a few milliamps, even though the radio is turned off. If your mobile radio turns on with a click switch, there is next to no current consumption, other than a couple of microamps to keep your memory battery circuit alive.

Stock Up

So the next time you’re out at your favorite warehouse or “we-have-everything” store, look for a display of jump-start batteries and load up! Convert them over to a wonderful self-contained, safe DC power source for your emergency mobile and portable radio system. Have fun and be safe!

Full 800 MHz Scanners

AOR AR-8200MKIII
Wideband portable receiver
- 0.5 to 3000 MHz continuous, (unblocked) $649 US
- NFM, WFM, NAM, WAM, USB & CW
- Alphanumeric memory identification
- Spectrum scan
- Ni-MH Battery
- Optional CTCSS & Extra memory boards

YUPITERU MVT-7300
Wideband handheld receiver
- 531kHz - 1320MHz (Unblocked for Cell) $439 US
- FM, WFM, AM, NAM, USB, LSB & CW
- Fully adjustable step sizes
- 30 channels/steps per second
- 1000 memory channels (10 banks 100)
- 10 user programmable search bands

ICOM IC-R3
Portable receiver with built-in TV receiver $439 US
- Modes of operation AM, FM, WFM, AM
- Wide frequency coverage, 0.5 to 2450 MHz
- 450 memory ch, 6 character alphanumeric
- TV picture receive capability, NTSC, M, PAL B/G

ALINCO DRA-8200M
Wideband scanner
- 0.5 to 960 MHz continuous, (unblocked) $459 US
- Fully adjustable step sizes
- 1000 memory channels (10 banks 100)
- 20 character alphanumeric
- TV picture receive capability, NTSC, M, PAL B/G

Guaranteed Delivery to USA.

www.radioworld.ca
Phone: 416-667-1000
FAX: (416) 667-9995
sales@radioworld.ca

February 2006 / POP COMM / 47
More On What Lies Below, And Look Ma—Less Noise!

Let’s look into our “Propagation Corner” mailbag this month and answer one reader’s comment on something we talked about in December’s column. Bob Roehrig, K9EUI, of Aurora University’s Telecom Department wrote:

Just received the magazine yesterday and was wondering how long ago you wrote the article [on longwave propagation] or if you bothered to do any recent research on what goes on below the broadcast band. On page 39 (middle column) you mention listening for both GWEN stations and OMEGA navigation signals. OMEGA went off the air Sept 30, 1997. GWEN has been deactivated, I believe deactivated since 2000. Some of the GWEN installations have been converted for DGPS transmissions.

Duly noted, Bob. This goes to show us that one must be careful when relying on information found on the Internet, as that information could well be out of date. I should have cross-referenced the information I was researching in order to uncover those facts.

The Ap Index And Understanding Propagation Terminology

The Ap index, or Planetary A index, is a 24-hour averaging of the Planetary K index. The Planetary K index is an averaging of worldwide readings of Earth’s geomorphical field. High indices (Kp > 5 or Ap > 20) mean stormy conditions with an active geomorphic field. The more active, the more unstable propagation is, with possible periods of total propagation fade-out. Especially around the higher latitudes and especially at the Polar Regions, where the geomorphic field is weak, propagation may disappear completely. Extreme high indices may result in aurora propagation, with strongly degraded long distance propagation at all latitudes. Low indices result in relatively good propagation, especially noticeable around the higher latitudes, when transpolar paths may open up. Maximum K-index is 9, and the A-index can exceed well over 100 during very severe storm conditions, with no maximum.

Classification of A-indices is as follows:

- A0–A7 = quiet
- A8–A15 = unsettled
- A16–A29 = active
- A30–A49 = minor storm
- A50–A99 = major storm
- A100–A400 = severe storm

Solar Flux (SFI): This flux number is obtained from the amount of radiation on the 10.7-cm band (2800 MHz). It is closely related to the amount of ultraviolet radiation, which is needed to create the ionosphere. Solar Flux readings are more descriptive of daily conditions than the Sunspot Number. The higher the Solar Flux (and, therefore, the higher the Sunspot Number), the stronger the ionosphere becomes, supporting refraction of higher frequencies.

Ionosphere: A collection of ionized particles and electrons in the uppermost portion of the Earth’s atmosphere, which is formed by the interaction of the solar wind with the very thin air particles that have escaped Earth’s gravity. These ions are responsible for the reflection or bending of radio waves occurring between certain critical frequencies, with these critical frequencies varying with the degree of ionization. As a result, radio waves having frequencies higher than the Lowest Usable Frequency (LUF) but lower than the Maximum Usable Frequency (MUF) are propagated over large distances.

Sunspot Number (SSN): Sunspots are magnetic regions on the Sun with magnetic field strengths thousands of times stronger than the Earth’s magnetic field. Sunspots appear as dark spots on the surface of the Sun. Temperatures in the dark centers of sunspots drop to about 3700° K (compared to 5700° K for the surrounding photosphere). This difference in temperatures makes the spots appear darker than elsewhere. Sunspots typically last for several days, although very large ones may last for several weeks. They are seen to rotate around the sun, since they are on the surface, and the sun rotates every 27.5 days.

Sunspots usually occur in a group, with two sets of spots. One set will have positive or north magnetic field while the other set will have negative or south magnetic field. The field is strongest in the darker parts of the sunspots (called the “umbra”). The field is weaker and more horizontal in the lighter part (the “penumbra”).

Galileo made the first European observations of sunspots in 1610. The Chinese and many other early civilizations have records of sunspots. Daily observations were started at the Zurich Observatory in 1749; continuous observations were begun in 1849.

The sunspot number is calculated by first counting the number of sunspot groups and then the number of individual sunspots. The “sunspot number” is then given by the sum of the number of individual sunspots and 10 times the number of groups. Since most sunspot groups have, on average, about 10 spots, this formula for counting sunspots gives reliable numbers even when the observing conditions are less than ideal and small spots are hard to see. Monthly averages (updated monthly) of the sunspot numbers show that the number of sunspots visible on the sun waxes and wanes with an approximate 11-year cycle.

For more information, see http://prop.hfradio.org.
region. The F2 layer contains the maxi-
ners to drift upward and add to the F2
which in turn allows the ions of lower lay-

sun. This causes long winter nights,
the year the earth is at perigee with the

months. During the first three months of
increasing as compared to the last few
maximum usable frequency (MUF) is
bands, and at the same time, the average
noise level is very low on the HF

point of the 11-year minimum activity
extends southward, especially on the
graphic latitude) to cause the mid-
latitude ionosphere. As we approach the
Spring Equinox, Earth’s magnetic field is
sufficiently perturbed by solar wind par-
ticles flowing into the auroral zone
(between 50 and 70 degrees north geo-
graphic latitude) to cause the mid-latitude
ionosphere to be depleted. This February,
we are unlikely to see any significant
solar storm, though we might see periods
when a coronal hole could influence
some storminess.

Below the auroral zone, during those
periods where the solar wind is elevat-
ed, the ionosphere develops a trough that
extends southward, especially on the
dark side of the Earth (at night) for two
or three days in a row. At the same time,
neat the equator, geomagnetic distur-
bances enhance ionization. This is the
reason for the higher MUF and iono-
spheric tilts that give us transequatorial
(TE) propagation. TE is prevalent dur-
ing the equinoctial months and more so
in the spring than in the autumn, and
throughout the winter in general.

While rare due to the low solar activ-
ity, 19 meters through 11 meters may
open shortly after sunrise and remain
open until early evening. Morning and
evening DX openings between some
areas in the Northern Hemisphere on
these bands are very short, because the
band in question closes on one end of the
path before it opens on the opposite end.

Paths on 31 through 15 meters remain
in their seasonal peak much like in
January, but with longer openings.
Continue to look for great openings
between North America and Europe in

www.popular-communications.com
<table>
<thead>
<tr>
<th>TO/FROM US WEST COAST</th>
<th>UTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARIBBEAN</td>
<td>00</td>
</tr>
<tr>
<td>NORTHERN SOUTH AMERICA</td>
<td>01</td>
</tr>
<tr>
<td>CENTRAL SOUTH AMERICA</td>
<td>02</td>
</tr>
<tr>
<td>SOUTHERN SOUTH AMERICA</td>
<td>03</td>
</tr>
<tr>
<td>WESTERN EUROPE</td>
<td>04</td>
</tr>
<tr>
<td>EASTERN EUROPE</td>
<td>05</td>
</tr>
<tr>
<td>EASTERN NORTH AMERICA</td>
<td>06</td>
</tr>
<tr>
<td>CENTRAL NORTH AMERICA</td>
<td>07</td>
</tr>
<tr>
<td>WESTERN NORTH AMERICA</td>
<td>08</td>
</tr>
<tr>
<td>SOUTHERN NORTH AMERICA</td>
<td>09</td>
</tr>
<tr>
<td>NORTHERN AFRICA</td>
<td>10</td>
</tr>
<tr>
<td>CENTRAL AFRICA</td>
<td>11</td>
</tr>
<tr>
<td>SOUTHERN AFRICA</td>
<td>12</td>
</tr>
<tr>
<td>MIDDLE EAST</td>
<td>13</td>
</tr>
<tr>
<td>JAPAN</td>
<td>14</td>
</tr>
<tr>
<td>CENTRAL ASIA</td>
<td>15</td>
</tr>
<tr>
<td>INDIA</td>
<td>16</td>
</tr>
<tr>
<td>THAILAND</td>
<td>17</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>18</td>
</tr>
<tr>
<td>CHINA</td>
<td>19</td>
</tr>
<tr>
<td>SOUTH PACIFIC</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TO/FROM US MIDWEST</th>
<th>UTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARIBBEAN</td>
<td>00</td>
</tr>
<tr>
<td>NORTHERN SOUTH AMERICA</td>
<td>01</td>
</tr>
<tr>
<td>CENTRAL SOUTH AMERICA</td>
<td>02</td>
</tr>
<tr>
<td>SOUTHERN SOUTH AMERICA</td>
<td>03</td>
</tr>
<tr>
<td>WESTERN EUROPE</td>
<td>04</td>
</tr>
<tr>
<td>EASTERN EUROPE</td>
<td>05</td>
</tr>
<tr>
<td>EASTERN NORTH AMERICA</td>
<td>06</td>
</tr>
<tr>
<td>CENTRAL NORTH AMERICA</td>
<td>07</td>
</tr>
<tr>
<td>WESTERN NORTH AMERICA</td>
<td>08</td>
</tr>
<tr>
<td>SOUTHERN NORTH AMERICA</td>
<td>09</td>
</tr>
<tr>
<td>NORTHERN AFRICA</td>
<td>10</td>
</tr>
<tr>
<td>CENTRAL AFRICA</td>
<td>11</td>
</tr>
<tr>
<td>SOUTHERN AFRICA</td>
<td>12</td>
</tr>
<tr>
<td>MIDDLE EAST</td>
<td>13</td>
</tr>
<tr>
<td>JAPAN</td>
<td>14</td>
</tr>
<tr>
<td>CENTRAL ASIA</td>
<td>15</td>
</tr>
<tr>
<td>INDIA</td>
<td>16</td>
</tr>
<tr>
<td>THAILAND</td>
<td>17</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>18</td>
</tr>
<tr>
<td>CHINA</td>
<td>19</td>
</tr>
<tr>
<td>SOUTH PACIFIC</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TO/FROM US EAST COAST</th>
<th>UTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARIBBEAN</td>
<td>00</td>
</tr>
<tr>
<td>NORTHERN SOUTH AMERICA</td>
<td>01</td>
</tr>
<tr>
<td>CENTRAL SOUTH AMERICA</td>
<td>02</td>
</tr>
<tr>
<td>SOUTHERN SOUTH AMERICA</td>
<td>03</td>
</tr>
<tr>
<td>WESTERN EUROPE</td>
<td>04</td>
</tr>
<tr>
<td>EASTERN EUROPE</td>
<td>05</td>
</tr>
<tr>
<td>EASTERN NORTH AMERICA</td>
<td>06</td>
</tr>
<tr>
<td>CENTRAL NORTH AMERICA</td>
<td>07</td>
</tr>
<tr>
<td>WESTERN NORTH AMERICA</td>
<td>08</td>
</tr>
<tr>
<td>SOUTHERN NORTH AMERICA</td>
<td>09</td>
</tr>
<tr>
<td>NORTHERN AFRICA</td>
<td>10</td>
</tr>
<tr>
<td>CENTRAL AFRICA</td>
<td>11</td>
</tr>
<tr>
<td>SOUTHERN AFRICA</td>
<td>12</td>
</tr>
<tr>
<td>MIDDLE EAST</td>
<td>13</td>
</tr>
<tr>
<td>JAPAN</td>
<td>14</td>
</tr>
<tr>
<td>CENTRAL ASIA</td>
<td>15</td>
</tr>
<tr>
<td>INDIA</td>
<td>16</td>
</tr>
<tr>
<td>THAILAND</td>
<td>17</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>18</td>
</tr>
<tr>
<td>CHINA</td>
<td>19</td>
</tr>
<tr>
<td>SOUTH PACIFIC</td>
<td>20</td>
</tr>
</tbody>
</table>
Figure 2. The sun’s atmosphere is threaded with magnetic fields (yellow lines). Areas with closed magnetic fields give rise to slow, dense solar wind (short, dashed red arrows), while areas with open magnetic fields—so-called “coronal holes”—yield fast, less dense solar wind streams (longer, solid red arrows). In addition to the permanent coronal holes at the sun’s poles, coronal holes can sometimes occur closer to the sun’s equator, as shown here just right of center. (Source: September 18, 2003, image from the SOHO Extreme ultraviolet Imaging Telescope, ESA/NASA)

the morning and between North America and Asia during the late afternoon hours. Twenty-two and 19 meters continue to be the best daytime DX bands, with 31 and 25 running a close second. TE paths on 25 through 15 meters will be reliable and open for most of the daylight hours, especially where paths terminate in the Southern Hemisphere.

Ninety through 41 meters will be useful almost 24 hours a day. Daytime conditions will resemble those of 25 meters, but skip and signal strength may decrease during midday on days with high solar flux values. Nighttime will be good except after days of very high MUF conditions. Generally, the usable distance is expected to be somewhat greater on the higher of these bands than on 90. DX activity tends to increase later in the evening toward midnight. Look for Africa and South Pacific (Australia, Papua New Guinea, and so on) on 90 through 60 meters throughout the night. On 41, 49 and 60 meters, long path DX is possible along the gray line.

The 120-meter band continues to remain stable, with very low noise levels. Throughout the winter season, high noise may occur during regional snowstorms. The band opens just before sunset and lasts until the sun comes up on the path of interest. Except for daytime short-skip signal strengths, high solar activity has little impact. Geomagnetic disturbances near the Spring Equinox cause signal attenuation and fading on polar paths. Noise will be very noticeable on these lower frequencies. Continue to look for Europe and Africa around sunset until the middle of the night, and then Asia, the Pacific, and the South Pacific as morning approaches.

Signals below 120 meters will remain strong and exciting, except during times of regional storms and high geomagnetic activity. Mediumwave DX is still quite hot throughout February.

**Coronal Holes**

A major source of solar disturbance during solar cycle minimums is the occurrence of coronal holes and the resulting solar wind storms. When the Earth is under the influence of high-
speed solar winds, we often experience periods of geomagnetic disturbances that can develop into significant storms. That in turn triggers the aurora VHFers look forward to.

A Chinese-German team of scientists has identified the magnetic structures in the solar corona where these fast solar winds originate. They analyzed images and Doppler maps from the Solar Ultraviolet Measurements of Emitted Radiation (SUMER) spectrometer, which SOHO was designed. It has long been known to the astronomical community that the fast solar wind comes from coronal holes. What is new here is the discovery that these flows start in coronal funnels, which have their source located at the edges of the magnetic network. Just below the surface of the sun there are large convection cells. Each cell has magnetic fields associated with it, which are concentrated in the network lanes by magneto-convection, where the funnel necks are anchored. The plasma, while still being confined in small loops, is brought by convection to the funnels and then released there, like a bucket of water is emptied into an open water channel.

Because of this discovery, the solar wind plasma is now considered to be supplied by plasma stemming from the many small magnetic loops, with only a few thousand kilometers in height, crowding the funnel. Through magnetic reconnection plasma is fed from all sides to the funnel, where it may be accelerated and finally form the solar wind.

Another group of scientists was surprised to discover that the structure of the sun’s cooler, dense lower atmosphere, the chromosphere, could be used to estimate the speed of the solar wind. This was unexpected because the solar wind originates in the corona, and the chromosphere is much deeper, lying just above the sun’s visible surface. “It’s like discovering that the source of the river Nile is another 500 miles inland,” said Dr. Scott McIntosh of the Southwest Research Institute, Boulder, Colorado, lead author of a paper on this research published May 10, 2005, in the Astrophysical Journal (see Figure 2).

The new work promises to increase the accuracy of space radiation forecasts. When the sun unleashes a coronal mass ejection (a billion-ton blast of plasma) into space at millions of miles per hour, it is likely to trigger geomagnetic storms. The VHF enthusiast benefits from a forecast that accurately identifies a pending storm, because that would signal the possible auroral propagation soon to commence.

The solar wind is gusty, much like winds on Earth, and range in speed from about 750,000 miles per hour (approximately 350 kilometers per second, to 1.5 million miles per hour (700 kilometers per second). You can view the current solar wind speed as measured by sending your Internet web browser to http://www.sec.noaa.gov/SWN/.

Since the solar wind is made up of electrically charged particles, it responds to...
magnetic fields that permeate the solar atmosphere. Solar wind particles flow along the invisible lines of magnetic force. When the magnetic field lines stretch straight out into space, as they do in coronal hole regions, the solar wind will move along these magnetic lines at a very high rate of speed. But, when the magnetic field lines bend sharply back to the solar surface, like the pattern you see with iron filings around a bar magnet, the solar wind emerges relatively slowly. For over 30 years this model has allowed space weather scientists to create a crude estimate for the speed of the solar wind.

In the new work, the team has tied the speed of the solar wind as it blows past Earth to variations deeper in the solar atmosphere than had previously been detected, or even expected. By measuring Earth to variations deeper in the solar atmosphere, the team was able to determine that the chromosphere is effectively “stretched thin” below coronal holes with their open magnetic fields, but compressed below magnetically closed regions.

**Clues On VHF**

The team used the observation to derive a continuous range of solar wind speeds from the structure of the chromosphere. The wider the chromospheric layer is, the more it is being allowed to expand by open magnetic fields and the faster the solar wind will blow. This new method is more precise than the old “fast or slow” estimate (see Figure 3).

This is a welcome development, since the radio hobbyist can now better assess the probability of geomagnetic activity that would trigger conditions useful for VHF propagation. By knowing more accurately when a solar wind shock wave will arrive, and how intense the plasma cloud will be, combined with the orientation of the magnetic components, the VHF radio amateur scientist can be ready for action. With the VHF radio community ready for these opportunities, more participants will be on-scene to make these openings memorable.

When the interplanetary magnetic field lines are oriented opposite to the magnetosphere’s orientation, the two fields connect and allow solar wind particles to collide with oxygen and nitrogen molecules in the upper atmosphere of these ovals. This causes light photons to be emitted. When the molecules and atoms are struck by these solar wind par-

---

**I'd Like To Hear From You**

You can join in with others in discussing space weather, propagation, and LF, MW, shortwave or VHF listening, at http://hfradio.org/forums/. Be sure to check out the latest conditions, as well as the educational resources about propagation, which I have put together for you at http://prop.hfradio.org/. I also provide a WAP/WML resource for wireless devices. If you want the latest propagation information like the solar flux, Ap reading, and so forth using a cell phone or other WAP device, check out http://wap.hfradio.org/, the wireless version of my propagation site.

And please don’t hesitate to write and let me know about any interesting propagation that you have noticed. Do you have questions about propagation? I look forward to hearing from you. Happy signal hunting!
Programming Software Overview—Understanding Which Software Package Is Best For You

As I have pointed out in the columns that have been published over the past year, the “leading edge” of modern radio design has shifted from the use of “real” electronic parts to “virtual” components. These virtual components are created when specially designed software programs are run in a personal computer and, rather than tuning a signal as conventional radios do, they “process” radio signals as digital information.

Due to this significant change in radio technology many hobbyists who have enjoyed building radios in the past are now faced with a dilemma: how do we continue to enjoy “hands on” construction projects when radio circuits are now computer software algorithms? The answer is simple: if that’s how radios are now being built, learn how to do that too using the new tools we have available.

Frankly the radio monitoring hobby has faced several major shifts in technology in the past and has managed to survive each one successfully. One example I’m old enough to remember was the big switch that took place between the use of vacuum tubes to transistors, and then to integrated circuits.

Even today there is still a strong contingent of people who proudly claim, “real radios glow in the dark,” who take great pride in maintaining their vintage equipment in top form. Likewise, you’ll still find a significant group of people who will only use vacuum tube based amplifiers in their high-end audio equipment.

What’s really going to bring about the biggest changes in radio monitoring will be the new modes of digital radio transmission that will be taking over the airwaves soon, such as DAB (Digital Audio Broadcasting), DRM (Digital Radio Mondiale), HDC (Hi-Definition Compression) and more. AM and FM radio, which have been with us since the 1920s and 40s, will eventually be retired from use in commercial broadcasting, rendering all of those wonderful analog radios we now own obsolete.

So truly it’s best to be ready for what’s in store.

So in addition to learning how to use your computer hardware and operating system very well, the best way to be prepared for this new software-based technology is to learn how to write computer software programs.

As I’ve point out many times, it’s actually not that difficult to learn how to be a software programmer, as long as you take your time, work out a goal and keep track of what you’ve learned.

Again, in last month’s column I pointed out that it is not the programming languages that make computer programs work it’s the sequence of concepts and the logic built into that software by the programmer that makes them truly functional.

So what I’m going to be introducing you to in this month’s column is the way in which you can create your new “workshop” for building Software-Defined Radios (not to mention other software projects that can be of direct benefit to the person who wants to perform computer-assisted radio monitoring). More importantly, what I’m also going to show you is how to set up this “workshop” for free, and that includes the training in how to use the software tools you choose to be part of your new toolkit. So let’s get started.

Choosing The Proper “Workshop”

One of the biggest obstacles that most people face when sitting down to the task of learning how to become a software programmer is choosing which language to learn first. Frankly there are a large number to choose from, ranging from the ones used in commercial software programming (FORTRAN, COBOL, C+, BASIC, Visual BASIC, JAVA, to name a few) to ones used in more specialized situations (Euphoria, Smalltalk, Ruby and Python, for example).

Again, what is extremely important to understand is that the primary task that the computer programmer performs is translating human concepts into a form that a computer can “use.” You must remember that ultimately the only program that a computer can “understand” is the binary code of 0 and 1 that make up “Machine Language.” This set of instructions tells your computer’s CPU (Central Processing Unit) what to do. In order for your computer to work, literally millions of 0’s and 1’s stream through the CPU every second, providing instructions for processing digital information.

Given such a vast number of 0s and 1s involved it’s impossible for a human being to be able to write computer programs in Machine Code. The closest that we can get to
writing directly in Machine Code is programming in Assembly Language, which uses grouped alphabet characters, called mnemonics, to represent binary code instructions.

Now when all is said and done, what you accomplish by writing a program in Assembly Language is a relatively simple program that takes a numerical value out of your storage memory (RAM), places it into the CPU for processing and then places the results in another memory location (again in RAM).

The results of using this type of programming is an extremely fast CPU processing of a large amount of information, which is important if you are doing a large number of mathematical calculations (say for when predicting weather for all of the continental United States for a week).

However, to be able to create such a program you need to have an extremely complex understanding of the computer hardware you are using and the information you are going to have it process. That task is going to involve a tremendous amount of time and energy, so such work is reserved for critical projects (like weather prediction, nuclear energy and physics experiments, to name a few applications).

So the vast majority of computer software programming used, “high-level” programming languages (such as FORTRAN, COBOL, C++, BASIC, Visual BASIC, JAVA, named before) due to the simple fact that they are relatively easier to work with than either Machine or Assembly languages.

More importantly, rather than simply performing “brute force” processing tasks that are performed using Assembly Languages, such as mathematical calculations, these high-level languages allow for more subtle concepts to be programmed, such as modeling a radio’s electronic components in virtual form.

So when you choose a computer software language to perform that task it is our job to convert a radio into mathematical formulas, what you must first do is ask which programming language will best convey those modeling concepts in software form.

Making a choice as to what language is appropriate for a particular programming situation is more of an art than science, and frankly for the types of situations that you will be encountering, only a handful of choices really need to be considered.

Likewise if you are interested in creating software for radio monitoring applications based upon the Microsoft Windows operating system, then you are really looking at two programming working environments—various versions of C (or more currently C, C++ and Microsoft Visual C++) and Microsoft Visual Basic.

Each of these software programming languages presents its own particular strengths and challenges, so let me introduce you to their essential characteristics and explain how each can be used to help you create useful programs for computer-assisted radio monitoring.

Intro To C, C+ And MS Visual C++

The C programming language was originally developed in 1970 by Ken Thompson and Denis Ritchie at AT&T Bell Labs for use on the UNIX operating system. It was originally used to write system software, which is one of the major components of an operating system that is used for running computer hardware.

Due to the fact that C was originally designed to work closely with computer hardware it was actually designed to be closer to assembly language than to a high-level language like BASIC and was once referred to as a medium-level language.

However, what made C different from assembly language was that rather than creating one executable file for an entire application (which those who remember early Windows or DOS based programs will be familiar with), C programs used a core program that accessed multiple libraries of functions stored in individual files.

You can see that structure if you use your Microsoft Explorer program to look at the content of a directory for most of today’s software programs. If you do that you will see that there is one file called an “application” with one or more files called “application extensions” residing in that directory.

The application is written using what is called a “core language,” which provides the main functions of the software program, and more importantly, makes use of those previously-mentioned extra files.

Those extra files are called libraries and they contain sub-programs that perform various functions that are useful for the operation of the main software program. Technically they are called “Dynamically Linked Libraries” and you will note that their file extension is “.DLL” (with the result being they are often called “DLL Files”).

These DLL files become useful due to their re-usability in more than one software program. So rather than having to program a lot of small details over and over again, a programmer can use a previously written DLL in order to save time.
How to say "Hello, world!" in a computer language.

---

**Assembly Language**

```assembly
clear "Hello, world!"
```

**C++**

```cpp
#include <iostream.h>

void main()
{
    cout << "Hello, World!";
    return 0;
}
```

**Visual Basic**

```vb
Private Sub Form_Load()
    MsgBox("Hello World!")
End Sub
```

---

One of the first computer programs that anyone learns is one that prints out "Hello, world!" on a video screen. Here is an example using the three computer programming languages that I talk about in the column. Don't worry about the details of what each line of code means right now. Just notice the differences for future reference.

In fact when you upgrade or add new features to a software program what you are most often doing is simply adding new DLL files to the library of an existing application.

Very often one software company may buy custom made DLL files from another software company that specializes in writing them in order to make their own software perform certain tasks, thus saving valuable programming time.

Likewise, many hobbyist software programmers share DLL files with one another for the same reason; so that people can add expanded functionality to their own software programs without having to spend time programming small details.

The power and flexibility of this type of programming was further enhanced during the 1980s as C became C+ (pronounced C Plus) and then C++ as new features came to be incorporated. These new features provided a very sophisticated programming method called "Object Oriented" (or OO), which models the characteristics of abstract or real things using objects.

Now to put this into terms that are understandable, an object is seen as having two basic characteristics: a state (of being) and (personal) behavior. For example, all the cats have a state (of being), that is they have a name, a color, and a breed and they are hungry on a regular basis. Likewise the majority of the cats exhibit the same (personal) behavior, barking, fetching, and tail waging.

Even inanimate objects have a state (of being), such as the bicycle, which has gears, pedals, two wheels and motion. It even has (personal) behavior, such as braking, accelerating, slowing down and changing gears.

As you can see, once you are able to model something (e.g. small dogs + bark a lot = Jack Russell Terriers, or 10 Speed + fast acceleration = racing bicycle) you are able to treat the results as having a "virtual" existence within your software program.

The key point here is that radios as objects have states and behavior too. (Have you experienced the big "ah-ha!" yet?)

So due to the fact that C++ is very close to assembly language it operates very fast with a personal computer, and because of that speed you can model the electronic components (resistors, capacitors and coils) and operational characteristics (frequency, bandwidth, demodulation mode and audio volume control) of a radio in virtual form.

More importantly (thanks to the efficiency of using DLL libraries to perform various functions) rather than trying to run one big software program, you are able to use a relatively small one thanks to the use of DLL files. By doing that you have a great deal of "left over" processing power of the personal computer's CPU that will allow you to operate virtual radio using SD radio software.

Again, you can operate a virtual radio within a personal computer by supplying the software program with digital samples of radio signals. This is accomplished by taking digital samples of radio signals off of an antenna by using a wide band digital sampling device, such as the ones I've described in previous columns.

Now if you want to take C++ to the next level of sophistication the current standard for programming application software for personal computers is C++, which is used by literally millions of computer programmers worldwide.

There is Microsoft Visual C++, which allows you to build the graphic user interface (or GUI) using simple tools (more on that in the next section on Visual Basic).

Now having said all that, there is one catch to using C or its derivatives, and that is the fact that it is a difficult software language for the beginner to learn due to its mid-range language characteristics.

A better choice for those who wish to become good amateur software programmers, and still have the potential for working with Object Oriented Programming (OOP), would be Microsoft’s Visual Basic.

As the name implies, its roots lay in the popular (and easier to understand) BASIC programming language, which has a proven track record of use and acceptance by those who want an easier entrance into software development. (And if you are curious, yes there was an “A” and “B” programming language before C, but that’s a story for another column.)

---

**Intro To MS Visual Basic**

The Beginners’ All-purpose Symbolic Instruction Code (BASIC) is a computer language that has been around for 40 years now, having first been developed by mathematicians John Kemeny and Tom Kurtz at Dartmouth College in 1964.

BASIC is a high-level language that uses an English syntax like LET, PRINT, IF and GOTO as commands, and in earlier forms provided line numbers that allowed a programmer to keep track of a task they were working on.

While originally designed as a training tool, BASIC has the capability of being expanded for use in more sophisticated tasks. This capability was used by Bill Gates and his business partner Paul Allen to create Altair BASIC in 1975, which was Microsoft’s first commercial product. (It was also Gates’ BASICA that brought Microsoft into a partnership with IBM due to the fact that company’s new IBM-PC needed a programming language. That opened the door for Gates to develop PC-DOS, and later MS-DOS and Windows, thus gaining control of the personal computer world for the next decade.)

So again, due to its origins as a training tool, many people have come to feel that BASIC is not a “real” programming language like C++, despite the fact that it is used today in powerful products like Oracle Power Objects and Microsoft Visual Basic.
Visual Basic (or VB) was developed by Microsoft in 1987 as a direct competitor to C and C++, and while it was not initially accepted by the programming community, today it is the fastest growing programming language on the market.

The primary strength found in Visual Basic is that you can create software code in minutes that would normally take you days in C++. Visual BASIC does this by allowing programmers to attach software code written in a sophisticated version of the BASIC programming language directly to the graphic elements used in the Windows operating system, such as buttons, pull down menus and text boxes.

So in order to create a software program using Visual Basic, what you essentially do is perform three steps.

First you use a graphic designer in the VB programming software to draw a user’s interface with all of the buttons and text boxes you require. Once that is done you then write the software code used to run the program and then “attach” that code to each of the buttons or boxes.

With all of the code attached, you then link the code together so that it performs the task that the software was designed to do. This can be illustrated by very simple example.

This is what happens after you write your code and create a finished software program. You end up with a mix of different types of files. As I outlined in the column, you have two primary types of files in a software application: one application file and many DLL files (plus a mix of additional files that provides documentation for configuring the application). Remember that the DLL files contain sub-programs used to reduce the overall size of the application by splitting it into smaller files. When you update a software application, these are the files that are replaced with new ones.
Say that you wanted to use Visual Basic to create a software program that would allow you to calculate the volume of a cylinder. To do that you would use the Visual Basic program to draw a window using the built-in graphics package and include three boxes and a button that is used to initiate a calculation.

You would then write a BASIC program for each of the three boxes—one to accept the height of the cylinder, another for the diameter and a third for displaying processed information.

Finally you would write a BASIC program for the button that would initiate the actual calculation when it was clicked (assuming that you had put numerical values into the first and second boxes).

That program would use the numerical data from the first to boxes to the formula for cylindrical volume ($\pi r^2 h$) and then display the product of that calculation in the third box.

Once you finished doing that you would write another BASIC program that would link together the three boxes and to that button, so that when you clicked on the button with your Window’s mouse the calculation would be performed and the product displayed.

When you were finished with all of those tasks you would then turn what you had written into an executable program and then run it in Microsoft Windows.

The truth is that most advanced programming techniques comes from learning how to build such simple software programs and then learn to attach more and more features as you progress in your knowledge.

So for many people who want to become hobbyist computer programmers, particularly for computer-assisted radio monitoring projects, Microsoft Visual Basic is an ideal beginning point.

**So, Which One Do You Use?**

Now the question you might have is, "well you told me earlier that you need OOP software like C+ and C++ in order to be able to model a virtual radio. Can you do the same thing with Visual Basic?"

Fortunately the answer to that is yes.

With the introduction of Microsoft Visual Basic 6.0 in 1998, all of the key components required for OOP (abstraction, encapsulation, polymorphism, and inheritance, which I’ll explain in detail in a future column) were included.

Since then each new version of MS Visual Basic (such as the 2005 version) have had further enhancements of OOP included, so as a result you can develop sophisticated software for Software-Defined Radios, or other computer-assisted radio monitoring applications, using this software development tool.

However, as previously mentioned, Microsoft also makes Visual C++, which allows you to create Windows software programs in the same way as MS Visual Basic, but using C++ code instead.

So given the choice between the two programming languages, which one is "the better choice"?

The truth is that today it’s becoming “six of one, half dozen of the other” when it comes to comparing. Anything written using C++ will save programming time because you use libraries of pre-written code and you also save time with Visual Basic because you build a significant part of the program using graphic tools, rather than code.

However, the bottom line for most software programmers is the fact that C++ is closer to machine language in form than BASIC, so programs written in C++ will be faster. In that regard it’s not surprising that for the best performance of virtual radio circuitry (such as is used in Software-Defined Radios) the language of choice is C++.

However, does that mean that you have to give up the simplicity of learning BASIC if you are new to software programming? The answer this time is no, because the refinements that have been made in the current versions of MS Visual Basic are making performance less and less an issue.

So the answer seems to be to try programming in both environments and see what you think of them. I’m sure your first reaction is “well, where am I going to find the money to spend on two pieces of software, one of which I may not like?"

Well thanks to the fact that Bill Gates wants you to become a software programmer you can download hobbyist versions of Microsoft Visual Basic and Visual C++ (along with several other programming languages) and use them for free!

Not only that, you can also get various types of training programs (ebooks, tutorials, on-line videos) for each of those programming languages directly from Microsoft for the same cost—free! This is an incredibly generous offer that you really should not pass up if you want to begin learning how to program in the Windows environment.

More importantly, there is a time limit on this free offer which will end on November 7, 2006. The thing to keep in mind is that while these are hobbyist versions of the programming languages, they are not toys. Not only can you use them to learn to write useful computer software by using them, you are also allowed under the license agreement that comes with them to create commercial (e.g. you can sell them for money) software packages without having to have a license from Microsoft.


Take your time and read over the background information on the software that is offered there, which includes Visual BASIC and C++, along with several other important programming languages. Also make certain that your computer has enough hard drive space and operating power to be able to use the programming software properly. For best performance you should have the following computer configuration (or better):

- 1-GHz Pentium Processor
- Windows 2000 with service pack 4 or Windows XP with service pack 2
- 256 Meg of RAM (or better)
- 1.3 GB of available hard drive space

As with anything to do with personal computing, the more RAM, processing power and hard drive space you have the better your computer software will perform, and this particularly applies to using programming software.

What you will discover is that the processing required to actually create a software program (compiling) takes a lot of computing power and will tax whatever system you have to its limits if you don’t have power to spare.

Likewise, given the size of the software programs that you are going to be downloading you will find that it will take a very long time if you are using a dial-up modem, so be forewarned.

The first thing you should do is to read the instructional material provided on the Microsoft Express website, particularly the Frequently Asked Questions (FAQ), overview information and
feature tour. That information will allow you to make the right decisions about downloading and installing the software. More importantly, it will also point you in the right direction for learning how to program and connect to on-line communities of people, called forums, who are sharing information on how to use programming software.

The key point is that the quicker you begin to use programming software, particularly if you are doing so while following some type of structured training instruction like that provided by Microsoft, the quicker you will be able to master the skills involved.

As I have always suggested in the past, set reasonable goals for yourself, work at a short but consistent pace (such as an hour a day maximum) and keep a log of what you do with your computer, particularly to keep track of new programming techniques you have just learned.

If you do that consistently then in a surprisingly short period of time you’ll find that you are making fewer mistakes and the code that you write will actually produce usable computer software.

Remember as well to enjoy the journey, be proud of your accomplishments as this is a challenging task, and remember that there are real rewards waiting for those who stay with that task to the end.

**Next Month**

I will be continuing this examination of computer programming, looking at what you get once you download and install one of Mr. Gates’ “Express” software development tools.

Yes, it is a little complicated at first, but once I have shown you the layout and structure of the files and how they are viewed and modified in the editor program, you will begin to see the bigger picture of computer programming very quickly.

Do not forget that if you wish to e-mail me with any questions use my e-mail address: carm_popcomm@hotmail.com. As mentioned before, I cannot answer general questions on computers, but will be more than happy to help you with any issues raised in the columns.

Unfortunately the unbelievably terrible storms and hurricanes have continued to hit parts of the United States, including Florida and Indiana. What a year it has been with so many people having to face so many personal hardships. In saying that I would like to suggest that you send donations to the American Red Cross—http://www.redcross.org/donate/donate.html in order to help your fellow American citizens in this time of trouble. There are many other good (and ethical) organizations that you can contribute to, so please use them if you wish.

Once again, do remember our troops overseas and give them your support. As mentioned previously, the “Any Service Person” mail program no longer exists for security reasons. Please refer to the U.S. Department of Defence’s official webpage, “Defend America.” They have a specific section found at: to www.defendamerica.mil/support_troops.html and it has an amazingly wide range of practical and useful ways that you can directly help.

If you are fortunate to have a home, a job and your loved ones around you in these times when so many don’t, please remember to give thanks for your personal blessings by remembering to pass on that blessing to others through regular acts of selfless sharing.

---

**INFOCENTRAL (from page 5)**

the Thai service, the BBC is also expected to end its central European language services such as Polish, Czech, Slovak, Romanian, Hungarian and Macedonian. The Nation also reports that the BBC also wanted to shelve the Tamil and Nepalese services, but that was put on hold as the political instability in Sri Lanka and Nepal remained on the international news agenda.

**American Military Launch Radio Rasul In Afghanistan**

Radio Rasul, an Arabic word meaning “message,” is a mobile radio station operated by the 82nd’s 1st Battalion, 325th Airborne Infantry Regiment and the 44th Signal Battalion that broadcasts music, news, public service announcements and other information provided by the Wardag provincial government to the local population. The radio station gives the government a way to promote itself and its programs to the local people, the majority of whom don’t read and don’t have access to televisions, said American Army Lt. Col. David Anders, Commander, 1st Battalion, 325th Airborne Infantry Regiment.

The radio station made its first broadcast September 16 and has been running from 8 a.m. to 9 p.m. every day since then. It broadcasts over FM and has a range of 40 to 60 km. The station is totally mobile and can be used anywhere as long as it has a power source. The programming is pre-recorded and is then beamed out over the airwaves in a continuous loop.

**SLBC Staff Protest Against Chairman**

Staff at the Sri Lanka Broadcasting Corporation (SLBC) has started protests against SLBC Chairman Hudson Samarasinghe. It’s being alleged that Mr. Samarasinghe assaulted SLBC news director Raja Katugampola and threatened his life for broadcasting Premier Mahinda Rajapaksa’s election campaign news. Mr. Samarasinghe was admitted to the hospital following the alleged assault. SLBC staff has accused Mr. Samarasinghe of creating “terror work conditions” at the SLBC, and are urging President Kumaratunga to dismiss him immediately.

A trade union spokesperson said that the Chairman “tries to introduce dictatorship in SLBC. The Sri Lanka Progressive Front trade union is angry with Mr. Samarasinghe for ‘crippling’ the ruling party presidential candidate’s election campaign.

**Japanese Abduction Inquiry Group To Start Shortwave Broadcasts**

Kazuhiro Araki, head of the Investigation Commission on Missing Japanese Probably Related to North Korea, has told reporters that the group plans to start shortwave broadcasts. The broadcasts, in Japanese, will be beamed to North Korea in the hope of reaching abducted Japanese citizens, who the Commission hopes will respond to the messages. No details were given of the times and frequencies, and whether these will be self-contained broadcasts or inserts into existing Japanese transmissions. (It seems unlikely that there will be any response, given that listening to shortwave broadcasts from overseas is forbidden in North Korea, and in any case making contact would be extremely difficult and dangerous.)
Although I’ve been—among other things—a computer tech for more than 20 years now, I have only recently begun to take advantage of the various online chat and instant messaging services available on the Internet (and used more effectively by millions of teenagers every day, I might add!). Perhaps it has something to do with the fact that I’m single again, but the conversations (QSOs?) I’ve been having online (DX and local) are quite a bit more interesting than the bulk of the conversations I have on-air—which is actually a bit upsetting!

Even in these dog days of the current sunspot cycle, when rampant, crazed, 24-hour DX contacts are impossible (and ragchewers exact their revenge on the bands), my ham conversations have become a bit stilted and “cookie-cutter.” To be sure, online chatterers aren’t bound by the constraints of FCC licenses, but they’re also not bound by most hams’ often unfortunate tradition of limiting our conversations to radios, signal reports, the weather, and gall bladder surgeries, either!

The online “netizens” are real people talking about real things—some interesting, some funny, and some stupid. And there’s no reason why we hams can’t follow their lead. Imagine how much fun our hobby would be if we were people first and hams second? Wayne Green, W2NSD, the founder and former editor of 73 Magazine, used to periodically rant about how hams need to be conversationalists first, technology hobbyists second. He was definitely onto something, and his message is still valid today.

Until I visited www.waynegreen.com I didn’t remember whether Wayne was still with us! Apparently, according to his recent blog entries, he is—and he’s as outspoken as ever. If you’re too new to remember “Uncle Wayne,” check out his website and see if you can dig up some of his 73 Magazine ham radio editorials. They’re required reading for every budding communicator! Besides, after reading some of W2NSD’s stuff, your wildest ham chats will probably still seem tame!

As Wayne and I see it, many hams see our hobby as a purely technical pursuit. Ask anyone and they’ll tell you that ham radio has a lot to do with complicated concepts and technology. And don’t forget the tests we’re all required to pass to get our licenses! Although hams no longer really need to learn Morse code, they do need to bone up on radio and electronics theory.

With all of the studying and brainpower involved, you’d think that the whole mess is about technology, right? About knowing when 10 meters will be open to the Pacific, how grounded-grid linear amplifiers are tuned, or how digital signal processing helps dig out those weak DX signals.

Wrong!

That’s the great irony about ham radio. For most of us the technology is simply a vehicle for an underlying, deeper reason for participating: communicating with other people who share similar interests (local or faraway).

To effectively participate, we need to learn about the technology involved—and certainly about operating procedures and protocols (that is, how to correctly communicate with others using whatever technology is involved)—but once that’s learned, we’re still faced with simply talking to someone else. Having a conversation. Sharing something of ourselves. Learning something about the person on the other end of the mic, key, or keyboard.

Sure, there are some who become hams for primarily “technical” reasons. They might love to build radios, or study...
the intricacies of VHF propagation from a scientific standpoint. But even these folks love to talk to other hams who share their particular interest. Just listen to two
“home-brewing” hams talk about building anything and you’ll be convinced.

So it’s all really about communicating. And to maximize your enjoyment of amateur radio, you need to be a good communicator. It’s not difficult, but a refresher course can often help get the ball rolling!

Before we discuss some ways to have more fun talking with and learning about your fellow hams, let’s review several (unfortunately) typical exchanges you could hear on the bands almost anywhere.

The rapid fire exchange between “robot DXers” immediately comes to mind: callsign, signal report, adios. Over and over. Amazingly, it took me 15 years to become bored with this. How long will it take you? (I’m not picking on contesters, just hams who seem to never stop contesting!)

The domestic version is just as boring: name, location, signal report, rig, antenna type, see-ya-later. Over and over. Painfully boring! Why bother turning on the rig? Most repeater conversations aren’t much better.

Instead of perpetuating the same old thing, why not expand your ham radio horizons? There are millions of interesting individuals out there disguised as ham operators! Dig deeper—you won’t be disappointed!

**Talk Radio—You’re On The Air!**

Here are a few tips to help you break the ice. Remember: Don’t be shy! If necessary, just blurt something out. If your QSOs are stuck in a rut, dare to do something different! You’ll enjoy ham radio in an exciting new way.

• The handiest tool for ham radio conversationalists is a good map or atlas. When you figure out where the other “guys” live, check out his QTH on the map. That little blue squiggle might seem insignificant on your end, but your new friend might have been trout fishing there since he was a kid. By simply asking about the local geography you’ll learn a lot more about that little blue squiggle (or whatever it is) and you’ll alert the ham on the other end that a real conversation is about to take place!

• If you’re still a bit shy on the microphone and your Morse code skills are non-existent or a bit rusty, check out PSK31 or its digital cousins. These keyboard-to-keyboard modes are a lot like chatting on the Internet, and the extra anonymity can sometimes make all the difference. Besides, PSK31 is a great beginner mode. Low power works wonders and everyone I’ve met on PSK31 is friendly and welcoming of beginners.

• If you or your QSO partner lives in a “famous place,” feel free to get a little conversational mileage out of it. If you’re chatting with someone in Winterset, Iowa, try out your best John Wayne accent. It couldn’t hurt, could it? I’ve started many an interesting QSO by mentioning that I live in Little Falls, Minnesota, the boyhood home of Charles Lindbergh (and the stomping ground of Paul Bunyan and his blue ox, Babe). You can, too.

• Asking people questions, on almost any topic, can often spice up an otherwise routine exchange. Be tactful, but ask away. Examples: “What do you do for a living?” “Have you ever been to Japan?” You get the idea. To narrow down the range of possibilities, tailor your probing questions to what you already know about your QSO partner, or to what you intuit or suspect.

• If you or your QSO partner is into the Web, why not post a few pictures that you can mutually refer to as your conversation progresses? You’d be surprised at the number of hams worldwide who have and use the Internet as they converse with you in real time. If a picture is indeed worth a thousand words, with a ham picture website you’ll be a chatterbox for sure! You can set up free personal websites in dozens of places, including www.myspace.com and www.geocities.com.

• As long as it’s within reason, feel free to let other hams know a little bit about what you’re up to. Instead of keying the repeater with “This is W9XYZ, listening,” try “This is W9XYZ on a round-the-world motorcycle trip, listening.” Which do you think would garner more responses on a typical sleepy repeater?

• Maybe the old-timer’s CQ, “This is Bill, W9XYZ, calling CQ from the Louisiana bayou town of Swampy Creek,” heard regularly in years past, has some merit. Don’t use it while checking into an emergency net, and don’t use it all the time, but you might give it a try on an uncrowded HF band just to see what happens.

• Be careful when discussing potentially controversial subjects such as politics, religion, sex, light beer, left-handed golfers, etc. I’m not trying to step on your First Amendment rights, I’m merely suggesting that you be respectful and use common courtesy when bringing up certain topics. Amateur radio is diverse, but it’s also tolerant and accepting, and the best ham radio discussions build on a common ground of shared interests.

**Life-Changing? Who Knows?**

Regardless of which techniques you use (there are many more than those listed here), taking steps to make ham radio friends through better conversation will only increase your enjoyment of our hobby. You never know when you’ll make a lifelong friend you would have otherwise overlooked because of a “cut and dried” QSO!

See you again next month—or perhaps sooner on the air! You can always drop me a line at Popular Communications, ATTN: “Ham Discoveries,” 25 Newbridge Rd., Hicksville, NY 11801 or via e-mail at kirk@cloudnet.com.
They’re Back…XEYU From Mexico, And Bhutan SW Gets A Cash Boost!

There should be a newly refurbished and revitalized shortwave voice on the air now from the National University of Mexico. XEYU, long an on-again/off-again resident of 9600 has a new 10-kW transmitter and should be hearable by most of us, depending on the existence or absence of competing signals.

VT Merlin Communications, which operates several shortwave transmitter sites for the BBC, has dropped the Merlin name and is now simply VT Communications.

Shortwave from Bangladesh has ceased, at least for now. Bangladesh Betar is reported to be off the air due to transmitter difficulties. They are trying to get back “on line,” but this may not happen until they can obtain new transmitters.

It seems earlier reports of the imminent passing of the Bhutan Broadcasting Service from the shortwave scene were premature. In fact, just the opposite is in the offing. Instead of closing up shop, the BBS, with monetary assistance from India, plans to add a 100-kW shortwave transmitter. Unfortunately this doubling of power probably won’t make it all that much easier to hear the station, scheduled on 6035 from 0100 to 1600.

Trans World Radio, working with HCJB, now has a broadcasting foothold in Liberia, with a license to operate a mediumwave station there—and the intention to add a shortwave outlet as well. As a guesstimate, this is at least a year away, so don’t go hunting for it just yet.

Also on the African scene, we learn that Radio France International plans to increase its efforts to better reach listeners on that continent. It’s unclear if this means an increase in power and/or broadcast hours or even new transmitters and sites.

Radio Tanzania-Zanzibar, 11735, is now carrying local the Spice FM in English. This airs from around 1800 but only a few minutes of news in English is aired before they go back to other programming at about 1810.

Australian Upgrades

Those always-elusive stations of Australia’s Northern Territories Shortwave Service are undergoing an upgrade. VL8A in Alice Springs was the first to receive attention and went off the air for a few weeks last fall while a new transmitter was installed. Local listeners were advised to tune to one of the other stations (at Katherine or Tennant Creek), which are next in line for a tune-up.

Radio Taiwan International is now being relayed for an hour per day (1100 to 1200) by Radio Nacional-Paraguay on their 9737 spot.

Rotten in Denmark news: Danmarks Radio, which left shortwave a couple of years ago, continues its self-destructive ways. Huge budget cuts are causing language services to be dropped as well as transmitter closings on medium and longwave—even (gasp!) cutbacks on programming over the Internet.

Radio Baluarte, Argentina, on 6215 has been reactivated. It’s not an easy catch; it runs until sign off at 0200. The station is located at Puerto Iguazu on the border with Brazil.

One of the really old time South American stations has been reactivated, or perhaps “rejuvenated” is a more accurate word. Emisora Ciudad de Montevideo in Uruguay has turned up on its old 9650 frequency, relaying their 1370 mediumwave station. Their exact schedule is unknown at present.

Reader Logs

Here’s the usual reminder that your shortwave broadcast station logs are always welcome. Please be sure to double or triple space items, list them with country name first, and include your last name and state abbreviation after each log. Also much wanted are spare QSLs you don’t need returned, station schedules, brochures, pennants, station photos, and anything else you think would be of interest. And how about sending a photo of you at your listening post? Step right up and get your 15 minutes of fame!

Guess we’re good to go, so here are this month’s logs. All times are in UTC. Double capital letters are language abbreviations (SS = Spanish, RR = Russian, AA = Arabic, etc.). If no language is specified the broadcast is assumed to be in English (EE).

ALASKA—KNLS, 7355 in RR at 1710. (Clapshaw, WA) 9795 signing on in RR at 1600. (Barton, AZ)

ANTARCTICA—Radio Nacional Arcangel, 15476 at 2100 with ID and mention of Base Esperanza. (Alexander, PA)

ARGENTINA—Radio Nacional, 6060 in SS at 0056. (Charlton, ON) 1045 and 2315 in SS. Also 15345 in SS at 0055. (Alexander, PA) 6060 at 0935, 11710 in SS at 0035 and 15345 in SS at 0002. (DeGennaro, NY) La Red, domestic feed, 8098 LSB at 0630 with play-by-play futbol in SS at 0200. Also 15820 with time pips and news in SS at 2200. (Alexander, PA) (irregular operation—gld)

ARMENIA—Voice of Armenia, 9965 in Armenian to South America closing at 0330. (DeGennaro, NY)

ASCENSION ISLAND—BBC Relay, 11765 in SS heard at 0030, 15400 in EE to Africa at 2039 and 17830 at 2018. (DeGennaro, NY)

ARGENTINA—Radio Nacional, 6060 in SS at 0056. (Charlton, ON) 1045 and 2315 in SS. Also 15345 in SS at 0055. (Alexander, PA) 6060 at 0935, 11710 in SS at 0035 and 15345 in SS at 0002. (DeGennaro, NY) La Red, domestic feed, 8098 LSB at 0630 with play-by-play futbol in SS at 0200. Also 15820 with time pips and news in SS at 2200. (Alexander, PA) (irregular operation—gld)

ARMENIA—Voice of Armenia, 9965 in Armenian to South America closing at 0330. (DeGennaro, NY)

AUSTRALIA—Radio Australia, 5995-Brandon at 0857 and into Tok Pisin at 0900. Also 7385 at 0708, 9475 to SE Asia at 1108, 9560 to East Asia at 1100, 9590 to Pacific at 1005, 9710 to Pacific at 1005 and 17795 to Pacific at 0003, all via Shepparton. (DeGennaro, NY)
Help Wanted

We believe the "Global Information Guide" consistently presents more short-wave broadcast loggings than any other monthly SW publication! (This month we processed 650 loggings!)* Why not join your fellow SWLs, let us know what you’re hearing, and also become eligible for our monthly shortwave book prize! Send your logs to "Global Information Guide," Popular Communications, 25 Newbridge Rd., Hicksville NY 11801-2953. Or e-mail them to Editor Harold Ort at popular-com@aol.com, or to your “GIG” columnist at gdex@genevaonline.com (please see the column text for basic formatting tips.) Come join the party—we look forward to hearing from you! *Not all logs get used; there are usually a few which are obviously inaccurate, unclear, or lack a time or frequency.

6020 at 1220. (Northrup, MO) 9580 at 0845 and 15515 at 2115. (Maxant, WV) 9685 with news and sports at 1415. (Barton, AZ) 11550 via Taiwan in Indonesian at 2255, (MacKenzie, CA) 11880 with history feature at 1708. (Burrow, WA) 13680-Shepparton to the Pacific at 2215. (Clapshaw, WA) 15405 in unid Asian language at 1252 and 15515 on auto racing at 0324. (Brossell, WI) Voice International, 7180 via Darwin in Indonesian at 1345. (Strawman, IA) 13685 with chimes at 1258, ID at 1300 and news. (Brossell, WI) AUSTRIA—Radio Austria Int., on 6155 in GG to Europe at 2150. Also 9870 to ECNA at 0055 and 13730 in GG to Europe at 1059.

Abbreviations Used In This Month’s Column

* — before or after a time (time the station came on or left the air)
(l) — after a frequency (lower sideband)
(p) — presumed
(t) — tentative
(u) — after a frequency (upper sideband)
v — variable
// — in parallel
AA — Arabic
AB — Australia Broadcasting Corporation
AFN — Armed Forces Network
AFRTS — Armed Forces Radio TV Service
AIR — All India Radio
Anmt(s) — announcement(s)
Anncr — announcer
AWR — Adventist World Radio
BSKSA — Broadcasting Service of Kingdom of Saudi Arabia
CC — Chinese
Co-chan — co-channel (same frequency)
Commnl(s) — commercial(s)
CP — Bolivia, Bolivian
CRI — China Radio International
DD — Dutch
DJ — disc jockey
DW — Deutsche Welle/Voice of Germany
EE — English
ECNA — East Coast of North America
f/by — followed by
FEBA — Far East Broadcasting Association
FEBC — Far East Broadcasting Company
FF — French
GBC — Ghana Broadcasting Corp
GG — German
GMt — Greenwich Mean Time
HH — Hebrew, Hungarian, Hindi
HOA — Horn of Africa
ID — station identification
II — Italian, Indonesian
Int — international
Irrs — Italian Radio Relay Service
Is — interval signal
JJ — Japanese
KK — Korean
LSB — lower sideband
LV — La Voix, La Voix
NBC — National Broadcasting Corporation (Papua New Guinea)
OrTB — Office de Radiodiffusion et Television du Benin
PBS — People’s Broadcasting Station
PP — Portuguese
PSA — public service announcement
QQ — Quetchua
RCI — Radio Canada International
Rdf. — Radiodifusora, Radiodiffusion
REE — Radio exterior de Espana
RFA — Radio Free Asia
RFE/RL — Radio Free Europe/Radio Liberty
RNZI — Radio New Zealand International
RR — Russian
RRI — Radio Republik Indonesia
RTBF — RTV Belge de la Communité Francaise
Relay — transmitter site owned/operated by the broadcaster or privately operated for that broadcaster
Sci — Song of the Coconut Islands (transition melody used by Indonesian stations)
s/off — sign off
s/on — sign on
SIBC — Solomon Is. Broadcasting Corp.
Sked — schedule
SLBC — Sri Lanka Broadcasting Corporation
SS — Spanish
TC — time check
TOH — top of the hour
TT — Turkish
TWR — Trans World Radio
Unid — unidentified
USB — upper sideband
UTC — Coordinated Universal Time (as GMT)
Ute, utc — utility station
Vern — vernacular (local) language
(via) — same as “relay”
VOAS — Voice of America
VOIRI — Voice of Islamic Republic of Iran
WCNA — West Coast of North America
ZBC — Zimbabwe Broadcasting Corporation

www.popular-communications.com

February 2006 / POP’COMM / 65
Robert Brossell was able to pry a QSL out of Radio TV Djibouti-4780.

(DeGennaro, NY) 13775 via Canada in GG at 1512. (Charlton, ON) 13775 at 1535 in EE. (Maxant, WV)

BELGIUM—RTBF Int., 9770 in FF at 1023 and 17570 via Germany in FF at 1506. (DeGennaro, NY) 17570 via Germany in FF at 1725. (Charlton, ON)

BOLIVIA—Radio San Gabriel, La Paz, 6085 in SS at 1255. (Northrup, MO) Radio La Cruz del Sur, La Paz, 4876.6 in SS at 1020. (Wilkner, FL) Radio Santa Ana, Santa Ana, 4660 at 2345 with orchestral music, indigenous "yipping" music and ID. (Wilkner, FL) Radio Panamericana, La Paz, 6105.5 at 1030 with ID, news in SS, (Wilkner, FL) Radio Eco, Reyes, 4409.7 with ID at 2320 and sudden close at 2343, all SS. (Wilkner, FL) Radio Paititi, Guayaramerin, 4684.7 at 2355 under local noise in SS to 0016 close. (Wilkner, FL) Emisora Mosoj Chaski, Cochabamba, 3310 in QQ at 0902. (DeGennaro, NY)

BOTSWANA—VOA Relay, 4930 with news items at 0421. Also 9885 at 0352 and 12080 at 0426. (Wood, TN) 9885 with news format at 0332. (Brossell, WI) 0354. (D’Angelo, PA) 17895 with Special English at 1608. (Charlton, ON)


BULGARIA—Radio Bulgaria, 5900 in BB to East Europe at 0104. Also 9500 in SS to South America at 2315, 11700 in FF to Europe at 1005, 13600 in SS to Europe at 1115 and 15700 in FF at 1107. (DeGennaro, NY) 9700/11700 with opera, ID at 2355. (Burrow, WA)

BURKINA FASO—RTV Burkina, 5030 at 2110 with SS talk, phone-ins, Afro-pops. Gene Scott’s University Network not using this frequency lately. (Alexander, PA) 2338 with information program in FF ending with postal mail address at 2358. Then brief anmts and close at 0001. (D’Angelo, PA)

CANADA—Radio Canada Int., 5840 via Horby, Sweden, in AA to the Mideast at 0248. Also 9390 via Horby in FF to Africa at 2257, 11755 via Ascension in FF at 2203, 11945 in FF to Europe at 1037 and 15455 in SS at 2308. (DeGennaro, NY) 9515 at 1425. (Northrup, MO) 17765 with CBC programming at 1528. (Charlton, ON) CBC Northern Service, 9625 at 1513. (Maxant, WV) CFRR, 6070 with call-in show at 0930. (Maxant, WV) 1305 with news. (Northrup, MO) CKZN, 6160 with DJ and 60s hits at 0715. (Maxant, WV) CFVP, 6030 (p) at 0414 with country vocals and man briefly in English in between. Apparent ad string at 0420. Poor signal. (D’Angelo, PA)

CHILE—Voz Cristiana, 11745 in PP to Brazil at 0019 and 17680 in SS heard at 2113. (DeGennaro, NY) 1545 in SS. (Charlton, ON)

CHINA—China Radio Int., 6040 via Canada in EE to ECNA at 1027. Also 9600-Beijing in EE to Europe at 2101, 9440-Kunming in CC to Asia at 1114, 9665 via Brasilia in SS to Americas at 0306, 9690 in EE to ECNA at 0311, 11660-Kashi in FF to Europe at 2205, 11790-Urumqi in EE to Europe at 2132, 11850 via French Guiana in PP to Brazil at 0042, 11975 via Mali in FF to Africa at 2217, 11800-Kunming in CC to Asia at 1041, 15120 via Cuba in SS at 0035 and 17490-Kashi in EE to Europe at 1457. (DeGennaro, NY) 9580 at 0118 and 13740 at 1528. (Charlton, ON) 9665 via Brasilia in SS at 0350 with transmitter cutting out. (Clapshaw, WA) 9690 via Spain in CC at 0224.
Radio Free Asia issued this special QSL card saluting the annual Winter SWL Fest last March. (Thanks Rich D’Angelo)

(Crossell, WI) Same at 0335. (Wood, TN) CPBS, 7345-Beijing in CC at 1135. Also 7620-Beijing in CC to Taiwan at 1127, 9500-Shijiazhuang in CC at 0947, 11270-Shijiazhuang in CC at 1012, 11800-Beijing in CC at 1015, 11905-Beijing in CC to Taiwan at 1027, 11915-Xian in CC at 1031 and 13610-Nanning in CC at 1046. (DeGennaro, NY) 11610 in CC at 2312, //11710. (MacKenzie, CA) China Music Jammer, 15250 against VOA-Philippines at 1248. (Crossell, WI)


COLOMBIA—Radio Lider, Bogota, 6139.8 in SS with romantic music and SS talk at 0902. (D’Angelo, PA) Envision, 14650 in RR at 1053 and 11755 in Finnish at 1035. (DeGennaro, NY) 15400 opening in Finnish at 1259. (Crossell, WI)


COSTA RICA—University Network, 9725 with Dr. Gene Scott at //0341. (Wood, TN) 13740 at 2015. (Maxant, WV) Faro del Caribe/TIFC, 5054.6 at 0051 with long SS talk, music to 0100 ID. (D’Angelo, PA)

CROATIA—Voice of Croatia, 7285 via Germany to ECNA at 0036 and 9825 via Germany to Croatia at Americas at 0047. (DeGennaro, NY) 9925-Germany with start of EE at 2215. (Burrow, WA; Maxant, WV) 2220 with poor audio. (Charlton, ON)

CUBA—RHC, 5040 at 0400 in SS, //9600 but not heard the next two nights. (Alexander, PA) 5055 in SS at 0115 with some dead air and woman in SS. (Taylor, WI) (Something seems to be going on here—glid) 6000 with news in SS at 1230. (Northrup, MO) 6060 at 0615 claiming a Miami group planning a terroristic attack against Cuba (Maxant, WV) 6060 in EE to ECNA at 0637, 11760 in SS to ECNA at 0023, 11875 ditto at 0053, 12000 in SS at 1100 and 15230 in PP to South America at 2356. (DeGennaro, NY) Radio Rebelde, 5025 in SS at 0852. (DeGennaro, NY)

CYPRUS—BBC Relay, 9410 with “The World Today” heard at 0142. (Crossell, WI) 0213 on keeping Ramadan traditions in the UK. (Wood, TN)

CZECH REPUBLIC—Radio Prague, 7345 at 2230. (Crossell, WV) 2315 in SS to South America. Also 9440 at 2302 and 11655 via Ascension at 0011. (DeGennaro, NY) 17485 at 1658 with schedule, IS and ID and into news at 1700. (Burrow, WA) 1610 on sleep and snoring. (Charlton, ON)


ECUADOR—HCJB, 6125 in QQ at 0927 and 12040 in GG at 0055. (DeGennaro, NY) 12020 in EE at 1515. (Charlton, ON) La Voz del Napo, Tenza, 3280 in SS at 0855. (DeGennaro, NY)

EGYPT—Radio Cairo, 9960 with news at 2140. (Crossell, ON) 2200 with news, ID. Poor modulation and some transmitter drift. (Burrow, WA) 12050 in AA at 0051. (DeGennaro, NY)

ENGLAND—BBC, 5875 in SS at 0052, 6030 via Oman in AA at 2117, 13660 in AA at 2054, 13745 in RR at 1957 and 17585 in AA at 1509. (DeGennaro, NY) 7325 in SS at 0320. (MacKenzie, CA) 15400 via Ascension at 1854, 17830 at 1912 and 21470 at 1832. (Charlton, ON) Family Radio, 15165 via England in AA at 1937. (Crossell, WI)

EQUATORIAL GUINEA—Radio Nacional, Bata, 5005, 0550 in SS, ID 0551. (DeGennaro, NY) 2100 with vern. talk, drums, Afropops. Off at 2257. (Alexander, PA) 2215 to 2301 close. (D’Angelo, PA) 2250 with seeming church service. NA at 2255. Strong carrier, low audio. (Strawman, IA)

ETHIOPIA—Radio Ethiopia, 7110 with brief bell IS, ID and gongs heard at 0300 before news in presumed Amharic. (Crossell, WI)

FINLAND—YLE/Radio Finland, 6120 in Finnish at 2156, 9600 in RR at 1053 and 11755 in Finnish at 1035. (DeGennaro, NY) 15400 opening in Finnish at 1259. (Crossell, WI)

FRANCE—Radio France Int., 5925 via South Africa in FF at 0301, 6045 in RR at 0314, 7160 via South Africa at 2129 and 11845 in FF at 1021. (DeGennaro, NY) 7150 with their African Service to 0458 close. 15300 in FF to Africa at 1844, 15605 in EE at 1620 and 17605 in EE at 1630. (Charlton, ON) 15605 with EE news monitored at 1705. (Maxant, WV)

FRENCH GUIANA—Radio France Int. Relay, 9800 in SS at 0111 and 17630 in SS at 2110. (DeGennaro, NY)

Gabon—Africa Number One, 9580 in FF with ID and address at 1956. Also 17630 in FF at 1513. (DeGennaro, NY) 15475 in FF at 1655. (Clapshaw, WA) 15475 heard at 1728 and 17630 at 1542. (Charlton, ON)

GERMANY—Deutsche Welle, 9545 in GG at 1048, 9735 in GG at 2033, 11865 in GG at 0049, 13780 in GG at 1102, 15205 in EE at 2019, 15425 in RR at 1605 and 21820 in Kiswahili at 1545. (DeGennaro, NY) 6140 in GG at 0900 and 7170 in EE at 1645. (Maxant, WV) 7225 in AA at 0440. (MacKenzie, CA) 15205 in EE heard at 2047 and 17595 in EE at 1634. (Charlton, ON) Deutschl Radio, Berlin, 6005 in GG at 2201. (DeGennaro, NY) Save the Gambia Project, (p) 9405 via Julich, 2014 in EE mentioning the Gambia numerous times. Switch to unid language at 2022 and off suddenly at 2030. (D’Angelo, PA)

GREECE—Voice of Greece, 7475 in Greek at 2247, 9375 in Greek at 2257 and 17705 via Delano in Greek at 2116. (DeGennaro, NY) 9420 in Greek at 0313. (Wood, TN) 12105 in Greek at 1705. (Maxant, WV) 15630 in Greek at 1300. (Crossell, WI) 1952 with futbol.

In Times Past...

And now for a bit of fun. We’ll give you a blast from the past here each month; perhaps a logging or station tidbit from the Pop’Comm shortwave history book. Here’s one for the memory books...

GREECE—Forces Broadcasting Service, Athens, 6045 with music and talk in Greek at 0430. Poor, with QRM from HCJB. Listed as only 5 kW. (Dexter, IA)
HUNGARY—Radio Budapest, 6025 with EE to Europe at 2114. (DeGennaro, NY)
INDIA—All India Radio, Port Blair (Andaman Is) (p) 4760 with flute and vocals at 1225. (Strawman, IA) 9915 in EE at 2250, 9445 at 2205, 10330 at 1715 and 13605 at 1745 with EE sign on. (Maxant, WV) 9470-9480, Aligarh in Hindi at 1221. (Brossell, WI) 10330-Bangalore in HH at 0232. (Brossell, WI) 10330-Bangalore in HH at 1152, 11620-Bangalore in HH at 1552, 11715-Panaji (Goa) in EE at 2159, 13605-Bangalore in FF at 1949, 13710-Bangalore in EE at 1053, 15050-Delhi in Sinhala at 1423 and 15175-Bangalore in HH at 1554. (DeGennaro, NY)
INDONESIA—Voice of Indonesia, 9525 with EE program heard at 0830. (Maxant, WV) 11785 in II at 1120. (DeGennaro, NY) RRI-Cimanggis, 9680 in II monitored at 1115. (DeGennaro, NY)
IRAN—VOIRI, 9435 at 0214 on lies in American media, ID “This is Iran—The Voice of Justice.” Also 9905 in SS at 0230. (Brossell, WI) 9635/11650 in EE at 1552. (Burrow, WA) 9905 in SS at 0048, 9935 in AA at 0044, 13790 in AA at 1515 and 15150 in AA at 1128. (DeGennaro, NY)
ISRAEL—Kol Israel, 9435 with big band show at 0300. (Wood, TN) 9345 in HH at 1530.
GUATEMALA—Radio Verdad, Chiquimula, 4052.5 with religious service in EE at 1105. (Wilkner, FL) Radio Buena Nuevas, San Sebastian, 4800 in SS with ID at 0050. (Taylor, WI) 0200 with news in SS. (Brossell, WI) 0228 with religious talk. (DeGennaro, NY) Radio Cultural, Coatan, 4780 with long talk in SS at 0050. (Taylor, WI) 0159 with SS ID, music and talks. (Brossell, WI) 0220 with short religious music, ID and off monitored at 0232. (Alexander, PA) 1031 sign on. (DeGennaro, NY)
GUAM—Adventist World Radio, 9385 with filler music, IDs from 1729-30 and into “Our World” program. (Burrow, WA) Trans world Radio/KTWR, 9465 in Asian language at 1218. (Brossell, WI) 11840 with 0812 sign on with IS, ID and opening anns in EE. (D’Angelo, PA)
GUINEA—RTV Guineenne, 7125 in FF at 2133. (DeGennaro, NY)
GUYANA—Voice of Guyana, 3291, 0407 with BBC World Service programs. (D’Angelo, PA) 0857 in EE with ID at 0600. (DeGennaro, NY) 0910 with music, talk on sharing and joy. (Maxant, WV)
HAWAII—KWHR, 11555 with sermon heard monitored at 1234. (Brossell, WI)
HONDURAS—La Voz Evangelica, 4819 at 0202 with songs, anns, ID, news or activities. (Brossell, WI; Taylor, WI) 0844 with religious message. (DeGennaro, NY) Radio Luz y Vida, 3250 at 0153 with hymn, ID, more hymn-like music. (Taylor, WI) Radio Misiones Int., 3340 at 0225 with talk in local language, ID at 0302. Mostly just talk. (Alexander, PA)
HUNGARY—Radio Budapest, 6025 with EE to Europe at 2114. (DeGennaro, NY)
INDIA—All India Radio, Port Blair (Andaman Is) (p) 4760 weak with flutes and vocals at 1225. (Strawman, IA) 9915 in EE at 2250, 9445 at 2205, 10330 at 1715 and 13605 at 1745 with EE sign on. (Maxant, WV) 9470-9480, Aligarh in Hindi at 1221. (Brossell, WI) 10330-Bangalore in HH at 0232. (Brossell, WI) 10330-Bangalore in HH at 1152, 11620-Bangalore in HH at 1552, 11715-Panaji (Goa) in EE at 2159, 13605-Bangalore in FF at 1949, 13710-Bangalore in EE at 1053, 15050-Delhi in Sinhala at 1423 and 15175-Bangalore in HH at 1554. (DeGennaro, NY)
INDONESIA—Voice of Indonesia, 9525 with EE program heard at 0830. (Maxant, WV) 11785 in II at 1120. (DeGennaro, NY) RRI-Cimanggis, 9680 in II monitored at 1115. (DeGennaro, NY)
IRAN—VOIRI, 9435 at 0214 on lies in American media, ID “This is Iran—The Voice of Justice.” Also 9905 in SS at 0230. (Brossell, WI) 9635/11650 in EE at 1552. (Burrow, WA) 9905 in SS at 0048, 9935 in AA at 0044, 13790 in AA at 1515 and 15150 in AA at 1128. (DeGennaro, NY)
ISRAEL—Kol Israel, 9435 with big band show at 0300. (Wood, TN) 9345 in HH at 1530.
GUATEMALA—Radio Verdad, Chiquimula, 4052.5 with religious service in EE at 1105. (Wilkner, FL) Radio Buena Nuevas, San Sebastian, 4800 in SS with ID at 0050. (Taylor, WI) 0200 with news in SS. (Brossell, WI) 0228 with religious talk. (DeGennaro, NY) Radio Cultural, Coatan, 4780 with long talk in SS at 0050. (Taylor, WI) 0159 with SS ID, music and talks. (Brossell, WI) 0220 with short religious music, ID and off monitored at 0232. (Alexander, PA) 1031 sign on. (DeGennaro, NY)
GUAM—Adventist World Radio, 9385 with filler music, IDs from 1729-30 and into “Our World” program. (Burrow, WA) Trans world Radio/KTWR, 9465 in Asian language at 1218. (Brossell, WI) 11840 with 0812 sign on with IS, ID and opening anns in EE. (D’Angelo, PA)
GUINEA—RTV Guineenne, 7125 in FF at 2133. (DeGennaro, NY)
GUYANA—Voice of Guyana, 3291, 0407 with BBC World Service programs. (D’Angelo, PA) 0857 in EE with ID at 0600. (DeGennaro, NY) 0910 with music, talk on sharing and joy. (Maxant, WV)
HAWAII—KWHR, 11555 with sermon heard monitored at 1234. (Brossell, WI)
HONDURAS—La Voz Evangelica, 4819 at 0202 with songs, anns, ID, news or activities. (Brossell, WI; Taylor, WI) 0844 with religious message. (DeGennaro, NY) Radio Luz y Vida, 3250 at 0153 with hymn, ID, more hymn-like music. (Taylor, WI) Radio Misiones Int., 3340 at 0225 with talk in local language, ID at 0302. Mostly just talk. (Alexander, PA)
This Month's Book Winner

To show our appreciation for your loggings and support of this column, each month we select one "Global Information Guide" contributor to receive a free book. Readers are invited to send in loggings, photos, copies of QSL cards, and monitoring room photos to me at Popular Communications, "Global Information Guide" column. So come on, send your contributions in today!

Our book winner this month is Dave Jeffery who has received a copy of the 2006 edition of Passport to World Band Radio, courtesy of the good folks at Universal Radio. You should have Universal's current catalog on your radio bookshelf. It's easy to get a copy of this gem-filled wish book. Just call 614-866-4267, or e-mail Universal at dx@universalradio.com or drop a note to them at 6830 Americana Parkway, Reynoldsburg, OH 43068.

www.popular-communications.com
PIRATE (Euro)—Mystery Radio, 6220 at 2225 with rock. Extremely weak. (Zeller, OH) 0130 with continuous pops, cabled ID at 0216. (Alexander, PA) 0244 with continuous rock and jingle IDs every 10 minutes or so. (D’Angelo, PA) Alpha Lima Int., 15069.7 at 1421 with pop/techno/rap. (Sawman, IA) 1528 with rock/pop and male anncr. Clear ID at 1620 even though the signal was very weak. (Zeller, OH) Radio Black Arrow, 15074.9 at 1640; just bits of music surfacing now and then. (Sawman, IA)

PORTUGAL—RDP Int., 11630 in PP at 0006 with sports results, 15295 in PP to South America with political speech at 2035, 15574 in PP with an interview at 1053 and 17615 in PP with football scores at 1414. (DeGennaro, NY) 15560 with futbol at 1945. (Barton, AZ)

RUSSIA—Voice of Russia, 7300-Komsomolsk in CC to Asia at 1148, 7330-Moscow in SS to South America at 0048, 7390-Samara in SS to South America at 0055, 9830-Armavir in SS to South America at 0108, 9860 via Vatican in EE to North America at 0324 and 17645-Moscow in SS to Asia at 1423. (DeGennaro, NY) 9830-Armavir in SS at 0020. (Clapham, WA) 9860 via Vatican at 0345. (Wood, TN)

SAUDI ARABIA—BSKSA, 15205 in AA at 1736. (Charlton, ON) 21600 in FF at 1530. (DeGennaro, NY)

SINGAPORE—Radio Singapore, 6080 with musical opening at 1059. ID and opening annts at 1100, then news at 1109. (D’Angelo, PA) 1345 with current events program. (Barton, AZ) 6150 with news in progress at 1500. (Burrow, WA) BBC Relay, 15285 in CC at 1250. (Brossell, WI)

SLOVAKIA—Radio Slovakia Int., 7200 in AA at 0312. (Brossell, WI) 9440 in FF at 0205. (Brossell, WI) 11600 in SS at 1447. (DeGennaro, NY)

SOLOMON ISLANDS—SIBC, 9545 at 0630 with a feature on Bali. (Maxkenzie, CA) 0240. Also 11975 at 2145 with “Jazz America.” (Brossell, WI)

SOUTH AFRICA—Channel Africa, 3345 at 0346. (DeGennaro, NY) 0402 with news, ID at 0408. (D’Angelo, PA) 6120 in Swahili at 0217. (Burrow, WA) BBC, 9660 in Mandarin at 2358, time pip, ID and back into man/woman alternating short items and music bridges. (Taylor, WI) 11665 in CC at 1430. (Barton, AZ)

SWEDEN—Radio Sweden, 6010 via Canada at 0311 on copper mines in northern Sweden. (Charlton, ON) 0145 with Judy Millerhosting. (Maxkenzie, WA) 6065 in Swedish at 2125. (DeGennaro, NY) 15240 on flooding in Romania at 1246. (Brossell, WI) IBRA Radio, 9675 via Julich in African language at 2012. (DeGennaro, NY)

SYRIA—Radio Damascus, 12085 heard at 2025. Off abruptly at 2026. (Maxkenzie, WA) 2044 in EE with lady anncr. (DeGennaro, NY)

THAILAND—Thai Radio, 5890 via Greenville at 0558 to 0100 ID and language change. Also 9680 in FF to Europe at 2023 and 11870 in Thai at 1049. (DeGennaro, NY) 7260 in VV at 0113; then IS. EE ID and into Cambodian. (Taylor, WI) VOA Relay, 9645 at 1300. (Barton, AZ) 9700 at 1218 with EE sentences repeated in an Asian language. (Brossell, WI)

TAINAN—Radio Tainan Int., 5960 via Florida at 0710 on tourism. Taiwan stock market. (Maxkenzie, WA) 15600-Florida at 2207. (Burrow, WA) 2213. (Chandler, ON) CBS, 9660 in Mandarin at 2358, time pip, ID and back into man/woman alternating short items and music bridges. (Taylor, WI) 11665 in CC at 1430. (Barton, AZ)

UKRAINE—Radio Ukraine Int., 5910 in EE to ECNA at 0012. (DeGennaro, NY) 7440 with EE news heard at 0007. (Charlton, ON)

UNITED ARAB EMIRATES—Emirates Radio, Dubai, 15435 in AA at 1609. (DeGennaro, NY) BBC Relay, 12030 in unid Asian language at 1254. (Brossell, WI)

UNITED STATES—AFN/AFRTS, 5446.5u via Florida heard at 0925 with CBS news. (Maxkenzie, WA) 1048. (DeGennaro, NY) Radio Miami Int. 7385 carrying HCJB’s DX Party Line program at 2130. (Maxkenzie, WA)

VATICAN—Vatican Radio, 5885 in II at 0604, 7305 in PP to Brazil at 0043, 9645 in EE at 2009 and 13765 in EE at 2005. (DeGennaro, NY) 7305 in SS at 0335. (Maxkenzie, CA) 9605 in SS at 0325. (Wood, TN) 11740 with Latin mass at 0630 and 15235 in EE at 1530. (Maxkenzie, WA) 15570 with IS to 1700 and into FF. (Clapham, WA) 15235 with Pope Benedict giving a homily during a mass heard at 1534 and 1741 with EE ID. (Charlton, ON)

ZAMBIA—The Voice, 4965s at 0358 with woman in EE with news and time check as “South African time.” Sounded like a US morning drive time show. (Wood, TN)

ZANZIBAR—Radio Tanzania-Zanzibar, 11735 at 1755 with Swahili talk, drums, EE news at 1800, back to Swahili at 1810. (Alexander, PA) News at 1800. (Maxkenzie, WA) 1805 with news in EE and 1808 “that’s the end of the news from Spice FM.” Then back into AA. (D’Angelo, PA) 2045 with songs and annts in presumed Swahili. (Brossell, WI)

And, once again, order is restored!

A gigantic round of applause to the following folks who did the good thing this time: Joe Wood, Greenback, TN; William Hassig, Mt. Prospect, IL; Rick Barton, Phoenix, AZ; Stewart MacKenzie, Huntington Beach, CA; Mark Taylor, Madison, WI; Brian Alexander, Mechanicsburg, PA; Jerry Strawman, Des Moines, IA; Robert Chandler, Windsor, ON; Charles Maxant, Hinton, WV; Robert Wilkner, Margate, FL; Ciro DeGennaro, Feura Bush, NY; Michael Clapham, Port Angeles, WA; Robert Brossell, Pewaukee, WI; Dave Balint, Wooster, OH; George Zeller, Cleveland, OH; Richard D’Angelo, Weyomissing, PA; Michael Yohnicki, London, ON; Mark Northrup, Gladstone, MO and Bruce Burrow, Snoqualmie, WA. Thanks to each one of you! And, until next month, good listening!
Just where did the year go? It seemed to fly by faster than an F-22 in full afterburner! I guess the older you get the faster it seems to pass. When I was a kid, Christmas took forever to get here, but now one barely has enough time to get the tree up and its over.

But it’s early in this shiny new year full of promise and time to clean some of the clutter off my desk and post here some things I’ve been meaning to write about for, well, almost a year now!

**Aurora Redux**

Remember Aurora, the almost mythical Mach 5 + methane-breathing unicorn of a spy plane that aviation buffs and journalists thought existed despite non-denial denials issued by the Pentagon in the early 1990s? Well it seems new evidence has come to light, some of it backed up by a radio communications interception.

The most talked about sighting from a reliable and trained observer was the famous “Chris Gibson sighting” of 1989. Gibson (an accomplished aircraft observer having served 12 years with the Royal Observers Corps) witnessed a strange wedge-shaped aircraft being refueled by a KC-135 and accompanied by two F-111 chase planes flying over the North Sea. At the time Gibson was an oil engineer working on a North Sea drilling platform. Because of Gibson’s credentials the sighting stirred much interest in aviation press.

This is what I wrote about the campaign to discredit the Chris Gibson sighting in my book, The Comprehensive Guide To Military Monitoring, and on my old website, “Project Black”:

Soon steps were made from within the Defense Department to debunk the evidence. The USAF went so far as to hire experts at the Massachusetts Institute of Technology (Lincoln Laboratories) to discredit the skyquake evidence. They analyzed one of the seismic tracings recorded from Catalina island and in a report stated that the aircraft in question was a run-of-the-mill F-14 Tomcat on a flight test mission off the California Coast.

This explanation didn’t fly with the aviation press because according to an earlier study released by the USAF Flight Test Center, sonic booms emitted by an aircraft flying at 50,000 feet only extend about 25 miles from the point of origin. Some of the seismic sensors recording the sonic booms were located 80 miles inland. Besides the sonic signatures weren’t classic sonic-boom “N” waves but rather a series of booms, rapid rolling booms unlike those of any conventional fighter aircraft.

Then Secretary of the Air Force, Donald Rice, went so far as to issue a blanket denial in a letter to the Washington Post. He said in the letter, “Let me reiterate what I have said publicly for months. The Air Force has no such program either known as ‘Aurora’ or by any other name. And if such a program existed elsewhere, I’d know about it—and I don’t. Furthermore the Air Force has never created or released cover stories to protect any program like ‘Aurora’ I can’t be more unambiguous than that. When the latest spate of ‘Aurora’ stories appeared I once again had my staff look into each alleged sighting to see what could be fueling the fire. Some of the reported sightings will never be explained simply because there isn’t enough information to investigate.”

Rice went on to say, “Other accounts such as the sonic booms over California, the near collision with a commercial airliner and strange shapes loaded into Air Force aircraft are easily explained and we have done numerous times on the record.”

So were these denials the end of Aurora story? Not hardly. Just prior to Rice’s letter to the Washington Post, sharp-eared military-radio monitoring hobbyists intercepted a radio phone-patch to the Air Force Special Projects office.

On the 12th of October, 1992 at 2310 GMT, on the (then) Mystic Star frequency of 6,812 MHz, a General Hogle was heard talking to an aide in the Air Force’s Public Affairs Office saying “We need to develop a response to inquiries. The guts of this should be that we have looked at the technical aspects of the sightings and what the logical answers for them are. You can quote Dr. Mori and then site the Lincoln Labs physics and the FAA’s efforts to debunk the other incidents. Go through three or four of the sightings, take each one on and conclude with a paragraph that says the fantasy of Aurora doesn’t exist.”

So were these denials the end of Aurora story? Not hardly. Just prior to Rice’s letter to the Washington Post, sharp-eared military-radio monitoring hobbyists intercepted a radio phone-patch to the Air Force Special Projects office.

On the 12th of October, 1992 at 2310 GMT, on the (then) Mystic Star frequency of 6,812 MHz, a General Hogle was heard talking to an aide in the Air Force’s Public Affairs Office saying “We need to develop a response to inquiries. The guts of this should be that we have looked at the technical aspects of the sightings and what the logical answers for them are. You can quote Dr. Mori and then site the Lincoln Labs physics and the FAA’s efforts to debunk the other incidents. Go through three or four of the sightings, take each one on and conclude with a paragraph that says the fantasy of Aurora doesn’t exist.”

They went on to discuss the Chris Gibson North Sea sighting, “Someone saw something accompanied by three F-111s. The Secretary wants us to talk to McMahan and say it was an F-117.”
Although Jane’s editor (and Motorbooks International author of Aurora), Bill Sweetman was able to confirm the conversation did indeed take place and that General Hogle was a high-ranking Air Force Special Projects brass hat. Who McMahan was, was a mystery, until now.

Tenacious journalist Bill Sweetman has never been one to let sleeping dogs lie and sent me a massive revealing that another important part of the Aurora puzzle has fallen into place, now placing serious doubts on the Aurora denials by Secretary Rice.

Bill writes (in an e-mail copied to me and Chris Gibson):

Chris,
I fell down an Internet rabbit hole today and found this guy:

“Mr. Tom McMahan has over 35 years of experience in aerospace government and industry, specializing in advanced technologies such as stealth and counter stealth. He spent 25 years in the Air Force and had oversight responsibility for all Air Force special access programs at the time of his retirement in 1993.”

Reference: http://www4.nas.edu/webcr.nsf/0/c60f11bfcfd99980852570a60057c0dc3?OpenDocument

So who cares?

If you remember, after your sighting was published in 12/92 and the USAF whizzed all over it from the highest levels, Steve Douglass published an intercept of a transmission from a special air mission flight (SAM 204) that had the AF Secretary, Don Rice, and the top uniformed AF flack, BG Woody Hogle, on board. Hogle later confirmed to me that the intercept was genuine. One key phrase, from Hogle to the SeeAF Public Affairs office on the ground:

“The Secretary wants us to talk to McMahan and say it was an F-117.”

We didn’t know who McMahan was at the time, but now we do.

Now, Hogle said then that he recalled using the words “see if it was an F-117” rather than “say it was an F-117” —the latter sounding like Rice had directed his flacks to issue a cover story. But it made no sense either way. Rice, as SecAF, should have known that no F-117 had been in the UK in 8/89 when the sighting took place, because no F-117 had landed outside the US by then.

Anyway, just another interesting data point...

**So What Became Of Aurora?**

Insiders say the true name of the project (a two piece-mother-ships-recon drone system) was in reality “Brilliant Buzzard” and never became fully operational due to serious technical issues and the fact that it was horrendously expensive and logistically difficult to operate.

Supposedly the Aurora mother ship is in flyable storage at Groom Lake but the pulse-detonation wave engine drone has seen service over Afghanistan, Iraq, and North Korea, which may account for various “donuts on a rope” and sonic boom reports coming from U.S. servicemen returning from the Middle East and from citizens in the North Korean capital.

**Armageddon And The Uniden BCD396T**

My friends are getting their ducks in a row and preparing for the worst. They are stocking up on dry goods and readying the fallout shelter.

Why? Because I bought my first IBM-compatible PC.

For some reason they seem to think that one of the sure signs that the apocalypse is near is the day I decided to get a PC. In fact I think I once said, “If a PC was the last computer on earth, I wouldn’t touch one to save my life.”

Yes, I’m one of those, a despicable Macintosh worshipper! Considered in IBM circles to be an elite computer snob who thinks PCs users are so unenlightened and slaves to a system rife with problems that they can’t see past their keyboards and realize to use a Mac is pure bliss.

When I hear my PC using friends complaining about how Windows has crashed for the fifth time that day and every time they turn the thing on they have to do battle with an invasion of hard drive killing viruses or insipid spy ware, I usually grin and say, “You wouldn’t have any of those problems if you were on a Mac!”

However, as near perfect as a Macintosh is, there are some things it just won’t do. One of them is running the new and exciting radio scanner software for the latest state-of-the-art unibody scanners. Having just acquired a shiny new BCD396T and knowing that it would be years, or never, before someone got around to writing Mac compatible software for it, I decided to do the previously unthinkable: get a PC. Plus I actually found one at the price I wanted—free!

One of my buddies, Frank “Bubba” Murphy gave me a two-year-old PC that was destined for the dumpster. There was nothing wrong with it (just a bit outdated), so I called on another friend of mine (and my personal computer guru) Mike Dunlap who (with his cache of spare parts gutted from other machines) built me a fairly decent PC, including maxing out the ram, adding a bigger hard drive, CD burner, DVD ROM, and even a router connecting it to my Macintosh and the Internet.

Michael even installed several scanner control programs, including Uniden’s E-Scanner software (for the BCD396T) and Buetel’s ARC 396. So with everything installed I now have computer control of the BCD396T, which should take advantage of the full capabilities of this new scanning receiver.

But, until I’ve had time to get a working knowledge of Windows XP and these new programs, you’ll have to wait until next month to see how it all works out.

In the meantime...

**Things I’d Like To See And The Uniden’s “RunkTracker IV”**

I’ve been getting to know Uniden’s new BCD396T scanner for over a month now. Despite the fact that it is a very good scanner that could do double duty as a portable and a base, there are some features of this receiver I would like to see tweaked or improved on future scanners in this line.

Many of you have no doubt read about the Uniden 996T slated to come out this spring. So before the software is written in stone for this promising new mobile/base scanner, here’s what I’d like to see incorporated. Keep in mind this is just a wish-list and I have absolutely zero influence on the designers at Uniden.

- Improve alphanumeric display to include the frequency: What I love about my Uniden 785D is that it displays both the frequency and alpha tag so I can see at a glance who is saying what on which channel. The display on the BCD396T only displays the alpha-tag and this can be confusing. If for example you have the same tag for different frequencies (such as Albuquerque Center) you can’t tell if it’s on UHF or VHF, unless you designate it as such, but sometimes you run out of room.
- Password protect: Although the Uniden BCD396T has a cool feature known as “screen masking” that enables you to hide the info on the screen from prying eyes, I would like to see a password protection system, one that would not allow unauthorized use of the scanner. It would only take a few lines of
simple code that would require you to enter a key so the scanner would not turn on or allow access to data stored within.

- Antitheft system. These new scanners are not cheap and unless you have an unlimited income, few of us can afford to plunk down more hard-earned bucks to replace a stolen Uniden BCD396T, so an antitheft replacement system would be nice. Maybe one could register the scanner with Uniden (who holds the list of who owns what) and if the scanner is stolen or lost, by sending it to Uniden it could be placed back in the hands of its rightful owners. This way a thief doesn’t acquire your name and address and the police (or anyone who finds the scanner (such as an honest pawnshop owner) could just contact Uniden who returns the scanner to you. If Uniden is worried about added cost, this could be an optional pay service, one I’m sure many scanner owners would subscribe to.

- Protection and accessories: I just hate it when the crystal on my display gets scratched or my scanner gets dinged from everyday use and bumps and accidental drops. How about including a custom hard (or even soft case) to protect the scanner is rapidly rubbing off with only minor use! I have noticed this was also the case on my BCD396T, and it now says “RUNKTRACKER IV” instead of TRUNKTRACKER IV.

Although this is a minor cosmetic problem and not a big enough concern for me to send the scanner back to the manufacturer, Uniden has stated that anyone who has encountered this problem can send the scanner in and they will replace the faceplate. I like my BCD396T so much that I don’t think I’ll send mine in until I can bear to part with it for a few weeks. Until then, I’ve covered both the display and labels with transparent tape to keep both from getting scratched.

News You Can Use: Glamour Shot

Speaking of Uniden, the pending release of the Uniden BC996T has scanner buffs tongue’s wagging and drooling over the just-released first photos of this cool-looking mobile scanner. For years I have complained that manufacturers have paid little attention to looks, but this is not the case with the Uniden 996T. What a great design! Modern, well laid out, and well lit. You can even change the color of the illumination of the keyboard and display. More on this unique scanner in the near future.

Iraqi Jam

Armed forces in Iraq charged with the art of electronic warfare (battling against IEDs, enemy-jamming, and hunting down insurgent clandestine radio broadcasts and tactical communications) are finding themselves engaged in a war with a new enemy, the overcrowding of the radio spectrum. The problem is now hindering U.S. operations so badly that US Central Command has moved the problem to the front burner and is calling for some kind of spectrum structure to be implemented.

Forces engaged in the hunt for radio-triggered explosive devices are finding themselves hindered by other forces using autonomous-jammers (hoping to flood the airwaves with signals so radio activation of the devices will not work) and also other electronic warfare emitters such as those aboard EC-130 Compass Call aircraft. The RF pollution has grown so intense it has even affected uplinks and downlinks from unmanned Predator aircraft and civilian radio and TV broadcasts, which are very important in getting vital information to the Iraqi populace.

To combat the problem, Central Command is speeding up development of the EWCC (Electronic Warfare Coordination Cell) to carry out daily updating (and coordination with EW units) who will issue each day a restricted frequency usage list.

Lt. Gen. Walter Buchanan, chief of the 9th Air Forces recently commented,

The EWCC is something I’ve been fighting for a long time. This is the first time that I have seen electronic fratricide reach the point that it has. In some cases when jammers are on, a soldier cannot use his radio. But if we create a narrow notch in the jamming that allows him to transmit, an insurgent may exploit this notch to trigger an IED.

The solution is careful coordination of all forces in the area concerning all emitters including EW jammers, surveillance systems including tactical radio transmitters from soldiers in the field and those used to control Predator UAVs. The EWCC will implement that solution.

Fighting Firewalls With Trojan Horses

Progress is proceeding rapidly in the development of the first U.S. Navy EA6B Prowler squadron to be equipped to deploy information warfare weapons, including the ability to hunt out and find enemy wireless information networks, invade them and use them against their own users. Found networks would be seeded with false information, worms, viruses, zombies, Trojan Horses and other computer attack tools that would leave an enemy communicating with U.S. intelligence analysts as often as they do with insurgents.

The ALQ-218 electronic attack system will go to war on board the EA6B
ICAP (improved capability) II system of the VAQ 139 Cougar squadron, hopefully to deploy in the first quarter of 2006.

**Stealth Network Attacks**

Pentagon think tanks are exploring new ways to probe terrorist communications networks using stealth aircraft the enemy will not know are there. Electronic communication packages that can find and read terrorist communications nets (including computer and voice circuits, satellite and cell networks, and frequency hopping transmissions) are being developed for use aboard stealthy aircraft like the F-22, B-2, and F-35. In contrast to the active attacks like those of the EA6B ICAP, stealth aircraft employed with such systems can probe an enemy network and collect data without the enemy being any the wiser.

Often the mission of these stealthy flying electronic sponges would be to enter enemy territory unseen and undetected, performing passive-surveillance which involves pulling information in, using active electronically scanning electronics packages. The information would then be analyzed by intelligence analysts with the goal being to invade and exploit said networks undetected.

**Dispatches**

Dennis Dean of Bay City, Michigan, sent in a news clipping detailing the dismantling of the Navy’s big ELF (extremely low frequency) transmitting facilities in the Chequamegon National Forest. “It’s not quick or easy or a clean process. It is messy, dirty and takes time,” says Tim Ward, operations manager for the facility located near Lake Calm.

The Navy made the decision to dismantle project ELF before the federal BRAC (Base Realignment and Closure) decisions were released.

“What makes the closure complicated is what to do with 1,500 poles spread across 42 miles of forest,” Ward said. Works done so far includes removal of all the radio transmitters and the sensitive electronic equipment from the 12 buildings and two sites and taking down 400 tons of aluminum antenna wire strung onto the poles. Ward added, “There is still miles of buried copper wire at the ends of the antenna that was part of the grounding system. Some wildlife officials want at least some of the antenna poles left standing to support nests for raptors,” Ward said.

Mike Crenshaw of La Grange, Georgia (admitted computer hater and master plumber) sent in a list of his VHF/UHF MILCOM loggings. Although space does not permit printing the whole list, here are a few of his choice loggings:

50.25 (FM) Raven UH-60 Blackhawks, Lawson AAF
   Columbus, GA
119.050 Lawson AAF Tower
120.750 Dobbins NAS Tower
120.750 Lockheed Test Flight, Marietta GA.
132.400 Lawson AAF
142.200 Raven UH-60 Blackhawks, Lawson AAF
   Columbus, GA
143.800 AZA/ACM/Bulldog MOA, Miller, GA
225.450 Raptor F-22 Air-to-Air Lockheed Test Flight,
   Marietta GA
225.925 Peach Ops, Robins AFB
228.900 NORAD/OAKGROVE CAP
235.550 FRYER drop zone, Lawson AAF

Erik Orange of Cleveland, Ohio, writes:

I always look forward to reading your column each month to pick up news MILCOM monitoring tips. My main MILCOM base receiver is a Uniden BC780 connected to a Diamond discone. The fast scan speed along with the excellent VHF and UHF sensitivity makes it a great receiver for mil air activity. I only wish it had more than 500 channels!

My main MILCOM handheld receiver is a Yaesu VR-500 coupled with a Diamond RH-77CA whip. Although the slow scan speed leaves something to be desired, the VR-500 has good UHF ears and works great as handheld HF receiver. Using just the whip, I have no problem picking up aural refueling on UHF, and can easily hear activity on 11.175. I have also had good luck with the VR-500 as I began to experiment with SATCOM (240-270 MHz). I wouldn’t mind seeing satellite comms as one of your future topics, too.

Erik, we will indeed be covering military SATCOM communications in a future issue.

George Baitzel sends us this quick missive:

The land station noted by SJ on 12359U is VAX498 in Burlington, Ontario, and is Herb Hilgenberg’s “Southbound Two” (II) with alt. active freq. 8294U. This is a sail boater trf net with Herb acting as a wx-location manager for the benefit of “yachties” in the Caribbean, Gulf of Mexico and Eastern Atlantic areas. Freq. chg from 8 to 12 seems to be consistent at 1940Z. Interesting trf esp during hurricane season.

Thanks, George!

**Renewing Our Commitment**

In this still new year, let us all resolve to get more serious about our UTE monitoring and pledge to share the data we collect with others who share this exciting hobby. Don’t forget you can e-mail loggings, clippings, frequency lists, and photos to the e-mail address listed above. Sometimes your loggings may get lost in the tons of SPAM I receive each day, but don’t give up hope if you get no immediate response, and try, try again. What you monitor and how you do it, and especially, who you are is very important to our readers and me.

Remember, without your input and feedback, this column is operating in a vacuum, nothing in, nothing out! See you again next time!

**Reader’s Logs**

0000 (Frequency MHz): STATION, Anytown, USA, summary of traffic heard in MODE at 0000Z. (monitor/sometimes location)
518.0: NMR, USCG, San Juan, Puerto Rico at 0600Z and NMA, USCG, Miami, FL at 0800Z w/NAYTEX bulletins, SITOR-B, (SJ)
3150.0: UNID YL/EE with 5-ltr grps. 2 msgs, one of 92 groups, one of 31 groups. Msghs repeated, but then off suddenly during repeat. A bit of QRM from a digital signal now and then. USB at 2222Z. (CG)
3167.0: LIMA, HOTEL, A6G, CZZ in USN Link coordination net at 1039. (MC)
3167.4: 6TI, 9PW, 4KH USN ships in comms in JAX OPAREA at 0000 (Frequency MHz):
3167.0: LIMA, HOTEL, A6G, CZZ in USN Link coordination net at 0145. (MC)
4270.0: UNID YL/EE with 5-ltr grps in USB at 2211Z. (CG)
4271.0: CFH, Canadian Forces, Halifax, NS w/wx forecast at 2348Z, Hurricane Ophelia approached, ITA2, 75 baud, 850 Hz. (SJ)
4295.0: FUE, French Navy, Brest, France w/marker at 2355Z, RYR and SGSG strings, dual 0-9 count, ITA2, 75 baud, 850 Hz. (SJ)
4316.0: NMG, USCG New Orleans, LA, computer-generated male voice w/wx forecast at 2325Z in USB. (SJ)
4583.0: DDK2, Hamburg Meteo, Germany w/wx forecast in English, ITA2 at 50 baud, 425 Hz, /7646.0 & much better 10100.8, then into standard marker at 0015Z. (SJ)
**0911.0:** UNID YL/EE with “JSR” rptd for several minutes, then “message” twice, “group” twice, “text” twice, then into 5-ltr grps. USB starting at 2203Z. (CG)

**5091.0:** UNID YL/EE with “JSR” rpted for several minutes, then “message” twice, “group 30” twice, “text” twice, then into 5-ltr grps. USB starting at 2203Z. (CG)

**5211.0:** OMAHA 747 (CBP UH-60) connected via SERVICE CENTER to HAMMER reporting they are supporting FEMA assessment in NC during Hurricane Ophelia monitored at 2116. (MC)

**5920.0:** UNID YL/EE rpting “YHF2.” USB at 2135Z. (CG)

**6131.0:** WLO, Mobile R., AL in QSO w/unid. vessel on 6265.5 at 2316Z, position report on Hurricane Maria, alphabet twice, QUICK BROWN FOX string, 0-9 count and END TEST, SITOR-A. (SJ)

**6317.0:** WLO, Mobile R., AL in QSO w/unid. vessel on 6265.5 at 2316Z, position report on Hurricane Maria, alphabet twice, QUICK BROWN FOX string, 0-9 count and END TEST, SITOR-A. (SJ)

**6483.0:** PBB, Dutch Navy, Den Helder, Netherlands w/marker, ITA2, 75 baud, 850 Hz at 2340Z. (SJ)

**6694.0:** HALIFAX MILITARY wkg CANFORCE 2416 (CC-130) at 1248. (MC)

**6855.0:** UNID YL/SS with 5-fig grps. AM at 2115Z. (CG)

**7313.5:** AFA2AJ Virginia, AFA2SO Kentucky, AFA2MH Georgia, AFA2VA Virginia in USAF MARS 2S1 Net monitored at 1241. (MC)

**7527.0:** CG 1701 (HC-130, CGAS Barbers Point) departing Mobile en route San Antonio requests guard from CAMSLANT at 0142. (MC)

**8301.6:** STINGRAY 14 (HU-25) ops and position report to Sector San Juan monitored at 2230. (MC)

**8397.0:** C6QZ5, DOLE COLOMBIA, 30,106 ton Bahamas-registered container ship w/AMVER/PR at 1850Z, 120 mi E of Myrtle Beach, SC en-route to Wilmington, DE. WCZ7837, DELTA MARINER, 3,950-ton U.S.-registered Ro-Ro cargo ship w/AMVER report at 2050Z. DYHS, TAMOYO MAIDEN, 17,297 ton Philippines-registered general cargo ship w/same at 2234Z. All stations SITOR-A. (SJ)

**8419.0:** WLO, Mobile R., AL in QSO w/unid. vessel on 8379.0 at 1323Z, wind forecast “Copyright 2005, Wilkens Weather Technologies, L.P...” SITOR-A. (SJ)

**8463.0:** KCH, Canadian Forces, Esquimalt, BC w/marker at 2345Z: “NAWS DE KCH ZKR F1 2740 4155 6254 8318 12380 16558 22182 AR,” ITA2, 75 baud, 850 Hz. (SJ)

**8502.0:** NMG, USCG, New Orleans, LA w/male giving wx forecast at 1730Z, live, not computer-generated, USB. (SJ)

**8670.0:** IAR, Roma R., Italy, with modified CW marker at 2345Z: “VVV VVV VVV DE IAR IAR IAR K 8 12 16 MHZ.” (SJ)

**8971.0:** TRIDENT 25 (P-3C) wkg GOLDENHAWK at 1922. (MC)

**8980.0:** CG 2129 (HU-25) p/p via CAMSLANT to District 7 Miami Ops regarding downed aircraft SAR they are working near Bimini at 1412. (MC)

**8983.0:** CG 2127 (HU-25) departing Mobile en route Corpus Christi requests guard from CAMSLANT at 1909. (MC)

**8992.0:** LL 60 (P-3C, VP-30) p/p via Offutt HF-GCS to VP-30 Duty Office heard at 2124. (MC)

**8992.0:** BOYS CLUB p/p via Puerto Rico HF-GCS to CREATION. Terminates their services at 0038. (MC)
9025.0: CG 1503 (HC-130, CGAS Elizabeth City) ALE initiated call to E-City Air at 0007. (MC)

9165.0: HLL2, Seoul Meteo, South Korea at 1205Z, first time heard on any freq., but weak at just 3 kW, FAX. Unid. station w/handsent CW 5 number groups at 0320Z, full number except “T” for “0.” (SJ)

10100.8: DD9K, Hamburg Meteo, Germany, w/wx forecast in English at 2058Z, ITA2 at 50 baud, 425 Hz. (SJ)

10242.0: CG 1711 (HC-130, CGAS Clearwater) p/p via SERVICE CENTER to Elizabeth City Air regarding status of CG 2005 heard at 2354. (MC)

10684.0: ADOBE 51 p/p via Puerto Rico HF-GCS to Travis AFB CP & Meteo heard at 2321. (MC)

10780.0: Cape R., Cape Canaveral, FL, calling LIBERTY STAR at 12342Z morning of planned DISCOVERY shuttle launch, USB. (SJ)

10933.6: CG 1705 (HC-130, CGAS Clearwater) w/kqg SHARK # at 2054. (MC)

11205.0: SHARK 43 (C-130) checkin with SMASHER monitored at 1247. (MC)

11232.0: DRAGNET VICTOR (E-3 AWACS) p/p via TRENTO MILITARY to BLACK WIDOW OPS at Luke AFB at 2312. (MC)

11232.0: KING 25 (HC-130) p/p via TRENTO MILITARY to Moody AFB Meteo at 1947. (MC)

13257.0: CANFORCE 2301 (CC-130) p/p via TRENTO MILITARY at 1932. (MC)

13907.0: CG 1718 (HC-130) departing New Orleans en route CGAS Houston requests guard from CAMSGLANT at 2145. (MC)

13927.1: REACH 0457 p/p via AFA3HS Kansas to HILDA regarding mechanical problem requiring divert to Kelly Field at 1938. (MC)

13927.1: TURBO 11 (KC-135, 22 ARW) p/p via AFAIRE Maine to SHOCKER CONTROL at McConnell AFB at 2349. (MC)

13927.1: EVAC 5249 (C-141C) p/p via AFA3HS Kansas to Air Evac Squadron, Andrews AFB reporting inbound patients for Walter Reed Hospital at 2136. (MC)

14396.5: AARRAYL (SHARES Central NCS Rund Control) and NNNOVUV (SHARES SW RCS) taking check-in from AFA2KM, Florida during Hurricane Ophelia at 0034. (MC)

15867.0: JULIET 14 p/p via SERVICE CENTER to Elizabeth City Air during Hurricane Ophelia at 1558. (MC)

11565.0: UNID YL/EE with “EZ12,” long pause, then “EZ12” rpted. USB starting at 2130Z. (CG)

12390.0: GYA, Royal Navy Fleet Weather and Oceanographic Centre, Northwood, England w/tubarf TAFs (Terminal Aerodrome Forecast) at 1854Z for 13 Middle Eastern airports, including Bandar Abbas (OIKB) and Shiraz (OISS), Iran, FAX. (SJ)

12479.0: VET2, CROWLEY'S UN, 9,200 ton Marshall Islands-registered Ro-Ro cargo ship w/AMVER rpt at 1652Z. 3FVF, NEROE, 99,355 ton Panama-registered crude oil carrier, w/AMVER/PR at 1831Z for departure from Puerto La Cruz, Venezuela en-route to Corpus Christi, TX, heard 19 days earlier on 12479.0 kHz en-route to Puerto La Cruz. All stations SITOR-A. (SJ)

12492.5: XCP1, NUOVO PEMP III, 44,575 ton Mexico-registered crude oil tanker w/lengthy SS telex at 2139Z incl. crew roster, detailed cargo info. Same vessel again w/crude roster only at 2347Z same day. XCGV, B.T. GUADALUPE VICTORIA II, 45,350 ton Mexico-registered oil products tanker w/lengthy SS telex at 2301Z to PEMEX office in Salina Cruz, Oaxaca, Mexico about fuel consumption, cargo, etc., signed by ship’s captain. Both stations SITOR-A. (SJ)

12503.5: UFII, AKADEMIIK MISTISLAV KELYUSH, 1,901 ton Russia-registered research vessel w/traffic at 2005Z to Kaliningrad R. UATX, KAPITAN SUKHODYAEVSKYI, 1,810 ton Russia-registered trawler w/traffic at 2035Z. Both stations SITOR-A. (SJ)

12545.0: Unid. vessels simplex QSO at 0120Z, males in Fujian/Taiwan dialect (Minnan) Chinese, somewhat frantic-sounding, USB. (SJ)

12568.0: UBAU, ALEKSSANDR MIOROUNKO, 3,372 ton Russia-registered trawler w/position report in Cyrillic at 2102Z, ITA2 at 50 baud, 85 Hz. (SJ)

12584.0: WLO Mobile R., AL w/auto-response to HELP+ command from unid. vessel on 12482.0 at 2310Z, SITOR-A. (SJ)

12666.5: FUO, French Navy, Toulon, France w/marker at 2150Z: “THE QUICK BROWN FOX JUMP OVER THE LZY DOG” (no “S”), instead of FUG, FN, Sassaic, France that is usually here, ITA2 at 75 baud, 85 Hz. Heard again here a few days later w/same marker at 2045Z, but in Reverse mode, back to Normal mode 6 days later around the same time of day. (SJ)

12823.5: CTP, NATO, Lisbon, Portugal w/marker at 2038Z: “NAWS NAWS DE CTP CTP QSX 04 06 08 12 MHZ AR,” ITA2, 75 baud, 85 Hz. (SJ)

12840.5: PBC312, Dutch Navy, Goeree Island, Netherlands w/marker at 2150Z: “02A 04B 06A 08A 12A 17X 22X PBC,” ITA2 at 75 baud, 85 Hz. (SJ)

13375.0: LINCOLNSHIRE POACHER, British MI-6 numbers station, YL w/EE 5 number groups x2 at 1655Z after musical sign-on, 00:16P08.0 in USB. (SJ)

15034.0: CHR, Trenton Military, Ontario w/Canadian Forces VOLMET wx broadcast at 1658Z, live male voice. USB. (SJ)

15920.0: CFH, Canadian Forces, Halifax, NS w/marker at 1510Z, perfect reception: “NAWS DE CFH ZKR F1 2822 3394 4155 6260 8303 12377 16576 22182 AR,” ITA2, 75 baud, 85 Hz. (SJ)

15988.0: DDK7, Hamburg Meteo, Germany w/CQ & standard “RYRY” marker w/frequencies at 1525Z, also 5 number groups for wx observations at 1702Z, ITA2, 50 baud, 425 Hz. (SJ)

16135.0: KVM70, Honolulu Meteo, HI w/chart sent lengthwise, fair reception at 0243Z, FAX. Nothing heard on //freqs. (SJ)

16687.5: Unid. vessel w/brief tcf in SS, SITOR-A at 1712Z. (SJ)

16696.5: DNSC5, HANJIN NEW ORLEANS, 70,337 ton South Korea-registered bulk carrier w/AMVER rpt at 1702Z. 3F6X, CROWN JADE, 10,332 ton Panama-registered refrigerated cargo ship w/AMVER/SP sailing plan at 1910Z for departure from San Juan en-route to Lisbon. Both stations SITOR-A. (SJ)

16699.0: Unid. vessel w/crude roster & report on crew member “MUTILADA EN SU PARTE SUPERIOR” in SS heard at 1738Z, SITOR-A. (SJ)

16747.0: Unid. w/news in EE at 2020Z, SITOR-B. (SJ)

16747.0: Unid. Philippine station w/EE news headlined TANJAY at 1438Z, currency exchange rate quoted as “1 GEORGE BUSH – $600.00 PHIL.PISO,” plus a few Tagalog words at signoff (SGS). (SJ)

16951.5: 6WW, French Navy, Dakar, Senegal w/marker at 2120Z, the usual “LE BRICK GEANT,” 0-1 countdown and RYRY/SGSG with the usual “LE BRICK GEANT,” 0-1 countdown and RYRY/SGSG

This month’s star contributors are Mark Cleary (MC), Chris Gay (CG), and Steven Jones (SJ). A hearty thanks to all.
Signal Tracing Techniques: Put Your Signal Tracer To Work!

Our last column covered the ins and outs for two representative signal tracers: a Heathkit model T-4 and a Heathkit model IT-12 signal tracer. I suggested how to select a nice working unit and gave a few hints on what is needed to keep these instruments running reliably for many more years to come.

This month I’m going to show you how to use a signal tracer, how to familiarize yourself with what the instrument can do, and how to use the instrument to trace the signal path through a radio from the antenna to the speaker! Like any other skill, there is a learning curve, and for that reason I advise starting with a known working radio. This lets you learn what the signals should sound like at various stages as you become comfortable using the signal tracer. It’s difficult for a novice restorer to dig into a dead radio, using unfamiliar test equipment without wondering if the radio or his interpretations of the test instrument indications are at fault! Learning by doing is good experience and builds your confidence before tackling more difficult endeavors.

A Basic Radio

I’ve drafted a partial schematic for a simple five-tube radio; this drawing is shown in Figure 1. Note that the power supply details are left out for brevity, and hence one of the five tubes—the rectifier—is not shown. On the other hand, the circuitry is reminiscent of most basic All American 5 AC/DC radios that were produced from the 1940s up into the ’60s.

The radio can be broken into two sections for the purpose of signal tracing. Points A through G are RF signal points, and to test these points for signals the signal tracer probe (Photo A) would be set to the “RF” position. In RF the probe switch places a small signal diode in the probe path. The diode acts like a wideband, un-tuned crystal radio, and will detect and demodulate any RF signal, and the recovered audio will be heard on the signal tracer’s internal speaker.

Where To Start

Let’s begin by setting our test bench up as shown in Photo B. Front and center is the radio that needs troubleshooting. Let’s assume that we’ve checked all the tubes, and that we’ve done a preliminary restoration by replacing all of the wax capacitors and out of spec resistors. We’ve checked the cathode, plate and screen grid voltages, and everything, so far, looks good. The radio still doesn’t work, and the next logical step is to systematically isolate the problem to a particular stage to make our repair task a bit easier!

The test gear is a Heathkit T-4 signal tracer, a Heathkit SG-8 signal generator with a companion RCA frequency counter, and, the most important item on the bench, an RCA Isolation Transformer. Since this is a hot chassis AC/DC radio, it is vital that the chassis be fully isolated from the AC lines, otherwise there is a good chance that the chassis could be live with 125 VAC to the nearest ground! Only the radio is plugged into the isolation transformer, both the signal generator and signal tracer are transformer powered and their chassis’s are isolated from the AC lines.

First Steps

First, set the probe to RF, and set the signal tracer audio level at about one-third clockwise. The speaker switch should be “on,” and the noise switch “off.” Refer to Photo C for a review of these controls.

Coupling The Signal

If there is a strong, and very local, station nearby, you should be able to connect the probe ground lead to the chassis and the probe tip to pin 7 of the 6BE6 converter tube (Figure 1), and by tuning the dial to that station’s frequency you should be able to hear the station on the signal tracer speaker. If not, the signal is probably too weak, and we’ll need to couple in a stronger signal from an outside antenna, or we will have to use the signal generator to produce a strong signal.

If the radio doesn’t have an external antenna connection point, you can add one to a radio using a ferrite bar loopstick antenna by winding several turns of wire over one end of the bar, and using these leads for connecting to a ground and antenna, or to the signal generator, as needed. As a last resort, a long external antenna can be coupled into the antenna circuit by using a small 5 to 10 pF capacitor in series with the antenna lead at
Figure 1. This basic AC/DC radio schematic is marked with alpha characters to denote points for a logical troubleshooting path from antenna to speaker.

point A on the drawing. This will detune the radio’s RF stage slightly, but it will work for signal tracing purposes.

If everything is working as intended, most of the local stations should be heard on the signal tracer as the set is being tuned across the dial. The next step is to move the probe to point B, the converter stage output. If no signals are heard here, the converter stage may not be working. A VTVM (vacuum tube volt meter) with a 1-megohm probe should show a few volts of negative self-generated bias voltage on pin 1 of the 6BE6 if the local oscillator stage is oscillating.

A sensitive frequency counter with a pickup loop can be used to sniff for LO signals near the local oscillator coil, or another radio can be used to listen for the LO signal (it will radiate a signal 455 kHz higher than the radio is tuned to). For example, a set with a 455-kHz IF that is tuned to 1,000 kHz will radiate a LO signal at 1455 kHz. Also check the DC voltages on the plate and appropriate grids of the 6BE6. No plate voltage could indicate an open plate winding in the first IF transformer.

The IF Stage

If the signal is heard at points A and B, it should be heard at point C as well. If no signals can be heard at point C, then either the first IF transformer is bad or grossly misaligned.

Most IF transformers are color-coded; the plate signal lead will be blue, the IF stage grid lead will be green. Miniature IF transformers usually will have a green dot near the grid terminal solder lug. The signal tracer probe would be moved from points C to D, from D to G, or until no signals were heard on the signal tracer. A loss of signal between C and D would indicate a bad IF amplifier stage, and the first step is verifying that the 6BA6 stage has the correct plate and screen voltages.

Again, the second IF transformer could be defective or grossly misaligned if no signals are detected at point D. Remember that the set’s selectivity is improving as the probe is moved from points B to G, and some retuning of the radio or signal generator might be needed to keep the signal peaked in the IF band-
pass. As you progress from the antenna through the mixer, IF amplifier, etc., the cumulative receiver gain will increase and the audio level on the signal tracer will have to be adjusted accordingly.

Detector Stage

The last point where an RF signal will be heard is at point G. This is the detector diode that recovers the audio information (demodulates) from the modulated RF carrier. The two 100-pF capacitors, with the associated 100 k-ohm resistor, form a low pass filter. This filter removes any remaining artifacts of the IF signal, and allows only the recovered audio and rectified DC from the detected carrier to pass. In some sets, the filter is an integral internal part of the last IF transformer, and some sets use a much simpler RC filter.

How The AGC Voltage Is Developed

From point E forward, the signal tracer probe needs to be set to “Audio” to continue following the signal through the remaining stages. As mentioned earlier, the detector recovers two things from the modulated carrier at the IF frequency: first, the demodulated audio, and second, a DC voltage resulting from the half-wave rectification of the IF signal. This is a negative voltage that is proportional to the signal strength. This voltage is used to provide the AGC (automatic gain control) voltage for the radio.

The DC voltage passes through the 3.3 meg-ohm resistor, and that resistance along with the .05 capacitor forms another filter that removes any audio components from the AGC voltage, leaving a pure DC voltage. As the signal increases, the voltage increases, but because the voltage is fed to the control grids of the converter and IF stages, the increased negative voltage also reduces the stage gain. This forms a closed loop feedback system, which works to keep the signal level constant at the detector as the signal fades and peaks, keeping the audio level fairly constant. Point K can be used to monitor the AGC voltage using a high-impedance meter (VTVM or digital meter) for alignment purposes.

Audio Tracing

The only remaining points that can be monitored with the tracer are for audio at points E, F, G, H, I, and J. No audio at point E could indicate a detector problem (pins 5, 6, and 2 of the 12AT7), or it might indicate that the second IF transformer secondary is defective. There might be a cathode-to-plate short for one of the diode sections; a good tube tester would isolate this fault in a bad tube.

If there is audio at point H, but not at point I, then the first audio amplifier stage is the source of the problem. If audio is heard at point F, but if nothing is heard at point H it could indicate that the audio potentiometer is defective. Audio loss between points I and J would show a problem with the 50C5 audio power stage. Again, the first step is to measure the DC voltages on the 50C5 cathode, screen grid and plate. Other possible trouble spots include the tone capacitor across the audio transformer primary winding being shorted, an open primary winding, bad socket or tube, or even a defective speaker!

Troubleshooting By Isolation

Most of these steps are a form of troubleshooting by substitution. The signal tracer is used to systematically replace various sections of the receiver until the problem is isolated. For example, with the probe at point F, the signal tracer is in effect substituting for all of the receiver’s audio stages. Going back to the RF position, and probing point G has the signal tracer substituting for the receiver’s audio stages, and the detector stage as well.

Shortcuts

Let’s continue with a more practical example—a Zenith 5516 chassis from my
Figure 2. The Zenith 5S127 schematic has also been marked to show the signal path to follow when signal tracing this set.
Zenith 5S127 tombstone radio. The set’s schematic is shown in Figure 2, and I’ve annotated the test points in alphabetical order to show the logical sequence for the signal tracing through the radio from antenna to speaker.

Here’s a neat shortcut: Points A, C, and G are accessible at the tube grid caps for the 6A8 converter (point A), the grid cap of the 6K7 IF amplifier tube (C), and the grid cap for the 6Q7 first audio stage (G). Using these points means you can quickly isolate the problem to a point before or after one of these stages without turning the chassis over! This technique is illustrated in Photo D.

The Zenith is a bit easier to signal trace, since it is pretty easy to inject a signal from the signal generator, or to ensure strong signals by connecting a long external antenna to the A and Z terminals on the receiver antenna connector. Points A, B, C, D, and E are all probed for RF signals, while points F through J will be audio, and the probe should be switched to the Audio position for those test points.

**Speaker Substitution**

Suppose you suspect the audio transformer, or even the dynamic speaker has problems, and you’d like to do a quick test to verify your suspicions. Photo E shows the Heathkit T-4 temporarily wired into the Zenith so it substitutes for the set’s electrodynamic speaker. Alligator clip leads are used to connect the T-4 audio transformer and speaker to the 6F6 plate and the B+ contacts on the speaker jack on the chassis rear apron. A 2000-ohm power resistor is being used to replace the field coil in the speaker; the 2000-ohm resistance matches the hot resistance of the field coil windings¹. Also note that the actual resistance of a field coil increases as it warms in use; often a schematic will indicate whether the shown field coil resistance is a cold or hot resistance. The T-4 must be switched to “off”; the power switch disconnects the T-4 audio transformer primary from the instrument’s circuitry for this use.

**Noise Switch**

Finally, these Heath signal tracers have a noise switch feature that can be quite useful in finding noisy components! When
the noise switch is on, and the probe is in the Audio position, the instrument couples a 130-VDC level to the probe through a 68 k-ohm isolating resistor. Any part placed between the probe tip and ground lead that breaks down under voltage will generate large amounts of noise in the tracer’s speaker!

This feature is especially useful to find noisy carbon resistors. Often a RC resistor in an audio stage will go noisy, and this test is a good means to find and isolate the part. Photo F shows a resistor being tested for noise. It might be a good method to check the newer molded IF transformers for silver migration problems as well. Placing the probe between the winding connections and the metal shell of the IF transformer should quickly show if silver migration leakage exists between the mica capacitors to ground.

On Target?

You can reference the Heath T-4 assembly manual for additional guidance, while more advanced restorers might want to obtain a copy of John Rider’s Servicing By Signal Tracing. This well-written 360-page book was first published in 1939, and had at least five additional printings. It should be readily available from used book vendors.

I’ve reached my allocated space for this month, so to conclude I’ll take this opportunity to ask whether these columns on signal tracing were of any benefit to you. Where they too technical or boring, or what could have I done to make them better? What other information was needed? Drop me a line and let me know.

Until next time, keep the soldering irons warm, and those classic old tube radios glowing!

References
1. The actual field coil resistance is 2125 ohms, but the 2000-ohm power resistor is close enough in value to work without any problems. The power supply filtering relies on the inductance of the field winding more than the DC resistance of the windings; substituting a resistor for the field coil may increase hum in some cases.

Tuning In (from page 4)

to offer up someone as a viable candidate for director. Not only is Bill Price a good man, kind and considerate, he’s so smart; not just book smart, but smart in the sense that he gets things done with little fanfare. He’s educated and he’s passionate about radio. And in so many ways radio is key and essential to the business of disaster preparedness and security. I just know he’d ensure all the responsible agencies would get the radios they need to stay in touch and communicate effectively, and he’d personally try them out. Hey, if you can’t have fun at work, what good is it?

On second thought—better not give him a microphone for more than a minute—just long enough to say, “testing, testing, testing.” What’s that, three seconds? Good enough.

Bill also meets one of the main requirements for High Office: he knows people. His friend Norm comes immediately to mind. If he and Norm can rig up half the things Bill tells us they have, we’ve got a director to die for! Maybe that’s not quite what I mean, but you get the idea. Bill brings the expertise, knowledge and people skills to the job and along with friends like Norm, his able-bodied assistant who brings some coax, a few radios from the attic and antennas, and before you can say Category Five, we’ve got a working demo made-for-TV-moment of how radios should work in an emergency.

I’ve spoken with Bill about this idea. We really don’t fault Brown when it comes to being able to roll from one Big Job into another, and really think he’s probably a good guy with a lot to offer—somewhere. What’s troubling to us is that the poor fellow at the dispatch center, who, like you and me, makes mistakes once in a while, and won’t ever be able to rise to Brown’s level of incompetence or write a best seller.

Bill has already typed his letter of acceptance as Homeland Security Director (he’s always prepared!), and that he tells me he’d like to personally hand-carry it to President Wayne Green in a couple of years.

On second thought, some things are better left to our imagination. Only in America!

Washington Beat (from page 41)

and data privileges on 3.55 to 3.7 MHz, 7.05 to 7.125 MHz, and 21.05 to 21.20 MHz at 100 watts output and on 28.05 to 28.3 MHz at 50 watts output. The League wants the FCC to provide HF phone and image privileges to Technicians on 3.9 to 4.0 MHz, 7.2 to 7.3 MHz, and 21.35 to 21.45 MHz at 100 watts output, and on 28.3 to 28.5 MHz at 50 watts.

These recommended privileges take into account the FCC’s proposal to adopt the ARRL’s so-called “Novice reforming” plan in WT Docket 04-140, according to the League. The same privileges for a reconstituted Novice license had been proposed by the ARRL earlier.

Army Awards Contract For Handheld Radios

The Harris Corp. has been chosen to produce more than 1,300 Falcon III dual AN/PRC-152 Multiband Handheld Radio and Vehicular Adapter Amplifier systems for the U.S. Army’s Communications and Electronics Command. The amount of the contract, announced late in 2005, totals $37.8 million, with a June 2006 delivery expected.

“The AN/PRC-152 vehicular radio systems will allow the U.S. Army to have the vehicular radio functionality and output power that they rely on for long-range communications, with the portability of a tactical handheld for quick-dismount scenarios,” said Dana Mehnert, vice president and general manager of U.S. Government Products, Harris RF Communications Division.

The AN/PRC-152 is a multiband handheld radio transceiver, a 50-watt, long-range power amplifier, and an integrated handheld battery charger, Harris says. “As delivered, the AN/PRC-152 provides interoperability with key waveforms, including SINCGARS, HAVEQUICK II and VHF/UHF AM & FM. With the AN/PRC-152 mounted in the vehicular adapter amplifier, the system provides a 50-watt output in the VHF (30–90 MHz) band,” an announcement on Harris’ web site reported. “Multiband operation is made simple with a separate antenna port for the 90–512 MHz band.”

The company’s four operating divisions focus on government communications, tactical radio, broadcast, and microwave systems. Harris has marketed systems and service to customers in more than 150 countries. Additional information about Harris Corporation is available at www.harris.com. Harris is headquartered in Melbourne, Florida.
<table>
<thead>
<tr>
<th>Advertiser</th>
<th>Page #</th>
<th>Website Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOR USA, Inc.</td>
<td>Cov III</td>
<td><a href="http://www.aorusa.com">www.aorusa.com</a></td>
</tr>
<tr>
<td>Advanced Specialties</td>
<td>53</td>
<td><a href="http://www.advancedspecialties.net">www.advancedspecialties.net</a></td>
</tr>
<tr>
<td>Antique Radio Classified</td>
<td>53</td>
<td><a href="http://www.antiqueradio.com">www.antiqueradio.com</a></td>
</tr>
<tr>
<td>Atomic Time, Inc.</td>
<td>21</td>
<td><a href="http://www.atomictime.com">www.atomictime.com</a></td>
</tr>
<tr>
<td>C. Crane Company</td>
<td>37</td>
<td><a href="http://www.ccrane.com">www.ccrane.com</a></td>
</tr>
<tr>
<td>CQ Amateur Radio Calendars</td>
<td>35</td>
<td><a href="http://www.cq-amateur-radio.com">www.cq-amateur-radio.com</a></td>
</tr>
<tr>
<td>CQ Books</td>
<td>25</td>
<td><a href="http://www.cq-amateur-radio.com">www.cq-amateur-radio.com</a></td>
</tr>
<tr>
<td>Communications Electronics</td>
<td>7</td>
<td><a href="http://www.usascan.com">www.usascan.com</a></td>
</tr>
<tr>
<td>Computer Aided Technology</td>
<td>45</td>
<td><a href="http://www.scancat.com">www.scancat.com</a></td>
</tr>
<tr>
<td>Electric Radio Magazine</td>
<td>53</td>
<td><a href="http://www.ermag.com">www.ermag.com</a></td>
</tr>
<tr>
<td>Grundig / Eton</td>
<td>10,11,14,15</td>
<td><a href="http://www.etoncorp.com">www.etoncorp.com</a></td>
</tr>
<tr>
<td>ICOM America, Inc.</td>
<td>Cov IV</td>
<td><a href="http://www.icomamerica.com">www.icomamerica.com</a></td>
</tr>
<tr>
<td>MFJ Enterprises, Inc</td>
<td>3</td>
<td><a href="http://www.mfjenterprises.com">www.mfjenterprises.com</a></td>
</tr>
<tr>
<td>Monitoring Times</td>
<td>59</td>
<td><a href="http://www.grove-ent.com">www.grove-ent.com</a></td>
</tr>
<tr>
<td>PowerPort</td>
<td>53,83</td>
<td><a href="http://www.powerportstore.com">www.powerportstore.com</a></td>
</tr>
<tr>
<td>RSGB Books</td>
<td>17</td>
<td><a href="http://www.cq-amateur-radio.com">www.cq-amateur-radio.com</a></td>
</tr>
<tr>
<td>REACT International, Inc</td>
<td>39</td>
<td><a href="http://www.reactintl.org">www.reactintl.org</a></td>
</tr>
<tr>
<td>Radioworld, Inc.</td>
<td>47</td>
<td><a href="http://www.radioworld.ca">www.radioworld.ca</a></td>
</tr>
<tr>
<td>Ten-Tec</td>
<td>19</td>
<td><a href="http://www.t%D0%B5%D0%BD%D1%82ec.com">www.tентec.com</a></td>
</tr>
<tr>
<td>Universal Radio</td>
<td>1</td>
<td><a href="http://www.universal-radio.com">www.universal-radio.com</a></td>
</tr>
<tr>
<td>W5YI Group, The</td>
<td>63</td>
<td><a href="http://www.w5yi.org">www.w5yi.org</a></td>
</tr>
<tr>
<td>Yaesu</td>
<td>Cov II</td>
<td><a href="http://www.vxstdusa.com">www.vxstdusa.com</a></td>
</tr>
</tbody>
</table>

Reach this dynamic audience with your advertising message, contact Arnie Sposato at 253-853-4080, FAX 253-853-4070, or e-mail: advertising@popular-communications.com.

**COMMUNICATIONS MONITORING ANTENNAS**

- **HF/VHF/UHF** Super Discone $49.75, AntennaCraft SuperCoax $47.70, 30-1200 MHz, 4-12 dB Log Periodic $69.50, 800-900 MHz, 13 dB 9 element Yagi $74.95, MURS/GMRS Dual Band Base $48.95. All prices INCLUDE Priority S&H. See these antennas plus many, many more for Amateur, Business, CB, and Monitoring radio, plus cellular phone antennas on the web at: www.antennawarehouse.com MC/Visa Order line 877-680-7818. To help maintain our low pricing, we do not print catalogs.


**ADVERTISERS’ INDEX**

<table>
<thead>
<tr>
<th>Advertiser</th>
<th>Page #</th>
<th>Website Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOR USA, Inc.</td>
<td>Cov III</td>
<td><a href="http://www.aorusa.com">www.aorusa.com</a></td>
</tr>
<tr>
<td>Advanced Specialties</td>
<td>53</td>
<td><a href="http://www.advancedspecialties.net">www.advancedspecialties.net</a></td>
</tr>
<tr>
<td>Antique Radio Classified</td>
<td>53</td>
<td><a href="http://www.antiqueradio.com">www.antiqueradio.com</a></td>
</tr>
<tr>
<td>Atomic Time, Inc.</td>
<td>21</td>
<td><a href="http://www.atomictime.com">www.atomictime.com</a></td>
</tr>
<tr>
<td>C. Crane Company</td>
<td>37</td>
<td><a href="http://www.ccrane.com">www.ccrane.com</a></td>
</tr>
<tr>
<td>CQ Amateur Radio Calendars</td>
<td>35</td>
<td><a href="http://www.cq-amateur-radio.com">www.cq-amateur-radio.com</a></td>
</tr>
<tr>
<td>CQ Books</td>
<td>25</td>
<td><a href="http://www.cq-amateur-radio.com">www.cq-amateur-radio.com</a></td>
</tr>
<tr>
<td>Communications Electronics</td>
<td>7</td>
<td><a href="http://www.usascan.com">www.usascan.com</a></td>
</tr>
<tr>
<td>Computer Aided Technology</td>
<td>45</td>
<td><a href="http://www.scancat.com">www.scancat.com</a></td>
</tr>
<tr>
<td>Electric Radio Magazine</td>
<td>53</td>
<td><a href="http://www.ermag.com">www.ermag.com</a></td>
</tr>
<tr>
<td>Grundig / Eton</td>
<td>10,11,14,15</td>
<td><a href="http://www.etoncorp.com">www.etoncorp.com</a></td>
</tr>
<tr>
<td>ICOM America, Inc.</td>
<td>Cov IV</td>
<td><a href="http://www.icomamerica.com">www.icomamerica.com</a></td>
</tr>
<tr>
<td>MFJ Enterprises, Inc</td>
<td>3</td>
<td><a href="http://www.mfjenterprises.com">www.mfjenterprises.com</a></td>
</tr>
<tr>
<td>Monitoring Times</td>
<td>59</td>
<td><a href="http://www.grove-ent.com">www.grove-ent.com</a></td>
</tr>
<tr>
<td>PowerPort</td>
<td>53,83</td>
<td><a href="http://www.powerportstore.com">www.powerportstore.com</a></td>
</tr>
<tr>
<td>RSGB Books</td>
<td>17</td>
<td><a href="http://www.cq-amateur-radio.com">www.cq-amateur-radio.com</a></td>
</tr>
<tr>
<td>REACT International, Inc</td>
<td>39</td>
<td><a href="http://www.reactintl.org">www.reactintl.org</a></td>
</tr>
<tr>
<td>Radioworld, Inc.</td>
<td>47</td>
<td><a href="http://www.radioworld.ca">www.radioworld.ca</a></td>
</tr>
<tr>
<td>Ten-Tec</td>
<td>19</td>
<td><a href="http://www.tentec.com">www.tentec.com</a></td>
</tr>
<tr>
<td>Universal Radio</td>
<td>1</td>
<td><a href="http://www.universal-radio.com">www.universal-radio.com</a></td>
</tr>
<tr>
<td>W5YI Group, The</td>
<td>63</td>
<td><a href="http://www.w5yi.org">www.w5yi.org</a></td>
</tr>
<tr>
<td>Yaesu</td>
<td>Cov II</td>
<td><a href="http://www.vxstdusa.com">www.vxstdusa.com</a></td>
</tr>
</tbody>
</table>

Reach this dynamic audience with your advertising message, contact Arnie Sposato at 253-853-4080, FAX 253-853-4070, or e-mail: advertising@popular-communications.com.
N3AVY Is Alive And Well (Thanks To Loyal Friends!)

O, I didn't almost die (well, not that I'm aware of, any-
way) but the beloved ham license and that pretty neat
callsign were in limbo for a while, but finally, the license
has been renewed. While I must thank the people in Gettysburg
and Washington D.C., I also owe a tip of the hat to Tom and
Karen Mitchell (a ham-couple from seven-land who share other
special interests with me), my friend John (who knows his own
last name), several readers who nudged me via e-mail, and of
course, Norm, who nudged me to the point of arranging to bring
me a rig and antenna which I promise to use so long as he does
not cause injury to himself, to me, or to any dairy animals dur-
ing the installation.

And before I go any further, I'd like to tell loyal (and patient)
reader Dwight Hanson, KB7AJE, that I am looking for a pencil
and paper so that I can send him a proper answer to his let-
ter, which is thumb-tacked RIGHT IN FRONT OF MY FACE
until I write him an answer!

Now for those of you who face an upcoming expiration of
your ham license, fear not! It was Tom and Karen who actually
copied the link and included it in an e-mail to me and assured
me that it was quick and easy, and didn't cost a dime to renew.
They were right, of course, and I now have (written on the wall,
so I don't lose it) some kind of FCC or FBI internal identifica-
tion number so that I can either renew my ham license or get
arrested with just the click of a mouse.

“And I learned that I am a dinosaur in
more ways than I thought before I renewed
my license.”

And I learned that I am a dinosaur in more ways than I thought
before I renewed my license. I now realize that my Advanced
class license ceased to exist and I am grandfathered into exis-
tence because they have taken pity on me, I guess, or they have
taken pity on the Extra licensees and don’t want me clutter-
ing up their frequencies. Too bad. I passed the extra class
code test the same day I passed my Technician, General, and
Advanced class code test. I just happened to get a lousy bunch of
questions on theory and regulations that day. Something about
the permissible height of the ionosphere during an invasion by
aliens from another planet, and I put seven when the answer
should have been nine. Oh well, some day I’ll take that part
again. Can’t do it online. Gotta get a volunteer examiner.

I just know that when Norm reads this, he’s gonna apply to
become a VE and then he’ll come down here and pester me to
take that! #$%^! Extra class exam until I pass it. And to know
Norm is to know that he would NEVER think of slipping me
an answer or helping in any way. I think he doesn’t want me
cluttering up their frequencies. Too bad. I passed the extra class
code test the same day I passed my Technician, General, and
Advanced class code test. I just happened to get a lousy bunch of
questions on theory and regulations that day. Something about
the permissible height of the ionosphere during an invasion by
aliens from another planet, and I put seven when the answer
should have been nine. Oh well, some day I’ll take that part
again. Can’t do it online. Gotta get a volunteer examiner.

I just know that when Norm reads this, he’s gonna apply to
become a VE and then he’ll come down here and pester me to
take that! #$%^! Extra class exam until I pass it. And to know
Norm is to know that he would NEVER think of slipping me
an answer or helping in any way. I know him too well. I think
I remember watching him give someone a novice test a long
time ago when we worked together, and to watch him agonize,
twisting and straining his face with enough body English to
shoot a pool cue across a football field, as if he was trying to
transmit the right answer to the poor test-taker through the air,
yet knowing that he couldn’t help the applicant. It was too
painful to watch. (Yes, the test-taker did pass, by the way.)

“I can see it now. As soon as the weather breaks,
he’ll be down here with a ream of computer print-
outs, with every possible combination of sample
test questions for me to practice with.”

I can see it now. As soon as the weather breaks, he’ll be down
here with a ream of computer printouts, with every possible
combination of sample test questions for me to practice with.
There will be no rest. In fact, there will probably be no sleep
until I ace every practice test to his satisfaction and go find a
local VE to administer the test.

And y’know what I’d REALLY like?
Internet CW.
Not that silly Internet long-distance stuff. Nosiree! I remem-
ber (here he goes again) back in Coast Guard radio school in
Groton, Connecticut (when dinosaurs roamed the Earth), all the
instructors and administrators had code keys and speakers by
their desks, connected to a master oscillator. They called one
another, or everyone, by using each operator’s two-letter “op-
sign” such as “JS DE JP K” (which for the uninitiated means
“JS, this is JP, over.” Of course, being Coast Guard radiomen
with a history of working the commercial ships, these guys were
proficient—and being instructors, they were extra proficient.
Those of us going through the school’s six-month curriculum
were duly impressed.

I guess I don’t need Verizon or Vonnage to set anything up
for me—I could just set up an audio chat with Norm (he’s the
only one crazy enough to be on the “other end” of a CW chat
room with me) and use a key and an oscillator. Hey—no static,
no bad conditions, no QRM, QRN (am I speaking a foreign lan-
guage here?)

But seriously, folks (I love saying that) I think that, once Norm
sets me up with the rig he promises to bring from the frozen
tundra once the weather breaks, it’s time for me to get back on
the air, at least often enough to start a little “lunatic net” where
loyal readers can practice their CW skills and exchange funny
stories; I just think CW is too important to let it die.

Meanwhile, I’m dulling up some of my biggest drill bits so I
can help him mount some of the biggest, ugliest, most unain-
ly antennas on that nice new chick-magnet of an SUV he’s dri-
ving. Maybe I can show him how my .45 can punch a nice .451-
diameter hole in a fender or a roof without the hassle of find-
ing a drill bit or an extension cord, or how a Remington 30-06
can give him a nice mounting hole from up to 200 yards away,
if he’s not too fussy about exact antenna placement.
Antennas for the Great Outdoors

**DA3000**: A 16 element receive wideband discone antenna with useable frequency coverage from 25MHz to 2GHz. Using different length elements to ensure true wideband characteristics, the DA3000 also includes one ‘loaded’ element to enhance low frequency performance. Engineered and manufactured to AOR’s exacting standards, the DA3000 comes with 50 feet of quality RG58/U coaxial cable terminated in a BNC plug for the radio connection and a low-loss TNC plug in the antenna base. Pole clamps are also standard.

Designed for areas where space is a problem or when an “unobtrusive” installation is essential, **SA7000** is a super wideband coverage receive antenna with useable frequency coverage of 30 KHz to 2 GHz. The SA7000 is a passive arrangement with two whip elements: a long element for short wave up to 30 MHz and a second shorter loaded whip antenna for frequencies up to 2 GHz. The loading coils are tuned around 150 & 800 MHz to enhance VHF & UHF performance.

Antennas for Indoor Enjoyment

AOR has made performance even better with the new **LA380** indoor antenna as successor to the popular LA350. The LA380 features full frequency coverage (40KHz – 500MHz) using a single receiving element. Designed to provide reception when away from the main monitoring location or when large external antennas are not practical, the LA380 is a compact active (1 foot diameter) loop antenna which features an internal high-gain amplifier (20dB for 40KHz-25CMHz) and excellent overall strong signal handling (high IP3 +10dBm). The loop design allows directional control and nulling noise or interference. Perfect for listening in remote locations or in antenna-restricted areas.

Accessories for Added Monitoring Capability

**P25-8600 APCO25 Decoder** can be installed in the AR8600MKII receiver to automatically decode the APCO25 signal. The decoded audio is then output from the receiver’s speaker. (Installation is required.)

**TV5000A NTSC TV Internal Converter** adds the ability to receive broadcast television signals (NTSC) and allow monitoring video feeds from a variety of sources including broadcast TV channels, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more when used with AOR AR5000A series of communications receivers.

**TV2000 External NTSC Video Decoder** is designed to be used with the AOR SR2000. Compact and lightweight, no external power supply is required (power is supplied from the SR2000). The video output is available from the rear panel of the TV2000 and audio is provided from the SR2000 through the external speaker jack.

For more great accessories, visit the website at www.aorusa.com.
IC-R75 **Tune in the world!** • 30 kHz - 60.0 MHz • AM, FM, S-AM, USB, LSB, CW, RTTY • 101 Alphanumeric Memory Channels • Twin Passband Tuning (PBT) • Synchronous AM Detection (S-AM) • DSP with Noise Reduction Auto Notch Filter • Triple Conversion • Up to Two Optional Filters • Front Mounted Speaker • Large Display • Well Spaced Keys and Dials • PC Remote Control with Optional Icom RSR75 Software for Windows® • And Many Other Features

**Handheld Receivers**

**IC-R3** • 500 kHz – 2.45 GHz* • AM, FM, WFM, AM-TV, FM-TV • 450 Alphanumeric Memories • CTCSS with Tone Scan • 4 Level Attenuator • Antenna with BNC Connector • 2" Color TFT Display with Video and Audio Output Jacks • Lithium Ion Power

**IC-R5** • 150 kHz – 1.3 GHz* • AM, FM, WFM • 1250 Alphanumeric Memories • CTCSS & DTCS Decode • Weather Alert • Dynamic Memory Scan • Icom's Hot 100 Preprogrammed TV & Shortwave Channels • Weather Resistant • AA Ni-Cd's & Charger

**IC-R20** • 150 kHz – 3.3 GHz* • AM, FM, WFM, USB, LSB, CW • 1250 Alphanumeric Memories • CTCSS & DTCS Decode • Dual Watch • Audio Recorder • Weather Alert • Dynamic Memory Scan • Icom's Hot 100 Preprogrammed TV & Shortwave Channels • Lithium Ion Power

*Cellular frequencies blocked on US versions. ©2005 Icom America Inc. The Icom logo is a registered trademark of Icom Inc. All other trademarks remain the property of their respective owners. All specifications are subject to change without notice or obligation.