QST

Official Journal of ARRL The national association for AMATEUR RADIO

Devoted entirely to Amateur Radio

www.arrl.org

September 2007

Special Emergency Communications Issue

QST reviews:

Tokyo Hy-Power HL-1.5KFX Linear Amplifier

Hendricks QRP Kits Firefly Transceiver

Gamma Research HPS-1a Switching Power Supply

Inside:

ARRL Diamond Terrace: *A New Way to Honor Hams*

Power Packing for Emergencies

Operating D-STAR

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IC-746PRO

This HF/6M/2M performer borrows much technology from its big brothers, the 756PRO series: Built-in 32-bit IF-DSP; 100 Watts on all bands, and 100% duty cycle; digital filtering (no need to buy optional filters!) with independently selectable tuning shapes for CW & SSB; menu-driven controls; auto and manual notch filter; built-in auto antenna tuner; band scope; and more.

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- All Mode, Including RTTY
- 32-bit IF-DSP & 24-bit AD/DA Converter
- Enhanced Rx Performance
- Selectable IF Filter Shapes for SSB & CW

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Introducing Icom's IC-R9500 Wide Band Receiver*

We've raised the bar with our super performance, multiple function wide band "measuring" receiver. The IC-R9500 has normal and wide spectrum scope functions. With five roofing filters before the first amp, two independent 32 bit floating point DSP processors, and 7-inch wide color TFT LCD, this is something to get excited about!

Features:

- 0.005 - 3335.000 MHz*
- USB, LSB, CW, FSK, FM, WFM, AM
- 1020 Alphanumeric Memories
- P25 (Option UT-122)
- Five Roofing Filters
- Dual DSP
- Digital IF Filter
- Multi-function Spectrum Scope
- 7-inch TFT LCD Display
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- Noise Reduction
- Multi-scan Functions
- Voice Synthesizer
- Digital Voice Recorder
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hy-gain® ROTATORS

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HAM-IV

HAM-IV
$559.95

The most popular rotator in the world! For medium communications arrays up to 15 square feet wind load area. *New* 5-second brake delay! *New* Test/Calibrate function. *New* low temperature grease permits normal operation down to -30 degrees F. *New* alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. *New* indicator potentiometer. *New* ferrite beads reduce RF susceptibility. *New* Cinch plug plus 8-pin plug at control box. Dual 98 ball bearing race for load bearing strength and electric locking steel wedge brake prevents wind induced antenna movement. North or South center of rotation scale on meter, low voltage control, max mast size of $2^{1}/_{16}$ inches.

HAM IV and HAM V Rotator Specifications	
Wind Load capacity (inside tower)	15 square feet
Wind Load (w/mast adapter)	**7.5 square feet**
Turning Power	800 in.-lbs.
Brake Power	**5000 in.-lbs.**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	26 lbs.
Effective Moment (in tower)	**2800 ft.-lbs.**

TAILTWISTER SERIES II

For large medium antenna arrays up to 20 sq. ft. wind load. Available with *DCU-1 Pathfinder* digital control (T2XD) or standard analog control box (T2X) with *new* 5-second brake delay and *new* Test/Calibrate function. Low temperature grease, alloy ring gear, indicator potentiometer, ferrite beads on potentiometer wires, *new* weatherproof AMP connectors plus 8-pin plug at control box, triple bearing race with 138 ball bearings for large load bearing strength, electric locking steel wedge brake, North or South center of rotation scale on meter, low voltage control, $2^{1}/_{16}$ inch max. mast.

T-2X
$699.95

T-2XD
$1079.95
with DCU-1

TAILTWISTER Rotator Specifications	
Wind load capacity (inside tower)	20 square feet
Wind Load (w/ mast adapter)	**10 square feet**
Turning Power	1000 in.-lbs.
Brake Power	**9000** in.-lbs.
Brake Construction	Electric Wedge
Bearing Assembly	**Triple race/138 ball brngs**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	31 lbs.
Effective Moment (in tower)	**3400 ft.-lbs.**

CD-45II

CD-45II
$389.95

For antenna arrays up to 8.5 sq. feet mounted inside tower or 5 sq. ft. with mast adapter. Low temperature grease good to -30 F degrees. *New* Test/Calibrate function. Bell rotator design gives total weather protection, dual 58 ball bearing race gives proven support. Die-cast ring gear, stamped steel gear drive, heavy duty, trouble free gear train, North center scale, lighted directional indicator, 8-pin plug/socket on control unit, snap-action control switches, low voltage control, safe operation, takes maximum mast size to $2^{1}/_{16}$ inches. MSLD light duty lower mast support included.

CD-45II Rotator Specifications	
Wind load capacity (inside tower)	8.5 square feet
Wind Load (w/ mast adapter)	**5.0 square feet**
Turning Power	600 in.-lbs.
Brake Power	**800 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/48 ball brings**
Mounting Hardware	Clamp plate/steel U-bolts
Control Cable Conductors	**8**
Shipping Weight	22 lbs.
Effective Moment (in tower)	**1200 ft.-lbs.**

HAM-V

HAM-V
$999.95
with DCU-1

For medium antenna arrays up to 15 square feet wind load area. Similar to the HAM IV, but includes *DCU-1 Pathfinder* digital control unit with gas plasma display. Provides automatic operation of brake and rotor, compatible with many logging/contest programs, 6 presets for beam headings, 1 degree accuracy, auto 8-second brake delay, 360 degree choice for center location, *more!*

ROTATOR OPTIONS

MSHD, $99.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $39.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

AR-40

AR-40
$289.95

For compact antenna arrays and large FM/TV up to 3.0 square feet wind load area. Dual 12 ball bearing race. Automatic position sensor never needs resetting. Fully automatic control -- just dial and touch for any desired location. Solid state, low voltage control, safe and silent operation. $2^{1}/_{16}$ inch maximum mast size. MSLD light duty lower mast support included.

AR-40 Rotator Specifications	
Wind load capacity (inside tower)	3.0 square feet
Wind Load (w/ mast adapter)	**1.5 square feet**
Turning Power	350 in.-lbs.
Brake Power	**450 in.-lbs.**
Brake Construction	Disc Brake
Bearing Assembly	**Dual race/12 ball bearings**
Mounting Hardware	Clamp plate/steel bolts
Control Cable Conductors	**5**
Shipping Weight	14 lbs.
Effective Moment (in tower)	**300 ft.-lbs.**

HDR-300A

HDR-300A
$1379.95

For ***king-sized*** antenna arrays up to 25 sq.ft. wind load area. Control cable connector, *new* hardened stainless steel output shaft, *new* North or South centered calibration, *new* ferrite beads on potentiometer wires reduce RF susceptibility, *new* longer output shaft keyway adds reliability. Heavy-duty self-centering steel clamp and hardware. Display accurate to 1°. Machined steel output.

HDR-300A Rotator Specifications	
Wind load capacity (inside tower)	25 square feet
Wind Load (w/ mast adapter)	**not applicable**
Turning Power	5000 in.-lbs.
Brake Power	**7500 in.-lbs.**
Brake Construction	solenoid operated locking
Bearing Assembly	**bronze sleeve w/rollers**
Mounting Hardware	stainless steel bolts
Control Cable Conductors	**7**
Shipping Weight	61 lbs.
Effective Moment (in tower)	**5000 ft.-lbs.**

Digital Automatic Controller

DCU-1
$699.95

Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

AR-35 Rotator/Controller

AR-35
$79.95

For UHF, VHF, 6-Meter, TV/FM antennas. Includes automatic controller, rotator, mounting clamps, mounting hardware. 110 VAC. One Year Warranty.

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NEW! Automatic Rotator Brake Delay

RBD-5
$34.95

Provides automatic 5-second brake delay -- insures your rotator is fully stopped before brake is engaged. Prevents accidentally engaging brake while rotator is moving. Use with HAM II, III, IV, V, T2Xs. Easy-to-install. Includes pre-assembled PCB, hardware.

hy-gain®

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MINI COOPER SHOWN WITH CP-5M UNIVERSAL LIP MOUNT AND COAX CABLE COMBINATION. NO HOLES TO DRILL!

MODEL	ANT CONN / COAX CONN
CP-5M	SO-239 / PL-259
CP-5NMO	NMO / PL-259
CP-5 3/8-24	3/8-24 / PL-259

Heavy-duty adjustable lip mount bracket with 16' 6" deluxe cable assy includes 18" mini RG-188A/U type coax for weather seal entry.

Max antenna 70" Attaches to trunk side/ van door/SUV door/ truck doors etc..

COMET BNC-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
• Wavelength: 2M 1/4 wave • 440MHz 1/2 wave • Length: 17" • Conn: BNC Super flexible featherweight whip

COMET SMA-24 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
• Wavelength: 2M 1/4 wave • 440MHz 1/2 wave • Length: 17" • Conn: SMA Super flexible featherweight whip

COMET SMA-503 DUAL-BAND 2M/70CM HT ANTENNA RX range: 100-1200MHz
• Length: 8.75" • Conn: SMA

Maldol MH-209 *(BNC Conn)* **MH-209SMA** *(SMA Conn)* **2M/70CM DUAL-BAND HT ANTENNAS**
3" length, soft rubber cover. Good performance in a small package!

COMET NEW! CSB750A DUAL-BAND 2M/440MHZ W/FOLD-OVER
Wavelength: 2M 1/2 wave, 70cm 5/8 wave x 2 • VSWR: 1.5:1 or less • Length: 42" • Conn: PL-259 • Max Pwr: 150W

COMET NEW! CSB770A DUAL-BAND 2M/440MHZ W/FOLD-OVER
Wavelength: 2M 5/8 wave center load, 70cm 5/8 wave x 2 center load • VSWR: 1.5:1 or less • Length: 51" • Conn: PL-259 • Max Pwr: 150W

COMET NEW! CSB790A DUAL-BAND 2M/440MHZ W/FOLD-OVER
Wavelength: 2M 7/8 wave center load, 70cm 5/8 wave x 3 center load • VSWR: 1.5:1 or less • Length: 62" • Conn: PL-259 • Max Pwr: 150W

Maldol AX-50 DUAL-BAND 2M/440MHz
Wavelength: 2M 1/4 wave • 70cm 9/8 wave • Length: 21" • Conn: PL-259 • Max Power: 60W

Maldol AX-75 DUAL-BAND 2M/440MHz W/FOLD-OVER
Wavelength: 2M 1/2 wave center load • 70cm 5/8 wave x 2 • Length: 30" • Conn: PL-259 • Max Power: 60W

Maldol AX-95 DUAL-BAND 2M/440MHz W/FOLD-OVER
Wavelength: 2M 1/2 wave • 70cm 5/8 wave x 2 • Length: 38" • Conn: PL-259 • Max Power: 60W

COMET B-10 / B-10NMO DUAL-BAND 2M/440MHz
Wavelength: 146MHz 1/4 wave • 446MHz 1/2 wave • Length: 12"
• Conn: B-10 PL-259 ,B-10NMO - NMO style • Max Pwr: 50W

COMET SBB-2 / SBB-2NMO DUAL-BAND 2M/440MHz
Wavelength: 146MHz 1/4 wave • 446MHz 5/8 wave center load • VSWR: 1.5:1 or less • Length: 18"
• Conn: SBB-2 PL-259 • SBB-2NMO NMO style • Max Pwr: 60W

Maldol EX-107RB / EX-107RBNMO DUAL-BAND 2M/440MHz
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • VSWR: 1.5:1 or less • Length:29"
• Conn: EX-107RB PL-259 • Ex-107RBNMO NMO style • Max Pwr: 100W

COMET SBB-5 / SBB-5NMO DUAL-BAND 2M/440MHz W/FOLD-OVER
Wavelength: 146MHz 1/2 wave • 446MHz 5/8 wave x 2 • Length: 39"
• Conn: SBB-5 PL-259, SBB-5NMO - NMO style • Max Pwr: 120W

COMET SBB-7 / SBB-7NMO DUAL-BAND 2M/440MHz W/FOLD-OVER
Wavelength: 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 58"
• Conn: SBB-7 PL-259, SBB-7NMO - NMO style • Max Pwr: 70W

COMET and Maldol Mobile

For a complete catalog, call or visit your local dealer.
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This Month in QST

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Technical

News and Features

US & Possessions: Membership in the ARRL, including a one year subscription to *QST*, is available to individuals at $39. Age 65 and over, with proof of age, $36. Licensed radio amateurs age 21 and under and the eldest licensee in the household may qualify for the rate of $20. Life Membership, including a subscription to *QST* is available at $975.* Age 65 and over, $900.* Membership and *QST* cannot be separated. Libraries and institutions, $39 per year. Single copies $5.

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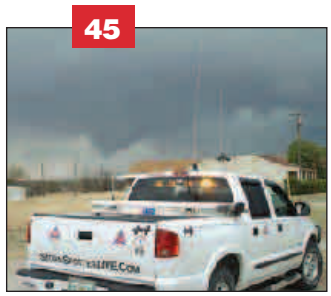
QST Workbench

Operating



OUR COVER
In this special EmComm issue, we celebrate the amateurs who, when all else fails, give their time, resources and ham radio skills to those in need. From the top: Phillip Rebensburg, KC9CI, and ARRL President Joel Harrison, W5ZN, at AES Superfest 2007 in Milwaukee; photo by Bob Inderbitzen, NQ1R. Hurricane Katrina ravaged much of the Gulf Coast, including this Mississippi neighborhood. Groups such as MARS teaming with the federal Transportation Security Administration work productively to assist with emergency communications; photo by Jim Oldham. The threat of tornados, like the one seen here in a photo by Brad Patrick, KE5EMF, bring out storm spotters who have saved countless lives in the Midwest. Satellite image at left courtesy of the National Weather Service.

Departments

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NEW COMPACT HF TRANSCEIVER WITH IF DSP

A superb, compact HF/50 MHz radio with state-of-the-art IF DSP technology configured to provide YAESU World-Class Performance in an easy to operate package.
New licensees, casual operators, DX chasers, contesters, portable/field enthusiasts, and emergency service providers - *YAESU FT-450…This Radio is for YOU!*

HF/50 MHz 100 W All Mode Transceiver

FT-450 Automatic Antenna Tuner ATU-450 optional

■ **FT-450AT** With Built-in ATU-450 Automatic Antenna Tuner

Compact size : 9" X 3.3" x 8.5" and Light weight : 7.9 lb

■ Large informative Front Panel Display, convenient Control knobs and Switches

■ The IF DSP guarantees quiet and enjoyable highperformance HF/50 MHz operation

Handy Front Panel Control of Important Features including:

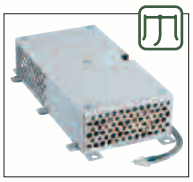
- **CONTOUR Control Operation**
  The Contour filtering system provides a gentle shaping of the filter passband.
- **Manual NOTCH**
  Highly-effective system that can remove an interfering beat tone/signal.
- **Digital Noise Reduction (DNR)**
  Dramatically reduces random noise found on the HF and 50 MHz bands.
- **IF WIDTH**
  The DSP IF WIDTH tuning system provides selectable IF passband width to fight QRM.
  SSB - 1.8/2.4/3.0 kHz , CW - 0.5/1.8/2.4 kHz
- **Digital Microphone Equalizer**
  Custom set your rig to match your voice characteristics for maximum power and punch on the band.
- **Fast IF SHIFT Control**
  Vary the IF SHIFT higher or lower for effective interference reduction / elimination.

■ The rugged FT-450 aluminum die-cast chassis, with its quiet, thermostatically controlled cooling fan provides a solid foundation for the power amplifier during long hours of field or home contesting use.

MOS FET RD100HHF1

The rugged aluminum die-cast chassis with cooling fan

■ Operate anywhere using optional internal or external antenna tuning systems



Internal Automatic Antenna Tuner ATU-450
Covering 160 m to 6 m Amateur Bands Dipole or Yagi antennas
(The ATU-450 Antenna Tuner is included in the FT-450AT)

External Automatic Antenna Tuner FC-40
Covering 160 m to 6 m Amateur Bands (with 65+ ft end fed wire)

Active Tuning Antenna System ATAS-120A
Covering 40 m to 6 m Amateur Bands
(For mobile)

More features to support your HF operation

●10 kHz Roofing filter ●20 dB ATT / IPO ●Built-in TCXO for incredible ±1 ppm/hour (@+77 °F, after warmup) stability ●CAT System (D-sub 9 pin): Computer programming and Cloning capability ●Large, Easy-to-See digital S meter with peak hold function ●Speech Processor ●QUICK SPLIT to automatically Offset transmit frequency (+5 kHz default) ●TXW to monitor the transmit frequency when split frequency operation is engaged ●Clarifier ●Built-In Electronic Keyer ●CW Beacon (Up to 118 characters using the CW message keyer's 3 memory banks) ●CW Pitch Adjustment (between 400 to 800 Hz, in 100 Hz steps) ●CW Spotting (Zero-Beating) ●CW Training Feature ●CW Keying using the Up/Down keys on the optional microphone ●Two Voice Memories (SSB/AM/FM), store up to 10 seconds each ●20 seconds Digital Voice Recorder ●Dedicated Data Jack for FSK-RTTY operation ●Versatile Memory System, up to 500 memory channels that may be separated into as many as 13 Memory Groups ●CTCSS Operation (FM) ●My Band / My Mode functions, to recall your favorite operating set-ups ●Lock Function ●Adjustable Main Tuning Dial Torque ●C.S. Switch to recall a favorite Menu Selection directly ●Hand Microphone included ●IMPORTANT FEATURE FOR THE VISUAL IMPAIRED OPERATORS - Digital Voice Announcement of the Frequency, Mode or S-meter reading

For the latest Yaesu news, visit us on the Internet:
http://www.vertexstandard.com

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2 m/70 cm Band
FM Dual Band Transceiver
(2 m 10 W/ 70 cm 7 W)
FTM-10SR

IP57 Submersible 3 feet for 30 min Body/Front panel

Great New Features to Support Outdoor Motor Sports Activities
Mobile Transceiver... Great Appearance ...Easy to Operate

2 m/70 cm Band
FM Dual Band Transceiver
(2 m 50 W/ 70 cm 40 W)
FTM-10R

IP57 Submersible 3 feet for 30 min Front panel

2 m Band
50 W 2 m Ultra Rugged
VHF FM Mobile
FT-1802M

2 m Band
65 W 2 m Rugged FM Mobile
FT-2800M

50 W 10 m/6 m/2 m/70 cm*
Quad Band FM Mobile
FT-8900R
*70 cm 35 W

50 W 2 m/70 cm*
Dual Band FM Mobile
FT-8800R
*70 cm 35 W

50 W 2 m/70 cm*
Dual Band FM Mobile
FT-7800R
*70 cm 35 W

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YAESU NOW PRESENTS THE THIRD GENERATION ULTRA-COMPACT HAND-HELD FM TRANSCEIVER

The Third Generation Ultra-compact Handheld, VX-3R, is loaded with more new convenient and enjoyable features — "AA" Battery Operation*, FM Stereo Broadcast Reception, Internal Bar Antenna for the AM Broadcast Band. Yaesu again leads the world of Compact Hand Held Transceivers!! The supplied High-Capacity Lithium-ion Battery (FNB-82LI) is compatible with the VX-2R. Handy to upgrade!

* Optional 3 x "AA" Cell Battery Case FBA-37 (Batteries not supplied)

ULTRA COMPACT 2 m/70 cm
DUAL BAND FM HANDHELD

VX-3R

- Ultra-Compact (1.9" x 3.2" x 0.9") and Light Weight! (4.6 oz)
- Rugged Aluminum Die-cast Chassis
- 1.5 W Output w/Internal Battery (70 cm : 1 W)
  3W Output w/External DC (70 cm : 2 W)
- High-Capacity Super-thin Tiny Lithium-ion Battery with Charger (supplied)
- The Optional FBA-37 Permits Convenient Operation with AA Batteries ("AA" x 3)
- Special Memory Banks :
  WX Broadcast, VHF Marine, Short-wave Broadcast Stations
- Huge 1286-channel Memory Capacity
  24 Memory Banks x 100 ch
- Wide-band Receiver Coverage (Cellular-band Blocked)
- Internal Bar Antenna for AM Broadcast Band
- Separate Broadcast Band Earphone Jack for a Stereo Headset or Earphone
- AF Dual (Sub RX) Function : Listen to Your Favorite AM or FM Stereo Broadcast Station and Monitor the Amateur Band at the Same Time
- New Mechanical Dial Lock Function
- CW Learning and Training Feature
- EAI (Emergency Automatic ID) Function
- WiRES-II® Internet Key
- Short Text Messaging Function

Actual Size

5 W Ultra-Rugged, Submersible 6 m/2 m/70 cm Tri-Band FM Hand held
VX-7R/VX-7RB
(220 MHz: 300 mW)

5 W Heavy Duty Submersible 2 m/70 cm Dual Band FM Hand held (220 MHz: 1.5 W)
VX-6R

5 W Heavy Duty 2 m/70 cm Dual Band FM Hand held
FT-60R

5 W Heavy Duty Submersible 2 m FM Mono Band Hand Helds
VX-120 VX-127
2 m Mono Band
70 cm FM Mono Band Hand Helds
VX-170 VX-177
70 cm Mono Band

Ultra-Rugged 5 W Full Featured 2 m FM Hand helds
VX-150/VX-110

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Public Service

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"It Seems to Us"

When All Else Fails... Amateur Radio

"'When All Else Fails… Amateur Radio,' the ARRL's slogan calling attention to the fail-safe nature of the Amateur Radio Service, has never been more true for more of us than it is today."

Purists, especially those old enough to remember the 1962 novel or the 1964 movie by that title, may quibble as to whether anything can be truly "Fail-Safe." But consider this. A skilled Amateur Radio operator with a power source, an HF transceiver and a piece of wire *will* be able to communicate with *someone* from virtually any place on the surface of the planet — if not right away because of an ionospheric disturbance, then within a matter of hours. While equipment failure or the loss of a skilled operator may put a given station off the air, there are enough of us in enough different places that the Amateur Radio *Service* will survive anything short of an unimaginable global calamity.

The "all else" mentioned in the slogan are all of the sophisticated telecommunications systems that we rely on every day. Most of the time they are, indeed, reliable — so much so that we miss them all the more when they are not available. Because they have become so much a part of our lives, it's easy to forget that ubiquitous cellphones and email are very recent developments. It's also easy to forget that what makes them work is an incredibly complex, insanely expensive infrastructure. There is so much of it that it, too, will mostly survive anything we can imagine. But if the piece that fails is between us and the rest of the infrastructure, our personal communicator — unlike our Amateur Radio transceiver — becomes useless.

To be useful, however, the transceiver needs another component: a skilled operator.

In 2007 there are more amateurs than ever before who are licensed by the FCC to use the HF bands. Passing the FCC exam is an important step, but it takes more than a license to be able to turn that piece of equipment into a versatile, reliable communications tool. It takes know-how. It takes an understanding of radio propagation. It takes practical experience hooking up equipment and operating using a variety of modes. It takes participation in nets and other on-air activities. Fortunately, acquiring that know-how can be fun — a lot more fun than studying for an exam!

Emergency communications is the theme of this month's *QST*. From power sources to antennas, we hope this issue will help you add to your skill set and "tool kit" to make you even more valuable to your family and your community. You will find articles on the early history of Amateur Radio emergency communications (did you know that it predated even the founding of the ARRL?), recent developments in the Military Affiliate Radio System (MARS) program, and what it's like to be an active emergency communications volunteer. There are a couple of articles on how to improve the availability and reliability of power sources when commercial mains are out of service and another on a practical portable antenna. (Speaking of antennas, you will also find a wealth of relevant articles in *last* month's issue.) There is a comprehensive report on D-STAR, an approach to digital voice and data that is gaining adherents across the country.

As you peruse the issue, don't overlook the offerings of our advertisers. Their innovative products are a large part of the reason why we can claim to have greater emergency communications capabilities than ever before. High-performance transceivers are smaller and lighter than ever, and the aftermarket is rich with enhancements. Mobile and portable antennas are more versatile and efficient. If you want to go somewhere without leaving your ham station behind, in most cases you can take it with you!

Thus far we have talked more about *how* to communicate than *what* or *for whom* we communicate. It's good to be able to keep in touch with family members and friends, and for many that's reason enough to earn a license and develop the necessary capabilities and skills. Great satisfaction (as well as justification for our access to the radio spectrum) also comes from being of service to the wider community, either directly or by supplying communications to the variety of governmental and non-governmental agencies that respond to natural disasters and other emergencies. Serving them requires that we understand their needs and speak their language, which in turn requires training. We're moving in a positive direction, but there is more to be done.

As we work to understand and to meet today's emergency communications needs we also must think about the future. As Harold Kramer, WJ1B, points out in his article on page 38, the traditional role of the Amateur Radio communicator no longer matches what the emergency management official is looking for. Replacing their missing telephone is no longer enough. To do their jobs, they also need email and possibly Web access. In the future, what they're likely to want is for their own iPhone (or equivalent) to work — in other words, for that missing piece of infrastructure that we mentioned earlier to be restored. Filling that need is within our capabilities as radio amateurs, but it may take us in new directions and into new partnerships. Let's be open to the possibilities, and alert to the opportunities.

David Sumner, K1ZZ
ARRL Chief Executive Officer

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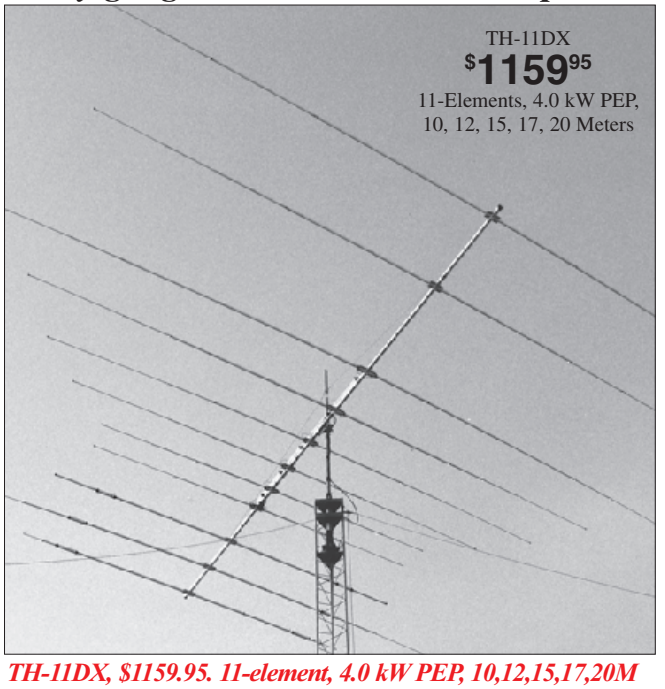

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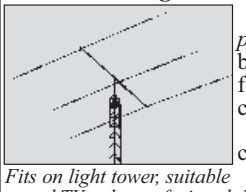

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TH-7DX	**7**			**1500**	**10, 15, 20**	**9.4**	**100**	**24**	**31**	**20**	**75**	**1.5-2.5**	**HAM-IV**	**$869.95**
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TH-3JRS	3	• Call toll-free		600	10, 15, 20	3.35	80	12	27.25	14.75	21	1.25-2.0	CD-45II	$359.95
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EXP-14	4			1500	10,15,20 opt. 30/40	7.5	100	14	31.5	17.25	45	1.9-2.5	HAM IV	$599.95

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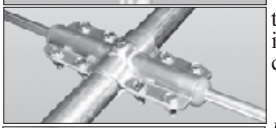

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

- The ARRL Board of Directors met July 20-21 in Windsor, Connecticut.
- The FCC filed its reply brief with the US Court of Appeals for the District of Columbia Circuit in the ARRL's challenge to the FCC's Broadband over Power Lines (BPL) rules enacted in late 2004 and affirmed by the agency in 2006.
- Preparations are under way for the 2007 ARRL National Convention/ARRL EXPO in Huntsville, Alabama August 18-19. The 2007 Global Amateur Radio Emergency Communications Conference (GAREC-07) will precede the National Convention on August 16-17.
- The winner of the *QST* Cover Plaque Award for June is Walt Legowski, WA1KKM, for his article "AARA 1, Murphy 0: Our Linux Logging Program at Field Day."
- Loren "Mitch" Mitchell, K6BK, of San Diego, California, has been appointed ARRL San Diego Section Manager to complete the term of office vacated by Pat Bunsold, WA6MHZ. In addition, Ron Murdock, W6KJ, of Yuba City, California, has been appointed Section Manager of the Sacramento Valley Section, replacing Casey McPartland, W7IB.
- In its Order in response to the recommendations of the independent panel reviewing the impact of Hurricane Katrina on communications networks, the FCC noted that "the amateur radio community played an important role in the aftermath of Hurricane Katrina and other disasters," and instructed its Public Safety & Homeland Security Bureau to "include the amateur radio community in its outreach efforts."
- The following online courses began August 3: Technician License Course (EC-010), Amateur Radio Emergency Communications Level 1 (EC-001), Radio Frequency Interference (EC-006), Antenna Design and Construction (EC-009), Analog Electronics (EC-012) and Digital Electronics (EC-013).
- The FCC dismissed three separate petitions to Section 97.119 of the Commission's Rules requesting changes to the way amateur stations are identified.
- Amateur Radio Emergency Service (ARES) members assisted firefighters on the Zaca Fire north of Santa Barbara, California, while ARES members provided communications support for damage assessment teams in flooded areas of Northeast Oklahoma.
- The IARU HF World Championship took place July 14-15.
- Grant H. Morine, W4GHM, a 17 year old from Wilmington, North Carolina, has been named the 2007 Young Ham of the Year.
- Almost 100 radio amateurs participated in TNCAT '07, the largest and most comprehensive exercise ever conducted by the Tennessee Emergency Management Agency.

Media Hits

Allen Pitts, W1AGP

"Field Day is not enough!"

One media hit a year for your club or group is not going to overcome 364 days of silence. We must publish or perish, and Field Day is definitely not enough.

But then….What a Field Day we had!

Normally I try to pick out several of the best media hits each month. I simply cannot do it this month as there are far too many. If you happen to be familiar with ARRL HQ, you may remember a very large bulletin board in the first floor hallway. It is currently wallpapered with single spaced listings of Field Day media hits — not even the articles themselves, just lists of them. It is very obvious even to the casual observer that something wonderful happened in June. There are newspapers, radio, TV, blogs, Web sites, videos and special public service announcements. The only problem I have is that there is not enough space because even more pages of listings are still coming in! The credit for this avalanche goes directly to the hundreds of PIOs and club members who took the time to advocate Amateur Radio for us all.

Alcoholics Anonymous members have a saying that goes, "It works if you work it." How true it is! The dedicated volunteers who refuse to just simply join in the lamentations chorus about ham radio but actively promote our Service are "working it," and finding results. It is to them that all credit should go for this result.

But there is a second phenomenon that members of the national ARRL Public Relations Committee spotted as the days went by. Not only were there more hits than ever, the quality of the hits was significantly improved. The newspaper articles were multi-column and almost always had pictures. The TV and radio stations had longer segments about Field Day. And, most of the reporters finally got it almost right. There were fewer obvious, major errors in the reporting.

The one and two sentence listings that used to be buried somewhere in the back pages between the bingo notices and the tag sales were rare.

Clubs did not just want a notice posted to get Field Day points, they wanted real publicity — and they got it.

Major themes this year were the provision of emergency communications for the local community or picking out one particular ham operator as an example and following their activities.

So many people worked so hard to get this result that it would be unfair to use this column to praise just a few of them and ignore the rest. The quality and quantity of the media coverage was excellent (even if propagation was not). We had everything from a Governor to a disheveled wanna-be Councilman. Ink came in from *Sports Illustrated* and *The Washington Post* and from grammar school newsletters. They all took effort, but it showed conclusively that "It works if you work it."

"Talk on a Disk" CD, Other PR Material Available

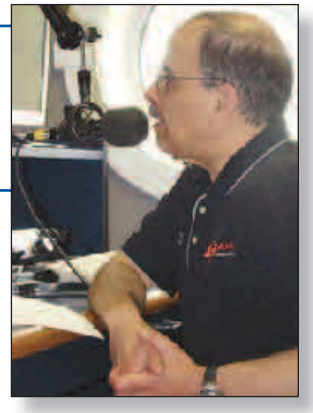
The ARRL has produced a full set of EmComm coordinated PR materials for PIOs and organizations to use in presentations to the non-ham public. Among the materials available are:

"Talk on a Disk" — a CD specially made to go with the new brochures and giving anyone the ability to make a first-class presentation about Amateur Radio to groups.

A special Web site at **www.emergency-radio.org** that describes Amateur Radio, emergency activities and how to get involved, obtain your own license and find local groups.

Information about how to order, download or receive these and many other 2007 PR materials is available on the Web at **www.arrl.org/pio**.

S. KHRYSTYNE KEANE, K1SFA



Commemorating the 40th anniversary of a contact between W1AW and VE2XPO at Expo 67, the Montreal World's Fair, ARRL Chief Operating Officer Harold Kramer, WJ1B, chats with Roland Masse, VE2PX, who was also at the mike at VE2XPO back in 1967.

PAUL ROSS, W3FIS

Delaware Governor Ruth Ann Minner seems to be enjoying her time on special event station W3D. She made several 80 meter Field Day contacts under the watchful eye of control operator Pat Ryan, KW3Z. Ryan is President of the Nanticoke Amateur Radio Club. — *tnx Walt Palmer, W4ALT*

Fort Sumter SpEv

Another chapter was written into the colorful history of Charleston Harbor's historic Fort Sumter in April, as special event station W4BWZ provided contacts in commemoration of the start of the Civil War in 1861. While actors portrayed what the battlefields and living conditions might have been like back in 1861, the Coastal Amateur Radio Association, with the cooperation of the National Park Service, operated W4BWZ.

Two stations were operational, one inside a casemate, just at the entry to the Fort and readily accessible to all visitors. The other was located at an observation point above the Fort. Handouts explained the purpose of the event and provided visitors with more information about Amateur Radio. — *Steven English, KG4WNL*

COURTESY STEVEN ENGLISH, KG4WNL

Members of the Coastal ARA set up and operated a special event station from historic Fort Sumter in April. From the left: Jeff Vortisch, W4JRV; Ted Avant, KG4RUM; Garry Barnette, WA4MDP; Bill Hiott, WA4GTC; Randy Hargenrader, K4QO; Bill Olendorf, K4KOA; Josh (not yet licensed), and Steven English, KG4WNL.

Reenactors also stayed the night on the island and performed for over 1200 guests.

Inside HQ

ARRL Publications

The ARRL offers about 200 book and CD titles. Of these, we publish about 100 ourselves and carry about 100 from our sister societies including RSGB from Great Britain and DARC from Germany along with a few other publishers. Our goal is to offer books that are useful, informative and instructive to radio amateurs. Therefore, all of our publications pertain to some aspect of Amateur Radio, radio communications or general electronics.

We also offer about 70 non-book items like logbooks, operating resources and other supply items. In recent years, we have published more titles on CD or DVD. These include annual *QST* compilation CD, *The ARRL Software Library CD ROM*, and our new *Emergency Communications CD*. A new DVD *Technician Licensing Course* will debut later this year.

While they are not yet on the *NY Times* list, our bestsellers are *The Handbook for Radio Communications*, *The ARRL Repeater Directory* (both pocket size and desktop editions), *The ARRL Antenna Book*, and our Licensing Manuals and Question Pool Q & A books.

We sell our books on the Web at **www.arrl.org/shop**. We also accept telephone or mail-in orders. Our books are sold through retail stores including Amateur Radio dealers, major bookstores and independent dealers, both on the Web and at hamfests, and through popular online retailers.

Steve Ford, WB8IMY, leads the book publication team. Shelly Bloom, WB1ENT, is our Production Manager. She is responsible for getting books designed, laid-out and printed. Sue Fagan, KB1OKW, our Graphic Arts Supervisor, designs all of our great looking book covers. Dave Pingree, N1NAS, and Devon Neal, KB1NSR, are the CAD-CAM artists who create the illustrations, charts and other graphics.

In addition, we have a team of knowledgeable customer service representatives and hard-working warehouse staff to assist you with and fulfill your orders. Our order process has recently been improved with updated shipment tracking and shipping options.

We use many of our own expert in-house authors to write ARRL books. We also work with a stable of freelance authors on individual book projects. We are always looking for new book ideas and authors. If you are interested, please contact Steve Ford at **wb8imy@arrl.org**.

With recent advances in digital print technology, we now able to economically offer smaller run publications in our catalog. If you currently self-publish a book and want us to consider adding it to the ARRL catalog, please get in touch with our Sales and Marketing Manager, Bob Inderbitzen, NQ1R, at **nq1r@arrl.org**.

73,

Harold Kramer, WJ1B
ARRL Chief Operating Officer
wj1b@arrl.org

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W1AW guest operating 10 AM to noon, and 1 to 3:45 PM (bring your license).

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www.arrl.org/arrlvec

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e-mail: qst@arrl.org

QEX — Forum for Communications Experimenters:
www.arrl.org/qex
e-mail: qex@arrl.org

NCJ — *National Contest Journal*:
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The American Radio Relay League, Inc.

The American Radio Relay League, Inc. is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communication in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every three years by the general membership. The officers are elected or appointed by the directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," the ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A *bona fide* interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters:
ARRL, 225 Main Street, Newington, Connecticut 06111-1494.

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As an ARRL member, you elect the director and vice director who represent your division on ARRL policy matters. If you have a question or comment about ARRL policies, contact your representatives at the addresses shown.

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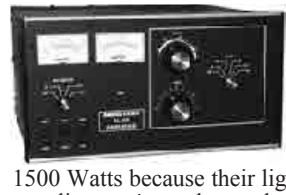

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Then there's the K3's unmatched versatility. It provides state-of-the-art performance as a primary home station, yet its size and weight make it ideal for DXpeditions, RV operation, and Field Day. You *can* take it with you!

- 100-W model starts at $1749; upgradable 10 W model, $1399
- 160-6 m; SSB/CW/AM/FM/data modes
- Up to five crystal roofing filters in both main and subreceivers
- 4"H x 10" W x 10"D; only 8 pounds
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Up Front in QST

Bitten by the cake? **I thought you might like to see the cake I created for our Brandon ARC Field Day outing this year. It was a big hit. — *Wayne Kocher, KA4IQZ***

Ham Radio Rocks!

Amateur Radio was on hand once again at the 2007 Creation Music Festival, an annual four day event at Mount Union, Pennsylvania, where every June dozens of Christian pop/rock bands and speakers come together with up to 100,000 music fans.

With thousands of vehicles converging on this rural 500 acre site, there is an obvious need to monitor vehicle traffic flow. Amateur Radio mobile operators stationed at key intersections up to 10 miles away provide information on traffic flow, vehicle breakdowns, people in need of medical assistance, lost children and other matters related to public safety. Their radio traffic is passed to a control station at the festival site. This station typically uses the special event call sign W3C. Urgent traffic is passed immediately to emergency management and local authorities assigned to the festival site. — *Mike Grimm, N8YZQ,* **n8yzq@arrl.net**

MIKE GRIMM, N8YZQ

The main concert arena at the Creation Festival at Agape Farm. Amateur Radio plays an important part in getting people safely to the festival and helps ensure they enjoy a safe and inspirational event.

MIKE GRIMM, N8YZQ

From the left: Mike Grimm, N8YZQ, Supervisor of Amateur Radio at the Creation Festival; Adam Miller, Emergency Management Director for Huntingdon County Pennsylvania, and Bill Creason, Counter-Terrorism Officer for the Pennsylvania Emergency Management Agency.

COURTESY JERRY FIORE, N4JF

Claude Gray, W4SE, of Birmingham, Alabama, is shown at the operating position of the special event station set up to commemorate the 80th anniversary of W4CUE, the Birmingham ARC. Claude, who is 97 years of age, was first licensed in the 1920s.

COURTESY OZ1XJ

He's well grounded: **Andrew Huddleston, OZ1XJ/OZ5E/G3WZZ, of Aarhus, Denmark, writes: We are completely rebuilding the shack so the ground plate went into the foundation and it looked so shiny that we had to take a picture. It struck me that the ARRL logo shows an antenna and a ground connection. There have been lots of pictures of antennas in *QST* but I do not recall the earth/ground being praised to the same degree. The copper plate is 1 × 2 meters × 0.7 mm in size. — *tnx N0AX***

National Preparedness Month is a nationwide effort held each September to encourage Americans to take simple steps to prepare for emergencies in their homes, businesses and schools. National Preparedness Month 2007 is sponsored by the US Department of Homeland Security. The goal of the month is to increase public awareness about the importance of preparing for emergencies and to encourage individuals to take action. ARRL is one of about a thousand National Preparedness Month Coalition Members. For more information, see www.ready.gov/.

National Preparedness Month

INDIANA NATIONAL GUARD

A camper rappels down a 40 foot wall as part of the fitness training at Camp Atterbury near Indianapolis. Two-hundred children nine and older took part under the Army's program for families of serving service personnel. During the weeklong session, youngsters kept in touch with home via MARSgrams, messages transmitted by Amateur Radio operators in the Army Military Affiliate Radio System. Captain Jeff Hammer, N9NIC (MARS call sign AAR5WL), an Afghanistan veteran himself, set up his portable MARS station at the Indiana Guard's Family Program Youth Camp at Camp Atterbury. — *tnx Bill Sexton, N1IN*

SUV Becomes MICC

Ready for action: **"C1," a 2003 Ford Explorer converted into a Public Safety Vehicle providing a Mobile Incident Command Center, is ready for rapid deployment by Connecticut Section ARES. Christopher Burns, N1FAA, designed it for use by the Shore Point ARC and ARES.**

Some of the gear onboard: **Motorola equipment covering VHF, UHF, VHF Lo, 800 MHz and 900 MHz bands, two Kenwood TS-B2000s with wired RC-2000 remotes and SkyCommand control by handheld transceiver, Kenwood TS-140S transceiver, Mobile Computer Terminal, Uniden BC796D scanner, BNC coax patch bay.**

Want to Submit a Photo to QST?

We're looking for good photos for *QST*. If you have one (or more), we'd like to try to publish it. Here are a couple of tips to help ensure that your photo can be considered for publication:

- Digital photos should be high resolution — if possible at least 2 megapixels. Low resolution images are convenient for posting to a Web site and to attach to an e-mail message, but they will not be published in *QST*. Resolution must be at least 300 dpi when the image is sized at 4 × 5 inches or larger. Your image-viewing software should have a "properties" function that will give you the specifications of any image.
- It's okay to crop your digital photo, but please don't resize it before sending it to us.
- Ensure that your photo is in focus and well lit. It's often helpful for us to have several different views of the same scene to choose from.
- We can also use glossy prints and slides taken with a 35 mm or larger format camera. Avoid writing directly on a print.
- Please include complete caption information, and the name and call sign of the photographer.

Photos for *QST* can be e-mailed to **qst@arrl.org** or mailed to *QST*, c/o ARRL, 225 Main St, Newington, CT 06111.

REDUCE OR ELIMINATE NOISE AND INTERFERENCE

DSP NOISE REDUCTION

CLRspkr

The CLRspkr is an amplified loudspeaker with DSP noise reduction that provides extremely effective noise reduction for both Voice and CW using the latest ClearSpeech® adaptive noise reduction. It is ideal for mobile radio operation with enough acoustic output to overcome ambient noise in the loudest vehicles. The CLRspkr clearly passes voice and CW while attenuating noise, such as hum, hiss, whistles and static. It effectively removes heterodynes, ignition noise, lightning crashes, power line noise, and hum. A CLRspkr makes mobile voice operation fun without all that background noise. Supplied with Powerpole 12 VDC connector, swivel mounting bracket and West Mountain Radio quality.

CLRdsp

A CLRdsp is the same ClearSpeech® adaptive noise reduction amplifier as inside our CLRspkr, provided in a stand alone box. The CLRdsp may be used with any un-amplified radio speaker or amplified computer speakers. Built in a heavy power coat painted aluminum case that is just the right size to be used underneath our COMspkr. A headphone jack allows use with headphones.

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If you, your family or neighbors haven't heard your signal coming out of their computer speakers you are quite a lucky ham. The COMspkr will solve this interference problem. The COMspkr is an RF proof amplified stereo computer speaker system, designed to install at a computer in or near your ham station.

The COMspkrs look good in a ham station or at a computer desk and have better sound quality than most two-piece computer speakers. The audio quality is especially good for music or voice with 3 watts per channel. They may be used mono or stereo with a radio instead of a computer, or even an MP3 player.

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RIGblaster pro

Operate digital voice on HF with SSB bandwidth! A RIGblaster pro and WinDRM software with a Windows computer that has a basic, full duplex, sound card is all you need to operate digital voice. HF signals that take no more spectrum than SSB but are noise free like FM. WinDRM is the HF digital program that works with a RIGblaster pro. The WinDRM program is free, and because you can use a RIGblaster pro there will be no problem in getting QSOs.

A RIGblaster pro is the only sound card interface that has the proper processing circuit, mic. pass-through, switching and muting to operate HF digital voice using a single full duplex sound card.

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High-end receiver performance, color LCD backlit screen, 6-160 meters transmit at 100 watts out plus general coverage on receive. 2.5 kHz Collins mechanical SSB filter standard. Optional Collins mechanical filters for CW use plus built-in DSP filtering. Superb SSB transmit capability with multiple controls for tailoring your audio. Ten-Tec's legendary silky-smooth QSK on CW. Easy to use whether you're using it in the radio room or remote from hundreds of miles away!

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CORRESPONDENCE

SLOPPY SIGNALS

♦ As an avid CW operator for more than 40 years, I have more than a passing interest in observing how our operating practices change over time. From my perspective, we, as a group of operators, are becoming increasingly sloppy. Some sloppy practices include using just the question mark as a general purpose communication to check if the frequency is occupied or to question who might have just called. We are increasingly forgetting to use DE after CQ or other calls before inserting a call sign. We are not consistently using K at the end of a transmission. We seem to be using the DX standard approach when answering another station's CQ by simply sending our call sign. My all-time favorite is some operators signing KN following a CQ.

Our hobby allows for much individuality, but we have always taken care to use good operating practices for more efficient, less ambiguous communications. With the demise of CW as a licensing requirement, it is incumbent on those of us who routinely use this mode to maintain solid, accepted operating practices so that new operators might develop good habits through our example.

FRED AFFELDT, W4JFA
Woodbridge, Virginia

DEVELOPING WITH THE DEVELOPERS

♦ I just read the product review of the Telepost LP-100 HF Digital Vector Wattmeter ["Product Review," August 2007] along with the other "antenna" related devices. I am a happy LP-100 user, having built it from a kit. The review is on target, but there is one feature that might have been pointed out. There is a very active e-mail list (**groups.yahoo.com/group/LP-100**) where users and the developer, Larry Phipps, N8LP, are working on new firmware versions and features at an amazing rate. I think the existence of an open communications channel with the developers is all too rare for ham gear, and it deserves to be highlighted when it exists.

MARTIN EWING, AA6E
Branford, Connecticut

QSL QUAGMIRE

♦ This is in regard to L. Jay Rostow's, K4AZV, letter ["Correspondence," July 2007]. When I send my QSL to the operator of a station I've worked, it is not only to confirm the contact, but also because I want to make further personal contact. I check the QSL PSE box because I hope that he will also want to share a personal contact and his card with me, and also that he will share the cost of postage. Checking the QSL PSE box should by no means be considered an obligation to return his QSL for whatever reason — it's a request! Where an obligation is implied, I do send a self-addressed, stamped envelope or an IRC and a self-addressed envelope. If I need the confirmation, I will always include one of the above. I don't get upset when I don't receive a requested card. I do, however, get upset when I have sent the required self-addressed, stamped envelope or IRC and my request still goes unanswered. I hope my requests have not caused anyone to become overwrought. It's a hobby!

DAVE TYSON, KB3MQN
Enola, Pennsylvania

♦ I could not believe what L. Jay Rostow, K4AZV, said. In talking about QSL cards, I understand the courtesy point that he was trying to make, but come on! To say my QSL cards are in effect "cheesy" was not at all called for. Within the US, I often send just the post card-type QSL card, as it saves me many coins. It's not how you sent it; it's that you *do* send it. I love getting QSL cards — what good radio operator doesn't? I have received many that were just a post card with the stamp on it, but what was important to me was all the info for the confirmed contact, not the fact they did not include a self-addressed, stamped envelope. Let me ask this: If you do not need a QSL in return, then is it still "cheesy" to send it as a post card with a stamp on it?

AL PENALUNA, N7RAA
Silver Springs, Nevada

DX DILEMMA

♦ In the June 2007 issue ["How's DX," pp 86-87], Paul Kidd, A35RK, had some interesting things to say about the various goings-on in the DX Summit Web site. He lamented the bad behavior of some people on the site and suggested that a solution might be to block the IP addresses of those miscreants; however, he went on to say that "fairness and free speech might become issues." I beg to differ.

Quite simply, fairness and free speech do not enter into it. The various DX sites were set up by individuals or groups who put forth the time, effort and money to do so — as such, the sites belong to them. They do have the last word on how people conduct themselves on those sites. It is no different than inviting people into your living room. You have the last word on what behavior will and will not be tolerated. If someone comes into your living room, whether it is in real time or cyberspace, you are perfectly within your rights as the owner to give the boot to anyone who behaves inappropriately. What constitutes fairness and free speech is entirely up to the owner(s) of the sites in question, not the guests who use it.

KENNETH P. "PAT" MYERS, N5MZL
Houston, Texas

PRIDE IN PUBLIC RELATIONS

♦ As I travel around my section and to hamfests in other locations, I repeatedly run into hams who question some of the PR campaigns dreamed up by PR types like me and the ARRL HQ folks. I want to reassure ARRL members that these campaigns aren't generated in a vacuum, because their primary use is to educate the public at large. When used properly, these campaigns are enormously effective. The general public continually needs to be reminded of Amateur Radio's importance as a hobby and a public service.

Case in point: We were very fortunate here in North Carolina that a state PRB-1 antenna relief bill became law in its first session of introduction in the state general assembly. While the bill was winding its way through the NC House and Senate, North Carolina ARRL members kept peppering legislators with the 2007 EmComm brochure and directed their staff assistants to look at the accompanying Web site, **www.emergency-radio.org**. The combination of both the print material and the Web site went a long way in helping legislators to comprehend the role Amateur Radio plays in emergencies. As the state with the second highest history of hurricane landfalls, the need for an antenna relief bill was easy once lawmakers grasped the importance of ham radio. By the way, the legislation passed unanimously in both the House and the Senate.

BILL MORINE, N2COP
Wilmington, North Carolina

Your opinions count! Send your letters to "Correspondence," ARRL, 225 Main St, Newington, CT 06111. You can also submit letters by fax at 860-594-0259, or via e-mail to: **qst@arrl.org**. We read every letter received, but we can only publish a few each month. We reserve the right to edit your letter for clarity, and to fit the available page space. Of course, the publishers of *QST* assume no responsibility for statements made by correspondents.

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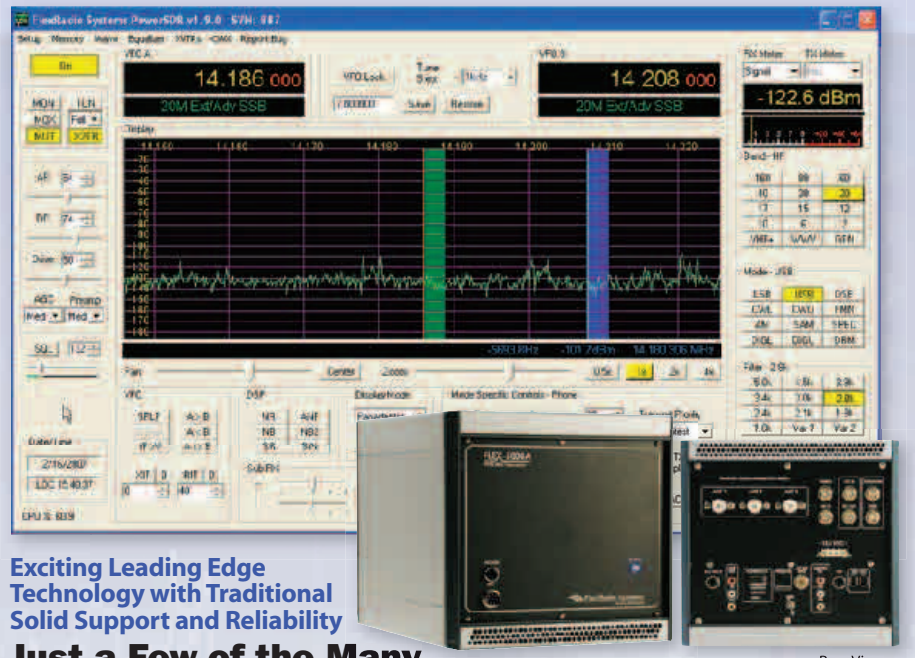
Mike, KM0T – I had always dreamed about a radio and interface like this; but never thought it would ever happen. I sometimes catch myself staring at the screen showing the microwave band frequencies thinking "Man this is awesome!" Seems every time I turn around, there is something new coming down the pipe to make the whole setup better.



Rear View

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All these data cables are included with the amplifier.

Features

- Lightest and most compact 1kW HF amplifier in the industry.
- The amplifier's decoder changes bands automatically with most ICOM, Kenwood, Yaesu.
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- Built in power supply.
- AC (200/220/235/240V) and (100/110/115/120V) selectable.
- Equipped with a control cable connection socket, for the HC-1.5KAT, auto antenna tuner by Tokyo Hy-Power Labs.
- Two antenna ports selectable from front panel.
- Great for desktop or DXpedition!

Specifications

Frequency:
1.8 ~ 28MHz all amateur bands including WARC bands and 50MHz

Mode:
SSB, CW, RTTY

RF Drive:
85W typ. (100W max.)

Output Power:
HF 1kW PEP max.
50MHz 650W PEP max.

Matching Transceivers for Auto Band Decoder:
Most modern ICOM, Yaesu, Kenwood

Drain Voltage:
53V (when no RF drive)

Drain Current:
40A max.

Input Impedance:
50 OHM (unbalanced)

Output Impedance:
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Final Transistor:
SD2933 x 4 (MOS FET by ST micro)

Circuit:
Class AB parallel push-pull

Cooling Method:
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MPU:
PIC 18F452 x 2

Multi-Meter:
Output Power – Pf 1Kw
Drain Voltage – Vd 60V
Drain Current – Id 50A

Input/Output Connectors:
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AC Power:
AC 240V default (200/220/235) – 10 A max.
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AC Consumption:
1.9kVA max. when TX

Dimension:
10.7 x 5.6 x 14.3 inches (WxHxD)/272 x 142 x 363 mm

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The design of the Prometheus is the result of over 10,000 hours of research and development, encompassing hundreds of hours of mathematical analysis, computer simulation and modeling, and numerous prototypes and experiments spanning over a five year period.

The result is a rugged, commercial quality amplifier designed to run cool under 1500W continuous SSB, CW or RTTY, with transformers and combiners designed for full power operation even on 160 meters. With no tuning and no warm up time delay, it provides reliable power instantly so that rare DX station doesn't get away. The product features tell just part of the story. Learn more about this cutting edge amplifier and Dishtronix, the visionary USA company that made PROMETHEUS a reality at: **www.dishtronix.com**

Product Features

- Fully Automatic Band Switching: The DX2400L1 can be controlled (optional converter may be required) with the transceivers band data through CAT/CIV/ RS232 style optically isolated interface.
- For older transceivers without band data, the DX2400L1 Internal Frequency Counter can sample the incoming RF drive and determine the proper band of operation under microprocessor supervision.
- Four Position Antenna Switch with automatic memory for last antenna used for each band.
- Cool running 4800W Extra Heavy Duty DC Power Supply is the most powerful in the industry.
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- Digital Bargraph Display for Forward Power, Reflected Power and True (computed) SWR.
- Full Loop QSK Keying to interlock transceiver and amplifier.
- Vacuum Antenna Relay as standard equipment. PIN diode T/R switch available as an option.
- FLASH Microprocessor allows field upgrades of amplifier firmware.
- Separate low voltage control transformer for bias and microprocessor circuits reduces power consumption in continuous standby mode and allows metering of transceiver when in bypass mode.
- Full Optic Isolation of all control functions (Key In, Key Out, PTT, Band Data, Remote On) from transceiver as well as full optic isolation of computer/ remote interface port.
- 2400 W PEP Total Rating of RF power transistors.
- Heavy Duty Low Pass Filters constructed with 12 gauge coils and custom high power capacitors.
- Oversize (30 lb) Heat Exchanger and 4 thermostatically controlled, ball bearing, variable speed cooling fans mounted in push-pull configuration for redundancy.
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- Dual Control Inputs allow operation from two different radios.
- Optional rack mount package.

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TM-271A

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Operating D-STAR

You've seen the ads, now find out how it works and what it does.

Gary Pearce, KN4AQ

ALL PHOTOS BY THE AUTHOR

Figure 1 — A complete system, an ICOM D-STAR repeater and controller, along with the ID-800 mobile and IC-91AD handheld, getting ready for operation on the K4ITL repeater system in Raleigh, North Carolina.

You've probably heard or read about D-STAR, the system for VHF/UHF digital voice and data being promoted by ICOM. At the very least you've seen the ads. But very few hams have actually used a D-STAR radio through a D-STAR repeater system. Since this could be the leading edge of "the future of Amateur Radio," you might be curious what that future sounds like and how it works.

Digital Telephony is Here to Stay

Out there in real life (that is, outside of Amateur Radio), the transition from analog to digital communications is happening all around us, though each industry has its own pace.

From the everyday user's perspective, cell phones are way out front. Try to buy an analog cell phone today — you're going to have to look hard. The cell phone industry had to embrace digital quickly, even though it had a huge analog infrastructure. Digital let cell systems more than quadruple the number of calls they could handle in a given amount of time and spectrum, two elements in very limited supply.

Digital *landline* telephony may seem in its infancy, but behind the scenes the good old phone company has been digital for years. The copper wire carrying your analog voice probably doesn't go more than a mile or two before the signal is converted to digital for transport to anywhere on the globe. Sykpe, Vonage and other VoIP phone systems are just the new kids on the block.

Digital audio and video on the Internet are booming. Just ask your kids. This is new stuff, with no old analog infrastructure to push out of the way, though it seems as if my computer is prodding me to install an update to one of the many media programs every few days.

Digital Voice over Radio

Broadcast television is teetering on the edge of its digital revolution. Almost every TV station now has a digital transmitter going, and most have at least some high-definition programming. In February 2009, just after the Super Bowl, all US analog TV transmitters get turned off for good. Public safety and business radio users sit poised to jump on the spectrum that will then open up in the 700 MHz band.

Broadcast radio, both AM and FM, are in their digital infancy. It's a troubled birth. I wouldn't blame you if you didn't know there *is* a digital AM and FM, even though there are more than a few stations broadcasting that way now and there have been a few fairly recent *QST* articles on the topic.[1,2] Digital AM yields "FM quality" sound, and digital FM is "CD quality." Some of the stations call themselves "High Definition Radio." They don't have the same pressure their TV siblings do, since digital radio is done "on-channel" along with the analog signal. It uses no extra spectrum, and there's no deadline looming for switching off the analog signals. Broadcast satellite radio is breathing down their necks, though, and they've been digital from the start (Sirius and XM Radio are the two satellite radio broadcasters in the US).

Business and public-safety two-way radio are slowly making the transition. They are required to reduce their channel space over the next few years, but they can do that with either analog or digital modes.

And then there's ham radio, where digital voice is still just a novelty. Hams are happily using voice modes that were developed in the first half of the previous century — AM, FM, SSB — and the equipment we use today is still compatible with the earliest products developed for those modes more than 50 years ago. For hams, the transition to digital is going to be bumpy, for many reasons. We have to spend our own money to upgrade and, except for the change from spark to CW, we've never been told we have to. SSTV, RTTY, packet, PACTOR and the other TORs, PSK and the newer, narrow text/data modes are niche modes that are fairly inexpensive add-ons to your existing HF and VHF radios. Even so, they have a relatively small (but enthusiastic) number of users. With few exceptions, digital voice is still an expensive and rare HF add-on.[3]

[1]Notes appear on page 33.

Enter D-STAR

Digital voice for VHF-UHF, such as with D-STAR, requires whole new, and fairly expensive radios. There have to be some big advantages to get us to go there. Will the D-STAR digital voice system provide the advantages that will spur a VHF/UHF version of the switch we saw from AM to SSB on HF in the '50s and '60s? It might. It offers clearer signals with less bandwidth than analog FM, and a more elegant and targeted form of networking than *IRLP* or *EchoLink* (amateur voice over the Internet with radio links) do today.

My first experience with D-STAR came in Huntsville, Alabama last October at a D-STAR training seminar. Here several D-STAR pioneers gave talks to help the next wave of early adopters understand how this system works. These seminars are intended for repeater owners and the most dedicated users. You can get really deep into this stuff. It reminds me of both the enthusiasm and complexity that packet network sysops experienced in the mid '90s. Everyday users, you and I, won't need to get this deep into it. At the most basic level, we'll be able to operate digital voice through repeaters almost as easily as we use analog repeaters today — you'll need to enter your call sign in a menu in your radio before you use any repeaters. After that, just key up and talk. To go beyond that, to talk to a ham on a networked repeater in a distant town, the D-STAR system makes you poke and prod inside your radio's menus a bit to enter more call signs

(your local repeater, the distant repeater, or the ham you want to talk to) and set options. If you are a ham who finds programming your radio for CTCSS (continuous tone coded squelch system) so you can use a tone access repeater too big a challenge, I'm afraid you might be left in the digital dust. At least for now.

But fear not — this change will happen slowly. That analog-only handheld you got for Christmas will have a place for a long, long time.

D-STAR Needs Repeaters, Too

D-STAR repeaters are special. Because of the narrower D-STAR bandwidth and special requirement to allow decoding of the modulating signals, D-STAR repeaters don't work between analog radios, nor can analog repeaters handle D-STAR signals.

Repeater coverage is reported to be just a little better with D-STAR than we're used to, thanks to the narrower bandwidth. I've heard numbers ranging from 10 to 25% better, although the same hams who make those reports also say that you might be able to copy a *very* weak, very noisy analog signal below the level that a D-STAR signal just disappears.

There are a few other things missing from your familiar repeater experience, at least with the current crop of repeater equipment and controllers being sold by ICOM. No squelch tails. No hang-time — just a quick burst of data from the repeater that you can see on your S-meter when you let go of your push-to-talk (PTT) switch. No courtesy beeps (though there is a beep of sorts generated by *your* radio that you hear at the end of a transmission sometimes). No autopatch. ICOM's controller has no provision for Morse tone (MCW) or voice identification announcements or other canned messages.

You hear a user's voice, or you hear nothing. You can *see* something, however. Whenever you receive a signal, you see the transmitting station's call sign on your radio display. You might also see a short text message, such as "Hello from Gary." And S-meters still work. When someone else is talking you can see how strong the repeater is, even if your ears aren't giving you any of the usual clues.

Otherwise, routine operation on a local repeater is, well, routine. You push-to-talk and release-to-listen. One exception — you have to program your call sign into the radio before you can talk through a repeater. You do that with the front-panel buttons and menus. Or you can do all the programming with a computer using optional software and an interface cable. (Everybody I've talked to recommends getting the software and cable.)

In theory, you don't ever have to speak your call sign. It's been sent as part of the data stream and appears on listeners' displays. In practice, D-STAR hams speak their call signs just as they do on analog FM, at least so far. (Maybe it's best not to lose that habit, if you also operate on analog repeaters.) You also have to have the repeater's call sign programmed in your radio, but that can be done automatically. Just make an initial transmission through to a repeater (that won't be repeated), and the repeater will send a bit of data with its call sign, which your receiver will pick up and store.

D-STAR Digital Voice — an Improvement?

What does D-STAR digital voice sound like? If you have a cell phone, you've probably heard lots of digital voice audio. My cell phone is one of the increasingly rare models that will do both digital and analog. When I'm in very rural areas (such as the middle of Death Valley, as I was recently when my phone surprised the heck out of me by ringing), I get only an analog signal, and I find the background noise and picket-fencing to be unusual, even though I'm used to hearing all that on ham repeaters. In digital mode, the cell phone audio is usually perfectly clear. When the signal gets *very* weak, the voice I'm listening to begins to garble a little. Syllables or whole words just disappear, but there is no noise. It's actually kind of irritating, because intelligibility begins to suffer before you know what's happening. You miss words, but you don't know you've missed them. With a noisy analog signal you know when you're losing pieces of a transmission.

Most of the time the digital signal is preferable to a noisy analog signal. On D-STAR, it's the same. No noise. No picket-fencing. Above the minimum signal threshold, the voices you hear are crystal clear. They do have a digitized quality to them. I've heard it referred to as "metallic," or "robotic." This is a result of the vocoder (voice encoder) that the hams in the Japan Amateur Radio League (JARL), who developed the D-STAR protocols, chose to incorporate.

The vocoder is the software that digitizes your voice and compresses the data into a skinny serial stream that doesn't use much bandwidth. It's not as pleasant and full-bodied as some of the better analog FM signals we hear today. You don't hear as much of the unique timbre and qualities that distinguish one voice from another. People don't sound exactly alike, but they're not quite the individuals they are with a good analog signal. And frankly it's not something I'd be happy hearing over the long term, although hams have been happy enough with 2.1 kHz wide SSB, which

Figure 2 — The full stack of D-STAR equipment at the test bench of Jim McClellan, N5MIJ. From top to bottom, an IP-RP2C controller, an ID-RP2D 1.2 GHz data repeater, an ID-RP2V 1.2 GHz voice repeater, an ID-RP4000 440 MHz voice and data repeater, a blank panel and an ID-RP2000 146 MHz voice and data repeater.

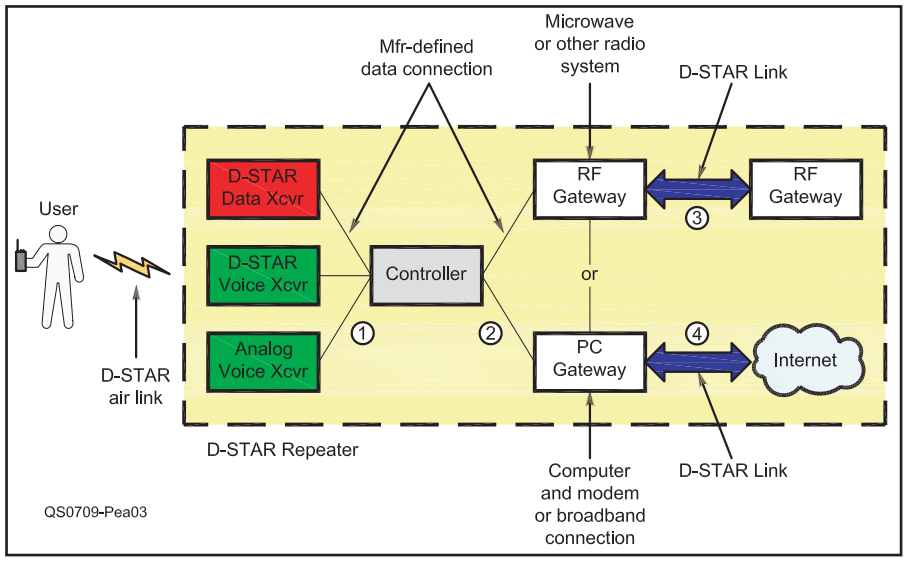

Figure 3 — Internal and external connections of a D-STAR repeater stack as in Figure 2.

destroys a voice's personality as much or more than D-STAR does. I look forward to a day when we can stuff some fairly hi-fi audio on a narrow digital signal. It's much more pleasant to listen to on a long rag-chew.

When D-STAR signals are weak you hear more garble, for a longer period of time, than you do on a cell phone. Cell phone systems suppress the weak, garbled signal. D-STAR doesn't. So if the signal you're listening to sits at the threshold for a long time, you hear something that sounds like speech with a bunch of random musical tones thrown in. You can pick a word out here and there, but you can't really understand anything. Just a little change in signal strength, though, and you're back to 100% again — or down to nothing.

D-STAR Does Data

D-STAR also includes data capability that starts with packet-like text and expands to moderate-speed Web browsing.[4] Basic connectivity starts with 2 meter and 70 cm transceivers and their repeaters that can feed combined voice and data at a respectable 9.6 kbps into network controllers. Transceivers at 23 cm work into separate repeater types dedicated to either voice or data at 128 kbps — perfect for data concentration nodes or heavy data hub connectivity. A full stack of D-STAR equipment at N5MIJ is shown in Figure 2.

The power of D-STAR data connectivity, and its usefulness as an emergency communication data backbone, is shown in Figure 3. Here we see the repeater interconnections expanding into potentially worldwide networks that can interoperate with other systems through internetworking.

Networking is Power

Networking is where D-STAR gets more complex and really adds value. D-STAR repeaters can operate as stand-alone systems. Or they can be interconnected into networks using either other D-STAR RF links or by plugging into the Internet. The connection to a network is called a gateway. A repeater with a gateway gives users instant access to other networked D-STAR repeaters. Here's where it gets cool, if a little complicated.

To communicate through a network to another station or group of stations, you program call signs into your radio. If you want to reach a specific individual on any repeater on the network your local machine is connected to, you program his or her call sign. If you want to talk to anyone and everyone on a specific repeater on that network, you program that repeater's call sign. If you want to talk to everyone on a *group* of repeaters or on the whole network — you can't. At least not yet. It seems the Japanese D-STAR developers did not plan for multiple repeater linking, in which everyone talks to everyone over a group of linked repeaters, so they didn't design that into the system. It'll come. (At this time, there is only one "network" of D-STAR repeaters, and each repeater owner with a gateway has joined that one network. There can, and probably will someday, be multiple networks. With the current gateway software, a repeater owner would have to make a choice — the repeater can't join more than one network.)

The ability to target an individual ham by call sign might be the most interesting feature of D-STAR. Once you've been "registered" on a gateway repeater (by talking to the sysop and to have your call sign plugged into the repeater database) your call is propagated to every other D-STAR repeater on that network. They all know *who* you are, and they all know *where* you are. That is, they know what repeater you keyed up last. So when you travel, say from your home in San Francisco to Washington, DC, you make a transmission on a D-STAR repeater when you arrive, and that repeater tells the network you are now on a specific repeater in Washington. A friend back in California may not even know you've left town, but when he plugs your call sign into his radio and calls you, his audio is routed to the Washington repeater and out your speaker. You reply. (There is some delay, up to 24 hours, in getting your position propagated across the network. But if you call back to your local repeater right away, that repeater updates your location immediately. System gurus are working on speeding up the general call sign propagation.)

The audio your friend hears is exactly the same as if you were still local. In fact, nothing tells him that you are on a distant repeater. No repeater calls, no beeps, clicks, crackles or sputters. Unless he looks at his display. Then he can see that there are a couple of repeaters involved in the QSO.

Figure 4 — Part of the extensive menu system on the IC-91AD handheld. It takes a minute to get used to what YOUR call sign and MY call sign mean. To talk to anyone, you program CQCQCQ in the YOUR field. If you wanted to talk to a specific station, you'd program that station's call sign in the YOUR field. If you want to use specific linked repeaters, you use the RPT1 and RPT2 fields. This is one radio you can't operate without some quality time in the manual.

You, though, need to do something on your end before you reply. You need to program your friend's call sign into your radio, so the network can route your signal back to him. You can set your radio to do this automatically when it receives a call directed to you.

This scenario does point to a combined technical and human consideration with D-STAR. If your friend does not know you are out of town, how likely is it that he's programmed your call sign into his radio? That depends. If you guys operate D-STAR mostly like a conventional repeater, where you just listen for any voice calls on the local machine, then it's not likely he'll program your call sign into his radio to make this call. It is a little cumbersome to program call signs into the proper menus. It is *not* something you want to do while driving. And he's expecting you to be listening, so he just calls.

If you're deeper into the D-STAR capabilities, though, he might expect you to be using something like "call sign squelch." With that, you can set your radio to be quiet unless someone calls you with *your* call programmed into *their* radio. It's like your own personal CTCSS code, only more obvious because it's your call sign, not just a tone frequency. And if your radio is on but you're not immediately available, it can send an automatic reply in data or voice to say you got the call. If you and your friends are D-STAR power users, you'll be ready for anything and you'll work the system like pros.

The Bells and Whistles

D-STAR is full of features like that, each more or less complex. Will hams take advantage of them? So far, most hams have shown little interest in much beyond push-to-talk. Figures 4 and 5 provide a view into programming features into an IC-91AD handheld transceiver.

Well, D-STAR call sign squelch is a more elegant next level compared to analog paging. You want to call me? You don't have to remember that I'm *256 and you're *847. You just plug in KN4AQ and you're done. Hams who have been using D-STAR for a while quickly realized that they could use the radio's extensive memory system to program common routing and call sign addresses, so they don't have to fumble with the keypad and display as much as they would have had to with analog equipment.

D-STAR's feature set goes well beyond voice and command data. The VHF and UHF radios can be used for 1200 bps text and data *while simultaneously being used for voice*. The 1200 MHz radios can be used for 128 kbps data, fast enough for Internet browsing and file transfer. ICOM's 1200 MHz D-STAR radios have Ethernet ports and appear to your computer as just another network. Hams are busy writing applications to adapt D-STAR to messaging, database,

APRS and other networking operations.

But How Will D-STAR Fit?

Beyond user operation, D-STAR has introduced some new challenges to the world of VHF and UHF repeaters. The US and other countries with significant V/UHF operation have band plans in place developed for our current analog technology — 15 or 20 kHz channel steps on 2 meters, and 25 kHz channel steps on 70 cm. In all but the most rural areas, the 2 meter band is fully allocated. There's little or no room for additional repeaters. In our bigger metro areas, the 70 cm band is also full. Where do we put new D-STAR repeaters? How do we accommodate this new mode, and take advantage of its more efficient use of spectrum (D-STAR repeaters work fine with 10 kHz channel steps, whereas analog FM repeaters work better with 20 kHz steps). Frequency coordinators and repeater councils are struggling with this question now. There are no easy answers.

The hams who want to run D-STAR repeaters now won't be contained. Some are taking down analog repeaters and replacing them with digital machines, for the time being wasting some spectrum. And some are squeezing into areas of 2 meters where repeater operation is prohibited (144.1-144.5 and 145.5-145.8) based on an exchange of correspondence with the FCC's William Cross, in which he expressed the opinion that if D-STAR is as described — more like a store-and-forward packet system than a voice repeater — it isn't really a repeater and is not subject to repeater rules. This opinion, and the logic behind it, doesn't hold water with many frequency coordinators, but there are some repeaters on the air now in regions of the spectrum generally considered not to be repeater segments.

As D-STAR grows, analog radio users, who will be in the majority for a long time to come, will begin to have problems with digital and analog signals mixed in the same spectrum. A D-STAR transmission heard on an analog receiver sounds like the rush of open squelch. Except you can't just turn up the squelch control and make it go away. Almost every repeater today has several neighbors on the same channel 100 to 200 miles away, and almost every repeater user hears one or more of their co-channel neighbors during band openings. If one of those neighbors goes digital, they will hear, instead of voices, that rush of noise. This won't make analog users happy, and the solution offered — have the analog users turn on CTCSS to block the unwanted signals — has never been popular.

Not the Only Game in Town

While this article is about D-STAR, I should point out that D-STAR isn't the only digital mode on VHF-UHF Amateur Radio. Alinco was actually first to market with a similar type of digital VHF Amateur Radio system but one not compatible with D-STAR.

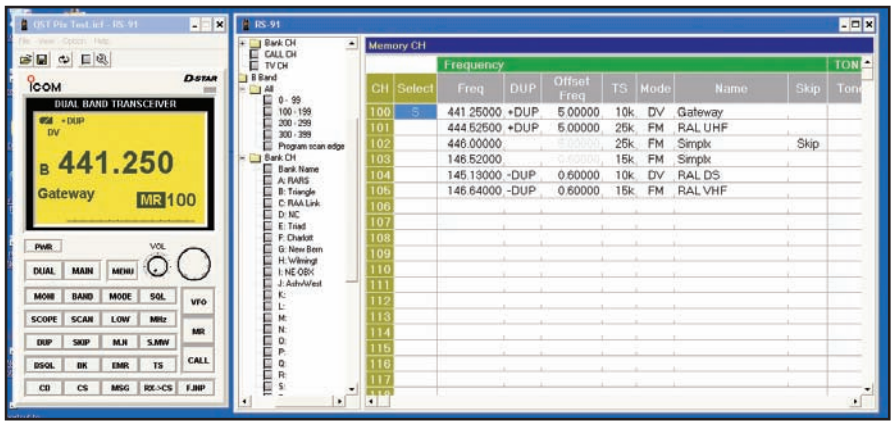

Figure 5 — Screenshot of a small part of the extensive RS-91 programming software for the IC-91AD. Each model radio needs its own software and interface cable, sold as individual options by ICOM.

They offer radios that can be upgraded to digital operation, but have not announced the repeaters and other networking hardware needed to make complete systems, as are available for D-STAR. The AOR digital models that some are using on HF can be used on any type of voice system, including VHF and UHF FM.[5] They offer the option of working with the existing repeater infrastructure.

A few hams have also acquired surplus commercial radios and have built repeaters using the APCO (Association of Public-Safety Communications Officials) P-25 digital standard used by public safety networks (also not compatible with D-STAR). Nobody's making P-25 equipment specifically for the amateur market. To use P-25 you have to convert commercial radios. For the moment, ICOM is the only manufacturer making D-STAR equipment, though it's not proprietary and others are expected to announce D-STAR equipment. All of ICOM's D-STAR equipment is dual-mode and works fine in the analog world. Nothing says that D-STAR will be *the* digital mode for V/UHF Amateur Radio in the future, though ICOM and D-STAR have a head start with a fairly deep line of mobile, handheld and repeater radios and systems already on the air.

Where Will it Lead?

In this article I've just scratched the surface of D-STAR. A deep scratch, perhaps, but there's still a lot more out there. I recommend two Web sites to begin learning more: ICOM America's site (**icomamerica.com/amateur/dstar**), and the Texas Interconnect Team, K5TIT, site (**k5tit.org**). Both sites feature forums from which you can review past discussions and ask your own questions. Beyond that there are many more Web sites and Yahoo forums dedicated to digital ham radio and D-STAR. I've talked to many D-STAR system operators while researching this article, and I'd like to thank them all for their contributions.

My ever-fuzzy crystal ball says that VHF digital does have the operational advantages to slowly gain popularity and eventually overtake — perhaps replace — analog operation. The questions are how fast, and how messy, the process will be. My guess is "not fast" because of the vast analog infrastructure we have now, and pretty messy because of the straitjacket of that infrastructure and the band plans that accommodate it. But it will grow. D-STAR repeaters are popping up around the country (with Alabama taking the lead, thanks to a statewide push to improve ham radio networking there following hurricane Katrina). The question for you today is whether you want to get in on the ground floor, or wait a while to see how it matures. Either option suits the future of ham radio just fine.

Notes

[1]R.Lindquist, N1RL, "FCC News: FCC Adopts Digital Broadcasting Standard," *QST*, Jul 2005, p 70.

[2]S. Ford, WB8IMY, "Digital Broadcasting Has Arrived — the Story of WOR," *QST*, Mar 2003, pp 31-33.

[3]*WinDRM* is an exception — see S. Ford, WB8IMY, "Life Could be a DReaM," *QST*, Apr 2007, pp 38-40.

[4]W. Silver, NØAX, "D-STAR Digital Voice and Data — An Overview," *QST*, Jun 2005, pp 67-69.

[5]J. Hallas, W1ZR, "Product Review — AOR ARD9800 Digital HF Voice Modem," *QST*, Feb 2004, pp 80-81.

Gary Pearce, KN4AQ, has been involved with FM and repeaters since the late 1960s. He is the former editor of the Repeater Journal, *the magazine of the SouthEastern Repeater Association — SERA — and is a former FM columnist for* CQ VHF *magazine. He is currently launching a video production company aimed at producing programs for and about Amateur Radio called ARVN, Amateur Radio//Video News. The ARVN Web site is* **www.ARVidNews.com**. *You can reach Gary at 508 Spencer Crest Ct, Cary, NC 27513 or* **kn4aq@arrl.net**.

Maximum Gain Portable HF Yagi

Here's a clever, portable beam, with gain on both 40 and 20 meters.

James Michener, K9JM

Inspired by VE7CA's November 2001 *QST* article describing a two element portable HF Yagi, I immediately concluded that such an antenna would be excellent for emergency communications as well as future ARRL Field Days. Given two supporting "boom" poles raised in the trees, I wanted to investigate how to achieve maximum gain from a 20 and 40 meter multiband version of this type of Yagi. Since it is easy to separate the two boom poles to support the Yagi wires, the question comes down to getting the most gain out of a rectangular area, while still keeping things simple.

Making It Coast to Coast

Field Day on the West Coast is especially challenging during a sunspot minimum. It's easy to work West Coast stations on the low bands, but the prize is having a solid signal to work the five times as many groups in the Midwest and the East. Breaking through the din all the way from California on 40 and 20 meters is a real challenge. This need gave birth to this unusual variant of a wire beam.

Gain and Directivity on Two Bands with a Single Antenna

Figure 1 shows the basic antenna. The antenna is a 40 meter two element beam consisting of an oversized driven element and a single reflector. On 20 meters the driven element becomes a double extended Zepp with a pair of reflectors, one behind each of the two current nodes. The antenna is also usable on 75 and 80 meters as a simple doublet. On 40 meters the performance is very much like a classic two element beam, with about 6.56 dBi gain in free space (see *EZNEC* plots in Figure 2).

On 20 meters there is an additional 2 dB of gain, or 8.46 dBi in free space, with gain nearly equal to that of a four element Yagi. In essence on 20 meters this antenna performs like two horizontally stacked two element 20 meter beams. While it nearly has the forward gain of a four element beam, its front to back is typical of a two element Yagi.

For best performance on 40 meters the antenna needs to be at least 40 feet in the air, although 50 to 60 feet is preferred. I tuned the antenna dimensions for the CW ends of each band and constructed my antenna out of 13 gauge insulated wire.[1]

The reflector spacing is not critical. The plots in Figure 2 are for 10 feet spacing for the 20 meter reflectors and 16 feet spacing for the 40 meter reflector. The spacing for the 40 meter reflector will most likely be determined by the length of the support poles you can find. There is a slight gain and bandwidth improvement with wider spacing, but any spacing between 15 and 20 feet will work.

[1] *EZNEC* model files are available at **www.arrl.org/files/qst-binaries**.

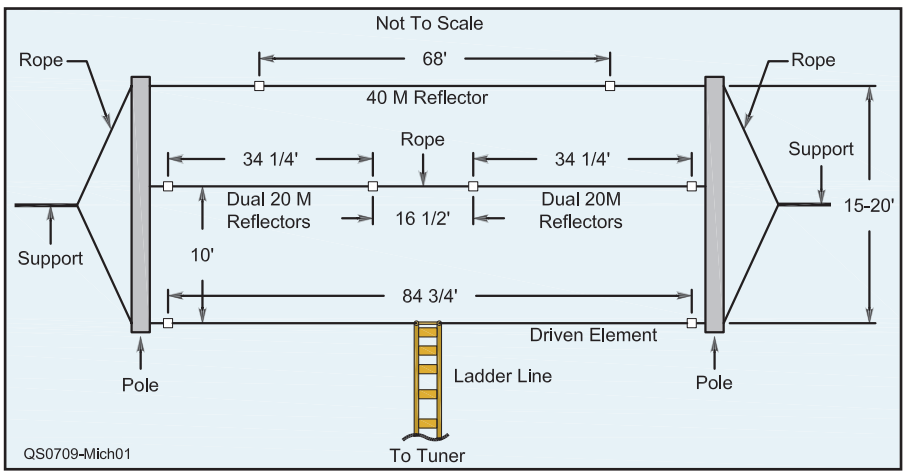

Figure 1 — Layout of K9JM 40 and 20 meter dual band Field Day Yagi. All wire is 13 gauge PVC insulated wire.

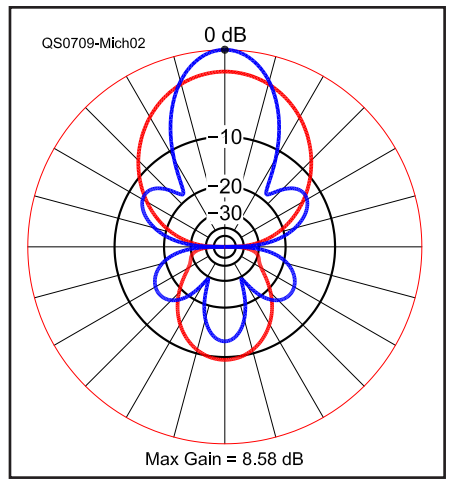

Figure 2 — Comparative azimuthal patterns for 20 (blue) and 40 meters (red) Yagis in free space.

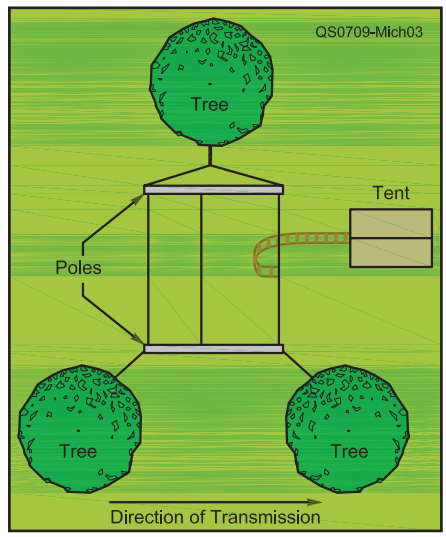

Figure 3 — Three-point technique for raising the K9JM 40 and 20 meter Field Day Yagi. This technique is flexible in deployment since the antenna can be aimed in a desired direction by tensioning the ropes properly.

Figure 4 — One end of the duoband Yagi, showing the bamboo support boom. The window line feed is also shown. (Keen eyed observers will note that this version includes an experimental set of 15 meter wires. The experiment wasn't successful, however, mainly due to SWR changes when the wind blew.)

Figure 5 — Putting up the Yagi was easy. Keeping the rattlers out of the tent was more of a problem at the AE6C Field Day site in the wilds of northern California! Pete Murphy, W6WY (not to be confused with Murphy's Law) holds up a large California rattler, which perished from a brain injury.

Pulling it All Together

The input impedance is reactive on both bands. For simplicity, I fed the antenna with open wire window line, tuned with an old Johnson Matchbox balanced tuner.

While the antenna is mainly wire and rope — both commonly available — you may have difficulty finding poles for use as spreaders. For Field Day, I would suggest using bamboo poles. I found mine by doing a Google search using my city and the word "bamboo" and found a local supplier. You might find that talking with a local carpet distributor results in some free bamboo poles that they use at the centers of their carpet rolls.

Bamboo is great for Field Day because it's lightweight, strong and inexpensive, but it won't last many winters in a permanent installation. For year-round applications 1½ inch diameter fiberglass poles come in 20 foot lengths and generally sell for around $3 per foot. These poles can be found through major industrial distributors in major cities or mail order (MFJ or Max Gain Systems).

Most installations use a two point support. I found that it was easier and more stable to use a three point technique as shown in Figure 3. I suggest using a spacing between support trees of more than 110 feet. Finding two trees with the right heading and spacing may be difficult. The three point technique provides a degree of directional adjustment through varying the length of the ropes.

Although this antenna is a behemoth, as a test I was able to raise it by myself on my own property before Field Day. With three people, it went up smoothly on Field Day. See Figure 4. First pull up one end into its tree, while a second person holds tension on the lower pole. Then pull up the lower pole.

The Payoff

At the AE6C Field Day in northern California, we were able to work East Coast stations with ease, while sidelobes were sufficient to also permit working West Coast stations. In 40 years of amateur operation, this was the easiest and best low band Field Day antenna I have ever used!

James Michener, K9JM (ex-WB2SMD), has been a ham for 42 years. He has a BSEE, MSEE and MBA, with over 30 years of experience designing RF and video equipment for the television broadcast industry. K9JM is an ARRL Pacific Division Assistant Director and serves as net manager for the Northern California Net. He can be reached at 16851 Aileen Way, Grass Valley, CA 95949-7338 or at **k9jm@sbcglobal.net**. QST

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Strays

ST LOUIS HAM'S STATION DONATED

♢The complete Amateur Radio station of Carl H. Hohenberger, WBØBZP (SK), was donated to Camp Wyman for underprivileged children by his sister, Carol, KAØHZS, in June. "Carl was a quadriplegic and Amateur Radio opened the world to him," Carol said. "It took away boundaries and allowed him to make friends both in St Louis and around the globe. He would be happy to know the gifts will be used to encourage youngsters to earn their ham licenses.

The station included a Kenwood TS-440, a new Butternut vertical antenna and accessories. In addition, Carol donated $500 to defray costs of any additional needed equipment. Camp Wyman is located at Eureka, Missouri, in St Louis County. The contribution was arranged by Dennis McCarthy, AAØA and included informational materials from the ARRL.

The Remote Power Controller

Tired of plugging and unplugging the battery cables on your older solid state transceiver? Then you need this nifty device.

Mike Bryce, WB8VGE

I've always enjoyed both fixing old radios and keeping my station on the air when the commercial power fails. It was these two interests that gave rise to this project.

One of the radios I use on battery power is an old Ten-Tec Triton IV. The Triton IV has a very quiet receiver and its current draw on receive is battery friendly. The Triton IV is all solid state and is capable of producing a fair amount of "fire in the wire" when transmitting using battery power. Best of all, there's no microprocessor to worry about.

But there is a problem running the old Triton from battery power — you can't turn the radio on or off from the front panel. You have to either unplug the power cord or remove the cables from the battery. Unless you have the specific Ten-Tec 262 power supply made for the Triton, you can't turn it on or off, no matter what the external source of power is.[1]

As designed, the power switch for the Triton IV controls the 120 V ac supply primary circuit. The power switch does not, nor can it, handle the more than 20 A at 13.8 V dc the transceiver requires.

Of course, it's not just the Triton IV that has this problem. Other Ten-Tec radios that include this feature are the Omni series, the Corsair series and the Argosy transceivers. My old Heathkit SB-104 suffers the same predicament. In fact, many older solid-state transceivers have this problem.

The Fix

My fix is shown in Figure 1. I call this project the Remote Power Controller. The front power switch on the radio operates normally, but it now controls a large power relay. This relay sends +13.8 V dc to the radio from any source, be it a battery or an ordinary low voltage, high current dc power supply. Now this is certainly not rocket science, but my circuit is a bit different. A power relay normally requires a fair amount of current to operate. When operating on battery power I did not want to waste power by keeping a relay closed.

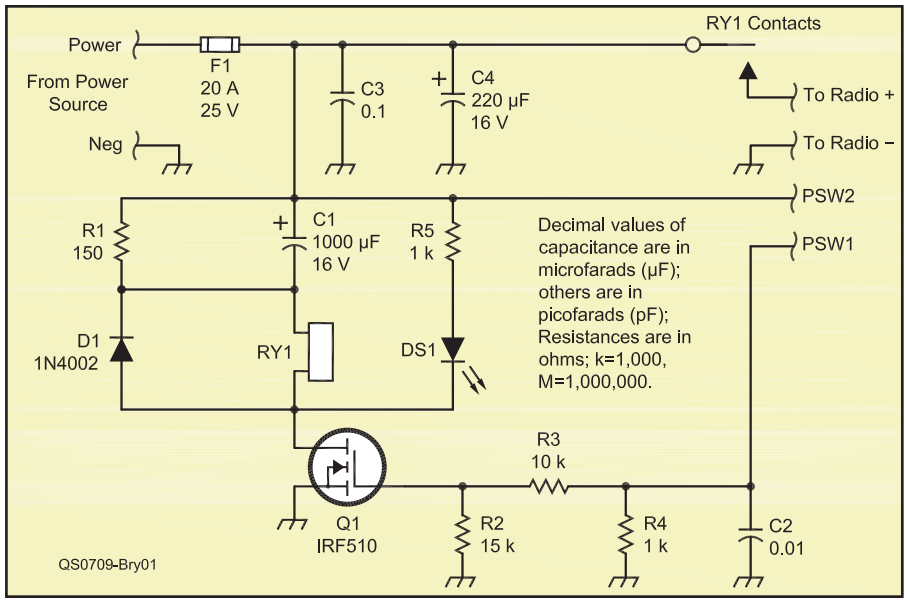


Figure 1 — Schematic of the Remote Power Controller.
C1 — 1000 µF, 16 V electrolytic.
C2 — 0.01 µF.
C3 — 0.1 µF.
C4 — 220 µF, 16 V electrolytic.
D1 — 1N4002 rectifier.
DS1 — LED.
F1 — 20 A automotive blade-type fuse.
Q1 — IRF510 power FET.
R1 — 150 Ω, 1 W.
R2 — 15 kΩ, ¼ W.
R3 — 10 kΩ, ¼ W.
R4, R5 — 1 kΩ, ¼ W.
RY1 — T-90 Omron relay, Mouser 653-G8P 1A4TP-DC12.

What Makes it Tick

My relay is controlled by power MOSFET Q1. I control Q1 by turning on the radio's power switch, which sends 13 V to the gate of Q1 through R3, a current limiter. Resistor R2 discharges the gate of Q1 when the power switch is turned off. Resistor R4 keeps the gate low, preventing Q1 from turning on from noise or stray voltage. Resistor R4 serves another purpose too. It allows about 2 mA of current to flow through the radio's power switch. This is enough to clean the contacts of the power switch.

Capacitor C1 discharges into RY1's coil, causing closure of the relay contacts. Once RY1 has pulled in, however, it doesn't require the same amount of current to keep the contacts closed. Resistor R1 provides just enough current to hold the contacts in after C1 discharges. The result is a savings of over half the required holding current. For the Omron relay specified, the nominal coil current is 90 mA. With R1 in series, the current drops to a battery saving 40 mA. While it does not sound like a lot of savings, over the course of several hours or days this adds up to quite a few ampere-hour savings.

Of course, no project should be without an LED indicator, so DS1 lights up when the relay pulls in. A purist would argue that current from the diode eats battery power, and they'd be right. So if minimum power consumption is your goal you can leave out R5 and the LED. Diode D1 clamps the EMF produced when RY1's coil drops.

To keep stray RF and other noise out of the circuit, I used filter capacitors C2, C3 and C4. For safety sake I also included a 20 A ATC "blade" type fuse. Every high current dc line should be fused, but in the case of the old Triton IV an additional magnetic circuit breaker should be installed as well.[2]

Building Your Own RPC

I built my remote power controller on a double sided, plated through printed circuit board. A kit of parts along with the PCB is available.[3] There is nothing fancy or special

[1]Notes appear on page 37.

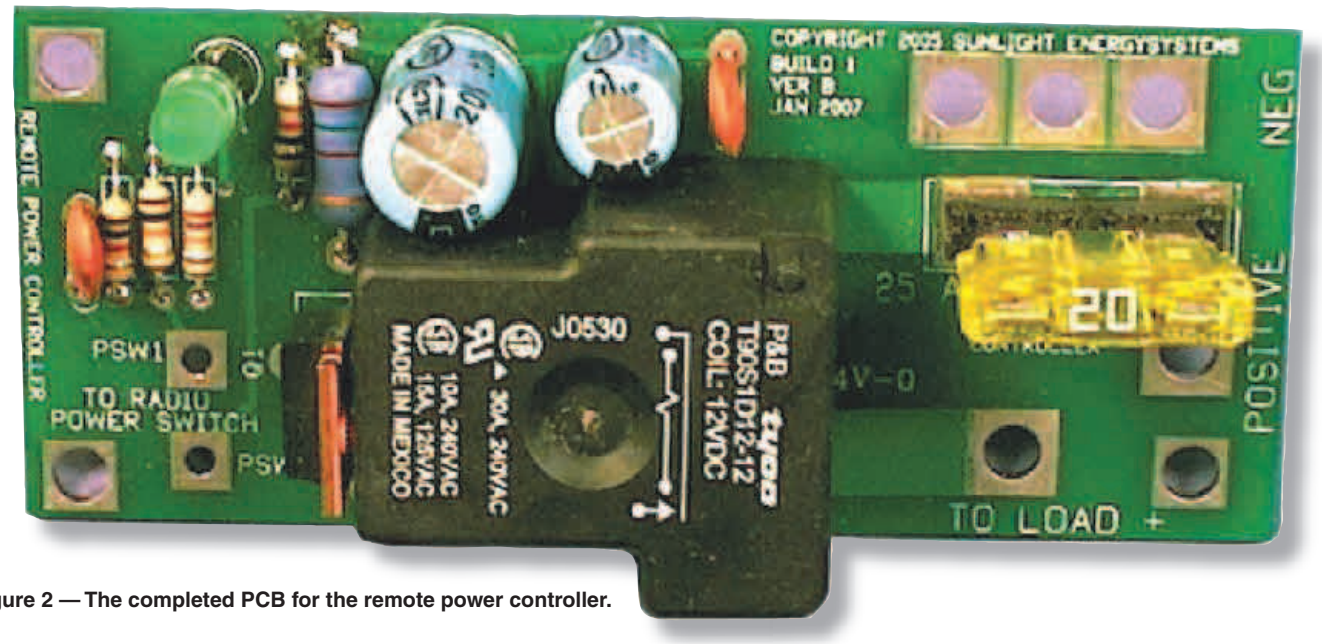


Figure 2 — The completed PCB for the remote power controller.

required. You can change the values of most of the parts without any problems, although the value of R1 should be left alone. Too much resistance and RY1's coil won't stay in. Too low and you'll eat up battery power in the coil. I found that 150 Ω was about right for the relay specified.

You could substitute a Potter & Brumfield T90 relay for the one I specified, which would be a Mouser Electronics number 655-T90S1D12-12. To save some money, an open frame version will work too. That would be a 655-T90N1D12-12 from Mouser.

The power MOSFET is sensitive to damage from static discharge. Use common sense to handle this device. Don't scuff your feet across the carpet and then pick up the MOSFET. Once installed in the PCB they're quite robust.

And while you don't need a PCB to build your own remote power switch, I've found this circuit so handy I've build over a dozen of them. So a PCB really makes for a quick and easy project, even for the novice builder. There's no rule that says you can't make one using perf-board or even the "dead bug" style of assembly.

Checking the Operation

Once you assemble the PCB, you should make a few simple tests to make sure the circuit is working correctly. You'll need a 13 V dc power supply with current limiting. Don't start out trying to use a large battery (like a car battery), because if you have a wiring error such a battery can supply enough current to burn copper traces right off the board!

Apply power to the circuit. Nothing should happen. Now, short the PSW1 and PSW2 pads. The relay should click in and the LED should light. A quick check on the output pad labeled TO RADIO with your VOM should show +13 V dc referenced to ground. Remove the short between PSW1 and PSW2 and the relay should drop out and the LED should go dark.

To ensure that the current saving function created by R1 and C1 is working, temporarily unsolder one end of R1 and remove this lead from the PCB. Now short PSW1 and PSW2. The relay will click in and then drop out. This shows that C1 has dumped its charge into the relay initially, but with R1 out of the circuit there's no holding current available. Solder the loose end of R1 back in the circuit.

I put the entire PCB assembly in a small plastic project box from RadioShack. I used Anderson Powerpoles to make the connections to the battery and power source. On the other end, I used the plug that goes to the radio. For some of the older Triton IVs, a Jones connector is used. The newer version uses a 4-pin Molex plug.

Not Just for Radios

Anytime you need to control a high current, low voltage load from a distance, the remote power controller can do it. I use one to turn on and off an old radiator-cooling fan salvaged from a junked car. I use the fan to blow air in and out of my greenhouse. I also use an RPC to turn on some low voltage emergency lighting in the shack. I am thinking of installing one in the mobile to control the high current needs for a VHF amplifier.

I can turn on or off my collection of old solid-state radios from their front panels, just like modern radios. That's a lot better than reaching around the radio and unplugging the power cord!

Notes

[1]The Triton IV 120 V ac supplies were the model 262 and its variants.

[2]Older Ten-Tec transceivers did not have any SWR foldback circuitry. These transceivers relied on the 120 V ac power supply to protect the finals. When the SWR is high the finals draw more current than they should. The power supply will then trip. You would then power the supply down, then power back up and try again, this time after lowering the RF drive level. Battery power was different. With no crowbar such as the one installed in the 120 V ac power supply, Ten-Tec required a fast acting magnetic circuit breaker to protect the finals while running from any non Ten-Tec power source. Ten-Tec recommends an AIR PAK T11-1-20.0A fast trip magnetic breaker.

[3]A complete kit of parts for the RPC with the printed circuit board is $20, plus $5 priority mail shipping. PCB only is $10, plus $5 shipping. Contact SunLight Energy Systems, 955 Manchester Ave SW, North Lawrence, OH 44666. Mastercard/Visa or PayPal accepted. E-mail: **prosolar@sssnet.com**.

Mike Bryce, WB8VGE, was first licensed in 1975 and currently holds an Amateur Extra class license. Mike has been president of the Massillon Amateur Radio Club and has been inducted into the QRP hall of fame. He also has developed a fascination for solar energy. His shack and home run from the sun's power. When not checking the water in the batteries, Mike spends time working QRP CW on 40 meters or chasing the HFPack guys on 18.1575 MHz. Mike also collects and repairs old Heathkit and Drake radios. In what little free time he has, he'll be inventing new words as he works on one of his Jeeps for the next rock crawling trip. Mike is also a previous QST *and ARRL book author. Mike may be contacted at 955 Manchester Ave SW, N Lawrence, OH 44666 or at* **prosolar@sssnet.com**. *He maintains a Web site at* **www.theheathkitshop.com**.

The ARRL and Emergency Communications

Was ham radio able to contribute in the aftermath of the 9/11 attacks and Hurricanes Katrina, Rita and Wilma? Absolutely! Could our efforts have been more effective and coordinated? Absolutely! Here's what we're doing to ensure that we're fully prepared when the next extraordinary event hits.

Harold Kramer, WJ1B

RICK LINDQUIST, N1RL

At ARRL HQ, a team of key staff developed strategic plans to assist with the aftermath of Hurricane Katrina. The team met daily until the need subsided.

In April, The Communications Academy, a weekend program held at Seattle Pacific University, asked me to speak about ARRL's Emergency Communications plans. This article is based on that presentation and on the work of the ARRL National Emergency Response Planning Committee (NERPC) and its Chair, Kay Craigie, N3KN.

The aftermath of Katrina, 9/11 and other extraordinary disasters are having profound effects on what we do, how we train and how we think about Amateur Radio Emergency Communications. The ARRL is committed to advocating and supporting Amateur Radio's participation in Emergency Communications and Public Service. We believe that it is ARRL's responsibility, as the nation's leader in Amateur Radio emergency preparedness, to address these issues.

After the Katrina/Rita/Wilma disasters in 2005, our Board assembled a committee of EmComm experts, the NERPC, to recommend improvements to determine how the ARRL could better respond to future extraordinary disasters.

Why do we need this? Isn't Amateur Radio already what works "when all else fails"? The answer to that question is — not necessarily! During and after Katrina, we learned that we need to act and think differently if we are to be taken seriously as a disaster resource. Given that our ability to provide emergency communications is one key reason for the existence of the Amateur Radio Services, we cannot assume that our role will be the same as it has been in the past.

Today, citizens, including professional emergency personnel, are all connected with cell phones, text messaging and so on. Amateur Radio Emergency communications no longer means only "Please copy number one, routine," or trotting about behind an official with a handheld transceiver on your belt.

Where We Come In

Then what is our role? In extraordinary disasters, the scale and intensity of the disaster quickly overwhelm local Amateur Radio resources. Local amateurs may be disaster victims themselves who are unable to volunteer for some time after the disaster occurs. Amateur Radio infrastructure becomes inoperative because of severe storm damage.

Meanwhile, a window of usefulness has opened for Amateur Radio — the time between the onset of the disaster and the restoration of conventional communications. Are we fully prepared to mobilize large numbers of qualified communicators during these extraordinary disasters? This becomes problematic when national-level relief agencies ask the ARRL to dispatch hundreds of amateurs to deployment centers for communications assistance.

What are we doing to solve this problem? For a start, we are having ongoing discussions with national-level served agencies so that we can respond quickly and provide large numbers of qualified Amateur Radio communicators to meet their needs. Both the timeliness and technical sophistication of non-amateur disaster communications technology are increasing. We must be better organized, more capable and on the scene as quickly as possible after our help is requested.

For starters, formal training requirements are increasing. All emergency responders, including volunteers, are subject to Federal Emergency Management Agency training requirements. This makes recruitment of volunteer ops more difficult. It also turns off experienced ops who consider the training to be irrelevant. Nevertheless, increased training requirements are here to stay and we all need to keep up with them.

We also bring other skills to the table. During Katrina, Amateur Radio operators functioned as electricians, computer technicians, truck drivers, mechanics and broadcast engineers. We are highly competent and technical experts in many fields. At the scene of a major disaster, much of our value is that we are all "MacGyvers."

High Tech or Low?

What technologies should we use? Old

At one of the Gulf Coast Emergency Operations Centers staffed by ham volunteers, a radar map showing Hurricane Katrina provides a chilling backdrop.

A team of Katrina volunteers from Rhode Island installs a temporary antenna.

tech, new tech or high tech, or a combination? We need to encourage new technologies for EmComm but not to the exclusion of the tried and true. I testified on behalf of the ARRL before the US Congress that our diversity of equipment, our use of multiple coordinated frequencies, and our redundancy and portability make us highly "operable." The ARRL and Amateur Radio should not commit to any one technology or system. We need to balance our growing professional respectability with the creative, improvisational spirit of Amateur Radio. Disaster preparedness is a moving target. No recommendations, no plans, no systems should be considered final.

Credentialing and background checks for operations outside a ham's home area are a difficult issue that arose during and after Katrina. This issue is here to stay. The ARRL Board has formed the Ad-Hoc Background Investigation Committee led by Director Bill Edgar, N3LLR, that is investigating these issues.

Putting Changes to the Test

How do we implement these changes? First, Multi-ARRL Section cooperation will be required. This is not easy, since ARRL Sections vary in likely hazards, culture and history, emergency management structures, natural environments, demographics, and relations with local and regional served agencies. What is common practice in one Section may be irrelevant or unworkable elsewhere. A one size fits all approach is unworkable. Individual Section leadership must analyze their situations, plan and cooperate.

The NERPC has recommended that we create the position of Major Disaster Emergency Coordinator. These positions will be created only when needed and MDECs will be the most experienced and trained leaders who will work in cooperation with the Section leadership.

We have also created a database of Amateur Radio Emergency Service (ARES) members for use in extraordinary disasters. Here at HQ, we had thousands of phone calls and e-mails from operators who wanted to help during Katrina. This response from the Amateur Radio community was gratifying but nearly impossible for staff to handle. Using this database for dispatching operators during major disasters will create less confusion for volunteers, provide better service to the served agencies and place fewer burdens on HQ Staff.

RICK LINDQUIST, N1RL

As Steve Coffey, KB1NRP, demonstrates, part of the response from ARRL HQ involved shipping repeaters and other ham gear donated by manufacturers to the stricken areas along the Gulf Coast.

And There's More…

Cross-training: What else are we doing at HQ to prepare? We learned that during major disasters, we still need to ship book orders, publish *QST* and so on. We have, therefore, cross trained employees so that other HQ personnel can fill in for those who need to devote themselves full time to disaster-related issues. We also now have more licensed and EmComm trained employees in the building.

EmComm Manager: We have hired a dedicated Emergency Preparedness and Response Manager, Dennis Dura, K2DCD, who will focus on emergency and public service. Dennis will be responsible for ARES and is the liaison to the Radio Amateur Civil Emergency Service (RACES), government bodies and served agencies. He will also develop an internal disaster response plan for ARRL staff. Dennis will provide more support, training and organization to the ARRL HQ staff as well as ARES and its 9000 volunteer field leaders.

Conference call bridge: One unexpected lesson that we learned is that our telephone conference call bridge was a major part of our communication during Katrina. We had scheduled calls twice a day with SMs, SECs and others who needed to communicate with each other. We have now updated and expanded our conference call bridge through

a Corporation for National and Community Service (CNCS) grant.

Backup generator: Murphy's Law plagued us here at HQ during Katrina when we had a major power failure. We currently have a backup generator for W1AW but we learned that our telephone system and Web access had only very limited backup power. We have since added an additional backup generator for these critical services.

Public relations: We need to use the story of Amateur Radio's emergency communications successes to support our regional and national advocacy goals. Katrina generated an enormous amount of public relations about Amateur Radio. Allen Pitts, W1AGP, and the volunteer PR Committee have improved and updated our EmComm media materials and kit of PR tools. These materials are now available to over 430 Public Information Officers and Public Information Coordinators.

W1AW: During Katrina, we learned that W1AW was a valuable Amateur Radio resource. W1AW relayed critical messages and provided an on air meeting place for agencies and volunteers. We have upgraded W1AW's capabilities to better prepare it for emergency operations. The funding for the upgrade is from a CNCS grant and the W1AW Development fund.

At W1AW, we have upgraded the transceivers and linear amplifiers so that we can run higher power and multiple modes on VHF and UHF. D-Star, Echolink, APRS and other digital modes are now up and running. We also replaced W1AW's 17 year old Yagi antennas. These upgrades have significantly improved W1AW's capabilities and preparedness.

Improved online training: We have updated our online EmComm training courses with the latest information to reflect the changes since Katrina. We plan to offer a Digital EmComm Course later this year. We also initiated the *QST* EmComm Honor Roll for those who have passed all three EmComm courses.

Ham-Aid: Based on our Katrina experience in dispatching equipment to the field, we created the Ham-Aid program. We have preassembled and tested HF/VHF go kits that are ready to ship out quickly, if needed. These kits are available on loan from the ARRL to support ARES volunteers and other Amateur Radio groups.

Publications: We have also increased the amount of EmComm editorial content in our publications. This special EmComm issue is one example. We have added practical EmComm information to the *ARRL Repeater Directories*. The *ARES E-Letter* continues to grow under the editorship of Rick Palm, K1CE.

We're Ready!

The ARRL is working hard to make these changes to improve Amateur Radio's disaster readiness and preparedness. While no one wants to experience another disaster of the magnitude of 9/11 or Katrina, we must do all we can to prepare for a worst-case scenario. We know that if "lessons learned" are not followed by "behaviors changed," then the lessons have not been learned at all.

Harold Kramer, WJ1B, is ARRL Chief Operating Officer and QST *Publisher. He can be reached at* **hkramer@arrl.org**.

Strays

On July 7, I listened on 7070.70 MHz and heard HB9CIC mentioning to another station that he had the same idea I had: to make a contact at 0707 UTC. I called Josef during that magical time slot and here is his QSL card with all those sevens.
— Dirk Van Britsom, ON6DK

ARRL VEC Volunteer Examiner Honor Roll

The ARRL VEC Honor Roll recognizes the top 25 Volunteer Examiners according to the total number of exam sessions they have participated in since their accreditations. Since each session requires an average time commitment of 2-4 hours or more, the thousands of hours our VEs have invested is extraordinary! Whether you are one of our VE Teams that test once a week, once a month or once a year, we want to express our warmest appreciation to all volunteers for their generous contributions to the ARRL VEC program.

If you are an ARRL VE, you can see your session stats online at **www.arrl.org/arrlvec/veparti.php**.

If you're not a VE, become one! See **www.arrl.org/arrlvec/become-a-ve.html**.

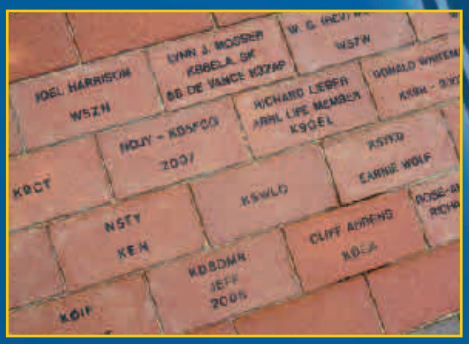
Examiner	*Sessions*	*Accreditation Date*
AE6Z, Emmett Freitas	533	31-Aug-1984
N5AF, Sammy Neal	452	20-Nov-1984
K6VIP, Royal Metzger	368	29-Apr-1985
K6RQ, Frank Glass	353	29-Apr-1985
KAØCDN, Karen Schultz	315	6-Sep-1984
WØIJR, Glenn Schultz	305	28-Sep-1984
KA6RHF, David Laurel	287	22-Apr-1985
W6IO, Leonard Scarpelli	285	1-Nov-1992
AC2T, Paul Maytan	278	6-Sep-1984
AC2V, Emily Maytan	267	6-Sep-1984
K3FL, Franz Laugermann	264	1-Dec-1991
ABØSX, Harry Nordman	263	9-Jan-2002
KP4PQ, Victor Madera	261	1-Mar-1992

Examiner	*Sessions*	*Accreditation Date*
KSØF, John Mackey Jr	258	1-Oct-1990
W7QGP, Mary Lewis	252	12-Aug-1985
K6PYP, Scott Swanson	251	1-Dec-1992
W6EOA, Salvatore Teresi	251	21-Aug-1989
AA2HX, Daniel Calabrese	243	1-Nov-1991
N8MPC, James Henderson	241	1-Nov-1991
KØIH, John Hauner	239	11-Jan-1985
KB5PGY, David Fanelli	239	1-Oct-1991
NI5S, Leslie Dale	239	6-Sep-1984
WA1RHP, Thomas Sefranek	236	1-Jun-1991
WB5R, Gerald Grant	235	4-Jan-1985
NØRN, Robert Hamilton	233	19-May-1987

The Diamond Terrace Shines Bright

S. Khrystyne Keane, K1SFA

Before the Diamond Terrace was constructed, the ARRL HQ building trim received a fresh coat of paint.



ARRL Chief Development Officer Mary Hobart, K1MMH, looks over the area of the new Diamond Terrace just prior to the pouring of concrete for new sidewalks.

Gracing the renovated entrance to ARRL Headquarters, the Diamond Terrace recognizes donors wishing to venerate their own call signs or to honor or memorialize the call sign of a family member, club or "Elmer" (mentor) with a 4×8-inch laser-engraved brick. ARRL Chief Development Officer Mary Hobart, K1MMH, said, "There is no limit to the reasons why bricks are placed to honor a call sign." Six garden benches of Vermont granite are the "capstone of the Terrace," Hobart said.

Hobart continued, "We already had plans to refurbish the Headquarters entrance area, so this was an ideal opportunity to invite our members to participate in the project and support League programs at the same time. We want to grow the Diamond Club, which enables the ARRL to continue programs that require revenue above and beyond what annual dues provide, ensuring their long-term health and enabling the League to do more on behalf of Amateur Radio. I hope that those who are fortunate to visit ARRL Headquarters will enjoy the new look of their Amateur Radio home. It has been a pleasure to work with each Diamond Club donor to craft the engraving for their brick, and I hope many can come and see the terrace personally."

Workers distribute the fresh concrete for the newly renovated entranceway to ARRL HQ. The Diamond Terrace graces both sides of the entrance.

S. Khrystyne Keane is the ARRL News Editor. She can be reached at k1sfa@arrl.org. *Photos by the author.*

Workers install the first of six initial bluestones. Each bluestone serves as the base for a bench made of Vermont granite.

ARRL President Joel Harrison, W5ZN, and CEO David Sumner, K1ZZ, cut the ribbon at the formal dedication of the Diamond Terrace on July 19.

The New Face of MARS

Operational integration brings profound changes.

Bill Sexton, N1IN

JAMES POGUE, KH2AR

It wasn't Field Day, although it may look like it. For the Defense Department's cross-band test Joseph Lowenthal, W4OVO, and Pat Lane, W4OGQ (AAA9EC), the Army MARS Emergency Coordinator, both of Memphis, set up this forward position at the Corps of Engineers station to prevent interference with colleagues operating on a nearby frequency at the main (indoor) site.

Anybody coming back after a 15-year absence might not recognize MARS today, otherwise known as the Military Affiliate Radio System. But a year from now, the transformation should be even more profound thanks to decisions just put into effect by the three MARS chiefs. In fact, dramatic enhancements to MARS emergency capability probably will show up during the present hurricane cycle. And coming two years after Katrina, that's pretty much the whole point.

LSI on the Way

Following half a century largely pursuing their own particular on-air activities, the three MARS branches — Army, Air Force and Navy-Marine Corps — agreed to large-scale integration during meetings held at the 2007 Dayton Hamvention®.

Voice operating procedures, emergency net structure and overall frequency utilization will be brought within a single set of standards. Important technological enhancements are also in the works, including a robust MARS version of Winlink 2000 that is capable, if need arises, of operating independent of the Internet.

The ultimate result should be the equivalent of "one-stop shopping" for any emergency response organization requiring quick, dependable backup for long-haul communication (say, from Incident Command Post to FEMA Region). Together, the three MARS organizations are practically everywhere, or can quickly get there. The new operational integration makes for an easy MARS fit into the National Incident Management System whenever and wherever disaster strikes.

The irony is that so potent a force is so little known, especially among first responders. No doubt part of the problem is the clubbiness that's a widespread (and often useful) part of ham radio. Part is the reality that rigorous training and sophisticated equipment do little for a fire department's image if it's never called to a fire (and please be assured that the writer isn't advocating more Katrinas for practice). Nor does division into seemingly competitive branches help with visibility, a handicap that ARES and RACES might join MARS in pondering.

Join the MARS Team!

The Military Affiliate Radio System (MARS) is a United States Department of Defense sponsored program consisting of Amateur Radio operators who provide military communications support in time of need. The MARS program is broken down into separate Army, Navy/Marine and Air Force branches.

More than 5000 amateurs are MARS volunteers. They are issued military call signs with 3-letter prefixes (example: AAA9AC) for their MARS operations. To join the MARS team you must:

- Be 17 years of age or older. (Signature of parent or legal guardian is required when an applicant is under 18.)
- Be a United States citizen or resident alien.
- Possess a valid Amateur Radio license issued by the Federal Communications Commission.
- Possess a station capable of operating on MARS HF and/or VHF frequencies. These frequencies are outside the amateur bands, but many transceivers are MARS capable, or can be modified accordingly. Check with your transceiver manufacturer.
- Agree to accept strict monthly requirements for on-air participation.

See these MARS Web sites for more information…
Army: **www.netcom.army.mil/mars/**
Air Force: **public.afca.af.mil/library/factsheets/factsheet.asp?fsID=7037**
Navy/Marines: **www.navymars.org/**

JAMES POGUE, KH2AR

Gary Weatherford, N4LGY (AFA2HB), of Collierville, Tennessee, operating the 14.486 MHz (military frequency) position at Army Corps of Engineers base station in Memphis.

JIM OLDHAM

Jeffrey Smith, W4ZH, first licensed in 1976 at age 14, became a federal screener at Pensacola (FL) Regional Airport in 2005. That made him the obvious choice to operate the TSA emergency rig during Operation Sidewinder in March 2007 when the Army MARS Winlink messaging system got its first comprehensive test for airport communications. Airports across the country are being equipped with similar ham rigs for use with the Army MARS network if normal communications are disrupted. Both MARS and the TSA are training teams to operate these stations.

Breaking from the Past

Not all that long ago, the main focus of MARS was handling "morale and welfare" traffic between service members abroad or at sea and their families and friends at home. Operation Desert Storm (1991) is still remembered with immense pride for the thousands of radio messages and phone patches passed by the volunteer hams in MARS. In those days the three services' distinctive operating style made sense.

The Northridge (CA) earthquake of 1994 changed all that. With phone circuits as well as freeways in shreds, the Pentagon called on southern California Army MARS members for situational reporting. They were ready. E-comm service in that catastrophe — the worst in U.S. history up to that point — fixed a new course for MARS. (Good timing, too, since e-mail and satellite phones soon took over the welfare traffic.)

Then came the September 11 terrorist attacks and hurricane Katrina, and a lot of hard-learned lessons. This spring the MARS chiefs and their staffs went to work applying those lessons.

Here are the main decisions announced in a May 24 joint bulletin signed by Chiefs Stuart ("Stu") S. Carter (Army MARS), Bo Lindfors (Navy-Marine Corps) and Don Poquette (Air Force):

- **Frequency sharing:** "All three Chiefs agreed to make all [MARS] frequencies available to each service and that the net control station (NCS) can be from any service."
- **Emergency nets:** "…the three service Chiefs will develop and provide guidance to establish joint regional nets on the best frequencies available for use during emergency operations in a region."
- **Standard voice operating procedures:** "Each MARS service will select one member to serve on a committee to establish a common voice protocol, which will allow voice nets in all three MARS services to operate the same."
- **Winlink 2000:** Army MARS assumes responsibility for safeguarding Winlink 2000 software code and upgrading it. Chief Carter said, "The MARS portion will be separated from the amateur side to ensure no crossover of messages and...the architecture is being changed so as to ensure there is always an HF link to and from each mailbox." Plans for a WL2K hub at Army MARS headquarters at Fort Huachuca, Arizona also were announced. Carter estimates the new architecture will be completed well within 2007.

With these enhancements agreed, Navy-Marine Corps MARS signed on to participate in the new messaging system. Chief Lindfors indicated his intent to establish a headquarters WL2K gateway.

A separate meeting brought MARS leaders together with Steve Waterman, K4CJX (AAA9AC), Victor D. Poor, W5SMM (AAA9WL), and Stephen Hicks, N5AC, of the Winlink Development Team. In addition to planning the software upgrades, they completed work on the document providing MARS access to the WDT's source code.

- **MARS-ALE:** At the main conference of leaders, Navy-Marine Corps MARS affirmed readiness to oversee the Automatic Link Establishment project previously under Army sponsorship, and to replace the Army MARS frequencies in the ALE pool. It was agreed, however, that "members of all three MARS services will continue their support of the MARS-ALE Software Development Team."

Lindfors, N9UH, whose Navy-Marine Corps membership numbers just over 1600, had barely returned to his Williamsburg, Virginia, headquarters before initiating change. He noted that the hurricane season was only two weeks away.

"I ask that all Region Directors [on the Atlantic and Gulf Coasts] immediately contact their Army and Air Force counterparts to coordinate frequencies," he messaged. "We won't be able to promulgate a new policy in time so I trust your judgment to set up a system that works."

For Don Poquette, Chief of Air Force MARS since last year and Equipment Custodian before that, this was the final meeting before retiring after 26 years' USAF active duty. He expressed optimism about the changes (and won a round of applause at the annual membership forum held in conjunction with the Hamvention).

"Yes, full interoperability is in sight," Poquette said. "Hopefully within one year, if everyone keeps working at it. ALE is already interoperable. The VHF networks are interoperable; we just have to get four sets of frequencies established.

Stu Carter, with 2600 hams in Army MARS, was making his debut at the Chiefs' conference barely six months after assuming the post at Fort Huachuca. It had been a period of dynamic change (some would say dyna*mite* change). Headquarters staff was realigned, an advisory board appointed;

The ultimate result should be the equivalent of "one-stop shopping" for any emergency response organization requiring quick, dependable backup for long-haul communication.

regional commands were established, a top-to-bottom public information campaign was launched. And the new e-comm partnership with the Transportation Security Administration went into action.

Exercise Sidewinder, the joint MARS/TSA exercise on March 28, gave the Winlink messaging network its first comprehensive workout under (simulated) emergency conditions. TSA and MARS deployment teams tested long-haul communications backup from commercial airports along a fictitious hurricane's swath from Miami toward Houston.

As a demonstration of the potential for operational integration, Sidewinder proved exemplary. An Air Force MARS member, Michael Green, WA4ZVW (AFA2MY), put Miami International Airport on the air. Jim Burrows, N4RLM (NNNØSYH), of Navy-MC MARS helped set up the Army MARS-licensed station at Pensacola FL Regional Airport.

At Fort Myers, where the government station was still being installed, Army MARS member Terri Lane, KI4MGF (AAR4BO), jumped in to file three reports by voice from her home station.

The operation was evaluated by TSA and MARS officers monitoring at Tucson (AZ) International Airport. Amateurs there included MARS headquarters staffers Grant Hays, WB6OTS (AAA9O) and Dewayne Smith, KK7VE (AAA9F), as well as regional members Al West, K7JUB (AAR9ED/T), Jim Wooddell, K7WFR (AAM9RT), and Larry Collins, K7DMB (AAT9CB).

"The TSA/MARS deployment capabilities were fully demonstrated and performed without error," the federal agency's evaluation team reported from Tucson. "Very few problems were encountered during the exercise and all members operated professionally and were able to successfully demonstrate the objectives."

Decades of Progress

A far cry, that high-tech operation, from Amateur Radio's first involvement with the US military.

That happened back in 1925 when Capt Thomas C. Rives of the Signal Corps invited hams to help train solders in what was the brand-new technology of radio. His volunteers in the Army Amateur Radio System went on to assist with research and development as well as training. By 1941 the AARS had 5600 members, roughly a fifth of whom saw wartime service in some capacity (including combat).

Amateur Radio was silenced by World War II, but 1946 brought reactivation of the AARS. After the US Air Force was created in 1947, it promptly gave birth to a separate branch of the renamed Military Affiliate Radio System. Navy-Marine Corps set up the third branch in 1963.

All three MARS organizations operate under the same Defense Department mandate to provide emergency communications support for government, but they are independently managed under regulations promulgated by their parent armed force. This year's moves toward operational integration foreshadow no change there.

Among MARS old-timers, one past change brought a lot of grief. The excitement and fulfillment of handling MARSgrams and phone patches they experienced during the Korean and Vietnam Wars and Desert Storm never materialized in Afghanistan and Iraq. Instead, fighting men and women found the Internet available almost everywhere (though a handful of MARS members in the US and Europe have kept the channels open looking for traffic to relay).

Army MARS budgets (primarily for headquarters personnel and gateway stations) took an immediate and continuing hit after the Gulf War. With resources totally focused on warfighting, MARS got limited attention. At one point, as the Army's Stu Carter told the MARS open forum at Dayton, it was really a case of "the lights were out, the doors were locked" as recently as six months ago.

"But all that is different now," he said.

In the new circumstances, Carter's to-do list includes a commitment to expand the concept of operational integration beyond MARS.

MARS-Ham Communication Tested Annually

A unique annual event called the "Armed Forces Day Cross-Band Test" has been demonstrating for just short of 60 years how well hams and the military can work together. On that one day a year, operators from the two realms listen on each other's dedicated frequencies and exchange QSL cards. It's quite a show — on May 12 this year Army stations tallied 1317 amateur contacts, Navy-Marine Corps 1147 and Air Force 500 and counting.

Yet a gray area looms where MARS can — or should — be interacting on a continuous basis with the Radio Amateur Civil Emergency Service and the Amateur Radio Emergency Service, sponsored by the ARRL.

There's already plenty of informal interconnectivity through individual members belonging to two (or all three) entities. That wasn't enough, though, to scratch the full potential of Amateur Radio during a Katrina-scale catastrophe.

Yet two years later there's still no concrete guideline for meshing civilian Amateur Radio's unmatchable local agility with the unique capacity of MARS for delivering emergency traffic over long distances, as obvious as the match is. Carter's staff is working on a fix.

Summing up the weekend's work, Navy's Lindfors offered this benediction:

"I have attended Tri-Service MARS Chiefs meetings since before I took over as Chief in November 1997. This was the first meeting that I felt we actually accomplished something and broke the inertia of 'we've always done it this way.'

"Rather than coming home frustrated," Bo said, "I actually came home from Dayton energized to take the necessary steps to move forward instead of having to explain why we couldn't do something."

Bill Sexton, N1IN, is a retired newspaper editor and foreign correspondent. He serves as volunteer Public Affairs Director of Army MARS, but any unattributed observations above are his own. Bill was first licensed in 1991 after many years of wishing it were easier to learn CW, which he finally did in time to get his Amateur Extra ticket two years later. He has been an Army MARS member since 1992. Handling MARSgrams for the troops was still a mission of pride then. With emergency communications now in the forefront, Bill is a regional alternate NCS for SHARES. His Northeast Coordination Net was on the air during both 9/11 and Katrina. You can contact Bill at PO Box 428, Richmond, MA 01254; **n1in@arrl.net**. QST

When the Call Goes Out…

…amateurs in southern Oklahoma answer!

Brad Patrick, KE5EMF

To paraphrase the old pilot's axiom, the life of an Amateur Radio emergency communications (EmComm) volunteer involves hours of humdrum normalcy, punctuated by episodes of sheer terror — or at least "sheer tension." For the most part, a volunteer's life is like any other, one unremarkable day flowing into the next and quickly passing from memory. On the other hand, there are some days you'll never forget.

You could pour ink over dozens of pages in an attempt to describe the Amateur Radio EmComm lifestyle. There is no need to waste paper, however, when a few glimpses can give you a taste of this exciting and rewarding avocation. What you are about to read amounts to snapshots of my personal experiences, and those of others, here in southern Oklahoma. Speak with volunteers in other areas of the country and you'll discover that their experiences are much the same.

Amateur Radio EmComm volunteers arrive at the Fox Den fire.

A Rude Awakening

I awoke in a panic with a shrill alarm ringing in my ears. I slapped the alarm clock once...twice...maybe three times, not understanding why I could not seem to find the SNOOZE button. I work all night and sleep during the day, so any awakening tends to be rude. The clock display read 3:27 PM, so maybe it was time to roll out of the sack after all, but what was wrong with the alarm?

Seconds later I realized that the piercing tone was coming from the weather radio. It scaled up and down and soon stopped as it was about to announce its warning. I closed my bloodshot eyes and fell back into the pillow, taking a deep breath. As my heart rate slowed to normal, I listened to the incoming alert message. An instant later my pager began vibrating. I snatched it up and saw a text message warning of a severe storm cell developing in northern Texas near Wichita

The author takes his position near the storm front as a wispy tornado begins forming in the background (center, right).

Storm spotters take to the streets as ominous skies produce a "wedge tornado" over southern Oklahoma.

Falls. The message said it was moving east/northeast at 35 MPH, with the potential for tornadoes and hail.

My feet hit the floor and I reached for my jeans. Rubbing my eyes, I hazily stumbled to the computer and managed to pull up the latest radar images.

While I dragged a comb through my hair, I searched for that all-elusive storm-tracking shirt. As I passed the desk again I checked the latest Nexrad images as they filled the 21-inch screen. Southern Oklahoma seemed awash in red echoes. The tracking boxes indicated an organized severe cell with a "hook" signature and rotation — the classic signs of a tornado. I had *maybe* an hour to get into position.

Dramatic as it sounds, it was just the start of another tour of duty at the weather front. There are worse things than thunderstorms, though. Take fire, for example.

Flames in the Night

"KE5BAL, KE5BAL from KE5EMF," I say into the microphone. I've rolled into the southern edge of the Ratliff City/Fox Den area and smoke is filling the air. Emergency vehicles sail past, heading this way and that. To the east, their flashing strobes can be seen piercing deep into the flame-licked countryside. The entire scene was other-worldly. Great rivers of sparks flew into the night sky as the winds whipped the trees. The blood-red glow from the 22,000 acre fire could be seen for 50 miles.

The tracking boxes indicated an organized severe cell with a "hook" signature and rotation — the classic signs of a tornado. I had maybe an hour to get into position.

"KE5BAL…go ahead, Brad." It was the voice of Vance Smith. He was the Southern Oklahoma Amateur Radio and Emergency Service and Scientific Society club president at the time.

"I'm just making it in from the south near Pruitt City. Where are you guys at?" I asked.

"We've set up an emergency shelter here at the senior citizens center in Ratliff City. Do you know where that is?"

"Roger," I replied. "Behind the fire department."

"That's right. We're setting up there."

"Any updates on the fire?"

"The Red Cross in Ardmore has been notified of families seeking shelter and food, and they are sending food and blankets for victims, and food and water for firefighters. I believe they plan to board the victims who lost their homes in motels in Ardmore. Did they send any supplies with you?"

"Affirmative. I've got a truckload of cool water for the firemen." I said. Those poor guys had been battling wildfires for weeks now, and this one was the biggest one yet. "I'll go ahead and start distributing some of this water, Vance."

"Good idea. Keep us advised of your position, and be careful." he said.

"Roger that. KE5EMF."

"Okay, Brad. KE5BAL," he replied.

The blaze was so massive, it didn't matter where I entered the fire area. It was all a fire zone! I hung a right on Camp Road and headed straight into the maelstrom. There wasn't a light anywhere, yet the area was well lit from the eerie glow of the fire. Embers danced along the ground and into the night on streams of wind.

House foundations now supported only smoldering rubble. A feeling of despair crossed my mind as I wondered whether the residents had escaped the inferno. I continued forward, stopping here and there to assure myself there were no remaining victims. In one of the backyards, there was a small pile of smoldering boards and a blackened chain running from the pile to a stake planted firmly in the ground. It was obviously the remains of a dog house. I was tempted to remove the boards, but I was afraid of what I might find beneath. It was too late anyway.

I returned to the truck and drove another mile into the destruction area. Far off in the darkness there were several small fires burning — and they appeared to be moving. The flames seemed to bounce up and down as they zigzagged over the horizon and vanished from view. When I reached my destination, I told a fire crewman about what I had seen. He grimaced and replied that those were cattle, on fire, running for their lives. I swallowed hard and handed the soot-covered firefighter a bottle of water as I turned and stared into the inky blackness.

In Their Own Words

EmComm volunteers in southern Oklahoma speak out…

- Our relationship with the emergency personnel at Falls Creek is one of outstanding cooperation. It is an excellent opportunity to promote public awareness of the uses of ham radio as we are developing relationships with several major businesses and prominent public officials. Everyone knows that, in an emergency, the first thing to go is electricity. Since nearly everyone has a cordless phone, completely dependant on electrical power, phone service will be out as well. A recent survey, which dealt with all of the major cell phone companies, found that in just such an emergency, the cell phone systems as they are today will not be capable of handling the overload calls. Thus, ham radio and the commercial bands will be the only communication assets available. We all know what the commercial bands will be doing (police, fire, etc), so that leaves Amateur Radio to carry the load, a task we are completely capable of handling. Expanding our capabilities, recruiting more operators and cementing our relationships with local emergency personnel can only increase our ability to be of service in a crisis. — *Renee Smith, KE5CUD*
- Training is critical. As new hams get licensed every day in the US, many of these people do not know proper procedures for emergency communications. If they are not properly trained they can cause a horrible melt-down and do more harm than good. I also feel that every member of the SKYWARN group should go through emergency communications training, even if they are not hams. This way, everyone will have communications training and will know what to do in a crisis. — *Mike Long, KE5GSR*
- I've been involved with numerous wildfires while assisting the American Red Cross, but the event in Ratliff City was one I will always remember. There was loss of personal property, disrupted families, lack of adequate shelter and complete devastation in some areas. It is difficult to imagine how rapidly a situation can change with just a minor shift in the wind. My hat goes off to the volunteer firefighters who put their lives on the line to combat these wild fires on a daily basis. — *Jerry Dunn, KD5YPF*
- I agree that training really is key. The ARRL Level One Emergency Communications course was the first class of that type I had ever taken. I was originally drawn into Amateur Radio as an interesting hobby that I could easily share with my kids. After getting my Technician license, I felt the urge to make better use of my license privileges. The course taught me how to best put my skills to work. — *Roland Stolfa, KC5UNL*

Only a Drill…This Time

The community wide tornado drill is a biennial event involving Ardmore emergency personnel and city management and communications staff, working hand in hand with local Amateur Radio volunteers and storm trackers. When you live in Tornado Alley, even a drill is serious business.

The pre-drill briefing took place at 1300 hours at the Emergency Operations Center below police headquarters. The Southern Oklahoma Amateur Radio Emergency Service and Scientific Society, in conjunction with the Southern Oklahoma SKYWARN Group, have their own emergency radio communications station within the EOC. These volunteers and important guests arrived promptly. Observers and visitors were given a tour of the entire facility soon after.

Immediately following the tour, participating storm trackers and club members met for a briefing, and to receive their individual assignments. The Fire Chief, Police Chief, Emergency Operations Manager, our own Net Controller and other pertinent emergency personnel manned the EOC as SKYWARN trackers hit the streets and headed for their posts at neighboring schools and businesses.

At 1400 sharp, the emergency sirens sounded all over the city and participating citizens implemented their evacuation plans. As SKYWARN storm trackers, we were there to evaluate these procedures, record data and offer suggestions for improvement. Jerry Smith, KD5YPF, and I were posted at the Plainview Schools complex. We watched as they responded to the sirens with brisk and serious action, emptying halls and sheltering 1450 students in less than 8 minutes. High school, middle school, and elementary school classes walked to their storm shelters in orderly fashion and awaited the "all clear." Jerry and I congratulated the Plainview Schools superintendent on a successful and efficient evacuation.

All communication between responding fire crews (for fake car extractions and debris removal), and police (for looters and emergency assist), and ambulance (treatment of fake victims), were trunked through the 911 dispatch center — until the center was hit with a "power failure." Amateur Radio operators stepped in to fill the gap, coordinating efforts between emergency personnel in the field, and the EOC and the 911 center. Backup systems eventually resolved the power failure and the 911 center returned to operation. Amateurs in the field resumed their assigned tasks and filled in the gaps of communication by providing a mutual aid network between agencies.

All officers and involved agencies presented their detailed reports at the monthly EPC (Emergency Preparedness Committee) meeting two weeks later. Amateur Radio operators sat among the law enforcement officers, firefighters, paramedics and city managers. We presented our reports and were complimented on our professionalism.

Amateur Radio EmComm volunteers Jerry Smith, KD5YPF, and the author observe and report as Plainview School students evacuate during a mock tornado drill.

And the Rains Came Down

It started raining in the early morning and the downpour continued until about 6 o'clock the next day. There was a short break in the action, and then it began again. Radar indicated that this was a powerful low-pressure system that wasn't going anywhere soon. It just spun over southern Oklahoma like an airborne whirlpool.

The blaze was so massive, it didn't matter where I entered the fire area. It was all a fire zone!

The creeks swelled from a trickle to raging waters. Lakes and ponds were overflowing their banks. A major flood was imminent. The City of Ardmore's drain-off system was no longer keeping up with the deluge.

The hams were activated for EmComm duty and took to the streets. Taking to the streets was hazardous, though, because they were disappearing beneath the water. My vehicle has four-wheel drive, but it was set up for storm tracking so it sits lower (the less air under the vehicle, the less likely for lift). Crossing flooded streets wasn't an option for me; I consider the practice foolhardy in any case. My assignment was to block dangerous crossings and flood-consumed intersections. This freed emergency personnel for more serious issues, like rescue and recovery.

Ardmore has an enduring relationship with its Amateur Radio community. Ham operators share the city EOC with first responders and can provide mutual aid communications when necessary. We are even authorized to assume control of all emergency communications should the need arise. We are not commissioned emergency personnel, but we strive to earn the respect of our professionals by assisting them, and our community, where we can.

On that dreary day, assisting my community meant sitting in a truck, listening to the rain pounding on the roof, and reporting road conditions. I'm not a first responder—far from it—but I know my work, and the work of all Amateur Radio volunteers, is very much appreciated. Service for the sake of service is reward enough.

"Be advised that the intersection of Commerce and 12th street is impassable. I repeat, no passable traffic at 12th and Commerce due to dangerous water levels. Please choose an alternate route. Thank you, and drive safely. KE5EMF."

Brad Patrick, KE5EMF, is an ARRL Public Information Officer and the Coordinator for the Southern Oklahoma SKYWARN Group. You can contact Brad at 1514 Dolese Rd, Ardmore, OK 73401-7592; **cybrsavag2004@yahoo.com**.

QRR: The Beginnings of Amateur Radio Emergency Communications

Would you believe that Amateur Radio emergency communications had its roots in helping to recover stolen cars?

Gil McElroy, VE3PKD

The devastation in late summer 2005 wrought by Hurricane Katrina — now considered the worst natural disaster to afflict the United States — is familiar to us all. In the post-disaster analysis of what went wrong in providing assistance to those in need, Amateur Radio emerged as one of the few examples of what went right. Federal reports from the US House of Representatives and the White House both highlight the vital role played by Amateur Radio in providing critically important emergency communications.[1]

How far we have come from the early days of ham radio when amateur communication via this new medium was almost outlawed! The early portrayal of hams as nuisances who deliberately interfered with commercial and military radio communications (often with far better equipment) almost succeeded in the creation of a federal law making amateur communications illegal. Pre-World War I newspaper portrayals of hams were less than flattering, and often downright hostile.

Thankfully, such depictions of the activities and motives of hams were countered by the reality that, in times of trouble, the Amateur Radio community was there to help. In April of 1913, *Modern Electrics* magazine reported on hams at the University of Michigan and Ohio State University putting their spark rigs to use, passing emergency traffic when a severe windstorm and flooding cut off all other communications in the region. A Radio Service Bulletin issued by the US Department of Commerce in March of 1915 details radio inspector J. F. Dillon's interest in organizing Amateur Radio stations in Ohio into an emergency communications network in the event of catastrophic events, like the flooding that periodically inundated the region. Five special licenses were reportedly issued as part of the plan.

The August 1915 issue of *Technical World Magazine* suggested "honorary commissions to be given out to those amateur radio operators who prove themselves worthy in technical knowledge and character." The author noted that, while the amateur had once been considered little more than a nuisance, "…now he is a necessity — and auxiliary to the forces of national public welfare."[2]

In 1914, with the formation of the American Radio Relay League, the role of amateurs in providing emergency communications took a useful form. It began in a small way, with the automobile.

Emergency Communications Takes Root

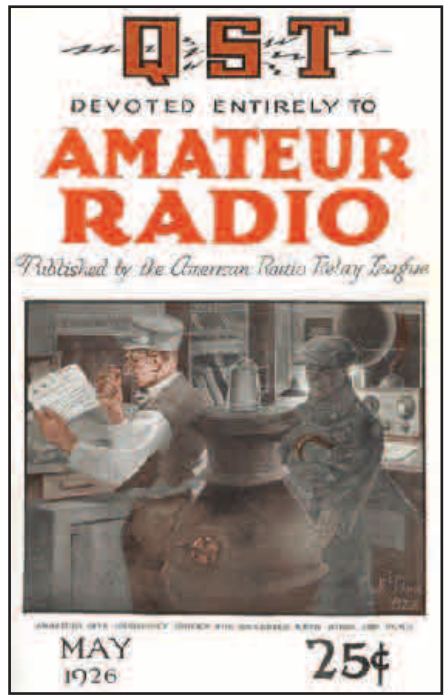
"Have any of you fellows ever thought of the possibilities of amateur radio in helping recover stolen automobiles?" began the editorial in the November 1920 issue of *QST*. "It would be the first time that amateur radio stations would be put to a real practical use all over the country."

By April of the next year, *QST* noted that the idea had taken root in several US cities, and reported the first instance of hams helping to recover a stolen car. The chief of police in Portland, Oregon even contributed a letter to the November 1921 issue of the magazine, thanking the ARRL for the assistance of amateurs.

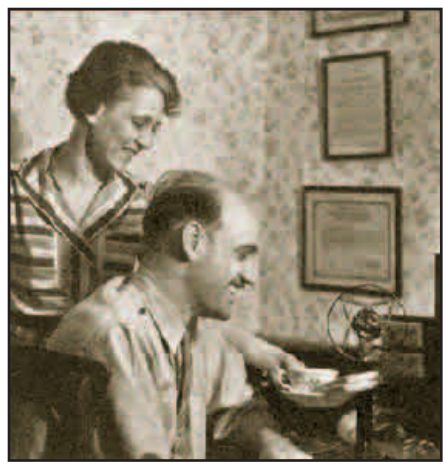
Concurrently, *QST* began to run reports of amateur involvement in communications during natural disasters, beginning with a deadly flood in New Mexico in 1921. R. W. Goddard, 5ZJ, wrote in the November 1921 issue about successful amateur efforts using portable spark equipment to help bring assistance to the devastated region. In April 1922, the magazine told the story of the relay route organized by amateurs in Minnesota following a severe ice storm that cut off all communications with the outside world.

Such stories became regular items in the pages of *QST*, but it was becoming increasingly evident that, as amateurs increasingly lent their services in times of crisis, there was no organization to their efforts. That was about to change. This time, however, it wasn't stolen automobiles that were impetus for change. It was the railroad.

The year 1923 began in great excitement with the announcement of successful amateur



The May 1926 *QST* cover featuring the partnership between the ARRL and American railroads.



"Ed. Tilton, W1HDQ, and Mrs. Tilton carried through a back-breaking program of emergency work in Springfield, Mass." This photo is from Clint DeSoto's, W1CBD, article, "Amateur Radio Rises to Greatest Emergency Need of All Time" in the May 1936 issue of *QST*.

[1]Notes appear on page 50.

"The A.R.R.L. HQ's station was completely inundated by the flood waters. As though a thick coating of silt over the shack and everything in it were not enough, several tanks of heavy road or fuel oil broke and got into the shack. When the waters receded the well known W1MK, familiar to all as shown in the [left] picture, turned into the sad sight you may be able to recognize in the [right] photo!" From *QST*, May 1936, page 20.

trans-Atlantic communication. But in the November 1923 issue, an editorial entitled "Helping the Railroads" was published that was, in hindsight, of equal importance: The abilities of the amateur had been noticed and our help was being solicited. "There is a great and powerful cooperative association of the railroads," *QST* editorialized, "… known as the American Railway Association, and this body had got in touch with our A.R.R.L. to ascertain what we can do to arrange routes of reliable amateur stations which will come to the rescue when the wires go out."

QRR

In February 1924, Arthur "Bud" Budlong, 1ALB (later W1BUD), Secretary of the ARRL Railroad Emergency Service Committee, explained it all in the *QST* article "Emergency Railroad Communication." The ARA contacted the League during an ARRL convention in Chicago, and they made an ad hoc arrangement until something more permanent could be established. Budlong's message was one of urgency, suggesting that "every amateur station…must automatically become an emergency relay point for any railroad that calls upon him during the winter…" In July, *QST* reported that a test in May of the Amateur Radio emergency relay system, set up in conjunction with the Pennsylvania Railroad, had been a success, despite adverse radio conditions.

By March 1925, the system had achieved such importance that the ARRL created a new "Q" signal to denote emergency work for the railroads: QRR. Budlong called it "the League's 'land SOS.'" Amateur Radio's service in assistance to the railroads marked the first formal ARRL emergency communications policy and strategy.

"The Future of Radio Depends on the Amateurs"

QST's "Traffic Briefs" began regularly including stories of amateurs providing emergency assistance across the country in times of need. In the May 1925 issue, the magazine included an article on amateurs cooperating with the Burgess Battery Company to test dry-cell batteries for use in emergency transmitters.

A major test of amateur emergency communications came in November 1927 when flooding devastated New England. *QST* noted that it "was the Amateur Radio operator and his station in this great emergency who provided the only rapid means of communication between the isolated affected area and the outside world." Even the chairman of the Federal Radio Commission (the forerunner to today's FCC) chimed in, stating that "the future of radio depends on the amateurs."[3]

In the November 1928 issue, *QST* addressed the issue of "Priority in Emergencies," laying out some of the procedures that should be followed in emergency situations, and advising every amateur to "give some thought today to the construction and installation of a set capable of doing emergency work." In the article "Why Handle Traffic" in the January 1930 issue of *QST*, R. P. Griffith, W9EJQ, urged all hams to become involved in traffic handling, because it was "the best preparation for being useful to the community or the nation in an emergency."

"An Amateur Radio Emergency Station In Every Community!!"

Assistant to the ARRL Secretary Clinton B. DeSoto, W1CBD, began his noted writing on amateur emergency communications in the January 1933 issue of *QST* with "QRR 1932," an article detailing the invaluable assistance hams had provided over the year. The importance that amateur emergency communication had achieved was made evident in June 1934 when *QST* announced the Second Annual Field Day. Established in 1933 as a test of amateur portable communications, by its second incarnation it had already achieved a new level of significance. ARRL Communications Manager Ed Handy's, W1BDI, announcement stressed that portable operation "facilitates operator preparation to render constructive service in time of emergency and encourages the development of equipment suitable for operation independent of interruptions of commercial power sources suitable for emergencies."

It was quite a load of responsibility for the Amateur Radio community to bear, and one in need of real institutional support and organization. The ARRL stepped up to the plate, and in September 1935 made history. On page 47 of that month's issue, leading the "Operating News" column, was a headline that would change Amateur Radio forever: "A.R.R.L's Emergency Corps — Join Now." Urging all hams to submit an application to join, Handy wrote that the newly organized AEC would "comprise those amateurs who have available at their stations transmitting and receiving equipment suitable for use in an emergency."

The goal? "An Amateur Radio Emergency Station In Every Community!!" By November, *QST* was able to announce the call signs of the 39 hams and four clubs that constituted the AEC's first members. By January 1936, in addition to listing newly joined members, the magazine was advising participating amateurs to make their availability known to "local Red Cross officials, railroads, military units, police departments, representatives of the press asso-

ciations and the like." Two issues later, membership had grown to 156.

The AEC's First Test

March 1936 proved to be the first real test of the AEC when flooding ravaged 14 states, leaving 500,000 people homeless and 171 dead. DeSoto detailed it all in his article "Amateur Radio Rises to Greatest Emergency Need of All Time" in the May 1936 issue of *QST*. "The group which had its first baptism by fire in this current situation, and which showed up very well indeed," he wrote, "is the recently-organized A.R.R.L. Emergency Corps." (The call signs of 18 AEC stations were listed separately in the magazine.)

DeSoto finished on a prophetic note: "Amateur radio has re-emphasized its status as an absolutely indispensable facility of modern civilization, and we are now provided renewed certainty that that status will be preserved."

Membership in the AEC blossomed quickly, and a Supporting Division was established for those amateurs without benefit of an auxiliary power source. *QST* even reported some amateur opinion as to the value of establishing a portion of the 80 meter band as a "QRR Channel."[4]

As 1938 began, Handy was using the pages of *QST* to discuss the development of emergency operating policies and the appointment of Emergency Coordinators around the country. In the space of just three years, a sophisticated emergency communications network entirely organized and operated by hams had grown up and assumed a critically importance place in the nation's public service.

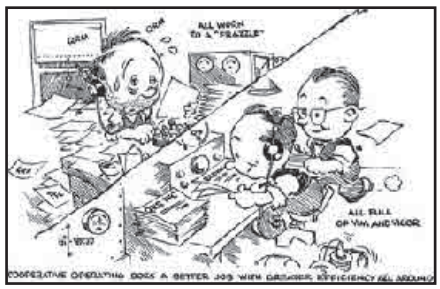
Hams Lead the Way to Advance Technology

There were, of course, technological advances behind it all, much of it led by amateurs. By the mid 1920s, the spark gap had given way to the vacuum tube and opened up entirely new areas of exploration. Operation using portable equipment became viable for the average ham, and the pages of *QST* increasingly featured construction articles for portable transmitters and receivers.

The link between portable operation and emergency communication had long been established, and was encouraged by such articles as "Portable Radio in Winter" by Ralph C. Folkman, W8COX (Associate Radio Editor for *The Cleveland Plain Dealer*), in the July 1929 issue of *QST*. "The first and worst blizzard of the season," he wrote, "trains late, traffic slowed, thermometer flirting with zero — what setting more ideal for testing the ability of amateur radio to function in emergencies such as might be created by tornado, flood, or other disaster?"

Amateur-led exploration of the "ultra-highs," as the VHF frequencies were first known, also spurred the development of portable equipment. In his May 1932 *QST* article "A Portable 56-Mc. Transmitter-Receiver," Frank A. Gunther, W2ALS, quite accurately predicted that "it will not be very far in the future when a thousand and one unforeseen uses for communication of these frequencies will be unfolded."

Every licensed amateur was eligible to join the ARRL Emergency Corps. The goal was to have an ARRL emergency organization in every community. A copy of this certificate was featured in Ed Handy's, W1BDI, article, "When Emergency Strikes" in the April 1938 issue of *QST*, page 35.



A cartoon by Phil "Gil" Gildersleeve, W1CJD (SK), from the April 1938 issue of *QST*, page 37, stressing the importance of rotating operators during emergencies so as not to have "harassed, overworked inefficient operators."

Hams were quick to explore the new technologies, and they quite naturally assumed a place in emergency communication services. In November 1938, *QST* acknowledged "the useful technique of certain stations equipped with e.c.o. [electron coupled oscillator, the original name for what we now call a VFO] …outside the main emergency zone, in quietly listening and hooking up stations with traffic for each other…." Though a standard part of today's Amateur Radio transmitters, at the time it was cutting edge technology.

New Challenges in Emergency Communications

Amateur Radio ceased operation during World War II, and many hams became involved with WERS — the War Emergency Radio Service. Although devoted to national defense communication in the country, WERS provided emergency communications during a number of natural calamities in 1944-45. With the war's end and the resumption of Amateur Radio, the AEC was back. In the December 1945 issue of *QST*, Handy announced its "reconstitution" of the Emergency Corps, and the following year the ARRL staged the first Simulated Emergency Test to bring the organization back up to speed.

There were new challenges with the beginnings of the Cold War. Civil defense again became a national priority. In an editorial for the December 1950 *QST*, Budlong, now *QST* Editor, wrote at length about the different requirements of emergency and civil defense communications, noting that "[p]reparation for one…is not necessarily adequate preparation for the other. From now on, we must prepare for both."

The ARRL became involved in discussions at governmental levels about the establishment of a new volunteer amateur service specifically tailored to civil defense needs. In April 1951, *QST* announced that "it may be named the Radio Amateur Civil Emergency Services (RACES)." The following year, it became official.

Today, RACES and ARES (Amateur Radio Emergency Service, as the former AEC has become) excel in providing emergency communication where and when it is needed. Hurricane Katrina was a major test of their worth. It certainly won't be the last.

Notes

[1]"The Katrina Chronicles," *QST*, Nov 2005, pp 43-48 and Feb 2006, pp 50-53. See also **www.arrl.org/news/stories/2006/02/17/2** and **www.whitehouse.gov/reports/katrina-lessons-learned.pdf**.

[2]H. Carver "Floods and Wireless," *Technical World Magazine*, Aug 1915, pp 806-807. See also **earlyradiohistory.us/1915ama.htm**.

[3]D. S. Boyden and R. D. Russell, "Amateur Radio Work in New England Flood," *QST*, Jan 1928, pp I-III (member edition).

[4]"QRR Channel" in "Correspondence" *QST*, Jun 1936, p 51; *QST*, Aug 1936, p 56.

Though his interest in Amateur Radio goes back to his childhood encounter with his father's Zenith Trans-Oceanic shortwave receiver, Gil McElroy, VE3PKD, was first licensed in 1991 at the age of 35. A writer and art gallery curator with a keen interest in Amateur Radio history, he is an active CW operator. Gil lives in a small village on the north shore of Lake Ontario. He can be reached at PO Box 7, Colborne, ON K0K 1S0, Canada or at **ve3pkd@arrl.net**.

Did you enjoy this article? Cast your vote at:

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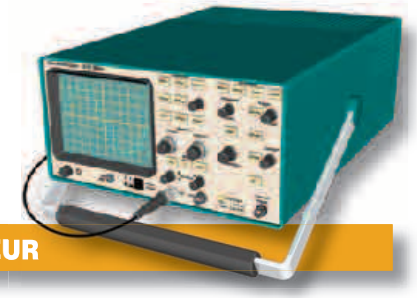
The Doctor is IN



PROJECTS AND INFORMATION FOR THE ACTIVE AMATEUR

Q Greg, KI4WQS, asks: I have a beginner question. I currently have a 2 meter 5 W handheld transceiver that I use both as a portable and in my vehicle as a mobile unit, running its output through a 35 W amplifier and out to a magnetic mount antenna. I am considering purchasing a regular mobile radio with an output of 65 W. Can I run the new 65 W radio through the existing 35 W amplifier to get increased output? Would the result be a gain of 35 W, to 100 W, or what will happen?

A Greg, this is a good beginner question! To amplify a signal is to multiply it, not add to it. So if your 5 W handheld is amplified to 35 W, the amplifier has a power gain of 7 (8.45 dB). If it were truly linear and had a very high dynamic range and if you put 65 W into its input, the output under those ideal conditions would be 455 W!

This will not happen. The transistors in the amplifier and/or (more likely *and*) the fuses in the power lead to the amplifier will melt long before. If you look at the specifications for your amplifier, you will likely find a couple of interesting numbers. One will be the maximum drive power — probably around 7 to 10 W. Another will be the power requirement. It probably says that it will draw between 7 to 10 A at full output. If it were to operate at 455 W output, it would likely draw 50 to 60 W, so there goes the supply fuse, and perhaps the wire as well. See Figure 1 for the comparison.

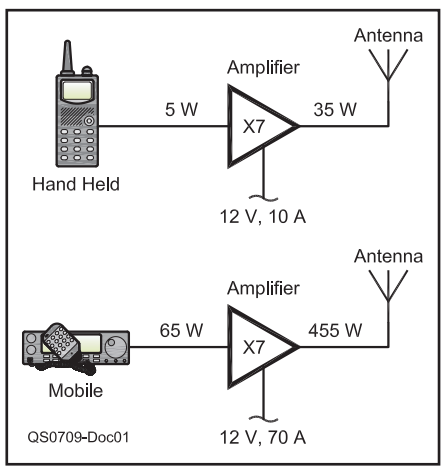


Figure 1 — Illustration of amplifiers used with VHF handheld and mobile transceivers.

You might be able to find an amplifier that would provide this output, but there will be few occasions (the setup won't quite work for moonbounce, even with the high power) when it will be helpful. It might be that setting your new radio to low power will result in 10 W output. Depending on its capability, you might be able to get 70 W out of the amplifier, but the difference from 65 to 70 W will never be noticeable. Perhaps you can use the amplifier with your handheld from your home station? Enjoy your new radio!

Q David, W9EXJ, asks: I have just received my Amateur Extra class license and am wondering what all the FCC's code letters mean? In my case the license indicates codes HA, applicant type I, group C, Grant date, and station privileges primary. I notice that the grant date 6/24/07 and the expiration date 7/14/2014 are the same on both the old Advanced and the new Amateur Extra class licenses. I would like to know where I can find a list of the codes.

A David, first — congratulations on your upgrade! The dates haven't changed because the FCC no longer automatically resets the renwal clock on license changes, but keeps the same 10 year term. ARRL Regulatory Information Specialist Dan Henderson, N1ND, notes that you can crack the code by looking at the list of codes provided on the FCC's ULS (universal licensing system) online help link at **wireless2.fcc.gov/UlsApp/UlsSearch/searchAmateur.jsp**.

There you will find that HA is the code for a regularly issued amateur sequential call sign. The code HV, for example, would indicate an applicant requested a vanity call sign. Applicant type I indicates an individual license, rather than one for a government entity applicant type G, for example. The group indicator shows the call sign group. Your Group C indicates that the call is one that could have been automatically assigned to a Technician or General class licensee, indicating that you apparently have not requested a change in call as you upgraded. A B would indicate a call type reserved for Advanced or higher class while an A indicates a class range reserved for Amateur Extra. You could request a change to either the next available Amateur Extra range call, or you could select one of the available ones in that range and change to a vanity call sign, for a fee.

Q Glen, W7GHQ, asks: If we assume a dipole antenna that is broadside to a signal and is delivering that signal at a certain level to a receiver and then the dipole is replaced by a Yagi antenna that has a gain of 6 dBd (6 decibels or four times the power compared to a dipole), will the signal at the receiver now be 6 dB greater than before? How is this greater signal obtained?

A Yes, but only if you point the Yagi at the source. The key is that antenna gain is not really a gain, but a redistribution of the signals. It may be easier to see if you are transmitting, but each Yagi element receives some of the energy from the driven element and reradiates it in the proper phase to add in the desired direction and subtract from the undesired ones. The total energy out of the Yagi is the same as if it were a dipole, it is just focused toward the desired direction and thus is stronger by 6 dB than

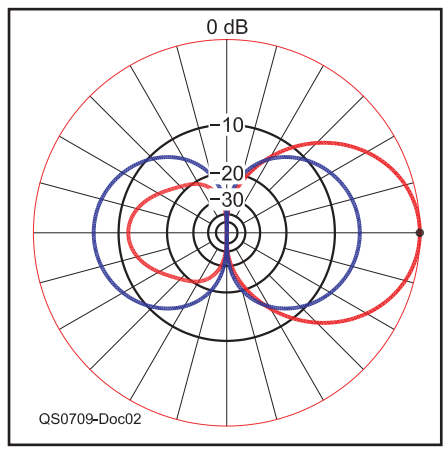


Figure 2 — Comparison of the azimuth pattern of a horizontal dipole with that of a horizontal Yagi. The Yagi will send (and receive) more power in its preferred direction at the expense of power to the rear. This is often a desirable characteristic, depending on your communication needs.

the dipole in those directions — just as the reflector in a flashlight focuses the energy of a small bulb to make an intense beam in the desired direction. It works just the same way in receive. The azimuth pattern of both are shown in Figure 2. Each element receives a sample of the signal from the desired direction and adds it to the signal received by the driven element resulting in a stronger signal. Similarly, signals from other directions are reduced by the out of phase combination.

Q Dongil Park, HL5BJS, asks: In your answer to Bob, N9XAW, in July 2007 *QST*, you said that voice communication could only be used on frequencies allocated to voice even if the voice signal is transmitted as digital data. I have read many Web pages and books about running tone modulated radio telegraphy (MCW) on 2 meter FM. Some use this mode for code practice on local repeaters since FM radios are not generally equipped to receive CW directly. If I do this in the US, should I use a frequency allocated to CW or to voice?

A First note that CW is permitted in all amateur voice bands, while the converse is not true. The CW portions of the US amateur band are allocated only to those using regular on-off keyed CW, called type A1A modulation. MCW, while transmitting CW signaling, is actually a phone mode (as if you were whistling in the mic). Because it occupies more bandwidth than the usual CW signal, it is specifically restricted to voice bands above 50 MHz. You can find them listed in Part 97.305. Authorized emission types of the FCC rules are defined online at **www.arrl.org/FandES/field/regulations/news/part97/**.

Q John, KØIZ, asks: Although I have been a ham for 50 years, I just purchased my first scope and frequency counter. All of the instructions I find on these type units say to *hook up* or *connect* the unit to the circuit to be measured, but no details are provided. My counter has, I believe, a 4 V maximum input limitation. My scope has a 10× (times 10 reduction) probe with a 300 V limit. Since I have some tube radios, how do I make measurements without exceeding input voltage limitations and damaging my units? Can the 10× scope probe be used with the counter?

A Good question, and it's good to make certain so that you don't blow out the front ends of your nice new test gear! I think you will be very glad you have this equipment and I expect it will serve you well for many years if you treat it right.

The key fact to remember is that in any situation you have two different levels to consider, and either can exceed the limit and cause damage. First, there is the dc level, often the most critical, especially if you mess with old tube gear. In a vacuum tube low level amplifier, you might have a plate voltage of 300 V dc and a signal in the microvolt region. Obviously the dc voltage is the concern, but that isn't always the case. For example, if you have a 100 W transmitter and put a probe on the plate cap of the final stage (not recommended, but an example that I can think of), you likely have a 700 V dc level, as well as perhaps a 700 V peak ac signal to deal with. Move to the 50 Ω output, and if it is going into a matched load, you will have $V = \sqrt{(R \times P)}$ or $\sqrt{(50 \times 100)}$, about 70 V_{RMS} or 130 V_{PEAK} and usually 0 V dc level.

Most 10:1 probes contain a series resistance, typically 450 Ω (R1 in Figure 3) if going into a 50 Ω load (R2). If they are designed for a high impedance input (say 1 MΩ) they would have a 9 MΩ series resistor. There is often a coupling capacitor (C in Figure 3) if the probe is not "dc coupled"; otherwise it is usually just a resistor, perhaps with some frequency compensation elements. If both the counter and scope have the same input impedance, you can use the probe with either. It certainly won't do any damage to use it in any case, but the reduction will be different than 10:1 if the input impedance is different than that for which it is designed.

One way to deal with the dc voltage problem is to add a 0.01 µF or so (depending on the frequency of interest) 2 kV (depending on how high a voltage you are likely to be dealing with) capacitor on the end of your probe. Don't forget about that ground lead. I have damaged gear by attempting to measure across a component with the ground lead of the counter on one end, which of course grounded one end of the component in the circuit. That's fine if that connection is to a ground point in the circuit you are trying to measure. Otherwise you may draw excessive current from the circuit and damage part of the radio you're testing! The solution in this case is to insert a second similar capacitor in the ground lead to avoid shorting part of the circuit under test. Note that depending on the circuit being tested, this may detune it so you aren't measuring what you thought you'd be.

If the ac voltage exceeds the limit, the easiest solution may be to build a simple one or two resistor attenuator, designed for the input impedance of the test equipment and able to handle the power being dissipated.

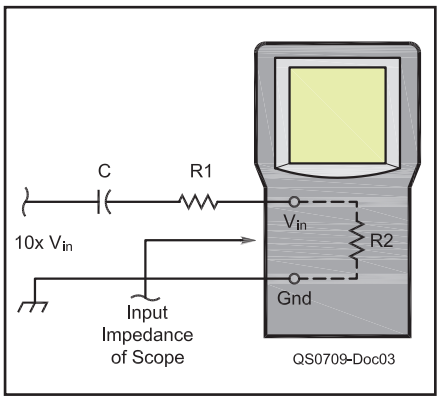


Figure 3 — Simplified schematic of a 10× probe, as used with an oscilloscope or other test instrument.

Q John, K4RIW, asks: I am planning on using a multi-band HF vertical antenna. In all the antenna books that I have read, it is stated that ground radials must be used. I see several commercial antennas advertised that claim no ground radials are needed. Could you please explain how they work?

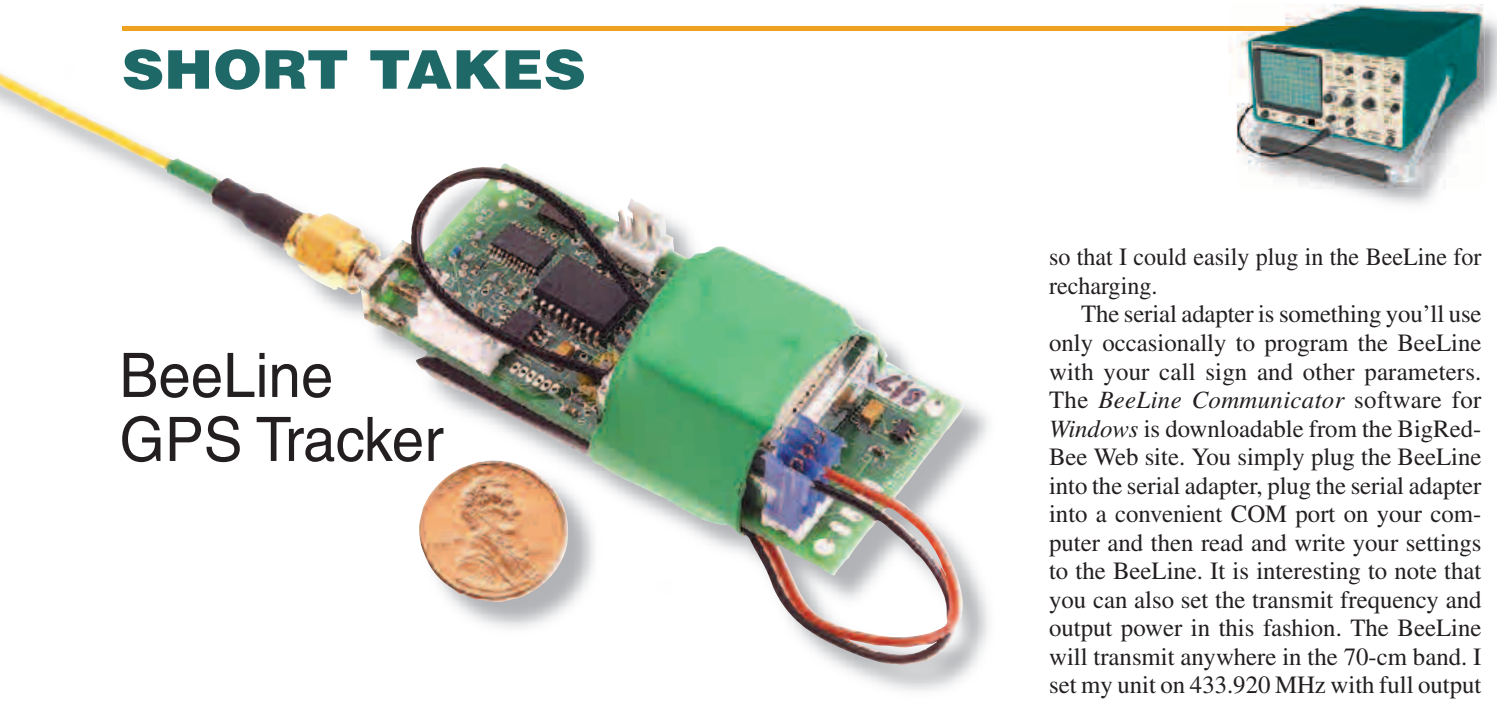
A The basic vertical monopole is ¼ wavelength (λ) long and the ground radials it uses make "the other half" of an equivalent λ/2 vertical dipole. It is also possible to construct an electrical λ/2 wave vertical dipole that avoids the requirement for radials. The no-radial designs are thus based on being an electrical λ/2 or longer. Even though fed at the bottom, they are still functional "dipoles."

Note that the conditions of the ground in the region around the antenna for some distance will still impact the radiation effectiveness (with or without radials). Poor, low conductivity ground will result in losses especially at the low angles. Verticals of any sort are at their best for low angle long haul communication if the nearby ground is quite conductive, as at the seashore; perhaps this is why waterfront property tends to be pricey.

Q Harry, KB3EEP, wants to know why we have kHz, MHz and GHz?

A The answer is it makes it easier to express frequencies without the need for lots of zeros either after the significant digits (if we used Hz or kHz for everything) or before the significant digits (if we used MHz or GHz for everything). Just as with linear measure, we use the units that best fit the problem. We could use either miles or inches to measure both the length of a desk or the distance between Connecticut and California, but the numbers are much easier to deal with if we use inches for the former and miles for the latter.

Do you have a question or a problem? Ask the Doctor! Send your questions (no telephone calls, please) to "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/. QST



BeeLine GPS Tracker

You have to admire any company that is comfortable with calling itself "BigRedBee." Not BeeTrex. Not BeeCom. Just *BigRedBee*.

This is a small business with a small, clever product: the BeeLine GPS Tracker. The BeeLine is a tiny (1¼ × 3 inch) module that contains a GPS receiver and GPS patch antenna, a Lithium-Poly battery and a 70-cm FM transmitter. The whole package weighs about 2 ounces.

The BeeLine is designed to be a go-anywhere APRS tracker. In case you're unfamiliar with the term, APRS stands for the Automatic Position Reporting System. An APRS tracker takes position information supplied by a Global Positioning System (GPS) receiver, reformats it as packet radio data, converts the data to a modulated audio signal and passes the signal to a transmitter (typically a VHF FM radio). At the receiving end, a packet radio Terminal Node Controller (TNC) decodes the transmission and feeds the information to a computer running APRS software. The result is a computer-generated map that displays the location of the tracker (and the object being tracked).

Unlike some bulky APRS tracking setups comprised of separate GPS receivers, TNCs and radios, the BeeLine integrates everything, including the battery, into a single compact unit. The only downside is that the BeeLine operates on 70 cm, whereas most APRS activity takes place on 2 meters (144.39 MHz). For specialized applications where you're not concerned with making the position information available to the traditional APRS network, this probably isn't an issue.

The BeeLine Package

For this review I purchased the complete BeeLine GPS package, which includes a battery charger, serial adapter (to communicate with your computer) and a 70-cm antenna.

The battery charger is an imported device originally intended to charge cell phone batteries. The BigRedBee Web site suggests modifying the charger to make it easier to interconnect with the BeeLine module. That's the approach I took, modifying the charger by adding a cable with a small three-terminal connector (DigiKey part number WM4201-ND) so that I could easily plug in the BeeLine for recharging.

The serial adapter is something you'll use only occasionally to program the BeeLine with your call sign and other parameters. The *BeeLine Communicator* software for *Windows* is downloadable from the BigRedBee Web site. You simply plug the BeeLine into the serial adapter, plug the serial adapter into a convenient COM port on your computer and then read and write your settings to the BeeLine. It is interesting to note that you can also set the transmit frequency and output power in this fashion. The BeeLine will transmit anywhere in the 70-cm band. I set my unit on 433.920 MHz with full output power (about 16 mW).

The antenna is a quarter wavelength flexible wire terminated in an SMA connector.

Kitty Tracker!

My first impulse was to launch the BeeLine in a model rocket, but the odds of it finding a new home in a treetop placed that notion well outside my comfort zone. So, I grabbed the nearest moving object at hand—my cat. I attached the BeeLine to her harness and turned her loose for a neighborhood patrol. I set the BeeLine to transmit a position beacon once every 60 seconds.

The BeeLine's GPS receiver quickly acquired enough satellite signals to determine her position and apparently maintained GPS lock throughout most of her journey. Back at home, I had no difficulty receiving the BeeLine's reports. You can see the result in Figure 1.

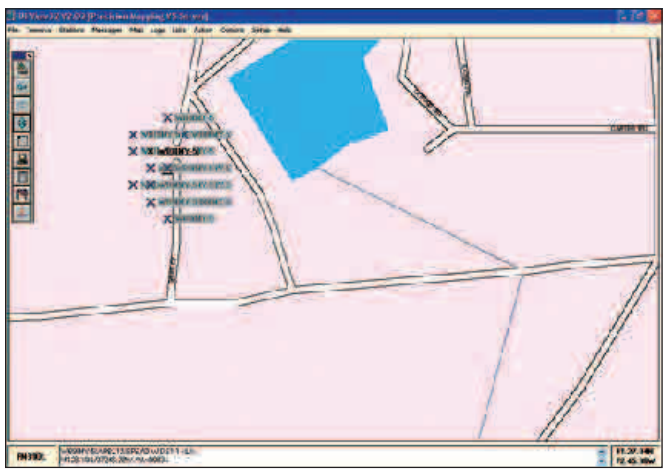


Figure 1—Herding cats may be impossible, but tracking one with a BeeLine GPS certainly works! These position reports were received on 433.920 MHz using a Kenwood TS-2000 transceiver (with its built-in packet radio TNC) and displayed with *UI-View* APRS software.

Serious Applications

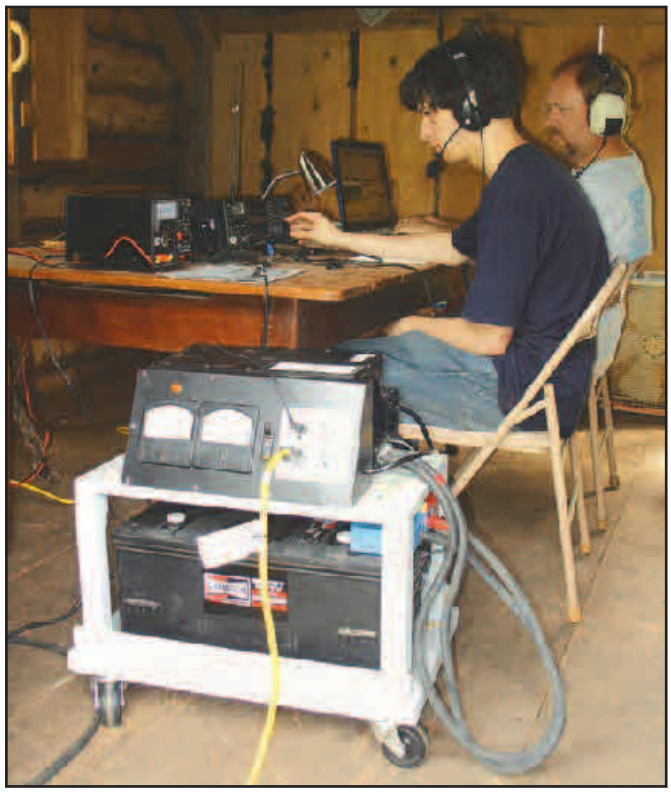
The minimal size and weight of the BeeLine makes it ideal for a variety of tracking applications such as model rockets, high-altitude Amateur Radio balloons, radio-controlled airplanes, search and rescue, etc. The BeeLine also features onboard memory that will record about 10 minutes worth of position data. This is particularly useful for model rocket and R/C airplane activity.

Manufacturer: BigRedBee, 5752 Bay Point Dr, Lake Oswego, OR 97035; **www.bigredbee.com**. *$299*

Steve Ford, WB8IMY ♦ *QST* Editor ♦ sford@arrl.org

Power Packing for Emergencies

John S. Raydo, KØIZ



Recent natural disasters have reemphasized for me the need for emergency power. Portable generators work well but can be highly inefficient under low loads. So how could I make a supply of gasoline last longer? A heavy-duty uninterruptible power supply (UPS) was the answer.

I was familiar with the small UPS units sold for use with PCs. These are typically rated for 500 VA or so and contain a small gel-cell battery. While adequate to power a PC for a few minutes the capacity is not nearly enough for reasonable emergency use. I might need to power ham gear, some lights, a PC, perhaps a small TV and other gear. More power was needed.

I decided I could make my own custom UPS from a battery charger, large capacity battery, dc to ac power inverter and control, indicator and distribution circuitry. My UPS requirements began to firm up:

- 1000 W continuous power available if needed.
- Sufficient capacity to last for X hours.
- Compact and portable configuration.
- Total cost target — under $600.

Picking an Inverter

I had first considered a modified sine wave inverter. These are commonly available in sizes from 100 W and up at very reasonable prices. The larger ones would have adequate capacity. However, I had some concerns in powering expensive ham gear with anything other than an ac sine wave. Others have also reported RFI from the modified sine wave type inverters.

I finally selected a Tripp-Lite Model APS1012 inverter. It had a 1000 W rating and many other features including my preference for true sine wave output. Key benefits included auto switchover to battery, a sophisticated three-step internal battery charger, tightly regulated frequency, over/under adjustable voltage limits and numerous other selectable settings. I have not experienced any RF noise on the HF bands with the Tripp-Lite unit. It is also dependable. My business used one for telephone and server backup with 40,000 hours of continuous operation.

This model has since been replaced by the APS1250, which is smaller and even higher rated at a continuous 1250 W output.[1] It is available from several Internet sources for about $400. There are also other brands with similar features.

A block diagram of the resulting system is shown in Figure 1.

Picking a Battery

The most familiar battery is a "flooded" (wet) type such as used in most cars. Some have removable caps to allow addition of

[1]Notes appear on page 56.

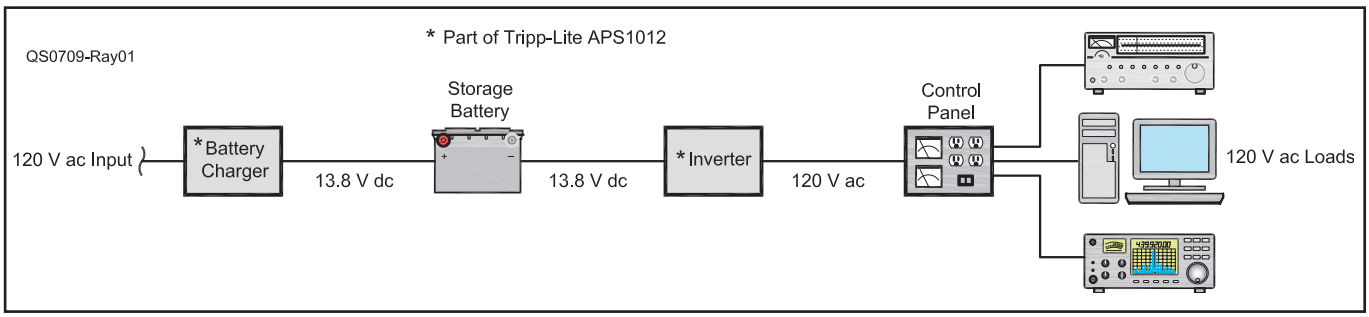


Figure 1 — Block diagram of the uninterruptible power system.

water. The so-called "maintenance free" variety is not totally sealed, allowing hydrogen gas to vent during charging. To avoid the danger of explosion, ventilation is required for indoor use. Your auto battery is designed to supply a very large starting current for a very short time. It contains many thin plates that look like a fine foam sponge designed to provide maximum surface area. Starting batteries are usually rated in CCA (cold cranking amperes) rating rather than ampere-hours (Ah). A relatively small number of deep discharge and charge cycles will cause this type of battery to fail. Thus a starting battery is not a good choice for emergency power.

Deep cycle flooded batteries have much thicker solid plates and can be repeatedly discharged as much as 80%. They provide high capacity at lowest cost with a typical life of 5 to 8 years. The most common are golf-cart GC-2 batteries. Don't confuse deep cycle with "marine" batteries. Many marine batteries are a cross between starting and deep cycle construction. An MCA rating (marine cranking amperes) probably means it's not a true deep cycle and likely will not last long in this application.

A "gelled" battery type contains acid with added silica gel to turn the acid into something that looks like gelatin dessert. This means no spill. Some, however, have to be charged more slowly than either flooded lead acid or absorbed glass mat (AGM) (see below) batteries to avoid gas pockets forming on the plates and forcing the gelled electrolyte away from the plates. For an emergency power pack with fast recharge rates this would be a disadvantage.

A newer type of deep cycle battery is the AGM. A fine boron silicate glass mat saturated with acid is placed between battery plates. AGM batteries have many advantages including a battery life of up to 15 years. AGM batteries generally cost considerably more than the other technologies, however. Unlike flooded batteries the oxygen and hydrogen produced in an AGM battery during charging are 99% recombined. This means almost no water is lost. AGM batteries will not spill and will lose only a few percent of charge per month. This means longer periods between charging than flooded batteries.

Next, how big a battery do we need? The battery Ah rating is usually specified at a 20 hour discharge rate (12.5 A for 20 h equals a 250 Ah rating). Since all batteries have internal resistance the Ah rating will be lower at higher discharge rates. At an 8 hour discharge rate, most batteries will supply only about 80% of rated capacity and substantially less at higher discharge rates. Thus, for a high power emergency supply it might be best to reduce the Ah rating by 20 or 30%.

The depth of discharge affects another important factor — battery life. Discharging only to 50% will typically yield 1000 discharge-charge cycles, double that of 80% discharges. Forget starter type batteries — they will fail after only a couple of dozen cycles. Complete discharge will badly damage most all batteries. You may have observed this effect if you have ever left your car lights on overnight. The best strategy here is to buy a big battery with lots of capacity so depth of discharge will be modest.

Other than initial cost I think the best choice is a big AGM battery. However, I went the cheap route with a big brute (135 pound) 8D size industrial flooded battery available at discount clubs for about $125. So far it's doing fine. Another low-cost option would be two GC-2 6-V batteries connected in series.

Assembling the Power Pack

The battery sits on a 15 × 25 inch piece of ¾ inch plywood with small ¾ × ¾ inch wood strips nailed on top at the edges. The inverter and control box are mounted on a 13½ × 23 inch piece of ¾ inch plywood with 1½ × 1½ inch wooden legs 12 inches high. The inverter assembly is not attached to the battery cart and can be lifted off for battery maintenance or travel. Four heavy duty 3 inch casters and some paint complete the UPS cart.

The control box is optional since loads can be plugged directly into the inverter ac outlets. However, I found it very handy to monitor the ac input voltage (especially if from a generator), and the UPS output voltage and load.

My control box includes two meters from my junk box, two duplex outlets, a circuit breaker and a neon voltage indicator. Almost any type of dc or ac meters can be adapted for this application. My junk box voltmeter displays an expanded 100 to 140 V scale based on a circuit in an earlier *QST* Technical Correspondence.[2] A 150 V ac meter or a dc meter with a 1N4004 diode and appropriate series resistor should also work. Figure 2 is a schematic of my control box.

My "wattmeter" actually measures ac

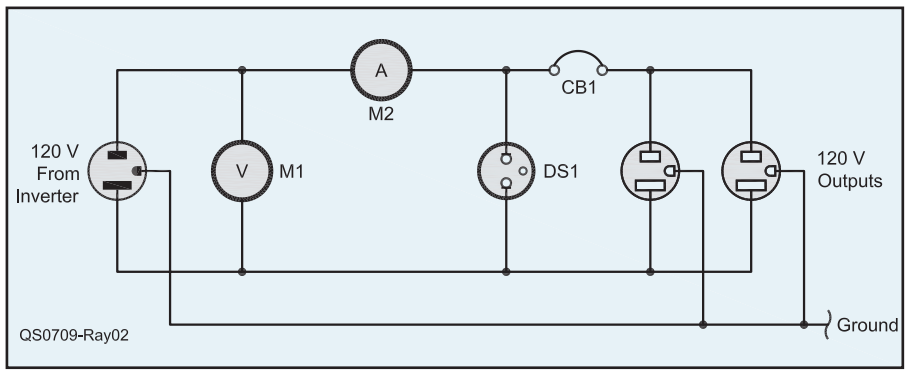


Figure 2 — Schematic and parts list of the control box.

CB1 — 10 A circuit breaker, Grainger 5B738 or equivalent load center breaker. Use hot glue to fasten to control panel.

DS1 — 120 V neon pilot indicator with internal dropping resistor.
M1 — 150 V ac meter (see text).
M2 — 10 A ac meter or wattmeter (see text).

Figure 3 — Control box showing voltage meter, "wattmeter," circuit breaker and ac outlets.

Figure 4 — Battery positive terminal. The 200 A fuse is on left. The link from battery terminal to fuse is made from a 2½ inch length of flattened ½ inch copper water pipe.

amperes with the "watts" calibration based upon an assumed 120 V. Accuracy seems adequate for the purpose but a true ac wattmeter would be better. Meter scales were replaced with new scales that I produced using a nice little program from WB6BLD.[3]

The control box itself is made of scrap ¾ inch wood with ¼ inch wood front and back. Dimensions are 7 × 15½ × 4¾ inches (HWD), sloping to 1¾ inches deep at the top, to allow better visibility of the meters. There is nothing unique about these dimensions or type of construction. A reclaimed computer ac cord was cut to about 2 foot length and plugs into one of the inverter ac outlets. Figure 3 shows the completed control box.

The inverter is connected to the battery using two 3 foot lengths of 00 gauge welding cable available from welding supply stores. It is much more flexible than other types of cables of this size. Stripping the insulation off the ends requires special attention. If provisions are not made, the many fine strands tend to flare out making connection at the inverter quite difficult. I soldered the wire strands together at the ends using a propane torch and then used a file to trim to fit into the inverter terminals.

Each of the battery terminals is shielded from accidental shorts with a standard 4 × 4 inch plastic electrical box with a hole drilled for the battery terminal. The box on the positive terminal also contains a 200 A fuse (see Figure 4).

Be Safe

These big batteries pack lots of energy. Make sure you install a fuse at the battery. Mark the positive terminal box and cable with red paint or red electrical tape. Take particular care when using a wrench to tighten those terminals. A shorted battery can explode!

AGM (and gel) batteries are safer to handle than flooded batteries, since they are sealed and don't have free liquid. If you use a flooded battery, some additional safety rules should be followed:

- Never add acid except to replace spilled liquid.
- Only use distilled water to top off non-sealed batteries.
- Charging non-sealed batteries will cause venting of explosive hydrogen gas. Keep away from flames including your furnace and have good ventilation.
- Overcharging will damage batteries and cause excessive venting and even splattering of corrosive liquid.
- Sulfuric acid will burn skin and destroy clothing. If any is spilled wash it away with a large quantity of water. Protect your eyes. Fumes are also very dangerous and should not be inhaled.
- All big batteries are heavy — watch your back!

Performance

My 8D battery contains 2400 watt-hours (250 Ah × 12 V × 80%) of energy to the 80% discharge point. The inverter is rated at 90% efficiency. Thus, this emergency power pack could provide 100 W of clean continuous ac power for 21 hours, 300 W for about 7 hours, and even 1000 W for a while. The low duty cycle of SSB and CW operation means I'll have the capability to support extended emergency operations. More expensive 8D batteries have even greater capacity.

A noisy ac generator is a necessary evil for most ARRL Field Day operations. At our radio club's last three Field Days we connected my power pack between the generator and our radios. Our three HF/VHF radios ran the majority of time on the power pack with only intermittent use of the generator to operate and recharge. Less gasoline was used and less noise was produced.

Power outages at our home have provided another good use of the power pack. I normally keep the Power Pack plugged into a 120 V ac outlet so the internal battery charger keeps the battery topped off without overcharging. During a recent power outage my wife, Judy, connected our big TV, satellite receiver and several lights to the power pack using an extension.

Notes

[1]**www.tripplite.com/products/**.

[2]J. Grebenkemper, KI6WX, "An Inexpensive, Expanded-Range Analog Voltmeter," *QST*, Dec 1992, p 52, and "Expanded-range DC and AC Voltmeters," Technical Correspondence, *QST*, May 1993, p 77.

[3]W. Jones, K8CU, "Easy Custom Meter Faces at Home," Hints & Kinks, *QST*, Oct 2002, pp 63-64. Also see **www.tonnesoftware.com**.

John Raydo, KØIZ, received his Novice class license in 1957 at the age of 13. From early on he has enjoyed designing and building ham radio equipment and antennas. He has authored several previous articles for QST. *He is an active member of the Johnson County (Kansas) Radio Amateur Club. John is a graduate electrical engineer and also holds a liberal arts degree in math and science as well as an MBA. He started his career working in the engineering department of TWA and later headed up their information services and purchasing departments. He is now retired from his second career as a principal with an investment company. John can be contacted at* **kcflyers@yahoo.com**.

ARRL Emergency Communications Course Honor Roll

We honor the following individuals who have passed all three ARRL Amateur Radio Emergency Communications courses (Levels I, II and III) between April 1 and June 30, 2007. This list also includes recertified individuals. If you are interested in taking an Amateur Radio Emergency Communications course, or one of our other ARRL online courses, see **www.arrl.org/cce/**.

John Ahle, W1JMA
Floyd Barlow, WA9BVH
John Bennett, KCØVRN
Charles Blakey, N4ADZ
James Campbell, W4BQP
Orville Carter, WØFII
John Churchill, N3DBC
Roger Courtney, N5RCS
James Cunningham, KØJRC
William Davis, KC5IND
David Downing, KE7LC
Jerry Drummond, KB9OHH
Roy Eades, KA9MZJ
Glenn Edmondson, KI4QLJ
William Everitt, KG4ZJT
Allison Gillespie, N9ZBE
Frank Goetzfridt, KBØHMR
Arthur Goodall, KCØKNU
Jack Green, AD4LP
Jeffrey Hardig, N9NJN
William Himes, WB9UTW
Leonard Holmes, W8MCD
Ronald Hornbeck, WD8LVF
James Isom, WB9LQX
Deborah Kaiser, WØDLK
Keith Kaiser, WAØTJT
Randall Kishbaugh, N3JPV
Theodore La Monica, KC2FZR
Robert Maiden, KI4MWU
Jimmie Martin, WB5K
Robert G Mechaley Jr, W1LL
William Mechura, KA5G
Robert Overton, WD5ILB
John Palmer, K4JP
Delmar Partridge, W5QQ
Bradley Paul, KC9JPN
Dennis Pearson, KCØTJY
James Philopena, KB1NXE
Randy Rathbun, NVØU
Philip Rittenhouse, NW9V
Ronnie Rodvelt, KCØQIG
Robert Seputis Jr, WQ9W
Russell Thomas, WI9B
John Tomlinson, KG6NWK
C Mark Tyler, K5GQ
Charles Walz, KI4NOC
Patsy Wheelock, KG4YAU
Larry Widener, KAØYJE
James Wiedemeier, KI4PSQ

N0AX

HANDS-ON RADIO

Experiment #56 — Design Sensitivities

Sensitivity is important in ham radio, and in more ways than just the ability to hear signals. When designing an electronic circuit, it's important to know which component values are critical. It might be critical to choose just the right type of component or even change the design to be more tolerant of component variations. In this column, we'll introduce sensitivity and how it's calculated.

Terms to Learn

Tolerance — allowable variation around the nominal value, usually given in percent (%) or parts per million (ppm).

Nominal value — the specified value of a component.

Standard value — a series of normal production values commonly specified for components.

Actual value — the measured value of a component.

Ideal value — an exact value resulting from a design calculation.

Typical value — a common value exhibited by components of the specified type.

Component Values

When designing a circuit, a calculator will spit out values with many digits, such as 4.83456 kΩ or 373.29 pF. It would be difficult to order components with these *ideal values*, however. You might use variable components carefully adjusted to those exact values, but what about inductors and transistors? What about measurement errors? Adjustment won't work very well. The usual technique is to use the closest *standard value* and accept any resulting differences in performance.

Where do standard values come from? If you open a catalog or look at a list of available component values, you'll recognize a series of familiar numbers such as those for "5%" components seen in Table 1. The percentage value refers to the component's *tolerance*. Each component's value is centered in a *tolerance window* centered between those of its neighbors. For example, a 12 Ω resistor with a 5% tolerance may have an actual resistance anywhere from 12 – 5% = 11.4 Ω to 12 + 5% = 12.6 Ω. The next lowest neighbor, 11 Ω, has a tolerance window ranging from 10.45 Ω to 11.55 Ω, overlapping the lower edge of the 12 Ω window from 11.4 Ω to 11.55 Ω.

Exercise Set #1

Use the same procedure as in the preceding paragraph to see if the 36 Ω standard value's tolerance window overlaps with the edges of the 33 Ω and 39 Ω windows. Find the tolerance window for a 68 Ω, 10% resistor. Go to your junk box and find up to 10 resistors with the same value marked on their surface in text or with paint bands. Using a volt-ohm-milliammeter (VOM), measure the value of each resistor and calculate the difference in percent from the marked value. If you have more than one VOM, measure the resistors *again* using the second VOM. (This is a good exercise to perform with a couple of friends, sharing resistors and meters.) Make a histogram of each set of values as shown at **en.wikipedia.org/wiki/Histogram** and compare the results. Not only do resistor values vary, but measurements by different meters vary, too!

Ideal, Nominal and Actual

The value indicated by those component markings, such as "103" on a ceramic capacitor meaning 1×10^3 pF = 1 nF = 0.001 µF, is the *nominal* value. It's almost certainly *not* the component's *actual* value because of the allowed tolerance, such as 5% or 10%. As you just saw in Exercise Set #1, there can be a significant amount of variation between components of the same nominal value!

A design calculation produces an *ideal* value, such as 1.0927 MΩ. The closest *standard* value is chosen for the design and that is the nominal value of the component. When the nominal values of each component are used to calculate circuit parameters such as gain or frequency response, the result is the nominal value for that parameter. If measured, the component and parameter will have a third value, the *actual* value. Actual values determine the actual value of circuit parameters — how the circuit actually functions.

Designers have to take into account this progression from ideal to actual, even for transistors and ICs. For example, the dc gain or β of a transistor is specified to have a minimum and maximum acceptable value, along with a *typical* value, representative of how most components will behave.

Because the values of the components vary from component to component, the performance of the circuit in which the component is used will also vary. Sometimes the variations are quite small compared to the amount of change in the component value. In other circuits, small variations can have big effects on performance. Circuit designers must take into account the relationship between component variation and circuit performance. This is called *design sensitivity*.

Calculating design sensitivity for a particular component begins with choosing the design parameter of interest. For example, in an antenna tuner circuit, sensitivity may be calculated with respect to range and not for harmonic rejection or power dissipation.

Table 1
5% and 10% Standard Values

5% Standard Series

10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

10% Standard Series

10	12	15	18	22	27	33	39	47	56	68	82

For 1% standard series see **www.rfcafe.com/references/electrical/resistor_values.htm**.

H. Ward Silver, N0AX ♦ PO Box 927, Vashon, WA 98070 ♦ n0ax@arrl.org

Only the value of the component under investigation is changed. Other component values are kept constant so that the calculated sensitivity depends only on changes in the value of the selected component.

Sensitivity is often expressed in % of parameter change per % of component change — % per %. If in the tuner circuit a change in 5% of a capacitor's value results in a 10% change in matching range, the sensitivity of range to capacitor value is 10% / 5% or 2% per %. (Sensitivity can also be expressed in electrical units, such as Ω / pF or V / μH, if that is most useful to the designer.) Amplifier and filter circuits often have sensitivity expressed as dB per % of change.

Exercise Set #2

Read the very first *Hands-On Radio* column (Feb 2003) about the "Common-Emitter Amplifier" shown in Figure 1 and find the equation for voltage gain; $A_V \approx -R_C/R_E$.[1] We'll determine voltage gain sensitivity to both R_C and R_E. Assume nominal values for R_C = 3.9 kΩ and R_E = 220 Ω. The nominal value for midband gain is approximately –17.7. What is the actual value of gain if either R_C or R_E vary by 5%? (Either –18.6 or –16.8) The sensitivity of gain to R_C = change in gain / change in R_C value = [(–18.6 –17.7) / –17.7] / 5% = 5.08% / 5% ≈ 1% / %, meaning that for every percent R_C changes, gain will change by the same amount. (The sensitivity for changes in R_E = –1% / % because as R_E increases, the gain is reduced.) Sensitivity to changes in R_C or R_E could also have been expressed in dB / %. A sensitivity of 1% / % = 0.04 dB / %.

Exercise Set #3

Read the *Hands-On Radio* column on "Notch Filters" from July 2006 and find the equation for center frequency, f_0, of the Twin-T circuit shown in Figure 2. Let's assume that all of the Rs and Cs are exactly matched. If this circuit is going to be used in your backpack station, it will probably be subjected to temperature swings. How much will the filter's center frequency change with temperature as the capacitors heat and cool?

Most audio circuits use film capacitors. A common temperature coefficient for film capacitors is –150 ppm / °C. (The capacitor expands, increasing the separation between electrodes and reducing capacitance.) A change of 10 ppm is 0.001%, so the capacitor has a "tempco" of –0.015% / °C.

Start by computing the sensitivity of f_O to the value of C as in the previous Exercise — change the value of C by a few percent and see how much f_0 changes as a result. (We're assuming both capacitors change temperature equally and so both can be treated as a single component.) You'll find the sensitivity of f_0 to C is –1% / %; as C increases, f_0 decreases. For C to change 1%, temperature must change by 1 / 0.015 = 66.6°C, which is equivalent to 1 / 66.6 = 0.015% / °C. So the sensitivity of f_O to temperature is –0.015% / °C. If f_O is 1 kHz at room temperature (23 °C), taking it outside into the hot sun at 35 °C, the change of 12° will result in f_0 changing by 0.015% × 12 = 0.18% or 1.8 Hz.

[1]ARRL members can download Hands-On Radio columns from **www.arrl.org/tis/info/HTML/Hands-On-Radio**.

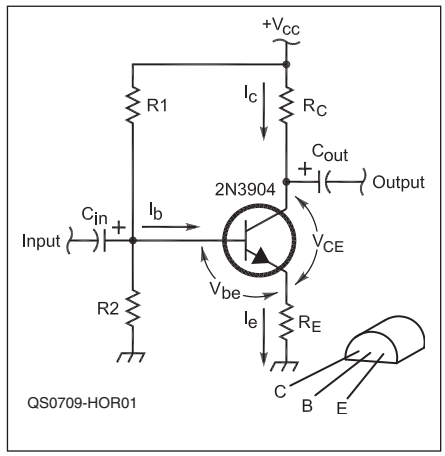


Figure 1 — The common-emitter amplifier's gain is determined by the ratio of R_C and R_E.

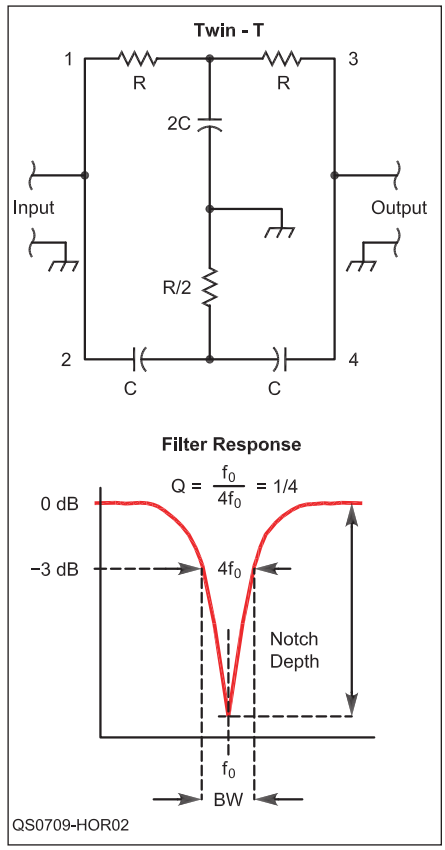


Figure 2 — Notch frequency and depth depend on careful matching of component values. Temperature changes can upset that balance.

Worst Case and Monte Carlo

In Exercise #2, what is voltage gain if R_C increases by 5% and R_E decreases by the same amount (–19.6)? Vice versa? (–16.0). The *worst case* values of gain occur when both components vary to the maximum amount allowed and in ways that change the circuit parameter in the same direction. In a complicated circuit, finding the worst-case scenario can be very difficult. As a result, circuit designers use the *Monte Carlo* method in which all significant component values are varied randomly within their specified tolerance windows. The resulting values of the circuit parameter, such as gain, also vary randomly. As more and more component value combinations are tried, gradually the extreme worst case values of gain are found. Obviously, this requires a computer to perform the necessary calculations and display the results.

Recommended Reading

How about some more practice in computing sensitivities? You can use any of the *Hands-On Radio* circuits that define a parameter in terms of component values. For a slightly trickier calculation, take a look at the August 2004 column on "Current Sources" and determine the sensitivity of load current (I_{LOAD}) to transistor gain (β) for the current mirror.

Next Month

We haven't visited transmission lines in a while, so let's learn some more about stubs and the use of the nearly ubiquitous SWR analyzer instrument. You'll need an oscilloscope to make the necessary adjustments and measurements. If you don't have one, buddy up, or make this one a club project. QST

Strays

MARIANAS CLUB SEEKS DONATIONS

♢ I am writing this as an appeal for help for the hams on Guam and throughout Micronesia. Our club, the Marianas Amateur Radio Club, has been actively recruiting, training and testing people from all over Micronesia and Oceania plus the military personnel passing through. We have been very successful in getting people licensed but now comes the problem: For several reasons, getting equipment to get these folks on the air is a major problem.

I'm asking for donations of your equipment, old or new, broken or not (as long as it may be repairable by robbing parts from one to another, as parts can be another problem.) MARC is a non-profit organization, and a tax deduction may be available to US residents.

I realize shipping may be a problem but we do have some resources for that as we are fortunate enough have a pilot for a major airline who will help line up the shipping. Our Web site is **www.guamham.com**.

Thanks for your time and constructive comments are more than welcome. — *Dick Manns, KH2G, Yigo, Guam*

A Resonance Probe for the Ham Shack

Grid-dip meters, even grids, are getting hard to find!

Hwang Nam Chang MD, KE2HF

One of the most daunting challenges with homebrewing RF projects can be winding inductors for tuned circuits. The challenge is knowing when you have fabricated or adjusted a coil to obtain the needed inductance value. A similar problem can crop up while repairing equipment that contains RF or IF transformers that need to resonate at a particular frequency.

Enter the Grid Dip Oscillator

Historically, a grid dip oscillator (GDO) has been used to measure the resonant frequency of tuned circuits. In the vacuum tube days, there were a number of models available at reasonable cost and many amateur stations included one in the workshop. These were simple tuned grid oscillators with a meter in the grid circuit and the oscillator coil outside the unit. If the oscillator coil were coupled to a resonant circuit, some of the energy would be coupled from the oscillator coil to the resonant circuit and the grid current meter would drop or dip. The calibrated dial of the GDO could be used to directly read the resonant frequency of the measured circuit.

Unfortunately, GDOs did not translate well to solid state, although there have been a few successful solid-state "dippers." Another problem is that modern circuits are so compact, it can be difficult to know just what you are coupling to. To make such measurements even more complicated, modern projects often use toroid wound, or otherwise shielded coils and transformers that do not couple well to such devices.

On to Plan B

Another way to determine the resonant frequency of a parallel tuned circuit is to observe that at resonance it will have the highest impedance. Thus, if we inject a signal into the circuit from a source with a finite impedance, the voltage across the tuned circuit will be highest at resonance. By having a sensitive indicator and a generator that covers the range of interest we

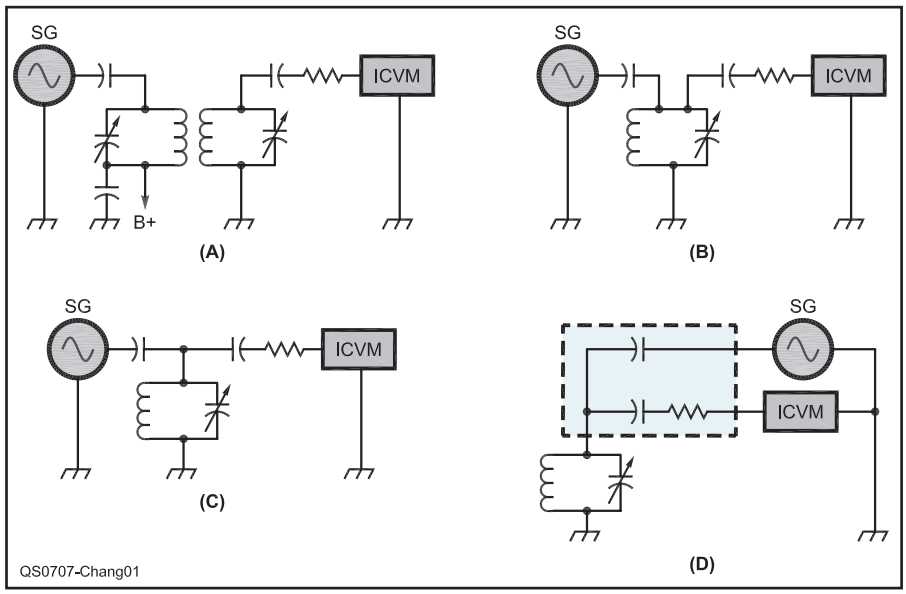


Figure 1 — Evolution of the resonance probe. At A, using a signal generator and voltmeter to determine resonance of a tuned transformer. At B, measuring the resonance of a tank circuit. At C, using a single connection and at D, the connections combined into a probe.

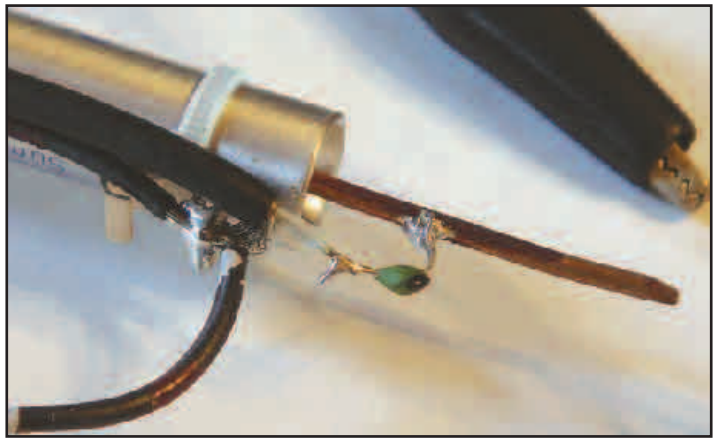


Figure 2 — Close-up view of the completed probe.

can determine resonance. The key is to have a test setup that doesn't change the resonant frequency while measuring it. The evolution from a two connection to single connection arrangement is shown in Figure 1.

I used the integrated circuit voltmeter (ICVM) with RF probe described in an early edition of *The ARRL Handbook* and my shop signal generator. The generator output was connected through a coupling capacitor to the tip of the RF probe.[1] When I put the tip of the probe to high impedance point of an RF resonant system, it was easy to find the resonant frequency by noting the generator frequency at which the ICVM needle moved up. I used a 15 pF coupling capacitor to minimize circuit loading well into the HF range for most circuits. Any voltmeter that reads down to well below 1 V dc could be used, including the RF voltmeter in the current edition of *The ARRL Handbook*.[2] The RF probe is still described in the current *Handbook* and can be used with almost any dc instrument.[3]

Putting it All Together

With the generator, suitable voltmeter and RF probe in hand, the only construction required is to tack one side of the coupling capacitor to the probe tip and the other side to some thin coax going to the signal generator output. Then tie them all together to make it happen as shown in Figure 2. This is the simplest construction project I've ever made, but it is the most useful. I tried three different home shop type signal generators — the Heath IG-42, Conar Model 280 and B & K Precision Solid State RF generator Model E-200D. All work about the same for this application. Only the generator attenuation and ICVM sensitivity need to be adjusted to provide an on-scale reading.

Putting it to Work

I checked my collection of salvaged RF coils and IF transformers both in circuit (with power off) and in my junk box. I found most of my IF transformers were at 455 kHz but there was one that measured 250 kHz, as well as a few VHF transformers that likely came from a TV set. Now I can tell what I have!

I checked some toroid coil based tuned circuits of an unfinished QRP project board only to discover that the resonant frequency was way off from the desired frequency. After I make the appropriate changes, I expect that when I put the power on, the previously useless projects will become properly functioning receivers and transmitters.

Notes

[1] *The ARRL Handbook for Radio Amateurs,* 1983 Edition, pp 16-4 to 16-6.

[2] *The ARRL Handbook for Radio Communications,* 2007 Edition, p 25.11. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 9760. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

[3] *The ARRL Handbook for Radio Communications,* 2007 Edition, pp 25.35 to 25.41.

Hwang Nam Chang, KE2HF, was licensed as HM4DF in Korea in 1966. He graduated from Chonnam University Medical School, Kwangju, Korea in 1965. He moved to the US for further medical training in 1972 and obtained his US license as WA2ACM in 1975. He completed a residency in internal medicine in New York City, decided to practice in Western New York, and has been practicing in the same place for the last 30 years. Ham radio was a major hobby during his training and medical practice. He upgraded to Advanced class about 10 years ago and received his current call, KE2HF. His radio interests include collecting and repairing antique radios.

In addition to Amateur Radio, he paints watercolors. His watercolor paintings have been accepted by the American Watercolor and National Watercolor Societies. Hwang is the inventor of the Zoomfinder, an art designing tool shown at **www.zoomfinders.com**. *You can reach Hwang Nam at 109 Franklin St, Newark, NY 14513 or at* **hchang2@rochester.rr.com**. QST

Strays

QCWA CELEBRATES 60TH ANNIVERSARY

◊It was what seems like only yesterday that on November 14, 1947, during a 10 meter roundtable QSO, the suggestion was made to form an association of ham radio operators who had been licensed for 25 years or more. With that thought in mind, a group of hams met on Friday evening, December 5, 1947, in New York City. That evening, the Quarter Century Wireless Association (QCWA) was born.

In order to celebrate our 60th Anniversary in grand style, the Quarter Century Wireless Association is pleased to announce a new, limited availability, operating award. The QCWA Sixty-Sixty Award is unique in that it represents the first award of its type offered by the QCWA. It is available to both Members and non-Members alike. The basic requirements are simple: Make 60 two-way contacts with 60 different QCWA Members.

The QCWA Sixty-Sixty Award commemorates the organization's upcoming 60th anniversary.

The QCWA Sixty-Sixty Award became available with its announcement at the 2007 Dayton Hamvention on May 18, 2007 by President John Johnston, W3BE. The final day for contacts is no later than 2400 UTC, June 30, 2008. All applications for the Award should be postmarked no later than September 1, 2008.

For specific eligibility requirements, see **www.qcwa.org/awards.htm** or contact Robert Buus, W2OD, 8 Donner St, Holmdel, NJ 07733-2004; **w2od@aol.com**.

WR1B

HINTS & KINKS

TRAVELING WITH HANDHELD RADIO "RUBBER DUCK" ANTENNAS

◊Do you travel with your handheld? Many of us do, and if you like to keep your equipment in the best of shape, this idea is for you. Before you go on your next trip, visit your local drugstore and purchase a toothbrush holder such as the one in Figure 1. Many of the new handheld antennas fit into a toothbrush holder, and can pack into your bags quite nicely this way. This protects the antenna and its connector from unnecessary bends and/or breaks. — *73, Nathan Ciufo, KA3MTT, 6323 Cinnamon Ridge Drive, Burlington, KY 41005*; **ka3mtt@arrl.net**

AUTOMATIC EMERGENCY POWER TRANSFER FOR YOUR HAM STATION

◊Living in the Midwest, adjacent to Tornado Alley, I have experienced many power outages. Most last only a few minutes to an hour or so. The ice storm of February 2002 lasted 10 days at my house, however. To keep my station on the air during these power outages, I use a 24 Ah, 12 V sealed lead acid battery. When the power goes out, however, I would have to disconnect the ac power supply from my radio equipment and connect the battery.

I worked on a design for an "uninterruptible power supply" using high current diodes to route the voltages. The problem is, if you place a diode between a battery and the transceiver, the voltage drop across the diode is often too much to keep the PLL circuits in the transceiver operating from a slightly discharged battery.

My solution is a simple high current relay to transfer the transceiver from the ac power supply to the battery when the ac power fails. When normal ac power returns, the relay is energized, connecting the transceiver to the ac supply. See Figure 2. The circuit also connects a trickle charge circuit to recharge the battery. With the 4.7 Ω current limiter, you cannot overcharge the battery. The diode prevents the battery from discharging through the ac power supply when the supply is switched off.

K1 is a DPDT relay with 15 A contacts. By paralleling the contacts, it has a 30 A capacity. I mounted the relay and its matching socket, along with the charging components in a project box.

I used a Tyco Electronics/Potter & Brumfield K10P-11D15-12 relay. The socket is a 27E895. A 3 A silicon diode (such as a 1N5400) and a 4.7 Ω, 1 W resistor make up the charging circuit. The project box is a RadioShack 6×3×2 inch box, part 274-1805. I bought the relay and socket from Electronics Supply in Kansas City, Missouri. My cost for the project was about $30.

I mounted RadioShack binding posts (part 274-661) on the plastic box cover as shown in Figure 3. I spaced them ¾ inch apart to allow the use of Pomona or General Radio double banana plugs for my connections to the power supply, battery and radio. [It would be simple to mount Anderson Power Pole connectors on the box, too. — *Ed.*] I used no. 16 AWG wire inside the box, but doubled all the runs for added ampacity. The wires to the battery should be at least no. 12, and should be as short as possible to reduce voltage drop.

When the ac supply is switched off (or the power goes out) my transceiver turns off but then returns to the same operating

KA3MTT

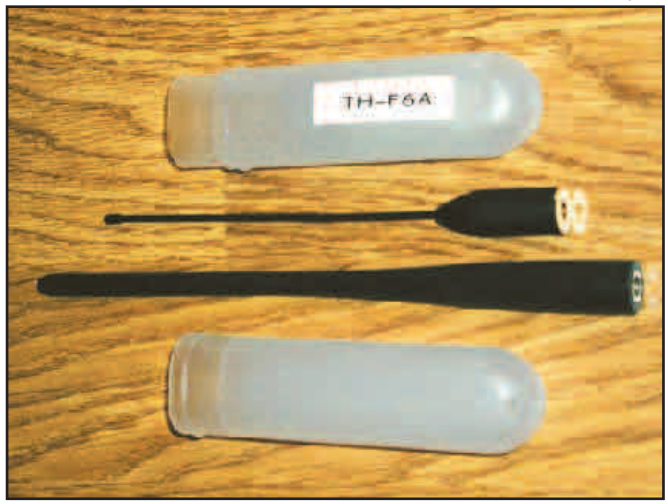


Figure 1 — A toothbrush holder is a convenient storage container to safely pack a rubber duck antenna. If you carry more than one handheld radio, use stick-on labels to identify which antenna is inside each holder.

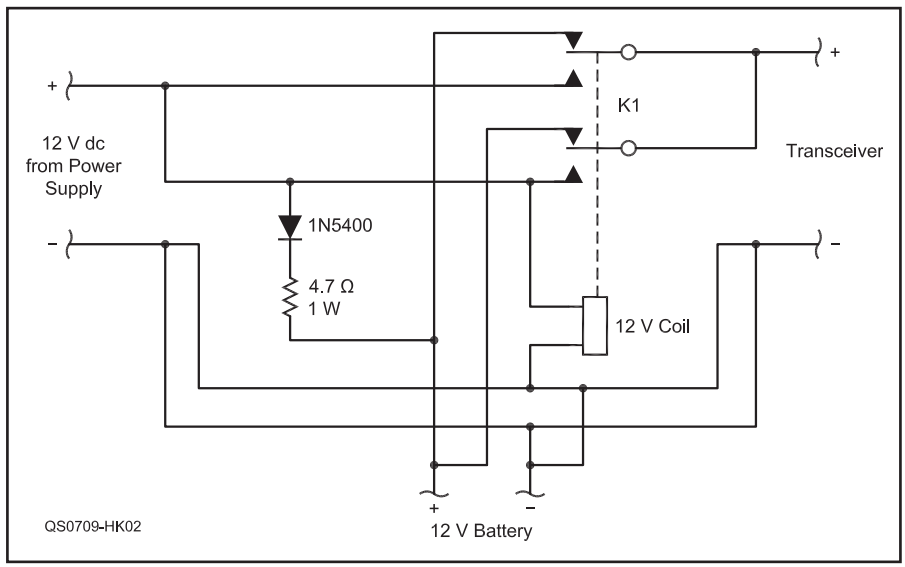


Figure 2 — This schematic diagram shows how a 12 V relay can be used to automatically switch between an ac power supply and a battery to power a radio. The diode and resistor form a trickle charger to keep the battery topped off and ready for the next power outage.

Larry D. Wolfgang, WR1B ♦ Senior Assistant Technical Editor ♦ h&k@arrl.org

Figure 3 — This photo shows how WØKWJ installed binding posts on a project box cover to connect his radio to an ac power supply or a battery.

Figure 4 — This view shows how the relay is mounted on a socket, with wiring between the socket and the binding posts. Notice that the no. 16 AWG wiring is doubled for all wiring runs, to increase the ampacity of the wiring.

frequency when the relay transfers it to the battery. My transfer unit has been in service for some time and works great. I can forget it is even in my shack.

It would certainly be possible to build a more sophisticated power transfer circuit or buy a commercially available unit. The battery charger circuit could also be improved to include voltage and current sensing. This simple circuit meets my needs, however, and may help others. — *73, Roger Snowdall, WØKWJ, 8405 Everett St, Raytown, MO 64138*; **rogerw0kwj@aol.com**

A QUICK GROUND CONNECTION

♢This idea for quick-connect antenna grounding was suggested by experience at the 2006 Vienna Wireless Society Field Day. Northern Virginia was doused by thunderstorms for a couple days preceding, and the same weather was promised through FD itself. At dinnertime Saturday the flashing and rumbling resumed and we decided to button up. That's when the problem reared its head. How do we ground the coaxial cables from all those high-flying Windoms, inverted V dipoles and long-wire antennas — and do so very quickly?

Our stations were on picnic tables with ground rods driven in near them. There was no good way to get both the shields and conductors of the antenna leads solidly connected to the rods, though.

Here is the solution whispered to me by the Radio Muse:

Get a 2-foot RG-58 patch cable with PL-259 connectors on the ends. Cut it in half. Strip off a couple of inches of the outer insulation, push back the braid, remove the foam, twist the shield down tight against the center conductor and hammer everything flat. Tin the whole tab thus created into a nice, big short. Add a barrel connector to attach the antenna feed line quickly and easily. Do the same with the other half of that piece of coax, and have a pair of grounding stubs.

When you prepare ground rods for Field Day or other portable operations, attach one of these stubs just below the top of each rod with two radiator hose clamps or other type of grounding clamps you can cinch down tight (for the best in strength and connectivity without the need for a kilowatt soldering iron). You may have to enlarge the short tab for the clamps to get a good grip. Just wrap stranded wire around the length of the tab and add more solder. — *73, Alan Bosch, KO4ALA, 5832 20th St N, Arlington, VA 22205*; **ko4ala@arrl.net**

PORTABLE BATTERY POWER

♢Great ham minds think alike! The portable battery operation setup described in the November 2006 *QST* Hints & Kinks column looks a lot like mine. You got it down to the same type of automatic battery charger! However, I might offer one more tip.

Picking up a big car/marine battery can be a challenge for some of us. The weight is a concern even for the normal maintenance and that inevitable battery replacement, where you have to return the old battery to the store for a core credit.

I use two of the smaller Lawn and Garden Tractor batteries in one marine-battery storage box. It is a pretty snug fit but they will fit in there. I can use one battery at a time or can switch them to parallel use for higher-demand loads.

This dual battery system also helps by having one battery available to run the rigs while another one can be charging. This configuration allowed me to keep my shack operational for the days following hurricane Katrina until utility power was restored. My vehicle was turned into a recharge station for the batteries during my commutes to work and back home. This setup will also run one of those RV fluorescent light fixtures for quite a long time. You would be amazed how much emergency lighting one of those lights will provide to a dark setting.

Keep up the good work! — *Joseph Maurus, KA5TWS, PO Box 45714, Baton Rouge, LA 70895*; **jmaurus@brgov.com**

[Yes, I realize that Lawn and Garden Tractor batteries are not designed for deep discharge applications, so these batteries should not really be used for this application. The concept of packaging several smaller, lighter batteries in a box, with a charger as described here and in the November 2006 Hints & Kinks column has some merit, however. While we are at it, it is also not a good idea to mount switches inside the battery box, where hydrogen gas could accumulate and a spark from throwing the switch could have explosive results. Mount the switches on an external panel or in a separate box, perhaps attached to the battery-box lid. — *Ed.*]

KEEPING AND LABELING A SUPPLY OF ALL SIZES OF HARDWARE

♢The following tip can be used by any "do-it-yourself" person, including hams. The next time you're in the hardware store, go to the section where they have all sorts of hardware in pull-out compartmented boxes. Take one of every size machine screw that you can lay your hands on in both SAE (American sizes like 2-56, 4-40, 6-32 and so on, up through no. 10 or so, depending on individual needs) and in the metric sizes from about M2 through maybe M5 or so, and push them into the edge of a piece of cardboard that you have brought with you. Label each screw next to where you've pushed it into the cardboard.

Buy fairly long screws. The reason for the long lengths is to have room on the screw shaft for a label listing the size, and so that you can handle them easier. Of course, you can just leave the screws in the cardboard, too. Take it one step further and you can assemble a full set of reference nuts, too, if you would like.

This will be your "reference" or "check" set of hardware, to verify the size that is needed for anything requiring additional hardware. The whole thing will only cost a few dollars, and can be indispensable for identifying all of those mystery-sized holes that we all find in ham equipment and elsewhere.

I have found this simple and inexpensive system to be quite helpful in minimizing hardware guesswork. In the field, or during another emergency, you can use that one screw in the size you need to hold something together, or you will have a sample to take to the hardware store with you to find the required replacement. If you use hardware from your "check" set, just be sure to replace it on your next trip to the hardware store. — *73, Joe Wonoski, N1KHB, ARRL CT Section Technical Coordinator, 1121 W Lake Ave, Guilford, CT 06437*; **n1khb@aol.com**

Hints and Kinks items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters, 225 Main St, Newington, CT 06111, or via e-mail to **h&k@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments. QST

PRODUCT REVIEW

Tokyo Hy-Power HL-1.5KFX Linear Amplifier

Reviewed by Mark Wilson, K1RO
QST Product Review Editor

The Tokyo Hy-Power name may be familiar if you've been involved with Amateur Radio for a while. Although they have been making ham products for many years, it's been a while since they had a major presence in the US. Their products — mainly VHF/UHF "brick" amplifiers and HF antenna tuners — were imported by Encomm in the 1980s. Perhaps you remember the *QST* ads showing their distinctive styling.

"Back in the day" I worked many grid squares on 70 cm with a Tokyo Hy-Power brick amplifier, so I was pleased to see the company back in the US market with a new distributor and sales through Ham Radio Outlet. Warranty and repair service are handled by AVSL in Virginia Beach, Virginia. (AVSL is an experienced electronics service shop that handles factory warranty service for Kenwood Amateur Radio and land mobile equipment, as well as a long list of consumer electronics products.)

Tokyo Hy-Power's initial offering is the HL-1.5KFX, a solid-state amplifier for 160 through 6 meters. Output power is 1 kW PEP (900 W CW) on HF and 650 W on 6 meters.

Overview

The HL-1.5KFX RF deck and power supply are in one compact package. Although I'd seen photos, when I first unpacked the amplifier I was surprised at how small it is. There are no external heat sink fins to grab skin or clothing while you're handling the box, just a muffin fan and assortment of connectors on the rear panel. Figure 1 offers a peek inside the box.

Four ST Microelectronics SD2933 power MOSFET transistors operating in class AB provide the RF amplification. There's a 6 dB attenuator at the amplifier input for better compatibility with 100 W transceivers, and switched low-pass filters at the output ensure compliance with FCC spectral purity regulations. The MOSFETs run from a 50 V power supply, and drain current is 30 to 35 A at full output.

Microprocessor-controlled protection circuitry helps keep the amplifier safe. If certain operating parameters are exceeded, protection circuits switch the amplifier to standby and a front-panel LED lets you know the cause of the fault. Turn the ac power off and then on again to reset the protection circuit.

If the drive power exceeds 100 W, the O.DRIVE LED lights. It also lights if the HL-1.5KFX senses that the frequency of the drive signal doesn't match the amplifier's band setting. I found that this feature works when your radio is set to a higher frequency band than the amplifier but not a lower band. For example, if your radio transmits on 14 MHz and the amp is set to 7 MHz, the protection will kick in. If the amplifier is set to 28 MHz, it won't.

If the power supply voltage exceeds the normal operating range, the O.VOLT LED lights. If the FUSE LED also lights, one of the internal fuses has failed. If the heat sink temperature reaches 40° C, the cooling fan shifts to a higher speed and the front panel FAN LED lights. If it reaches 70° C or the power transformer reaches 130° C, the amplifier switches to STBY and the O.HEAT LED comes on. The amplifier can't be reset to operate until the temperature is within the normal range. If the reflected power exceeds approximately 80 W, the amplifier switches to STBY and the PR LED lights. At 1000 W output, that corresponds to an SWR of about 1.8:1.

Although it doesn't shut down the amplifier, the front-panel ID LED flickers if drain current is higher than 35 A. Excessive drain current usually means that drive power or antenna system SWR are creeping toward the amplifier's limits. When I saw the ID indicator flickering, it was usually time to touch up my antenna tuner settings.

Bottom Line

If you're looking for a bigger signal on 160 through 6 meters at home or in the field, this compact, solid-state amplifier should be on your short list.

In the Lab

Lab test results are shown in Table 1. The HL-1.5KFX easily met its power output specifications. Initial testing revealed that the spectral purity met FCC requirements on all bands except 6 meters. There the second harmonic was suppressed only 50 dB (60 dB is required). Working through AVSL and Ham Radio Outlet, we learned that the problem was in the low pass filter. Coils supplied by a parts vendor and used in our unit's production run were only 5 turns instead of the required 6. Tokyo Hy-Power supplied a replacement filter board, which ARRL Test Engineer Michael Tracy, KC1SX, installed in the review unit.

With that repair, the 6 meter second harmonic suppression improved to 66 dB, in line with our expectations. AVSL has replacement coils to correct any other amplifiers not meeting spec.

Connections and Setup

The 41 page instruction manual includes specifications, interconnection and operat-

Mark J. Wilson, K1RO ♦ Product Review Editor ♦ k1ro@arrl.org

Table 1

Tokyo Hy-Power HL-1.5KFX, serial number 0520087

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency range: All amateur frequencies, 1.8 to 54 MHz.	As specified.
Power output: 1000 W PEP, 900 W CW for HF; 650 W PEP for 50 MHz.	As specified for SSB and CW.
Driving power requi\red: 85 W nominal.	As specified.
Spurious and harmonic suppression: Not specified.	HF, 52 dB (worst case); 50 MHz, 66 dB. Meets FCC requirements.
Intermodulation distortion (IMD): Not specified.	3rd/5th/7th/9th order: 36/39/50/57 dB below PEP.

Primary power requirements: 100/110/120 V ac, 20 A max, or 200/220/240V ac, 10 A max.

Size (HWD): 5.6 × 10.7 × 14.3 inches; weight, 45.5 pounds.

Typical retail price: HL-1.5KFX, $3000; HXT-1.5KF fan, $110; HC-1.5KAT auto-tuner, $1150.

ing details. Several pages detail theory of operation and troubleshooting. The last 15 pages include block diagrams and schematics along with photos and drawings of PC boards and modules inside the case. Labels call out the location of key components. The photocopier-quality photos are clear enough to be useful although it's difficult to make out details in some shots. The English translation is pretty good and illustrations are helpful. I had no difficulty learning how to connect and use the amp.

The HL-1.5KFX operates from 100 to 120 V (20 A maximum) or 200 to 240 V (10 A maximum) ac lines. There are four jumper-selectable steps in each range. The amplifier ships with the jumpers set for 115/230 V; changing them requires removing the cover and moving wires on a terminal block according to instructions in the manual. A switch on the bottom of the case selects between the two ranges.

You'll need a good ac line for 120 V operation, one rated for 20 A and dedicated to use with the amplifier. It's a good idea to run a 240 V line to the shack if you plan on running an amplifier regularly. As is usually the case with Amateur Radio amplifiers, you'll need to supply an ac line connector to match the power source in your station.

Tokyo Hy-Power provides an SO-239 for the transceiver antenna jack, plus phono jacks for TR switching and ALC. The TR key line is 5 V at 1 mA, so it will work with just about any transceiver. The manual suggests connecting the ALC to avoid overdriving the amplifier, especially with transceivers capable of more than 100 W output.

There are two SO-239 antenna jacks (A and B) on the back panel. They are selected with the front-panel ANT switch, and the control circuitry remembers the antenna last selected for each band. I hooked one jack to the antenna tuner feeding my all-band HF wire and the other to a 6 meter beam. With power off, the transceiver is connected to antenna jack A.

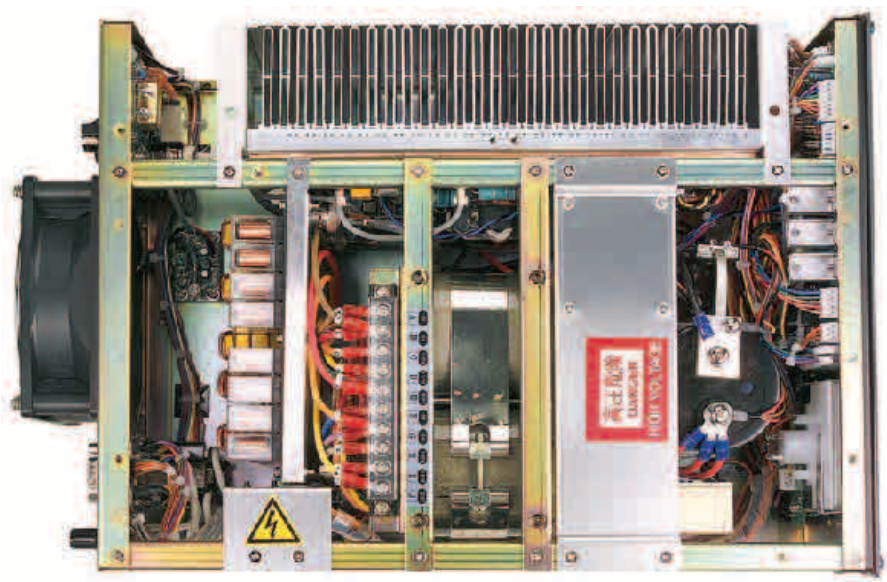


Figure 1 — Inside the HL-1.5KFX.

Band Selection

Ideally, a broadband or auto-tune amplifier includes automatic band switching and follows right along with the transceiver so you don't have to think too much about it. Some amplifiers I've used incorporate RF sensing circuitry and frequency counters, while others are designed to work with band data from a matching transceiver.

The HL-1.5KFX takes the band data route. The amplifier includes decoders for radios from a variety of manufacturers via rear-panel connectors (Figure 2). For ICOM radios, you can use the CI-V interface or the dc band data from an accessory jack on many ICOM models. Yaesu radios with an 8-pin BAND DATA jack (FT-920, FT-1000 series, FT-2000, FTDX-9000) are supported. An RS-232-C connection for Kenwood transceivers is available, but according to the manual only the TS-480 and TS-2000 are compatible. The manual offers some hints for making an interface to use the Ten-Tec Orion with the Yaesu jack. Users are encouraged to contact Tokyo Hy-Power for more information.

The front panel BAND SELECT control switches among the ICOM, Kenwood and Yaesu jacks. If automatic band switching doesn't work for you, there's a MANUAL position for front-panel frequency UP/DOWN switches. A row of LEDs lets you know which band is selected.

Although the amplifier includes extensive protection circuitry as described earlier, the manual cautions that driving the amplifier with full power on CW (or RTTY or other high duty cycle mode) with the amplifier set to the wrong band "leads to the failure of the valuable final power FET devices." That caution sure got my attention and is perhaps the best reason to use the automatic band selection feature.

I used the HL-1.5KFX with my IC-746 HF/6 meter transceiver and opted for the dc band data connection. That entailed using the supplied cable to connect between the ACC2 jack on the transceiver and the ICOM phono jack on the amplifier, and then switching a slide switch to the ICOM setting (rather than CI-V). As soon as I set the front panel BAND SELECT switch to ICOM the amplifier instantly followed band changes on the transceiver. I also confirmed operation with a Yaesu FT-1000D.

My one complaint is that the supplied cables are just over 3 feet long, limiting options for amplifier placement on my desk. Extending the ICOM cable with a shielded phono cable is easy enough, but the Yaesu cable, with DIN connectors on each end, takes a little more thought.

In the Shack

The HL-1.5KFX's front panel is clean and simple. Rocker switches control POWER and OPER/STBY. When you need the amp, just switch it on and it's ready to go. An analog meter displays forward and reflected power, drain voltage and drain current (switch selectable). The only other controls are for band and antenna selection as described earlier.

Figure 2 — The rear panel includes connections for the amplifier to receive band information from ICOM, Yaesu and some Kenwood transceivers. Supplied cables make for a no-fuss installation if you have a compatible radio.

In past years, the ritual for setting up a new HF amplifier included contacting the manufacturer to find out how to enable 10 and 12 meter operation. The 1970s CB craze prompted FCC regulations prohibiting operation anywhere near 27 MHz for Amateur Radio amplifiers. Individual amateurs could make their amplifiers work on those frequencies, though, and there was always some secret modification that the manufacturer provided upon receipt of a copy of your Amateur Radio license. The rules changed in December 2006, and the HL-1.5KFX is ready to operate on 10 and 12 meters right out of the box.

The rear-panel fan makes a little noise, but it's not objectionable. It blends right in with noise from fans in other station equipment. I noticed that the fan runs for about 30 seconds after switching the amplifier off while the filter capacitor discharges.

The manual cautions against running full power with high duty cycle modes such as RTTY or FM. It recommends reducing drive power by 20-30% — about 600 to 700 W output. For AM phone, the manual says no more than 30 W drive to maintain signal quality. If you plan on a lot of high duty cycle operation, consider the optional HXT-1.5KF external cooling fan.

Operation couldn't be simpler. Turn the amplifier on, make sure that the band selection feature is working, check the antenna SWR and operate. The 80 W reflected power limit means that you'll need well matched antennas (about 1.8:1 at full power). I'm using a multiband dipole fed with ladder line and a tuner, so that's not an issue.

Competing (but somewhat more expensive) 1 kW HF/6 meter solid-state amplifiers from Yaesu and ICOM include internal antenna tuners that will match up to 3:1 and switching for four antennas.[1,2] Tokyo Hy-Power recently announced a companion automatic antenna tuner, the HC-1.5KAT, designed to work with the HL-1.5KFX. The tuner has connections for three antennas and is specified to match impedances from 12.5 to 200 Ω (SWR of 4:1).

The HL-1.5KFX is a good companion to the many HF/6 meter transceivers on the market. It's compact and easy to use. CW operators will appreciate the full break-in (QSK) capability using fast miniature relays. The small size and manageable weight make it a good candidate for portable operation as well. It's priced well below competing solid-state amplifiers, although adding the optional antenna tuner makes the capabilities (and price) more comparable to the other units. Tokyo Hy-Power has announced additional products for the US market, including similar amplifiers at higher and lower power levels. Welcome back.

US distributor: Tokyo Hy-Power Labs, Inc — USA, 487 East Main St, Suite 163, Mount Kisco, NY 10549; tel 914-602-1400; **thpusa@optonline.net**; **www.thp.co.jp**. Available exclusively from Ham Radio Outlet, **www.hamradio.com**.

[1]M. Wilson, "ICOM IC-PW1 Linear Amplifier," Product Review, *QST*, Feb 2001, pp 85-87. *QST* Product reviews are available on the Web at **www.arrl.org/members-only/prodrev/**.

[2]M. Wilson, "Yaesu VL-1000 Quadra Linear Amplifier," Product Review, *QST*, Jan 2002, pp 74-76.

Hendricks QRP Kits FireFly Transceiver

Reviewed by Rich Arland, W3OSS
ARRL Contributing Author

I've known Doug Hendricks, KI6DS, for 15 years. Doug, along with Jim Cates, WA6GER (now a Silent Key), were the founders of the Northern California QRP Club (NorCal) in 1993. Doug has been a driving force behind a succession of kits that have literally revolutionized the low power side of ham radio. When *QST* contacted me about reviewing one of Doug's FireFly transceiver kits, I was drawn like a moth to a flame. Interested? You bet!

Having been involved with QRP (operating with 5 W RF output or less) for over 40 years, I've watched this aspect of ham radio grow into what we enjoy today. One problem during the early years was a lack of kit radios for the home constructor. After Heathkit left the business, there were few options for someone who wanted to build a station. You had to gather parts and follow one of the designs published in the magazines or handbooks, or else roll your own radio set. There was an attempt by the QRP Amateur Radio Club International in the '80s to field a small QRP transceiver kit, but with the appearance of NorCal, things started to happen on a large scale.

Starting with the NorCal-40, a 40 meter CW transceiver, and followed by the Sierra, a multiband CW transceiver, Doug and NorCal forged the path for the home constructor to build well-designed gear with repeatable performance. Both were initially designed by Wayne Burdick, N6KR (now of Elecraft) and were big hits with the QRP fraternity.

Bottom Line

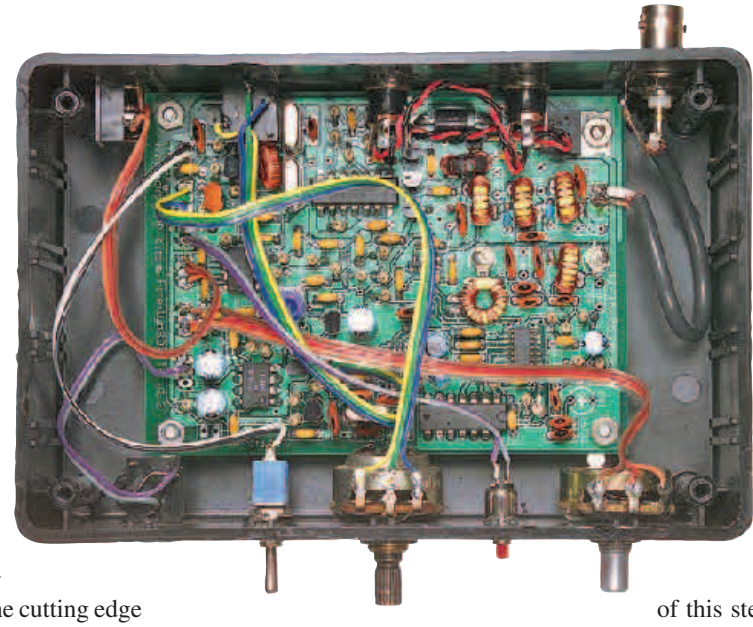
The FireFly from Hendricks QRP Kits offers an inexpensive way to explore the world of software defined radios. It's fun to build and its good performance makes it enjoyable to use on the air.

The FireFly — QRP Meets Software

This trip down memory lane serves to establish Doug's experience in kitting some really spectacular QRP radio and accessory kits. Through Hendricks QRP Kits, Doug is now developing and marketing several interesting products for the QRP community including the FireFly transceiver kit reviewed here and the DC-40 40-meter transceiver we looked at in July *QST*.[3] Designed by Dan

[3]S. Ford, "Hendricks QRP Kits DC-40 Transceiver," Short Takes, *QST*, Jul 2007, p 49.

Tayloe, N7VE, the FireFly attempts to marry a software defined radio (SDR) SSB/CW receiver with a conventional variable frequency crystal oscillator (VXO) CW transmitter for a state-of-the-art radio set that is loads of fun to build and operate. The stable transmitter has 3.5 W minimum output and, thanks to using a dual crystal "super VXO" circuit, nicely covers much of the 30 meter band. A CW keyer and full break-in (QSK) are included on the board. Another version of the Firefly kit covers 20 meters.



In essence the FireFly places the frugal QRPer on the cutting edge of radio technology. The receiver requires a modern computer with sound card and special software to operate (more on this later). Basically, an SDR is a hardware platform that, through the use of on-board firmware and associated computer software, can be reconfigured on-the-fly without resorting to hardware modifications. If you have an SDR, you can change the operational characteristics of the radio simply by modifying the computer software that runs the radio. A few key strokes or mouse clicks and you can alter IF filter performance, change operating modes, change frequency, or call up a spectrum analyzer and actually look at nearby frequencies, all from the computer keyboard. Neat, huh?

Building the Kit

The FireFly is a monoband transceiver, so you need to pick 30 or 20 meters. I have lots of 20 meter radios, so I picked the 30 meter version. The kit uses through-hole components. There are five surface-mounted parts, but they are installed before the kit ships.

The kit arrived in a deceptively small box. You need to get a copy of the manual in PDF format from the Web site (**www.qrpkits.com**). Once I had the manual printed (all 66 pages of it!) I took it to Office Max and had it spiral bound. That allows it to lay flat on the workbench and offers an effective way to store the manual after the build.

The next order of business was to inventory the contents and be sure that everything was on hand (it was). I cannot overstate the importance of this step. You don't want to discover, halfway through the build, that you don't have the proper parts to complete the kit! Resist the temptation to dive right in with your soldering iron, instead do a complete

Table 2
Hendricks QRP Kits FireFly (30 m Version)

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency coverage: Receive, 10.09-10.138 MHz; transmit, 10.108-10.119 MHz.	Receive, as specified; transmit, 10.095-10.118 MHz.
Power requirement: 9-13.8 V dc; receive, 28 mA; transmit, not specified;	Receive, 25 mA; transmit, 0.53 A. Tested at 12 V.
Modes of operation: CW (SSB receive only).	As specified.
Main Receiver	***Receiver Dynamic Testing***
Sensitivity, 500 Hz BW, –127 dBm.	Noise floor (MDS), 500 Hz filter: –123 dBm.
Blocking dynamic range: 100 dB (offset not specified).	Blocking dynamic range, 500 Hz filter:* 95 dB, independent of offset.**
Two-tone, third-order IMD dynamic range: 93 dB (offset not specified).	Two-tone, third-order IMD dynamic range, 500 Hz filter:* 20 kHz offset: 85 dB; 5 kHz offset: 85 dB.
Third-order intercept: Not specified.	20 kHz offset: +4.5 dBm; 5 kHz offset: +1.5 dBm.
Transmitter	***Transmitter Dynamic Testing***
Power output: CW, 3.5 W (max).	CW, 5.2 W max.
Spurious-signal and harmonic suppression: ≥50 dB.	68 dB. Meets FCC requirements.
CW keyer speed range: Not specified.	12 to 48 WPM.
CW keying characteristics: Not specified.	See Figures 3 and 4.
Price: $70, postage-paid in the US.	

*Receive performance is sound card dependent. Tested with 24-bit Sound Blaster Fatal1ty Gamer and Rocky SDR software.
**Level at which the analog to digital converter goes into overload.

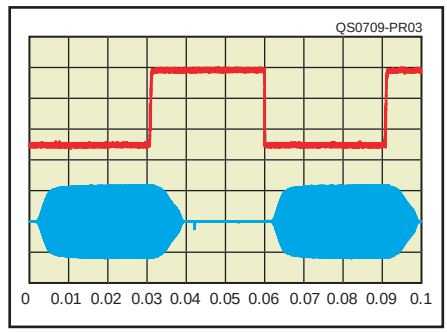


Figure 3 — CW keying waveform for the FireFly transmitter showing the first two dits in full-break-in (QSK) mode using external keying. Equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. (Note that the first key closure starts at the left edge of the figure.) Horizontal divisions are 10 ms. The transceiver was being operated at 5 W output at 10.1 MHz.

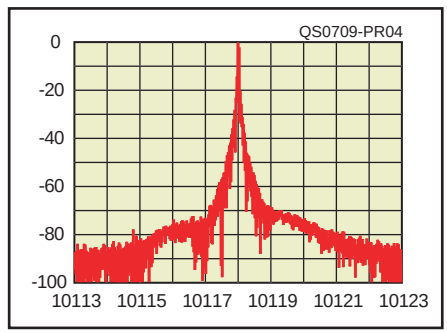


Figure 4 — Worst-case spectral display of the FireFly transmitter during keying sideband testing. Equivalent keying speed is 60 WPM using external keying. Spectrum analyzer resolution bandwidth is 10 Hz, and the sweep time is 30 seconds. The transmitter was being operated at 5 W PEP output at 10.1 MHz.

inventory. This step also helps you visualize the overall kit building process and become familiar with the various parts.

The actual build took me 11 hours. Experience has taught me to take my time and check each step. I like to have my projects work the first time out of the hanger (call me crazy) as it saves valuable time troubleshooting mistakes. Time better spent taking a nap!

The entire manual is extremely well written and illustrated. The FireFly is built in sections with a portion at the end of each construction phase for troubleshooting using a 9 V battery and a multimeter. I found that this method of building virtually guarantees trouble-free startup at the end of the construction phase. My test measurements during construction were within 10% of the predicted numbers, so I felt confident that the kit went together without any misrouted wires, bad solder connections or misplaced parts.

The secret to building any piece of electronic equipment, whether from a kit or from scratch, is to plan your build, allocate adequate time, use good soldering techniques and (in the case of a kit project) *read the instructions carefully*! Most problems with homebrew projects are *not* malfunctioning components, but poor solder connections or misplaced parts.

The overall quality of the FireFly kit is quite high. The double sided PC board has plated through holes and solder masking, and the silk-screen on the component side is easy to read. For me, the hardest part was winding L1, the VXO toroidal inductor. L1 requires 56 turns of 32 gauge wire. It takes a concentrated effort to wind it correctly. Aside from the tedious task of winding L1, this kit is a breeze to build and get working.

Computer: 1 — W3OSS: 0

I wish I could say the same for the computer-to-radio software interface! I should have known better, really, I should have. The FireFly kit went together so smoothly that I should have been on guard for the dreaded software boondoggle. Let me just say this: I am an analog guy in a digital world! Yes, I dabbled with *BASIC* in the dark ages, but today's software is black magic to me.

With the FireFly transceiver passing initial tests and working per the manual, the next step is to hook the radio up to the computer. That entails running a cable from the receiver's low-level I/Q audio outputs to the computer sound card's LINE LEVEL inputs.

I tried hooking up the FireFly receiver to my HP laptop. This particular laptop is only about a year old, so I figured that it would work fine. Not so! I soon discovered that the built-in sound card has no stereo LINE or MIC input, only a monaural one. My other household computers were older models that would not handle the SDR software needed to make the receiver perform (you need a 1 GHz or faster machine).

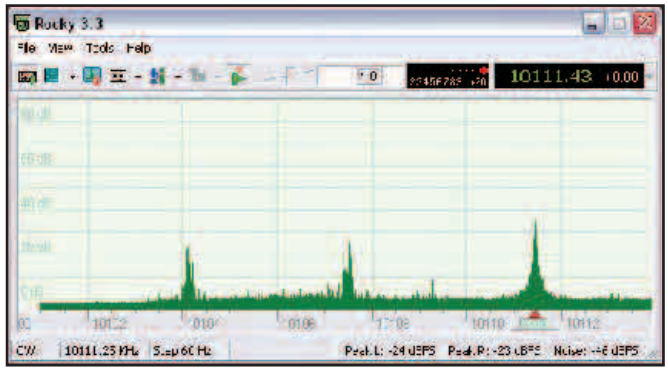


Figure 5 — Here's the FireFly and Rocky SDR software in action during my QSO with W1AW.

I contacted the ARRL Lab for advice, and Test Engineer Michael Tracy, KC1SX, sent an M-Audio Audiophile USB (a high-end external sound card tested in May *QST*). Of course I couldn't get that sound card to work with my laptop, so Michael offered to take a look. Not being one to look a gift horse in the mouth, I immediately put the package in the mail.

Within a couple of days Michael said he was having problems getting the Audiophile USB, his own Compaq laptop and SDR software to play well together. He had gotten the FireFly to work with a desktop computer that had stereo inputs on the internal sound card (a high-end Sound Blaster Fatal1ty Gamer, also reviewed in May *QST*). He did the Lab tests in Table 2 with that setup and sent the radio back to me. I ended up borrowing a friend's Sony Vaio desktop computer and using the internal sound card that came with it. This time the SDR receiver and software worked just fine! Okay, now we are getting somewhere!

So, how do you check to see if your computer will work with the SDR software for the FireFly receiver? Simple: Open the audio control panel and check to see if the MIC and/or LINE input has an R/L (Right-Left) toggle on the menu above the VOLUME slider. If the internal card has a *true* stereo input, this R/L toggle will be highlighted. No highlights, no stereo input.

The FireFly manual includes some suggestions on sound cards. Although the receiver will work with the generic 16-bit sound card included with most computers these days, a 24-bit device, such as the one used for ARRL Lab testing, yields noticeably better test performance. In practice, I found that the stock Vaio sound card worked well enough for enjoyable QSOs. I'd suggest starting with whatever you have and then deciding about an upgrade after you've used the radio for a while.

Which SDR Software to Use?

The FireFly manual points to two compatible SDR software packages that can be downloaded from the Web free of charge and used with the radio — *PowerSDR* (**www.flex-radio.com**) and *Rocky* (**www.dxatlas.com/rocky/**). The manual suggests *PowerSDR* because it has more features and has had more development, but Michael suggested that I try *Rocky* because it's simpler and he had used it while the FireFly was in the Lab. Since I had enough aggravation in the software department, I left well enough alone and used the *Rocky* software with the FireFly. It worked beautifully! Of course there's no reason you can't download and try both packages. The manual has extensive instructions for setting up and using the computer, radio and software. It goes into great detail to describe the various options and show how to tweak the FireFly receiver for optimal performance.

Transmitter and Control Features

The more conventional transmitter portion of the FireFly is like a well broken-in pair of boots — comfortable. The transmitter tuning range is specified to be 10.108 to 10.119 MHz, with the lower end varying a bit depending on the characteristics of the crystals. Our FireFly covered all the way to the lower band edge (10.1 MHz) and then some. The receiver coverage is approximately ±24 kHz, centered on 10.120 MHz. This covers almost the entire 30 meter ham band. The radio operates on any supply voltage between 9 and 13.8 V dc. The Lab measured 5.2 W output at 12 V dc, a bit more than specified.

The kit features a built-in memory keyer. By holding one of the paddles during initial power up, the keyer reverts to a straight key mode. All you have to do with this keyer is to plug in a paddle set (or a straight key) and work the speed control. The last five pages of the manual have all the instructions on how to get the most out of the keyer.

One of the very neat *Rocky* features is the ability to choose between a waterfall display and a classic spectrum analyzer display on the receiver. I like the spectrum

analyzer. You can look at a fairly large slot of receiver bandwidth and see the various signals popping up out of the noise. By placing the cursor over the desired signal and left-clicking the mouse, the receiver tunes to that signal and you hear it in the audio. Figure 5 is a sample of what you see while using the radio and software.

A SPOT switch places a low level stage of the transmitter on the air so you can see your operating frequency on the receiver display. To initiate a QSO with a station you're hearing, simply turn on the transmitter SPOT control and adjust the frequency until the transmitter output is superimposed over the receive signal on the spectrum analyzer display. Hit the paddles and give him a call! It's that simple.

On the Air at Last

On-air testing was a blast! In keeping with the frustration encountered with the software, 30 meters seemed dead when I fired up the FireFly. I attached my Elecraft XG-2 test oscillator to the FireFly antenna input and immediately found the generator's 10.106 MHz signal in the spectrum display. Tweaking C75 and C87 peaked the receiver preselector for maximum signal input. So much for the receiver alignment!

A couple of days later I asked Michael Tracy if he could try a QSO from W1AW and listen carefully to the FireFly signal. No sooner was I on frequency testing than Mark Wilson, K1RO, the Product Review Editor, came up on frequency and we chatted a bit. Mark's signals were a solid 599 and he gave my QRP signal a 579 at his New Hampshire QTH. In the meantime, Michael and W1AW's chief op, Joe Carcia, NJ1Q, were reading me 599 and I worked the HPM Memorial Station next. The FireFly sounded good on both transmit and receive, and being able to see the other station's signals on the display was extremely cool. A quick click of the mouse and I was able to narrow the receiver IF passband to improve the received signals. Hey, there may be something to this SDR stuff after all!

I'm very pleased with the overall performance of the FireFly. The fruitful minds of Dan Tayloe, N7VE and Doug Hendricks, KI6DS, offer the frugal QRPer an inexpensive, feature packed kit that is on the cutting edge of technology for the radio amateur. Couple that with the enjoyment of building your own equipment, and the FireFly is a great choice for the intermediate and experienced kit builder.

I found out more than I ever cared to know about sound cards! Seriously, building and testing the FireFly transceiver kit was a positive experience. Learning to use the capabilities of an SDR receiver provided me with an in-depth look at this new generation of radio gear. Once the FireFly's running, you can try out other versions of SDR software, as they become available, to add features or performance to your rig. Since the performance of the FireFly is so dependent on the software, we did not include the usual performance comparison bar chart that we generally use with HF radios.

Manufacturer: Hendricks QRP Kits, 862 Frank Ave, Dos Palos, CA 93620; tel 209-704-3522; **www.qrpkits.com**.

Rich Arland, W3OSS, is the author of Low Power Communications*, published by ARRL. The revised third edition will be available shortly after you read this review. Check the ARRL Web site for more information.*

Gamma Research HPS-1a Switching Power Supply

Reviewed by Michael Tracy, KC1SX
ARRL Lab Test Engineer

Lightweight 13.8 V dc switching power supplies are increasingly popular for communications use, largely the result of "quiet" (at radio frequencies) designs. Switching power supplies in consumer electronics equipment often use switching signals in the 25 to 35 kHz range and minimal filtering, resulting in spurs of the same frequency spacing across the HF range. The spurs tend to move up and down the band, presenting a real headache to those with nearby receivers. With additional filtering and more stable operation, switchers for amateur use have been a welcome change.

I've been a fan of switching supplies ever since I worked at a switcher manufacturer in the 1980s. So naturally when I went shopping for a new power supply for my modest shack, several switchers from past *QST* reviews were on my list.[4] Then I discovered a new product from Gamma Research that is smaller and lighter, yet capable of powering a 100 W transceiver.

Big Current, Small Package

Gamma Research's Fred Graham, K3GQ, recognized that in typical CW and SSB HF amateur use, power supplies reach their maximum current draw for a small amount of time while the radio is transmitting at peak power. The rest of the time, the supply just loafs along at a fraction of its capability. By drawing off some of that excess energy and returning it when it is needed during transmit, you can use a lower current supply to do the job of a larger one.

The problem is that until very recently, the only practical way to do that was by using batteries (big and heavy, or small and very expensive). To a small degree, filter capacitors in the supply output provide the same ability, but not nearly enough to bridge the gap between a 20 A draw and a 5 A source. Another recent advance is the so-called "super capacitor" with capacitance values *much* larger than we are used to seeing. Values as high as *100 farads* (F) are being manufactured and sold today. The HPS-1a takes advantage of these new parts to provide 5 F of output capacitance (actually five 25 F capacitors in series, necessary because of their low voltage ratings).

Bottom Line

The Gamma Research HPS-1a dramatically shrinks the size and weight of a 100 W transceiver power supply. RF noise is somewhat higher than other power supplies we've measured, but that isn't too much of a problem in on-air use.

The HPS-1a is a very tiny package, just 1.6 × 3.4 × 5.3 inches and weighing a mere 20 ounces. Apart from the labeling, the front has only a single LED for power, giving it a sleek appearance. The back of the supply carries the power cord, dc output (a 2-pin Molex connector), power switch and a cooling fan just big enough to fill out the remaining panel space. The fan runs full

[4]M. Wilson, "More Switching Power Supplies," Product Review, *QST*, Jul 2006, pp 58-61.

time but is essentially silent.

Note that there is no room on the panel for a fuse. On the ac line side, the Gamma HPS-1a has a small cylindrical plastic-package fuse soldered on the board, a better alternative than a larger case. Users should also consider fusing the dc output because with the massive filtering capacity, this supply could put more energy into a faulty load than a larger supply, even after the input fuse blows.

As with other supplies we've looked at, the documentation is modest — a single sheet with specifications, a diagram for the dc connector and a couple paragraphs of usage guidelines. The back of the sheet features a drawing of a Molex terminal pin, describing the various parts and proper installation technique. A connector and two pins are included with the supply, and spares are readily available.

Some folks have lamented that the output connector is not the popular Anderson PowerPole, but an adapter is easy to make. A minor case modification permits connector replacement, should you wish to go that route. (Frequent *QST* contributor Phil Salas, AD5X, describes one such mod at **www.ad5x.com/presentations.htm**.)

The supply provides 5 A continuously at 13.8 V, but more significantly, it can supply 22 A at a reduced duty cycle of 25%. This means you can have an SSB or CW QSO with your 100 W transceiver and a power supply that is less than half the size and weight of even the smallest of the other switchers we've reviewed so far. Of course there is a tradeoff: With the other supplies, you can also run RTTY at 100 W, but with the HPS-1a, you have to reduce power (just how much depends on the duty cycle of your transmissions). As with other switchers we've reviewed, the case temperature remains reasonable after extended transmitting times.

RF Noise Testing

With a full 5 F of output filtering, the expectation is that the supply should be exceptionally quiet, and that's the consensus of Internet discussion group opinions. Testing in the ARRL Lab showed a different picture, however, as the level of RF noise on the dc output is higher than other switching supplies we've tested (Figures 6 and 7).

So what accounts for this disparity? Part of the answer is at the other end of the supply, the ac input. Because the wiring attached to the input (the house wiring itself) is much longer than the dc connections between the supply and transceiver, the ac wiring makes a much better "antenna" for spurious RF radiation. So a lot of filtering on the dc output doesn't necessarily mean a quiet power supply. Additionally, filtering in the HF range requires small capacitors rather than very large ones (this is why you often see small capacitors in power supplies for RF circuits). A measurement of the RF noise on the ac line connection of the HPS-1a appears in Figure 8. This type of measurement was recently made possible by a generous donation of new test equipment by Dr Ulrich Rohde, N1UL, to be described in a future article.

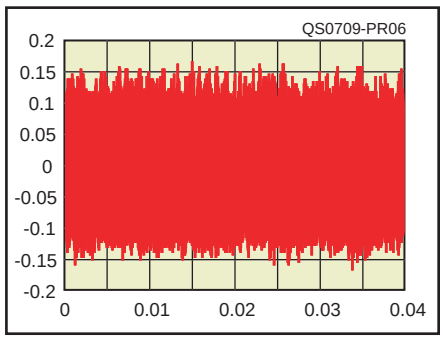


Figure 6 — Oscilloscope trace of the dc output of the Gamma Research HPS-1a under 20 A load. The vertical scale is 50 mV/div and the horizontal scale is 5 ms/div. The level of the dc ripple is higher than other supplies we've tested, about 100 mV p-p, with visible 150 mV spikes due to switching.

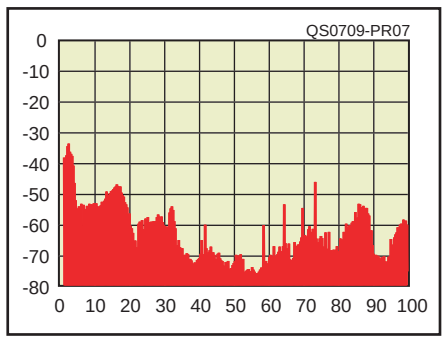


Figure 7 — Spectral plot of the dc output of the Gamma Research HPS-1a under 5 A load. The vertical scale is 10 dB/div, and the horizontal divisions are 10 MHz. Overall, the noise generated by this supply is moderate.

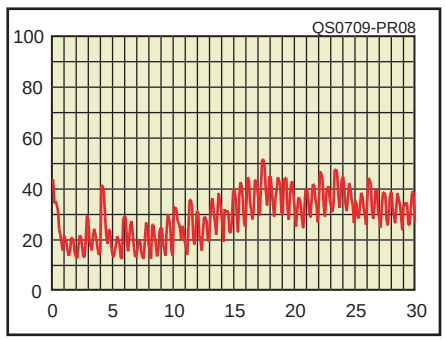


Figure 8 — Spectral plot of the ac line of the Gamma Research HPS-1a with no load as measured on a Rohde & Schwarz ENV216 line impedance stabilizer network (LISN). The vertical scale is noise amplitude in dBµV, and the horizontal scale is 0-30 MHz.

With a typical HF transceiver and an 80 meter dipole at modest height, a couple of S7 level spurs about 130 kHz apart could be heard on 15 meters, along with a number of much lower spurs on other bands (most of which did not move the S-meter). Note that this agrees very well with the ac line noise measurement. Gamma reports that they are working on a solution to the noise issue.

Although the HPS-1a generates more RF noise than other switchers we've tested, in most cases it's not objectionable. The extremely small size and weight make this supply attractive, especially for portable stations or when space is at a premium.

Manufacturer: Gamma Research Inc, PO Box 50885, Nashville, TN 37205; tel 615-424-3555; **www.gammaresearch.net**. Price: $149. QST

Strays

QST CONTRIBUTING EDITOR K2TQN CONTRIBUTES TO 2007 ARRL ONLINE AUCTION

◊Donations are already arriving in advance of the 2007 ARRL Online Auction, which will be open for bidding October 24 and will run through November 2. In addition to a great selection of donated items, this year's auction will also feature a large selection of the gear featured in *QST* Product Reviews that readers having been poring over during the year.

"Old Radio" columnist John Dilks, K2TQN, and his wife stopped by ARRL HQ in July with a spare Hallicrafters SX-25 Super Defiant receiver and matching speaker in tow, which he generously donated to the auction. More details will be forthcoming soon, but we can say that bidders will see a large assortment of new and vintage equipment, Amateur Radio-related products and services — and a few surprises as well.

Have an item of interest to your fellow hams that you'd consider donating? Contact Debra Jahnke, K1DAJ, at **k1daj@arrl.org**.

John Dilks, K2TQN, who has written the *QST* "Old Radio" column since January 2000, admires some antique radio gear in the ARRL Headquarters lobby. He delivered the first donation to the 2007 ARRL Online Auction, a circa 1940 Hallicrafters receiver.

FCC Responds to ARRL's BPL Brief

On July 11, the FCC filed its reply brief, No 06-1343, with the US Court of Appeals for the District of Columbia Circuit. The brief attempted to rebut the ARRL's challenge to the FCC's Broadband over Power Line (BPL) rules enacted in late 2004 and affirmed by the agency in 2006. According to ARRL General Counsel Chris Imlay, W3KD, "The FCC's brief does not accurately describe ARRL's arguments concerning harmful interference."

Given what is in essence a 100 percent probability of interference from BPL systems to fixed and mobile HF facilities at significant distances from power lines, Imlay said Section 301 of the Communications Act does not allow unlicensed BPL systems to operate in the HF bands. Imlay said: "Basically, Section 301 says you can not operate a radio frequency emitting device without a license. The legislative purpose of Section 301 is clearly to avoid interference. FCC's Part 15 rules have assumed that certain very low power devices and systems can operate without predictable interference, thus allowing them to operate without a license, notwithstanding Section 301. But with BPL, the FCC has ignored conclusive record evidence which shows that there will be, and in fact our experience conclusively demonstrates, that BPL causes severe interference to licensed services."

The FCC claims that it has the authority to permit unlicensed BPL under Section 302 of the Act; this section allows the FCC to regulate the interference potential of RF devices. What Section 302 does not do, Imlay said, is to create a loophole in, or modify, or invalidate Section 301.

"It is the ARRL's position," Imlay said, "that the FCC can regulate and authorize BPL with certain safeguards, consistent with the terms of Section 301; however, the FCC simply cannot honestly maintain the position that BPL has an inherently low interference potential. It has a high interference potential, and the rules they have enacted to date are woefully inadequate and insufficient to address it." The ARRL has long maintained that BPL, when not adequately "notched," causes harmful interference to Amateur Radio operations. In its brief, the FCC claims BPL does not cause significant interference and the Courts must defer to the FCC's expertise to decide this issue.

ARRL Chief Executive Officer David Sumner, K1ZZ, commented: "The FCC misrepresents the ARRL's position as being that the FCC has no authority to allow unlicensed devices that pose any risk whatsoever of causing interference to licensed services. That's not our position at all. Our position is that the FCC possessed clear evidence, at the time it made its BPL decisions, that the limits it was adopting would allow the deployment of BPL systems with a near-100 percent probability of causing harmful interference to radio receivers hundreds of feet from the power lines. Yet, despite this evidence it characterized the likelihood of harmful interference as 'low.'"

The brief goes on to say that, in the FCC's view, mobile stations and fixed stations are protected against harmful interference from BPL. But with respect to mobile stations complaining of interference, the FCC requires only that BPL operators reduce the radiated emission levels to 20 dB below the Part 15 maximum levels for radiated emissions. This, in the HF bands, still permits BPL noise at levels that preclude communications entirely. It offers mobile stations no protection whatsoever, Imlay stated.

Sumner explained: "The FCC claims that it continues to protect mobile stations from harmful interference, but it does so simply by defining whatever interference a mobile station might encounter from a notched BPL system as not harmful! None of the steps to limit the interference potential of BPL systems that the FCC took in this rulemaking proceeding reduce the likelihood of interference to the amateur service, and to this day the FCC has declined to enforce its rules even when protracted violations and interference have been documented."

The FCC's brief also attempted to justify its presumption that a BPL radiated interfering signal decays at a rate of 40 dB per decade of distance. "A 'decade of distance' is a factor of 10," Imlay explained. "For example, if a victim receiver moves from 3-30 feet from the power lines (10 times farther away), that is one decade of distance. For each decade of distance, the FCC believes that there is a 40 dB signal decay. In the HF bands, however, the evidence in the record shows that the signal decay is closer to 20 dB than 40 dB per decade of distance from the power lines. The FCC's brief claimed that there was conflicting evidence on the subject, but ARRL's view is that the FCC merely avoided consideration of the overwhelming evidence favoring the more conservative decay factor."

Imlay said the ARRL has asked the Court to order the FCC to "rethink the rules governing BPL and for the first time to take into account the evidence on the record concerning harmful interference to Amateur Radio." ARRL's reply brief was due for filing with the Court July 28, 2007. There is no date set yet for oral argument before the three-judge panel in Washington, DC.

FCC RELEASES POST-KATRINA *ORDER*

On July 11, the FCC released its *Order* regarding the recommendations of the independent panel reviewing the impact of Hurricane Katrina on communications networks (the Katrina Panel). It contained their conclusions following a review of the comments filed in response to the FCC's Notice of Proposed Rulemaking (NPRM). The Commission asked for comments a week after the release of the report and recommendations of the Katrina Panel and directed the Public Safety & Homeland Security Bureau (PSHSB) to implement several of the recommendations. The FCC also adopted rules requiring some communications providers to have emergency/back-up power and to conduct analyses and submit reports on the redundancy and resiliency of their 911 and E911 networks. The FCC's actions went into effect August 10.

The Commission noted that "the amateur radio community played an important role in the aftermath of Hurricane Katrina and other disasters," and instructed the PSHSB to "include the amateur radio

S. Khrystyne Keane, K1SFA ♦ ARRL News Editor ♦ k1sfa@arrl.org

FCC News

FCC ENFORCEMENT ACTIONS

The FCC's Enforcement Bureau, Spectrum Enforcement Division, sent out radio amateur enforcement correspondence via certified mail to five hams and one commercial company regarding alleged misuse of Amateur Radio activities.

In two unrelated cases, letters sent to William E. Westley Jr, AF4GC, of New Port Richey, Florida, and Donald E. Ellis, KBØTVP, of Sioux Falls, South Dakota, for repeater interference included warnings to stay off certain repeater systems. The FCC said both Westley and Ellis were cited for "failure to follow operational rules set forth by the licensee/control operators of the repeater system."

Jeffrey Stouffer, W6JSI, of Vista, California, received notification that his uncoordinated repeater was allegedly causing interference to coordinated repeater WB6HTS. The complaint said Stouffer has been contacted regarding the interference but has "declined to address" the issue. The FCC requested Stouffer provide information regarding his repeater.

Oscar Resto, KP4RF, of San Juan, Puerto Rico, was cited by the FCC from a complaint originating with the Puerto Rico Virgin Islands Volunteer Frequency Coordinators, Inc. The FCC requested that Resto "either resolve the interference problem or comply with the frequency coordinator's recommended frequency change by midnight July 1, 2007." The FCC reported that Resto changed frequencies and the matter is now resolved.

The FCC also sent a letter to Mark F. Hubeny, N9ZHW, citing the "operation of your Amateur Radio station on non-Amateur Radio frequencies," resulting in "deliberate interference." The FCC requested Hubeny to respond to the FCC within 20 days of receipt of the letter to fully address the complaint. He was also asked to clarify his mailing address for his amateur license.

In a complaint against Tennessee Steel Haulers of Nashville, the FCC noted that "one of your drivers has been operating radio equipment without a license on 28.085 MHz and causing interference to licensed stations in the Ten Meter Amateur Band." The penalty for such actions includes fine or imprisonment, as well as seizure of any non-certified radio transmitting equipment. Fines can range from $7500-$10,000.

To read the correspondence in its entirety, please see the Enforcement Bureau's Web site at **www.fcc.gov/eb/AmateurActions/Welcome.html**. Address all inquiries regarding this correspondence to Riley Hollingsworth at **riley.hollingsworth@fcc.gov**.

FCC DISMISSES PRMS

On June 27, the FCC dismissed two Petitions for Rule Making (PRM) concerning "spectrum deregulation in the Amateur Service," as well as a vanity call sign request for a call sign outside the Commission parameters.

In the Order, the FCC first dismissed a PRM requested by the Communications Think Tank (CTT), filed June 20, 2005, that requested the FCC "discontinue mandatory segmentation of emission modes and the activities using these modes in the Amateur Service, and substitute a voluntary system of coordination to achieve greater, and more efficient, utilization of frequency allocations within the amateur radio bands." On November 6, 2006, CTT requested its PRM be withdrawn.

On November 14, 2005, the ARRL requested the FCC "comprehensively modify the means by which the extremely varied emission modes in the Amateur Radio Service are developed, experimented with, implemented and regularly utilized in the course of normal Amateur Radio communications." On April 27, 2007, the ARRL requested its petition be withdrawn.

In the Order, the FCC agreed to drop both PRMs, saying they will take "no further action with respect to these petitions for rulemaking or the comments filed in response thereto." The Commission went on to say in the Order that both PRMs are "dismissed without prejudice," meaning the subject may be revisited at a later date.

FCC COMMISSIONER GETS PRESIDENTIAL NOD TO CONTINUE; AWAITS SENATE CONFIRMATION

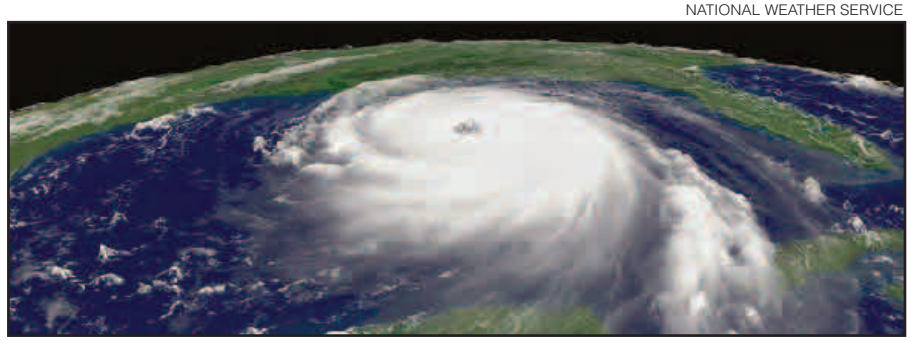
President George W. Bush has announced his intention to nominate Deborah Taylor Tate to a full term as a Commissioner of the Federal Communications Commission. Tate is currently serving out the remainder of former FCC Chairman Michael Powell's term. Current FCC Chairman Kevin Martin said of Bush's announcement: "If confirmed, I look forward to continuing to work closely with Commissioner Tate. She has served admirably at the Commission for the past year and a half, and I appreciate her continued dedication to public service. Debi brings important insight to the Commission, including her distinguished career as a leader in state government. Her thoughtfulness, dedication, and leadership have made Debi an invaluable member of the Commission." Among her responsibilities, Tate serves as Chair of both the Federal-State Joint Board on Universal Service (Universal Service Joint Board) and the Federal-State Joint Board on Jurisdictional Separations.

Commissioner Tate

community in its outreach efforts."

The FCC invited comments on the Katrina Panel's recommendation that the FCC "act to enhance the public safety community's awareness of non-traditional emergency alternative technologies that might be of value as back-up communications systems in a crisis." Several commenters suggested that the public safety community be educated about the applicability of Amateur Radio in a crisis. The FCC agreed with these comments, saying that

NATIONAL WEATHER SERVICE



Hurricane Katrina as seen from space on August 28, 2005.

improving the public safety community's knowledge of, and training in, alternative technologies would improve preparedness for future crises. They directed the PSHSB to "develop and implement an awareness program to educate public safety agencies about alternative technologies and to encourage agencies to provide regular training on any alternative technologies to be used," including educating public safety agencies about alternative technologies.

The recommendations said that several Amateur Radio operators recommended changes to Part 97 of the FCC's rules. Many of the suggestions, the report said, have already been implemented, and as such, require no further action. For example, "the Commission recently eliminated Morse Code proficiency as a license qualification requirement, an action supported by several commenters in this proceeding."

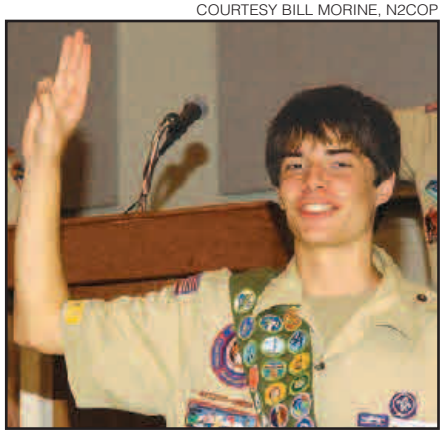
The FCC once again made clear that Part 97 "does not prohibit Amateur Radio operators who are emergency personnel engaged in disaster relief from using their amateur radio bands while in a paid duty status." This changed in December 2006 with WT Docket 04-140, the "Omnibus" Amateur Radio Report and Order (R&O).

The Commission also previously decided to phase out RACES station licenses, "making proposed changes to rules relevant to these licenses moot." ARRL Regulatory Information Specialist Dan Henderson, N1ND, notes that the FCC "is not phasing out the RACES program, just the RACES station licenses."

NORTH CAROLINA EAGLE SCOUT NAMED 2007'S YOUNG HAM OF THE YEAR

Grant H. Morine, W4GHM, a 17 year old from Wilmington, North Carolina, has been named the 2007 Young Ham of the Year, announced YHOTY Award Administrator Bill Pasternak, WA6ITF, and Award Committee Chairman Mark Abramowicz, NT3V. Grant was selected based on his commitment to Amateur Radio, along with his work in public service and his promotion of the Amateur Radio Service to others through the Boy Scouts of America. Grant will receive his award as part of the Huntsville Hamfest, held in conjunction with the 2007 ARRL National Convention.

COURTESY BILL MORINE, N2COP



Grant H. Morine, W4GHM, 2007's Young Ham of the Year.

The son of Bill, N2COP, and Pamela Morine, and the brother of Reid, W4RSM, Grant was first licensed in June 2001 when he was 10; he holds a Technician class license. His nomination told of the public service project that he spearheaded to earn the rank of Eagle Scout — the construction and donation of 30 222-MHz J-pole antennas to the Carolinas Amateur Radio Emergency Services (CARES). The antennas are indoor back-ups for the CARES network of hospitals, located in some of the storm-prone coastal areas of the Carolinas.

To complete his project, Grant successfully solicited the donation of the needed raw materials from a local hardware store. He then organized a group of three adults and 10 Scouts to assemble the antenna systems at his home. After each antenna was completed, it was tested for proper performance before being handed over to CARES managers in October 2006. Grant's antennas were recently tested by CARES when they were utilized in a test run in South Carolina.

The Amateur Radio Newsline "Young Ham of the Year" award program (formerly the Westlink Report Young Ham of the Year Award), is entering its 21st consecutive year. It is presented annually to a licensed radio Amateur Radio operator who is 18 years of age or younger and who has provided outstanding service to the nation, his/her community or the betterment of the state of the art in communications through the Amateur Radio Service.

NEW EMERGENCY PREPAREDNESS LAW "LEGALIZES" AMATEUR RADIO IN ALL TEXAS PUBLIC SCHOOLS

In what can only be termed a huge victory for the future of Amateur Radio in Texas, Governor Rick Perry recently signed Senate Bill 11 (SB11) into law in June. Among many disaster response specifications, the new law contains two important Amateur Radio-related provisions: State employees who are ham radio operators may to take up to 10 days of paid leave while participating in a disaster response or training exercise, and Amateur Radio is now allowed in all Texas public schools.

A single sentence in Article 2 of SB11 modifies the legal definition of a banned paging device by adding the following ham radio exception: "The term does not include an Amateur Radio under the control of an operator who holds an Amateur Radio Station License issued by the Federal Communications Commission."

A decades-old provision in the Texas Education Code (Section 37.082) granted Texas schools blanket authority to ban student possession of all paging and RF devices, including ham radios. The original intent of the law was to prevent on-campus drug dealers from communicating with one another using now-obsolete numeric pagers. Cut off their communication, the logic went, and drugs on campus would be seriously curtailed. The old law broadly defined a prohibited "paging device" as any RF device that had the ability to vibrate, emit a sound, display a message, or in any way convey a communication to the possessor. There was no exception for school-based Amateur Radio programs or clubs.

Texas is the first state to enact such a sweeping change allowing school-based ham radio programs statewide. It is hoped that similar measures will be enacted in other states. Local clubs in Texas are urged to contact their school boards and encourage them to bring school policies regarding student possession of RF devices into compliance with the new law. — *James Alderman, KF5WT*

NORTH CAROLINA GOVERNOR SIGNS ANTENNA BILL

On June 29, North Carolina Governor Mike Easley signed HB1340, the "Amateur Radio Antenna" bill into law. North Carolina becomes the 25th state to pass a state model of the FCC's 1985 PRB-1 regulation, and becomes the halfway point for all 50 states having some kind of state antenna legislation. The bill was introduced for the first time in February and passed unanimously in both the House and the Senate. The law, which takes effect October 1, 2007, permits antennas up to 90 feet in height in areas regulated solely by municipal ordinances. QST

Ardent Sentry 07

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Amateur Radio operators managed the Staging Area for Ardent Sentry 07.

In November 2006, the State of Indiana and local agencies from the Indianapolis Metropolitan Area, in conjunction with the Homeland Security District Task Force 7, began planning for the Department of Defense's Ardent Sentry/Northern Edge Exercise. The Exercise is an international one that included scenarios on the East Coast, Alaska, Canada and Indiana. The scenario in Indiana involved a terrorist attack utilizing a 10 kiloton improvised nuclear device in a simulated portion of Marion County. The 72-hour exercise started on May 10, 2007, and Mike Palmer, N9FEB, ARRL Emergency Coordinator of Marion County and Volunteer Staff Member of Marion County Emergency Management, was the Amateur Radio Communications Leader.

Marion County maintained the primary Incident Command because the simulated disaster happened in their county. The other participating counties were Boone, Hamilton, Hendricks, Hancock, Johnson and Shelby. There are mutual aid agreements in place that describe how each county supports the other in large scale incidents.

If this entire event had been carried out inside Marion County, local hams would have had at least eight VHF and ten UHF repeaters to use, not to mention simplex could have been used to cover Incident Command (IC) to Emergency Operations Center (EOC) operations. Our new IC this time was 65 miles away from the EOC.

A recon was performed early on to find out what repeaters would provide coverage from Marion County to Jennings County and yet provide other participating counties and Camp Atterbury where the Forward Joint Operations Center (FJOC) was located. There were only a few repeaters that met these requirements: Shelby, Bartholomew, Johnson, and Marion Counties. But one repeater system stood out among the rest, the W9WIN Linked Repeater System. This VHF/UHF linked system has coverage over most of central to southern Indiana, so it was used as the primary communications link, but not the only link.

Mike, N9FEB, wrote the communications plan to include UHF, FM, VHF and SSB, simplex operations around the IC area, EchoLink, Internet Radio Linking Program (IRLP) and HF (40 M and 80 M) operations. The hams at the Muscatatuck Urban Training Center (MUTC) in Butlerville were capable of operating in a cross-band repeat mode which would have allowed the IC Commander handheld access to speak to any of the EOCs and Camp Atterbury FJOC stations on frequency. By having multiple bands and modes, we were assured of getting traffic passed.

The Amateur Radio Mission

The designed mission of the Amateur Radio support was to maintain a communications network that would allow the Incident Command to speak with all county EOCs, the State EOC, and the remote site for Indiana Department of Homeland Security (IDHS) as well as MARS liaisons in order to disseminate information to a wider audience. Fifty Amateur Radio operators were directly involved.

Just days prior to the exercise, the Amateur Radio mission changed when Mike, N9FEB, was asked by emergency management to post themselves as Staging Area Managers for Incident Command, which is a vital role to the success of the overall disaster response. The hams were also to distribute Personal Protective Equipment (PPE) clothing to responding law enforcement and emergency medical personnel.

The hams also assisted Metropolitan Emergency Communications Agency personnel in distribution of radios to all emergency responders, signing them in/out as needed. By accepting this mission, all other Amateur Radio activities took second stage.

The exercise was evaluated for its interoperability/National Incident Management System (NIMS) compliance and the use of the National Response Plan (NRP), State Response Plan, and local emergency management plans. The ham radio volunteer coordinators (ARES®/RACES/MARS Leaders) were to ensure all were compliant with at least 1S-100 and IS-700 certificates.

What Actually Happened

As in any disaster response, first responders go directly to the "fight." A couple of exceptions were allowed on this response due to the distance they had to travel and for the NIMS accountability purposes, everyone had to process onto the MUTC Military Post.

We were allowed to arrive at MUTC prior to first responders, where we established communications with the EOC immediately prior to using the W9WIN System. Knowing this was only a temporary location, we did not put many antennas in place. Incident Command was also in place prior to first responders arriving.

Once given the order to relocate and establish the Staging Area, we did so just as 168 responders arrived. It was pretty hectic, but

all tasks were accomplished: communications was reestablished, radios and PPE were issued and the Staging Area was operational.

The entire exercise was divided into six 12 hour operational periods giving response opportunities to each county. The IC leadership changed with each period as did all responders including law enforcement, Emergency Medical Services and Fire Rescue. National Guard units arrived day and night throughout the exercise.

The military was represented by numerous National Guard units from Indiana, Illinois, Ohio, Kentucky, Maryland, and other places. The Civil Support Team (CST) was well represented with its communications equipment. It was evident that units came with very well-trained soldiers. State-of-the-art communications equipment, MPs, Medical and Air units were all represented. Many hams visited each bivouac site to exchange information and the Guard did likewise. There were also volunteers present that no disaster can be without. The Red Cross and Salvation Army were at the MUTC supplying food, water, and ice all over the Post.

WebEOC

No actual shelters were set up in this Ardent Sentry exercise. However, sheltering was addressed using WebEOC and a tabletop scenario. In Marion County, incidents of all sizes are tracked using Internet-based software called WebEOC. By inputting incidents to this site, responders and managers alike can view what is happening throughout the entire event.

Public information releases were done through WebEOC as well. Rather than have an insurmountable number of media representatives try to gain access to the secured EOC, news updates were performed by this Internet system so that all could receive the same exact information at the same time.

What Went Well

Initial coordination between Comm Leader and the various ham radio group leaders was excellent. All were eager to be a part of this exercise once the scope was explained. Repeater owners were contacted and access was granted to any incident, carte blanche. To ensure repeaters would be operational, technicians traveled and "tweaked" systems. EchoLink and IRLP were made accessible on repeaters they were not normally found on.

Having the ability to send pictures from the incident to the various EOCs was great. EOC representatives could not get enough pictures since they had no visual means to see what was happening outside their area. Amateur Radio operators sent pictures via slow scan using MMSSTV from the incident area and MARS and EOC radio amateurs acknowledged receipt of them. Evaluators, first responders in the Staging Area, National Guard personnel, and many other visitors to the IC ham radio trailer witnessed these transmissions and were amazed that Amateur Radio had this technology available to them.

Amateur Radio will always be a vital backup radio network to commercial systems. It is up to hams to stay in practice using net procedures and good operating practices. If hams are to work with government offices like the Emergency Management Agency, it is imperative that they complete the NIMS courses and be familiar with local directives and emergency management plans.

Since this was the first Ardent Sentry exercise to have civilian agencies participate in it, and it was also the first national "boots to the ground" deployed exercise of its size, it was a huge learning opportunity for all who participated. Hams were ready at all levels to support it.

Field Organization Reports

Public Service Honor Roll
June 2007

This listing is to recognize radio amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 6 categories (as reported to their Section Managers). Please note the maximum points for each category:
1) Participating in a public service net, using any mode. —1 point per net session; maximum 40.
2) Handling formal messages (radiograms) via any mode. —1 point for each message handled; maximum 40.
3) Serving in an ARRL-sponsored volunteer position: ARRL Field Organization appointee or Section Manager, NTS Net Manager, TCC Director, TCC member, NTS official or appointee above the Section level. —10 points for each position; maximum 30.
4) Participation in scheduled short-term public service events such as walk-a-thons, bike-a-thons, parades, simulated emergency tests and related practice events. This includes off-the-air meetings and coordination efforts with related emergency groups and served agencies. —5 points per hour (or any portion thereof) of time spent in either coordinating and/or operating in the public service event; no limit.
5) Participation in an unplanned emergency response when the Amateur Radio operator is on the scene. This also includes unplanned incident requests by public or served agencies for Amateur Radio participation. — 5 points per hour (or any portion thereof) of time spent directly involved in the emergency operation; no limit.
6) Providing and maintaining a) an automated digital system that handles ARRL radiogram-formatted messages; b) a Web page or e-mail list server oriented toward Amateur Radio public service — 10 points per item.

Amateur Radio stations that qualify for PSHR 12 consecutive months, or 18 out of a 24 month period, will be awarded a certificate from Headquarters upon written notification of qualifying months to the Public Service Branch at ARRL HQ.

692 W2LTB
645 W7TVA
536 KI4GEM
499 NØENO
450 KG4TND
390 KB9KEG
315 W4DNA
302 K4DND
300 KC2LIX
290 WB7WOW
280 KD8BGQ
270 K7EAJ
250 WA2WMJ
245 W5HUD
244 KC9JMW
240 N5MEL
235 WW6CC
223 K5SFM
220 N1UMJ NØYR
215 K4RLD N7CM
205 KD5TXD
200 W7GB
204 N4VAD

196 KK1X
195 WAØVKC
190 WD8JAW
189 KB5PGY
185 WA2BSS
175 WB8OIF
174 WU8Y
173 KØIBS
164 N7EIE
160 KGØGG
158 K2GW WB2KNS
157 W2DWR
155 K9LGU
150 WA2YL WB5ZED KA8ZGY KE5HYW
149 W4CAC
147 K2BR KB3OOJ
145 K4IWW
140 W7QM K8AE K8MFK N8IO K7BFL
135 K9FHI W3YVQ W8UL NIØI
132 NØZIZ W5PY
130 W4EAT W4FAL N2QZ W7EKB
127 N2VC
125 W2DSX W4LN WA2YBM N2GJ
123 K8AMR
120 K2UL WB9JSR WB8RCR KC8WSE KA5KLU KK3F KA4FZI KW1U W1GMF K1YCQ W7IG NN7H KC5OZT K6JT N7BEC
117 W4ZJY
115 N5KWB K4FQU
112 NR4DW N4US WB2LEZ NØMEA
110 K5MC KK5GY KS3Z W5ESE KE4JHJ W2EAG N1IQI K4GK WØLAW N4ABM N7XG N7YSS WV8RG WD8Q N3YTD
109 WA4UJC NN7D
105 W3ZQN AG9G K2TV W4TTO N8OD
104 K8ZJU
103 KJ7NO
102 K7BC
100 N7IE W3TWV N5OUJ KB2KLH AA3SB WB4FDT WA4EIC KE4YHR NR2F WX4H N9MN N1LKJ K2VX WA8SSI K4SCL KF7GC NX1Q W7GHT
99 WD9FLJ
98 KBØDTI
96 KV4AN AD4BL
95 W5XX K8RDN W5XX KI4JQB WG8Z WB6OTS
94 W5CU N3RB
90 WA2CUW N4EJF N3SW N3ZOC NY4E KI4YV W3GQJ W8IM K1JPG KF4WIJ K4ZZA N1JX KC2PFV WB4BIK K8GA KD7ZLF WD8DHC W8CPG W8IVF KA8WNO N8DD WB8SIQ AL7N WE2G KA1RMV KA1GWE NUØF N3KB
89 W4TY
88 K4BEH W9XAN
87 NA7G WA5OUV AA4BN WØCLS
85 W2CC W7VSE
81 KB3LFG KD7THV
80 WA2NDA KE7DVV AB8SY K8KV
79 WDØGUF
78 KD4FUN K7HQA
77 W7DPW KK7TN
76 W3CB
75 K7MQF W9RSX
72 W4DGH W5GKH KE5DLZ
70 KAØFUI KØDUW NØMHJ NØUKO WØWSP NØDUW WØWSP NØDUX KCØZQC W9JDH

The following stations qualified for PSHR in previous months but were not recognized in this column: (May) N2LJD 71. (Apr) K4RLD 185, W4DNA 155, W4LN 145, W4EAT 130, W4FAL 130, K4IWW 120, W4TTO 120, KF4ZLU 117, KE4JHJ 110, W2EAG 110, WA2YBM 110, W4ZJY 99, KE4YHR 92, KD4FUN 90, W4DGH 72, W4NTI 71.

Section Traffic Manager Reports
June 2007

The following ARRL Section Traffic Managers reported: AL, AR, AZ, CO, CT, ENY, EPA, EWA, GA, ID, IL, KY, LA, MI, MN, MO, MS, NC, NFL, NLI, NNJ, NNY, NTX, OH, OK, OR, SD, SFL, SJV, STX, UT, VA, WCF, WI, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports
June 2007

The following ARRL Section Emergency Coordinators reported: AK, AR, AZ, CT, EMA, EWA, GA, IL, IN, KS, KY, LA, MDC, MO, NC, NNJ, NTX, NV, OH, RI, SD, SFL, STX, SV, VA, WTX, WV, WWA.

Brass Pounders League
June 2007

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
WB5ZED	15	2071	1727	30	3843
W4ZJY	0	889	934	0	1823
N1IQI	0	247	1133	0	1380
WB5NKC	57	203	929	7	1222
K7BDU	3	524	521	2	1050
W7QM	198	368	425	11	1002
KA5KLU	0	505	474	0	979
WB5NKD	18	122	844	0	974
W8UL	0	450	470	6	926
W1GMF	0	150	727	0	877
KW1U	0	390	417	1	808
WX4H	0	298	392	10	700
N8IXF	0	360	289	11	660
KB9KEG	6	299	36	299	640
KK3F	15	302	300	2	619
W7SMC	35	272	307	0	614
N1UMJ	34	261	282	25	602
WB9JSR	0	293	386	23	602
W4EAT	0	310	282	0	592
N1JX	0	270	313	3	586
N2LTC	0	253	235	37	525
K4ZZA	3	251	244	11	509

The following station qualified for BPL with 100 or more originations plus deliveries: W7TVA 132. The following stations qualified for BPL in previous months but were not recognized in this column: (Apr) W4ZJY 2767.

W3ZZ

THE WORLD ABOVE 50 MHz

On The Road

The originator of this column, Ed Tilton, W1HDQ, was an active contester who used to write about his contest observations in the column even though he also wrote the formal summary of the contest that appeared in *QST* at a later date. As my readers know, I really enjoy working contests of all kinds, and in the last 25 years or so, especially VHF contests. So, although it is much to soon to know who had the top scores in each category, this month I revive Ed Tilton's tradition and give you some observations about the June 2007 ARRL VHF QSO Party. I will focus on my own operation from a mountaintop portable location, and on the unusual conditions this weekend featured.

Portable Operation

The two warm-month ARRL VHF contests present an opportunity for mountaintop portable operation. In almost every area of the country, single op and multiop portable operations act as workable beacons for fixed stations. Given their excellent locations these portable stations provide an opportunity for fixed stations to work out to much greater distances than normal, even under unenhanced conditions. Portable operation involves real effort and not inconsiderable expense. What follows is a capsule view of what all serious portable operations encounter to one extent or another. I will look particularly at the hardware, and on fixing that hardware in real time when it fails.

On the Bus

As Ken Kesey of the Merry Pranksters said in the early 1960's of their psychedelic bus: "You're either on the bus, or you're off the bus." For the Grid Pirates, K8GP, we're on the bus going to Spruce Knob, WV, 4863 ft (1482 m) elevation, the highest point on the East Coast between Mt. Washington, NH and the VA/NC border. No psychedelic colors but we transport our entire portable station some 165 miles (265 km) over steep hills in three school buses (See Figure 1). We also tow a 15 kW diesel PowerGuard generator on its own trailer. Eight towers ranging from 9 to 28 m in height are carried on top of the buses and are supported by the buses in their raised positions so no guys are needed. A ninth tower is mounted on the generator trailer with a 24 ft mast supporting a pair of 6 m beams.

Once at the Knob we array the buses parallel to one another in one of the parking lots and place the generator equidistant from the buses in an adjoining parking lot. Figure 2 shows the general layout. The equipment and antennas are described in Tables 1 and 2. We have a kilowatt or more on the bottom four bands, so we are easy to find and hopefully easy to work. We have the ability to look in three directions at once on 6 and 2 m with two separate stations on each of those bands. Everything above that has sufficient power and big enough antennas to maximize our chances of working folks up the bands.

This Month

September 9	Good EME conditions*
September 15-16	10 GHz and Up Cumulative Contest
September 17	144 MHz Fall Sprint
September 25	222 MHz Fall Sprint
September 29-30	ARRL International EME Competition

*Moon data from W5LUU

Fix the Problem

Every large VHF station is a mix of systems, some of which are sufficiently complex that failures are bound to happen. What separates the winners from the losers is how fast they recognize these failures and how resourceful they are at fixing them rapidly. Fixed stations have an advantage here. If they have enough time they can wring out their systems, find the failures in advance and fix them before the contest.

Let me give you two examples of the difficulties that K8GP encountered: In order

K1RA

Figure 1 — A caravan of K8GP buses carrying its multiop portable station to Spruce Knob, WV. Not shown are the truck that pulls the generator and its trailer or the ordinary car that follows the caravan to get help in case something breaks down in one of the buses.

K1RA

Figure 2 — A panoramic view of the K8GP operation. The generator trailer is to the left with the third 6 m beam stack. Three buses to the right: three 2 meter arrays on the white bus, 222, 903/1296 MHz and two microwave dishes on separate towers on the first red bus and two 6 m arrays and the 432 antenna on the second red bus (antennas only visible over the trees in the center).

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to do WSJT and record the entire contest by digital audio, and do this on 2 m with a new IF strip — an FT1000MP — the control box under the bus that controls the ability to independently transmit and receive on any one or all of three antenna systems, and to transfer operation to an FM radio and amplifier with small vertical FM beams was opened to gain access to the auxiliary contacts of one of the changeover relays. Inadvertently in making this wiring change, every time the main or secondary station was keyed, the FM transfer relay was activated so that the SSB stations were transmitting into a vertically polarized fixed beam. The operators could still hear perfectly well because transmit and receive are completely independent, and the receive antennas were correctly connected to the three horizontal arrays. It took a few hours before the operators concluded that there was not some odd kind of one way propagation but that something was seriously wrong. Tracing the connections, the error was discovered and fixed, but in the meantime our rate on 2 m was less than half of normal and all the passes we could have made to the high bands were lost. We were only able to recover some of that later in the contest.

Table 1
K8GP Station Equipment
24 GHz and 47 GHz stations are tripod mounted homebrew transverters running a few mW each. 300 GHz stations are modified 10 mW laser pointers with photoelectric detectors.

Bus	*Band*	*Station*	*Equipment*
Bus 1 (Red)			
	6	1	FT2000 — HB 8877
	6	2	TS850 — DEMI xvtr — solid state 1 kW amp
	2	1	FT1000MP — DEMI xvtr — Lunar Link
	2	2	TS850 — DEMI xvtr — solid state 1 kW amp
Bus 2 (Red)			
	222		TS850 — DEMI xvtr — Lunar Link
	432		TS850 — DEMI xvtr — Lunar Link
	903		TS850 — DEMI xvtr — 500 W solid state
	1296		TS850 — DEMI xvtr — 2 × 500 W solid state combined
	2304		TS850 — DB6NT xvtr — 135 W solid state
	3456		TS850 — DB6NT xvtr — 135 W solid state
	5760		TS850 — DB6NT xvtr — 25 W solid state
	10 GHz		TS850 — DB6NT xvtr — 25 W solid state

The second problem involved the microwave station, where we had had a long-standing problem blowing preamps on 2304/3456 MHz. Even additional Tohtsu isolation relays had not cured the problem. Immediately before the beginning of the contest, while rechecking the system, we found an error in the sequencer wiring. An extra wire was connected to the main PTT input, in addition to the wire controlling the sequencer. The first thing a sequencer must do — and nothing else — is to remove the preamp from the RF path before anything else happens during the sequence to go to transmit. Whatever else was connected there was generating some kind of RF spike that we had detected. Moving that unknown wire to a later port on the sequencer eliminated the spike. Problem cured. However, the 3456 MHz station was still not receiving or transmitting correctly. Had we blown the 3456 preamp before fixing the sequencer? After some diagnostics during the contest we concluded that the 3456 changeover relay must have failed. About ⅔ of the way through the contest, we shut down the microwave station and replaced the failed component with one of those nice Tohtsu relays cannibalized from the isolation box, which was no longer needed once the sequencer was fixed. Once again problem fixed but some microwave contacts never did get into the log.

Propagation

June is the peak month for E-skip. Last year we had one of the best 6 m E-skip openings in the history of this contest. This year was different. From the east coast, except for a small opening to WØ Sunday afternoon, and a decent, but not spectacular 2 hour opening to the Gulf Coast and TX Sunday night, all contacts were either local area (out to 500 miles), scatter, a little enhanced tropo Sunday morning or what I call popcorn E_s — individual E_s contacts and in a few cases even double hop contacts that seem to appear in all directions and only last for a matter of seconds at a time. Our 6 m grid total was almost 100 less than last year. The best we did was a cluster of grids at the edge of the "donut hole" in CO and the Dakotas and about half a dozen stations double hop into the northwest as far WA and ID.

We did have a strong tropo opening to the west and southwest, reminiscent of what happens about every one year in five in September, but almost never before in June. This began around dusk on Saturday and extended until the sun burned off the duct mid-morning on Sunday.

Microwave conditions were enhanced but the amount of microwave activity to the parts of the Midwest we were reaching (we really did not get into Northern Lights territory in MN where there are a lot of microwave stations) and to the southwest is much less than we see in the northeast. Microwave totals were only slightly elevated, at least at our station.

On 2 m we worked NE to FN46, north to EN75, 84 and 64, west to EN21 EM28 and 29, SW to EM31 and south to FM13. The 222 MHz band opened west to EN41, EM 48 and EN40, 41, SW to EM31, NE to FN46 and south to EM54-94. On 432MHz, we worked west to EN21, SW to EM31 and north to FN15, 25 and EN64. The microwaves worked into EM44, 48, EM55 EN50, 51 and EM64. We worked 10 band VUCC, and I believe we set all time records for grids on 222 (84) and 432 (94). Now we will have to wait for the final results to see how accurate we were and who won.

There were quite a few big stations activated in this contest. Among the ones I remember encountering were mountaintop portables W2SZ (FN32), KA1ZE (FN01), W4IY (FM08) N3EMF (FM19) and W3SO (FN00) in the northeast and W4NH (EM85) and AA4ZZ (EM96) in the southeast. Add to that fixed stations like K1TEO (FN31), WA2FGK (FN21), K9NS (EN52) and K5QE (EM31) and no doubt some stations in the west I did not hear and you have many "beacons" to provide two-way contacts. I hope you all had good conditions and enjoyed working them in June.

Next month I will finish this discussion by looking at some contest issues: the quantitative value of rovers to fixed station scores; problems with submitting scores to the ARRL robot; and the role of calling frequencies. I will also provide the details of the June 6 m activities, for which there was not sufficient space this month.

ON THE BANDS

Every summer season has its own characteristics and this one has been no different. After an early start and a slow development, 6 m hit its stride later in the month. Two meters had some interesting E-skip and as we saw, the ARRL VHF QSO Party had unusually good June tropo. My thanks to the reflectors at **dxworld.com**, OH2BUA, the chat net at **www.dxers.info/** and my correspondents.

6 Meters

For much of the country, excluding California, this season has been very good indeed. E_s occurred somewhere in the US on every day in June. At least a third of the days or more had openings to the Caribbean, South America and/or Central America. After a slow start, there were numerous openings to Europe, particularly from more western areas than usual during the latter half of the month. The peak occurred on June 25, one of the best DX days ever in any summer almost every-

where in the US. Comparing years, Dave, N3DB, found June 2006 open on 12 separate days — June 1, 4, 8, 9, 16, 17, 18, 19, 20, 24, 29, 30 for 136 QSOs and 27 European/African countries. Due in large measure to working 101 stations on the 25th, June 2007 provided 222 QSOs in 30 countries on 11 days — June 6, 13, 17, 18, 19, 20, 25, 26, 27, 28, 30. May 2006 was definitely better, and the 2006 year totals were buoyed by an even better July and August. Mick, W1JJ, supports the idea that as a whole, 2006 seemed better.

Two noteworthy events occurred this June. One was a 50/70 MHz transatlantic multihop E_s cross-band contact between Mike, VE9AA (FN66) and Nige, G7CNF (IO81) at 23Z on June 25. Mike was running 100 W on 6 m and Nige 160 W on 70 MHz. Vic, WB4SLM (EM82) got partial calls from Nige. David, G4ASR, notes that it was not a first because Andy, VE1ASJ, worked G4BPY in November 1980 and later five stations in G, EI and GW in November 1981 on F2 at the peak of the sunspot cycle. The current contacts are the first via multihop E_s. Congratulations to Mike and Nige!

The other was multiple appearances of Hawaii, particularly the Big Island, in all parts of the US. Fred, K6YM, at NH6P (BL01) had nine openings to the mainland to go with seven in May. He worked 1350 QSOs in 45 states. Notable were W4 June 17; 300 QSOs to all districts except VE8 June 18; W4, 5, 6, 7, Ø, VE5, 6, 7 June 21; W1, 2, 3, 4, 8, 9 June 26; WØ,1,2,3,4,5,7 June 27; WØ, 2, 3, 8, 9 June 28; and W1, 2, 3, 4, 8, 9, Ø June 30. In addition, on the 20th, Fred, KH6FI (BL01) worked a number of stations in both the Northeast and Southeast US.

Jay, KØGU (DN70) in CO worked 46 Europeans/Africans in 16 countries in June. While June 30 was his all-time best day to Europe (23Q/9DXCC), Jay believes that 2006 was better because it was more consistent with openings spread over a much longer period of days. Russ, K4QI (FM06) in NC worked 34 countries as far east as LZ, OE and 9A. From the Caribbean, Pedro, NP4A, reports the band open almost every day stateside and about 20 days toward Europe. The daily average was 150 QSOs and the best weekend was June 16/17, with 875 US stations, 146 Europeans, eight from Africa and six from South America, for a total of 1035 QSOs and 269 grids. Best DX for the month was 4X4, 5B4, C5, EA9, 5T5 and TA. Julio, NP3CW, echoes that report with good openings to Europe and the US almost every day. Larry, NØLL (EM09), however, worked only a few Europeans in CT, CT3 and 9A1, and Alaska. Chip, K7JA (DM03) bemoaned the fact that the European openings completely missed California.

Table 2
K8GP Operators and Antenna Layout

Band (MHz)	*Antennas*	*Operators*
Bus 1 (Red)		
Tower 1		
50	4 stack 2 × C3I 5 el Yagis, Fixed Northeast 2 × C3I 5 el Yagis, Rotatable	K1HTV, NW5E
Tower 2		
432	4 × 22 el K1FO Yagis, Rotatable	K1TR
Generator Trailer		
Tower 3		
50	2 × 3CI 5 el Yagis, Rotatable	
Bus 2 (Red)		
Tower 4		
222	16 el K1FO Crossed Yagi, Rotatable	W3ZZ, N2NAR
Tower 5		
903	2 × 45 el Directive Systems Loop Yagis	K8ISK
1296	2 × 55 el Directive Systems Loop Yagis	
Tower 6		
2304	6 ft dish dual band feed	K3CB
3456		
5760 10 GHz	4 ft dish dual band feed	
Bus 3 (White)		
Tower 7		
144	8 × 5 el Directive Systems Yagis, Fixed NE	K3MM, K1RA
Tower 8		
144	4 × 5 el Directive Systems Yagis, Rotatable	
Tower 9		
144	4 × 12 el K1FO Yagis, Rotatable	

2 Meters and Up

On June 26, an intense E cloud supported contacts between Jay, KØGU (DN70mq) and Shelby, W8WN (EM77), WA8CXI (EM99), K9KHW (EN63), a heard report for WA1ZMS/B (FM07fm) but alas nothing with your conductor in FM19jd. Other contacts included: NØVSB (DM79) to N4QWZ (EM66ok), K9UHF (EN53) and WA8CXI; N4QWZ to KØIR (DM79) and KIØRN (DN70). At right angles to that path: NØRQ (EM13) to KAØPQW (EN33) and K5QE (EM31) to WØGHZ (EN34). On June 27/28 we had John, W5UWB (EL17) to W4KVW (EM80); W7CI (DM41um) to Howard, W4HLR (EM56), K4KOR (EM65) and N4QWZ; Al K7ICW (DM62oh) to N5KDA (EM41), KD5FPW (EM51) and KB5AAB (EM51); and AG4V (EM55) to AB2TI/mobile (DM73). Many of these contacts exceeded 2000 km, the longest being W7CI/N4QWZ at 2232 km.

Beyond the big tropo opening during the contest Matt, W3UUM (EL29) reports enhancement out to EM44, 54 and 55 on 144 and 432 MHz on June 7. KH6HME/B was audible via the 2 m transpacific duct in DM03 on the 27th and DL44 on the 20th.

Microwaves

It's never an ill wind or a thunderstorm that doesn't blow someone some good. At 0057Z on June 22, Mike, KMØT (EN13vc) and Erv, K8EB (EN73cb) set a new US 5.7 GHz rain scatter record at 526 mi (848 km) as well as the second place rain scatter distance record on 10 GHz at 0002Z. Mike also heard N4PZ (EN52gb), K3SIW (EN52ta) and K2YAZ (EN74av) off the same cell. On June 25/26 a line of thunderstorms moving from EN33 to EN56 provided an opportunity for more 10 GHz rain scatter. Chris, NØUK, and Holly, KCØZXS, set up in EN34jv where Chris worked N4PZ (437 km), W9ZIH (480 km — EN51nv) and K2YAZ (571 km). Holly then worked YAZ. During this time, Bill, KØAWU (EN37ed) also worked K2YAZ, W9ZIH and N4PZ. KØKFC (EN35), WØGHZ (EN34) and KMØT (EN13) were missed because of an unusual amount of Doppler shift on these backscatter paths. In total, seven grids in five states were worked as a result of the latter storm.

EME

Peter, PJ4/PA3CNX, and René, PE1L, have been operating as PJ4EME on Bonaire. In June they worked >275 QSOs in 50 countries using 4 × 9 el (2.5 λ) and 1 kW. Look for an article in *QST* soon with picture and more details. Even with 6 m wide open on E_s, some parts of the country have a tough time working DX in some areas, so 6 m EME continues to flourish. Bob, K6QXY, worked HA3UU on the 17th for DXCC #141 and Initial #59. Lance, W7GJ, worked V26HS on the 20th for DXCC #114.

HERE AND THERE

ARRL September VHF QSO Party

This contest occasionally has excellent enhanced tropo conditions. This contest runs from 1800Z September 8 to 0300Z September 10. Further details can be found in August 2007 *QST*, or at **www.arrl.org/contests/rules/2007/sepvhf.html**.

2007 ARRL International EME Competition

There are major changes in this contest, whose first (microwave) weekend, 2304 MHz and above, begins September 29 at 0000Z and ends September 30 at 2359Z. In addition to previous categories, entries and awards can be: analog only, digital only or mixed mode. *Mixed mode* entries can work stations on analog and again on digital on the same band. *Multioperator* entries can use separate locations so long as they are within 50 km of each other. There are new rules for use of packet clusters and loggers. You must read the rules at **www.arrl.org/contests/rules/2007/eme.html**.

ARRL 10 GHz and Up Cumulative Contest

The second weekend begins 0600 local time Saturday, September 15 and ends midnight local time Sunday, September 16. Operate no more than 24 hours total. See the August World Above 50 MHz column and **www.arrl.org/contests/rules/2007/10-ghz.html**.

Fall Sprints

Sponsored by the Southeastern VHF Society, these are fine tune-ups for the fall seasons. 144 and 222 MHz Sprints are on September 17 and 25, respectively, from 7 to 11 PM local time. The other Sprints will appear in the October column. Logs go to a different person for each Sprint. See details at **svhfs.org/fall_sprint_rules.htm**.

W3UR

HOW'S DX?

VP6 Ducie Island February 2007

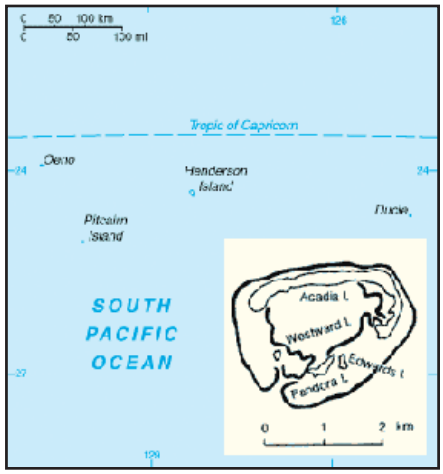
The VP6DX team, heading to Ducie Island, has been busy behind the scenes preparing for the much anticipated February 2008 DXpedition, reports Carsten Esch, DL6LAU. The group has decided "to extend the duration of the expedition." As a result that will increase the budget for this operation. Plans are to depart Mangareva Island, Gambier Islands, French Polynesia via the *Braveheart* (**www.braveheart.pn**), on February 5, 2008 and head for Pitcairn Island, which normally takes about 36 hours.

The ops will spend a few hours there before taking another 36 hour trip boat ride, still aboard the *Braveheart*, to Ducie Island. They are planning to arrive at sunrise on February 9th. The only landing area is located on the northeast side of the island and it can be tricky. They hope to be up and running within 24 hours.

The team needs to be back on Mangareva by March 3, so they would need to allow about six days in order to get back in time. Looks like if all goes well, including the weather, they will have VP6 QRV for as long as 19 days. There is a slight chance of a short visit to another uninhabited island [Henderson Island is the only one on the way to and from Ducie Island. — *Ed.*] if things on Ducie slow down.

Since the Dayton announcement the operators list has been adjusted. Unfortunately Krassy Petkov, K1LZ, will not be able to go. The current list of operators is DJ8NK, DL3DXX, DL6LAU, DL8LAS, K3NA, OH2BH, OH2PM, SP3DOI, UA3AB and WA6CDR. The group plans to announce the addition of three more ops in the near future.

The VP6DX DXpedition team will be assisted by a support team. Kan Mizoguchi, JA1BK, who was the DXpedition leader on the first operation (VP6DI) from Ducie and who supported the second operation (VP6DIA), will be advising the VP6DX team. DF6QV, DJ2YA and OH1JT will be the Antenna Engineering Team. The team's Webmaster will be DL1MGB. Bob Beebe, GU4YOX, is the electrical team manager and Miralda Warren, VP6MW, is the Pitcairn Island liaison. More support personnel are expected to be announced soon.



Ducie Island was added to the DXCC list in March 2002. The island is located about 350 km east of Henderson Island.

Early on, the team chose to take radios that would possibly be "the best radio for this kind of operation." The team will have seven of the new K3 transceivers thanks to the sponsorship of Elecraft (**www.elecraft.com**). Another sponsor for this operation will be ACOM (**www.hfpower.com**) as the team will have six or seven of the ACOM 1000/1010 amps and one ACOM 2000A (for 160 meters).

Serious efforts are being made in many aspects of this DXpedition including their antennas. They will have two phased verticals on 160 meters aimed at Europe and the US and one vertical will be used to all other areas. Plans are to have two 4 squares on 80 meters, one on CW and the other on SSB, for simultaneous operation. Four Squares will also be used on the 30 and 40 meter bands. On 10 through 20 meters they will be using phased vertical dipoles.

As you can see, from the list of operators, their time on the island, the equipment and antennas, this will be a serious effort to make Ducie Island available to the DX community. Donations for this operation are being requested, in order to make this operation a success. Your support before the operation is requested, as "all of the expenses have to be paid way before" the team actually depart. The team members have already put the moneys upfront. Donations have already been received or promised by the following sponsors: German DX Foundation (GDXF), Danish DX Group (DDXG), Clipperton DX Club (CDXC), Chiltern DX Club (CDXC), European DX Foundation (EUDXF), UK Six Metre Group (UKSMG) and the Central Virginia DX Contest Club (CVCC). Individual contributions have been received so far from: K9CT, W2RI, DJØQN, G4DYO, K7HC, N6OX, DK5WL, DL2OE, K7EIE, DL3JJ, JF7RJM and DL7ZZ.

The budget for this operation is over $200,000 (USD). Those willing and able to support this operation, get details on the team's Web site at **ducie2008.dl1mgb.com/content/view/33/54/**. Over the next few weeks the VP6DX team will be preparing the shipping container, which will contain the "radios, amplifiers, antennas, generators," etc.

The VP6DX Web site (**www.vp6dx.com**) is constantly being updated and a monthly news letter will be available with all the details prior to the trip. Those wishing to receive the newsletter automatically can go to the Web site and "leave your e-mail address in the News section."

DL7DF AND COMPANY HEADING TO BURUNDI

Sigi Presch, DL7DF, has announced plans for a multi-op team going to Burundi from September 26 to October 9, 2007. The group will use the call 9UØA. Activity is expected on 6 through 160 meters on CW, SSB, RTTY, PSK31 and SSTV. The experienced crew will include Manfred, DK1BT; Wolf, DL4WK; Sigi, DL7DF; Jan, DL7UFN, Frank, DL7UFR; and Leszek, SP3DOI.

The team will emphasize the low bands. For equipment they will have four transceivers (two K2s, an IC-706 and an IC-7000) and three TY900 kW amplifiers. The antennas will include a Titanex V8ØE, 18 meter low band vertical, a four square on 30 and 40 meters, two hex beams for 10-20 meters, a five element Yagi for 6 meters and several Beverages for the low bands.

Plans are to have online logs, which are expected to be updated during the DXpedition. The

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pilot station for this operation will be DF3CB, Bernd (**bernd@df3cb.com**). QSL via DL7DF either direct or via the bureau. Direct QSLs can be sent to Sigi Presch, Wilhelmsmuehlenweg 123, D-12621 Berlin, Germany. Direct requests should send a self-addressed envelope and 1 IRC or 2 US$ for outside of Europe and 1 IRC or 1 US$ for mail within Europe. For more information on this DXpedition check out their Web page at **www.dl7df.com/9u/**.

UA4WHX AFRICAN AND MIDDLE EAST TOUR COMPLETED

UA4WHX, Vladimir Bykov, is now home in Izhevsk, Russia after being in Africa and the Middle East for over two years. He went through two radios, lost a finger and traveled to 21 countries in 26 months managing over 310,000 QSOs. During that time he made many DXers happy with all time new ones and many band pointers.

This was Vladimir's third and longest junket. All of Vladimir's operations from trip 1 and 2 have been approved by the ARRL DXCC Desk and most have received their QSLs for those first two trips. Vladimir was QRV with the following calls between May 2005 and June 2007: 3DAØVB, 4KØVB, 4LØB, 5H3VMB, 5R8VB, 5X1VB, 5Z4/UA4WHX, 7P8VB, 7Q7VB, 9J2VB, 9UØVB, 9XØVB, A25VB, C91VB, D2ØVB, D6ØVB, J2ØVB, OD5/UA4WHX, ST2VB, V51VV and Z2/UA4WHX. Complete QSL details can be found at **www.dailydx.com/UA4WHX.pdf**.

Vladimir Bykov, UA4WHX, operating as C91VB from Mozambique. This was just one of his 21 country stops over the last 24 months!

DX GATHERINGS

Great Lakes Division Convention

This year's ARRL Great Lakes Division Convention will be held in conjunction with the 2007 Cleveland Hamfest over the September 22-23 weekend. The actual GLDC will take place September 22 at the Sheraton Independence Hotel in Independence, Ohio. The opening ceremonies will begin at 1130 AM. DX and Contest speakers for this event include Tedd Mirgliotta, KB8NW; Bernie McClenny, W3UR; Don Karvonen, K8MFO; John Papay, K8YSE; Bob Allphin, K4UEE, and Tim Duffy, K3LR. DXCC card checking will be available. Full details about this event can be found on the official 2007 ARRL Great Lakes Division Convention Web site at **www.2007gldc.com/**.

South East DX and Contesting Organization

This year's South East DX and Contesting Organization (SEDCO) will be held September 29 at the Main Stay Suites and Convention Center in Pigeon Forge, Tennessee. BS7H and VU7RG are just two of the presentations being planned. They will also have DXCC card checkers on hand. For more info check out the SEDCO Web site at **www.sedco.homestead.com/**.

Fred, G4BWP, is on a work assignment in the United Arab Emirates and soon hopes to be QRV. Here Fred is meeting Mohammad, A61DX, after a club meeting at A62EQ.

Clipperton DX Club DX Convention

Mark your calendar for this year's Clipperton DX Club's (CDXC) 29th annual DX Convention, which will be held on September 21 and 22, 2007 in Puyloubier near Marseille and the Mediterranean Sea. S21XA, XT2C, 5A7A, VE/F5PAC/VE/F5AHO, TM5F, TX6A and VU7RG are just some of the scheduled presentations for this gathering. Most of these presentations will be done in French. For complete details check the CDXC Web site at **tinyurl.com/2dzpqm**.

DX NEWS AROUND THE GLOBE

C5 — The Gambia

C56YK, operator ON7YK, Andre, will again be active from The Gambia, September 14-27. He will be on 80-6 meters SSB. QSL via his QRZ.com info.

JD1/M — Minami Torishima

Look for JA6GXK/JD1, Masafumi, to be QRV from Marcus Island from August 29 to September 30.

Pacific Isles

Ulli, DL2AH, says his next operation will be September 29-October 12 from ZK2, Niue, then October 17-30 from ZL7, Chatham, and the following two weeks from VK9N, Norfolk Island. He'll have an FT-897 and loops for 40-10, on SSB and RTTY.

P29 — Papua New Guinea

Hans, SM6CVX, and Derek, G3KHZ, are activating two new Papua New Guinea island groups, including Tauu Island, OC-283; Nukumanu Island, OC-284, and Tulun, OC-256 or Nuguria, OC-257. This effort will be September 25-October 15. They will be on "all bands CW and SSB." They will have QSL info and call signs later. They have hired a boat and say costs will be very high, about $30,000 US for the two operators. These islands are far from the main island and they have special permission to land. They will also try to get on 160 and 80 meters with good antennas. They will try to have six days on each of the first two islands, with the last two being bonus.

VK9 — Lord Howe and Norfolk Islands

Jack, VK6CTL/HB9TL, is heading back to the Pacific Ocean. First stop will be Lord Howe Island where he plans to operate as VK9CLH October 8-17. Look for him on 10 through 80 SSB only. Next he will be QRV as VK9CNF from Norfolk Island October 19-25. Again on SSB only on 10 through 80 meters. QSL direct only via HB9QR.

VR2 — Hong Kong

International Telecommunication Union (ITU) bulletin # 885, dated June 1, 2007 reports: "On the occasion of the 10th anniversary of Hong Kong's reunification with China, the Administration of Hong Kong (Special Administrative Region of China) authorizes amateur stations to use the special call sign prefix VR1Ø in replacement of VR2 from July 1, 2007 to June 30, 2008."

WRAP UP

That is it for this month. A special thanks to DL7DF, HZ1IK, KE3Q, UA4WHX, W8GC and *The Daily DX*. Keep sending your DX news, photos and tidbits to **w3ur@arrl.org**. Until next month, see you in the pileups! — *Bernie, W3UR*

Strays

MOTHER/DAUGHTER TEAM EACH HAVE 50 YEARS IN HAM RADIO

◊Ruth Rice, K8ARA, and her daughter Judy Talago, K8AVP, both received their Quarter Century Wireless Association 50 year certificates at the West Virginia Chapter's Spring Gathering. (For more information about the QCWA, see **www.qcwa.org**.)

Ruth is the matriarch of a large family of at least a dozen hams. Her husband was Vaughn, W8VOI (SK). Their other daughters have also held tickets: Cindy, K8WOD (SK) and her husband Jay, KB8YQR; Linda, N8XXH, and her husband Gene, KC8PXN, and Vonda, KC8HUR. Two granddaughters are also licensed: Beth, KA8NHD, along with Joni, KB8PQF, and her husband Rick, KC8HFN. There is also one grandson, Rick, N8VZH. Last but not least there is Stan, W8PRM, Judy's husband, who received his 50 year certificate last year. Congratulations to Ruth and Judy! — *David Mays, W8UI*

K2TQN

OLD RADIO

A Collins Time Capsule Found

Every once in a while a great radio becomes available and every great once in a while the right person becomes the new owner. This is such a story.

Bruce J. Howes W1UJR

October 2, 2006, just after 9:30 PM EST, on a small peninsula on the Maine coast, a Collins 30K-1 amateur transmitter, serial number 32, returned to life after a 48 year hiatus.

This was no simple resurrection, but the culmination of a long journey that started over half a century ago. The journey began in 1947 when serial number 32 left the Collins factory at Cedar Rapids, Iowa, and traveled to the station of Walter Jahries, W7MGA, in Salt Lake City, Utah. It saw service at W7MGA until sometime in the late 1950s. After the passing of W7MGA the unit was put into storage. In 1991 it traveled westward to Los Gatos, California, and the home of Peter Brickey, K6DGH.

Peter, busy with other projects and his Hallicraters HT-4 station, never got around to unpacking the transmitter and getting it on the air. So there it sat, in heated storage, for 15 years, until September 2006, when it headed for the East Coast and to my home at Woolwich, Maine, some 59 years after it first rolled off the factory floor.

But it was not just the transmitter that survived the half-century of storage and travel. Amazingly, the complete station, *sans* antenna, survived intact! For included in the package was the matching Collins 75A-1 receiver, Collins 270G-1 speaker, Collins 310A exciter to drive the big 30K-1, W7MGA's manuals, extensive spare parts, a homebrew coil holder and a Shure microphone. In other words, the complete 1940s-era station of W7MGA had been transported through time and space to arrive here, the coastal station of W1UJR.

A Little History

The 30K series was designed by Collins engineer Warren Bruene in 1945 and was first offered for sale the following year. It was, in some way, a "Hail Mary Pass" for Collins as the war contacts were drying up, and yet Amateur Radio operation was still banned during wartime. Collins forecast a pent up demand from the return of GIs from

W1UJR

W1UJR's restored 1947 Collins station.

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W1UJR

W1UJR's Collins 30K-1 after restoration.

the war, and with the elimination of the wartime ban on amateur operation, hoped the 30K would fill the gap. Sales were somewhat limited as the 1946 cost of the 30K-1 transmitter and 310A exciter was $1450, the equivalent to approximately $15,000 in today's dollars. According to Jay Miller's (KK5IM) excellent publication, *The Pocket Guide to Collins Amateur Radio Equipment 1946-1980*, less than 100 of the 30K-1 are known to have been built, and few survive today, making serial number 32 a rare bird indeed.

Visually, the 30K transmitter series are most impressive to behold. Housed in a cabinet 5½ feet tall, finished in black wrinkle paint and weighing over 350 pounds, this is a big transmitter! The design of the unit is pure Art Deco; vertical and horizontal chrome accent strips, a large window for viewing the 4-125 final tube, and a most impressive meter panel at the top of the cabinet, also housed behind glass. Looking every inch a serious transmitter, the 30K-1 is of robust construction along the lines of commercial broadcast gear.

Emission modes are CW and Fone (AM), with the plate input power given as 500 W on CW, and 375 W on AM. The 30K-1 covered from 80 to 10 meters using two plug-in output coils. With 11 tubes in the transmitter and 10 tubes in the 310A exciter, the 30K station is as much a delight to operate as it is to look at.

Provenance

Whenever I purchase vintage amateur gear, I like to know the identity of the previous owner, or builder, and document the construction, use and ownership of the item. The museum people call this "provenance" and use it to establish the authenticity of an item. For my purposes I find this information gives me a greater appreciation of, and respect for, the handiwork of the previous owner. It can also be helpful for restoration purposes, knowing what period of components to use in a rebuild, or even in designing the station configuration.

Fortunately Peter remembered the name and call sign of the previous owner, so with the Internet close at hand, it was a simple matter to track down his next of kin. I sent a tentative e-mail off to W7MGA's son, Conrad, who was most helpful in filling in the details and history of the station.

Conrad shares the history of the station:

> That is interesting about your having the old 30K station. Yes, it belonged to my Father, W7MGA (born in Chicago in 1895). I think he bought it from Henry Radio in Kansas City, probably in 1947, as he returned from Hawaii in 1946. He was the district manager for S. H. Kress Company in Hawaii and the store manager for the Honolulu store. He retired over there in 1946 and moved back to Salt Lake, where he lived before being transferred to Honolulu in 1936. The way he got into ham radio is when we lived in Honolulu, my brother was going to university here in Salt Lake, and he ran into a fellow by the name of Malc Majors. Malc was a ham (WØOJI) and set up schedules between Hawaii and Salt Lake to talk with my brother. When we returned to Salt Lake dad got his ticket about 1947 and purchased the Collins equipment.
>
> I was in school then and remember his having people up to the house all times of the day and night to have schedules with servicemen in the South Pacific. He was using a 4-element beam for 10 meters and 3-element beam for 20 meters. It was home made and sat on top of a 44 ft Vesto tower. The skip was open then and I think he made most of his contacts on 10 meters. 10 meters was open in the early evenings and people were over to the house almost every day. He did a lot of hamming on 10 and 20, spending most of his time in the shack. He sort of lost interest in hamming in the late '50s and the Collins sat in his shack for quite a while. When he passed away, I got it and it sat in my basement for several years not being used. I was interested in RTTY and used Kenwood Twins when I was on the air, so I never used the Collins.

The Rest of the Story

You can finish reading this long and interesting story on the W1UJR Web page, **www.w1ujr.net**, or by purchasing two back issues of *Electric Radio Magazine*, issues #215 and #216, **www.ermag.com**. The W1UJR Web site is loaded with interesting stories and many photos. It will take you several hours to see everything that is there.

About W1UJR

Bruce says this about himself, "I delight on bringing back this gear, and while I enjoy using it now, I take additional joy in knowing that I am in, some small way, preserving it for future generations of radio amateurs. For in many ways I feel that I am not so much the owner, as I am the caretaker of these radios. They are all that is left of the once proud American radio industry, and deserve the best of treatment so they may be passed on to future generations."

Bruce's interest is the service and operation of vacuum tube ham gear from the 1930 to the 1950s, focusing on Johnson and Collins equipment. He says he has a special place in his radio heart for homebrew gear from the 1920s to the 1940s.

W1UJR's Conclusion

In closing I want to thank Todd Bigelow, KA1KAQ, for his countless hours of encouragement; Peter Brickey, K6DGH, for his tireless efforts to get the station to me without damage; Conrad Jahries, WB7DHJ, for sharing about his father; the good folks on the Collins Collectors Association e-mail reflector for their information, and finally Walter, W7MGA himself, for building and maintaining such a wonderful station. Your help has been invaluable to help this transmitter live again, and continue to be part of W7MGA and Amateur Radio's rich legacy. QST

AMATEUR RADIO WORLD

IARU Gets Busy

The Administrative Council of the International Amateur Radio Union (IARU) held its annual meeting May 14-15 in Boston, Massachusetts. Topping the agenda was emergency communications, including the IARU's upcoming participation in the Global Amateur Radio Emergency Communications Conference (GAREC-07), taking place in Huntsville, Alabama just prior to the ARRL National Convention in August. The Administrative Council's primary goal is to enhance the coordination and promotion of Amateur Radio's worldwide disaster response capabilities.

During the Boston gathering, Council received a draft strategy paper from IARU International Coordinator for Emergency Communications Hans Zimmermann, HB9AQS/F5VKP. The body will seek additional information from member-societies on the national regulatory position of the Amateur Service in preparing for and providing emergency communications, with an eye toward identifying problem areas and developing solutions.

Continuing the strategic planning initiative begun in 2003, Council reviewed and renewed progress on a three-year plan for the development of support for Amateur Radio frequency allocations for 2008 through 2011. Some details are pending until after WRC-07.

A working document describing the requirements for radio spectrum allocations to the amateur and amateur-satellite services was reviewed. Council will take a comprehensive look at the document following WRC-07.

In other business, the IARU Administrative Council reviewed and endorsed a plan to revitalize the IARU Worked All Continents (WAC) award program; selected "Amateur Radio: A Foundation for Technical Knowledge" as the theme for the next World Amateur Radio Day, April 18, 2008, and received and discussed reports from each of the three IARU regional organizations.

The next scheduled Administrative Council meeting will be in Germany in June 2008.

There's a Reason They Call it a "Working Party"

In June, IARU Secretary and ARRL Chief Executive Officer David Sumner, K1ZZ, participated in a meeting of International Telecommunication Union-Radio Communication Sector (ITU-R) Working Party 1A (WP 1A) in Geneva, Switzerland. This group, responsible for spectrum engineering techniques within Study Group 1 (spectrum management), worked on a document that may eventually become what's called a "preliminary draft new report" on the impact of power line telecommunications (PLT, or BPL on this side of the Atlantic) on radiocommunication systems operating below 80 MHz.

In June, ITU-R Working Party 8A (WP 8A) finished up their meeting in Geneva. This group is responsible for most of the land mobile services, plus the amateur and amateur-satellite services. Working Group 1 (WG 1), a subset of WP 8A, completed work on the *Amateur Service and Amateur-Satellite Service Handbook*, which in turn was approved by WP 8A. The *Handbook* is an overview of the activities of the amateur services, along with existing ITU texts that relate to the two services. This will be published by the ITU in the six official UN and ITU languages (English, French, Spanish, Arabic, Russian and Chinese), and will be a useful guide to administrations in countries where the amateur services may not be well developed. IARU President Larry Price, W4RA, and Secretary David Sumner, K1ZZ, represented the IARU. ARRL Chief Technology Officer Paul Rinaldo, W4RI, is chairman of WG 1 of WP 8A.

Region 2 Gets Ready to Meet in Brazil

The IARU Region 2 Conference is scheduled for September 10-14 in Brasilia, Brazil. The ARRL is a member of Region 2.

For the past two years, the Region 2 HF Committee has been working on the HF band plans, and has completed their study of and proposed revisions to the band plans for consideration at the conference. Region 2 President Rod Stafford, W6ROD, said that there will be at least one member-society attending the conference that will be proposing changes to how Region 2 societies pay their Region 2 dues. "All Region 2 societies should voice their opinions on this issue, since there are several Region 2 societies that have experienced decreasing membership and revenue over the last 10 years or so."

An IARU committee is currently studying IARU structure and there "will no doubt be a presentation at the conference on their work to date," Stafford said. "No firm decisions have been made at this point about the proposed structure, but a lot of thought and work has taken place to try to determine how IARU can be most effective for the Amateur Radio community worldwide in the future." He said that one of the ideas being studied is to have a "governing board made up of elected officers elected worldwide by IARU societies and appointed 'commissioners' who have specific areas of responsibility."

Stafford said, "There might be a commissioner who bears the responsibility of dealing with the Regional Telecommunications Organizations such as CITEL. There might be other commissioners who deal directly with CEPT and APT, the other primary regional telecommunications organizations. Other commissioners might have responsibility in specific 'amateur operating' areas such as contesting, DXing, digital modes, and such. IARU Member Societies and other interested groups interested in the specific operating activities could participate in the various commissions dealing with these specific operational activities. If such a structure works well, there may not be a need for IARU to have regional components such as Region 2." QST

SEANET 2007 Set for Thailand

The South East Asia Amateur Radio Network (SEANET) is an on-the-air meeting (14.320 MHz) that takes place daily at 1200 UTC to strengthen unity and cooperation among hams around the world, especially those within the region. Their first convention of SEANET was on the island of Penang, Malaysia in December 1971. Now in its 35th year, SEANET plans on meeting in Lampang, Thailand November 8-11. Lampang is known for its teak forests and ceramics, as well as the world's first elephant hospital and training center. The technical session will include a special track on activities in Thailand concerning the role of Amateur Radio in disaster communications since the tsunami disaster in December 2004. For more information, please see **www.sabah.net.my/seanet/seanet_2007.htm**.

S. Khrystyne Keane, K1SFA ♦ ARRL News Editor ♦ k1sfa@arrl.org

WB8IMY

ECLECTIC TECHNOLOGY

"Live" SSTV

Hams have been swapping Slow Scan TV (SSTV) images on the HF bands since the late '60s. I saw my first demonstration not long after I was licensed in 1971. The repetitious musical signal was strange enough, but the real show was taking place on a homebrew monitor crafted from an amber cathode-ray tube that had previously seen service in a radar console. The low-resolution image appeared slowly (they call it "slow scan" for a reason), painting from the top of the screen to the bottom. As the last of the image solidified at the bottom, the top was fading out of existence. Then, the cycle would resume at the top of the screen. The resulting picture was terrible by today's standards, but to see it created before my eyes from a radio signal was magic as far as I was concerned.

Fast forward to 2007. The old radar screens are long gone, replaced by computers and monitors. Sound cards handle the tasks of decoding received signals and encoding transmitted signals. Everything is done in software and the images we exchange are now in glorious color. In additional to traditional analog SSTV, we also have digital SSTV, or *DSSTV*. Different software is used for DSSTV, but the sound card is still acting as the modem.

Getting started with SSTV is vastly simpler today than it was decades ago. All you need is an SSB transceiver, a computer with a sound card and a sound-card interface to act as the liaison between your computer and your radio (interfaces are sold by several *QST* advertisers). If you are active on the HF digital modes, you're about 90% there already.

Figure 1 — My test transmission was received at KE5RS, but not very well. It was captured and displayed on his Web site in all its noisy glory.

Figure 2 — KE3Y captured my second test transmission with some noise (upper left image). KE3Y's Web site displays multiple images.

SSTV software is available at no charge. For analog SSTV, download *MMSSTV* at **mmhamsoft.amateur-radio.ca/**. For DSSTV, you can try *HamPal* at **www.kb1hj.com/hampalbig**, *DigTRX* at **paginas.terra.com.br/lazer/py4zbz/** or use the image feature of the free *WinDRM* digital voice software at **n1su.com/windrm/**.

Smile! You're on the Internet!

So what does all this have to do with our topic, "live" SSTV?

Well, perhaps you've heard of so-called *remote receivers* that monitor specific HF frequencies and stream their audio over the Internet. A number of hams have established these around the world and they are convenient tools for checking how well your signal is reaching various destinations.

Now the same remote reception ability is available for SSTV. Enthusiasts refer to it as "live" SSTV, or "SSTV cam."

If you know your way around Internet file transfers, setting up an SSTV monitoring station is straightforward. KE5RS wrote a neat little *Windows* application that automatically grabs received SSTV images and uploads them to your personal Web page, or any other Web page. You'll find it at **www.ke5rs.com/sstv/create.html**. All a monitoring station needs is a receiver connected to a sound-card equipped computer running SSTV software. KE5RS's application takes care of the rest. Since everything is handled automatically, the monitoring station can operate unattended.

Each time the monitoring station receives an SSTV image, the KE5RS application immediately transfers it to the Web. Depending on the Web page design, you may see a single image frame that is "refreshed" with new images as they are received. Or, you may see a page that archives multiple images received over, say, the last hour. There are even Web sites such as the one maintained by PE2SWL at **pe2swl.sprinterweb.net/worldwide-sstv-servers.htm** that display "live" image captures from a dozen stations or more.

Gadget geek that I am, I had to give this a try. I parked my radio on the 20-meter analog SSTV frequency, 14.230 MHz, loaded an image into my SSTV software and clicked the TRANSMIT button. Within 60 seconds after ending my transmission, my test image started popping up on various live SSTV Web sites. KE5RS picked me up, in fact, although not very well as you can see in Figure 1. Reception was much better at KE3Y, as shown in Figure 2.

The sheer ingenuity of our Amateur Radio brethren never fails to impress! QST

Steve Ford, WB8IMY ♦ *QST* Editor ♦ sford@arrl.org

AT THE FOUNDATION

Scholarships Awarded to 61 Amateurs

The ARRL Foundation is proud to honor the 2007 scholarship winners, to celebrate their academic achievements and to recognize their commitment to Amateur Radio. We wish them well in their pursuit of higher education.

The application period for the 2008 awards opens October 1, 2007 and ends February 1, 2008. For more information about available scholarships and complete application instructions and forms, go to **www.arrl.org/arrlf/scholgen**.

If you or your organization is interested in sponsoring an annual scholarship award, contact Mary Hobart, ARRL Foundation Secretary at **mhobart@arrl.org**.

James Aman, KD5UJC
The Tom and Judith Comstock Scholarship

Luke Anderson, KG4TQS
The Albert H. Hix, W8AH Memorial Scholarship

Robert Anderson, KCØIVR
The Irving W. Cook, WA0CGS Scholarship

Kathryn Ankenbauer, KD8AHA
The Yasme Foundation Scholarship

Matthew Bailey, KI4JUD
The Challenge Met Scholarship

Jonathan Baize, AD5OJ
The Northern California DX Foundation Scholarship

Nicholas Bauer, KC9GZY
The Northern California DX Foundation Scholarship

Aaron Bestick, KD7YQE
The Dayton Amateur Radio Association Scholarship

Ashley Bierzonski, KB3OIQ
The Challenge Met Scholarship

Daniel Bradke, W2AU
The Henry Broughton, K2AE Memorial Scholarship

Nicholas Brennan, KD7YDD
The Yasme Foundation Scholarship

Robert Capizzio, KC2EMA
The Challenge Met Scholarship

Matthew Chetta, AF4EO
The Charles Clark Cordle Memorial Scholarship

Andrew Cwalina, WA4JJZ
The Northern California DX Foundation Scholarship

Gillian Davies, KB1KGP
The New England F.E.M.A.R.A. Scholarship

Adam DiLuglio, KB1LJR
The Challenge Met Scholarship

Brian Earley, W1BWE
The New England F.E.M.A.R.A. Scholarship

Daniel Ellis, KG4IVC
The Jean Cebik Memorial Scholarship

William Fisher, W4WJF
The Yasme Foundation Scholarship

Daniel Friedrichs, KØIPG
The Richard W. Benedicksen, N7ZL Memorial Scholarship

Neil Gebhardt, KB9ZGZ
The Earl I. Anderson Scholarship

Matthew Goldstein, KB1NCS
The Henry Broughton, K2AE Memorial Scholarship

Erin Gordon, KC2JQD
The Challenge Met Scholarship

Nathaniel Heatwole, WZ3AR
The You've Got A Friend In Pennsylvania Scholarship

Mary M. Hobart, K1MMH ♦ Secretary, ARRL Foundation Inc ♦ mhobart@arrl.org

Keone Hon, KD7LRB
The New England F.E.M.A.R.A. Scholarship

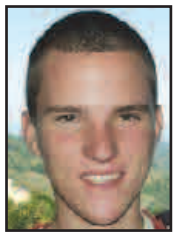
Stephen Hughes, KI4EBV
The K2TEO Martin J. Green Sr. Memorial Scholarship

Amy Johnson, KB3HXF
The Dayton Amateur Radio Association Scholarship

Hannah Jones, KD5QNQ
The Challenge Met Scholarship
The Fred R. McDaniel Memorial Scholarship

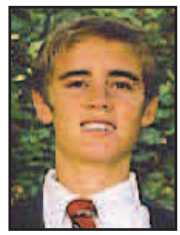
Jenny Kim, AD7DN
The William Bennett, W7PHO Memorial Scholarship

David Lambert, KC9BLA
The Earl I. Anderson Scholarship



Timothy Little, W8LBO
The Zachary Taylor Stevens Scholarship

Kerry Manderbach, KCØVNH
The Paul and Helen Grauer Scholarship



Frank Matte Jr., KI4DVY
The NEMAL Electronics Scholarship

Charles McClish, KB9RGF
The Edmond A. Metzger Scholarship

Reid Morine, W4RSM
The Gary Wagner, K3OMI Scholarship

Jennifer Moyher, N1ZZY,
The New England F.E.M.A.R.A. Scholarship

Ryan Murphy, KG6OVO
The Challenge Met Scholarship

Ryan Nill, KD5FCT
The Carol J. Streeter Scholarship

Sabra Perry, KD7JPR
The Mary Lou Brown Scholarship

Victoria Reid, AA3OT
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Rebecca Rich, KBØVVT
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The Northern California DX Foundation Scholarship

Robert Rickard, KG4MBQ
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The Seth Horen, K1LOM Memorial Scholarship

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Henry Stonesifer III, W3QND
The IRARC, Joseph P. Rubino, WA4MMD Memorial Scholarship

Jonathan Troup, KØDE
The Yasme Foundation Scholarship

Jonathan Van Norman, KCØORR
The Dayton Amateur Radio Association Scholarship

Catherine Vest, WA4QVI
The ARRL Foundation General Fund Scholarship

Michael Volz, W8KAR
The Earl I. Anderson Scholarship

Matthew Zielinski, KD7KQK
The Central Arizona DX Association Scholarship

Not pictured: **Zakir Durumeric, KCØVAA, The PhD Amateur Radio Association Scholarship; William Finan, KC2EJQ, The Dr James L. Lawson Memorial Scholarship.**

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

KA1CQA **Gallagher**, Mary E., Damariscotta, ME
N1EUX **Greenwood**, Alden T., Mason, NH
KB1HJ **Donnelly**, Wayne E., Bradford, NH
W1IE **Zellon**, James, Worcester, MA
KB1MTJ **Felici**, Robert G., Providence, RI
K1NKA **Howell**, John R., Georgetown, MA
AK1O **Vanacore**, Anthony J. Jr, Northford, CT
WA1PFC **Bosse**, John A., Lakeville, MA
WA1PLS **Goldberg**, Edward M., Springfield, MA
K1SAP **Crawford**, David A., Newton, NH
♦ W1UUZ **Hitchcock**, Theodore W., Wesley Chapel, FL
WA1VHR **Stiles**, Sherman A., Meriden, CT
N1WB **Bond**, Wiley C., Tuscaloosa, AL
KA1WGV **Shakalis**, Peter A., Plymouth, MA
K2AFK **Pratt**, Rodney C., Holland Patent, NY
AH2AM **McIntyre**, Luther B. Sr, Salisbury, NC
K2COO **Nelson**, Arthur M., Overland Park, KS
K2DN **Skinner**, Frederick J., Cortland, NY
N2GKQ **King**, Glen P. Jr, Rochester, NY
W2GMX **Schaffner**, Harold E., Elmira, NY
WA2LGE **Winans**, John H., Morris Plains, NJ
WA2LMD **Becker**, Jack E., Elmira, NY
N2ML **Leven**, Merwin, Mamaroneck, NY
N2NCT **Spencer**, Robert A., Pompano Beach, FL
N2PEO **Robideau**, Edward A., Troy, NY
KA2SLC **Dunn**, Curtis D., Dunkirk, NY
KB2VKO **Turner**, Mark L., Indianapolis, IN
N2XVO **Parkinson**, William S., Spencerport, NY
KF3BZ **Leaman**, William C., Adelphi, MD
N3EEH **Bailey**, Frank G., Scranton, PA
♦ W3HYW **Von Hagel**, Donald F., Darlington, SC
NI3O **Van Meter**, R. C., Lansdale, PA
W3PQB **Keller**, Donald Jr, Green Lane, PA
N3RTY **Peterson**, Richard, Port Allegany, PA
WD4DMA **Snider**, Tracy J., Claxton, GA
W4EAA **Glenn**, Alvin E., Houston, TX
KU4FR **Lange**, Edward C., Spartanburg, SC
W4HCM **Miller**, Henry E., Millington, TN
KE4JDW **Polk**, Thomas C., Goldsboro, NC
KE4JWB **Snowdon**, George R., Englewood, FL
WA4MGB **Briehler**, Donald J., Decatur, IL
W4PBP **Brackett**, Clyde R., Sarasota, FL
WA4REL **Lambert**, Doris C., Birmingham, AL
WB4RUK **Weaver**, Erven S., Millbrook, AL
KE4TP **Gerardi**, Peter, Coral Springs, FL
KD4TZP **Sapp**, Claude N. Sr, Statesboro, GA
KC4UDT **Head**, Obie T., Douglasville, GA
W4ULW **Grant**, Frank R., Hollywood, FL
♦ W4VOL **Davis**, James E., Lakewood, CO
W4VSE **Weixler**, H. J., Louisville, KY
KE4WEK **Cook**, Harold M., Montgomery, AL
♦ WA4ZVK **Alexander**, Joel S., Roswell, GA
♦ W5BGE **Davis**, William D., San Antonio, TX
K5BNR **Gattis**, Reginald O., Sherman, TX
W5FYI **Stewart**, Otis W., Hilltop Lakes, TX
W5FZW **Cronvich**, James A., Harahan, LA
K5GHS **Tolbert**, James T., Austin, TX
K5IRS **Sheffield**, Ernest L. Jr, Alexandria, VA
N5KNX **Dugal**, James P., Lafayette, LA
W5LMR **Ohlsson**, Seldon D., Jefferson, LA
N5ML **Lipsey**, M. R. Jr, Broaddus, TX
WA5MWB **Grant**, James G. Jr, Baton Rouge, LA
WA5VUX **Leitch**, J. D., Beaumont, TX
WB6BBH **MacKenzie**, Albert L., Hemet, CA
♦ WA6BXT **Hodges**, Joan T., San Carlos, CA
N6FAB **McJunkin**, William, Yuba City, CA
W6HAV **Weeks**, Rollo F., Fresno, CA
♦ K6IDP **Eaton**, J. O., Sacramento, CA
KF6JAB **Tubbs**, William R., Vacaville, CA
K6JM **Moses**, John L. Sr, Rimrock, AZ
K6JOY **McGinnis**, Jewel, San Francisco, CA
KF6KR **Armor**, Robert G., Nevada City, CA
N6OSI **Gardiner**, James H., Glendale, CA
WA6PYH **Ross**, Eliot A., Livingston, TX
♦ W6QFE **Vogel**, Stanley W., Palm Desert, CA
KC6QZP **Schmidt**, Joseph D., Rodeo, CA
WA6SFB **Miller**, Earl Jr, Santa Rosa, CA
NC6V **Corlew**, Richard J., Oceanside, CA
KF6VOG **Hardy**, William C., Oakland, CA
K6ZZA **Sowle**, Bill P., Yreka, CA
KF7HO **Scheibner**, Walter S., Selah, WA
KB7HX **Sater**, Wilbur A., Deltona, FL
KE7JSX **Horton**, James D., Yakima, WA
W7KAP **Folden**, Albin T., Sun City, AZ
KD7MXR **Walker**, Alvin H., Minden, NV
W7RHX **Harold**, Herbert C., Colville, WA
KD7TIV **Walker**, Alice, Minden, NV
KL7TO **Giebel**, Alfred, Anchorage, AK
KZ7U **Montgomery**, C. R., Stayton, OR
W7VMN **Crotts**, Gerald L., Duncan, AZ
WS7X **Denney**, Loren H., Pinedale, WY
N7ZT **Meal**, Thomas J., Carson City, NV
WA8CIA **Conner**, Earle H. Jr, Pittsburgh, PA
K8DMD **Leon**, Dawn M., Holton, MI
♦ W8EI **Nielson**, Read R., Oxford, OH
W8EOK **Lewis**, John D., Clermont, FL
W8LMJ **Poeth**, Dean F. Jr, Columbus, OH
W8LWX **Steinberger**, Charles A., Springfield, OH
W8LZ **Zawlocki**, Laurence E., Muskegon, MI
WB8PLP **Turle**, James A., Bedford, OH
KF8QG **Ewald**, James L., Kettering, OH
N8UPK **Caseman**, Anne, Marietta, OH
W9BXL **Alsop**, William P. Sr, Fishers, IN
K9GEO **Stuart**, George S., Brooks, OR
W9JK **Krause**, Jack C., Milwaukee, WI
K9KJD **Little**, Raymond L., Reelsville, IN
♦♦ WA9OJS **Wilbrandt**, Robert A., Crystal Lake, IL
W9RF **Bauer**, Christ, Sheboygan, WI
N9SNK **Heuer**, Bertram F., Homewood, IL
KD9U **Griffith**, Richard C., Arlington Heights., IL
AA9UZ **Paczesny**, Jerry M., Waukesha, WI
W9WHT **Riggs**, Robert L., Indianapolis, IN
KA0ABA **Smith**, Norman F., Lincoln, NE
KØBGW **Ingino**, Robert T., Kansas City, MO
WØCC **Schrempp**, Russell, Saint Louis, MO
WAØEDA **Cummings**, Rolland D., Pittsburg, KS
WBØEGF **McLaren**, John F., Cedar Rapids, IA
KØGAA **Anderson**, Gwen A., Ashland, NE
WDØGNL **Inman**, Myron C., Kansas City, MO
WØJFD **Daly**, John F., Estes Park, CO
WØJUV **Berg**, Emma B., Lawrence, KS
WØKGW **Jameson**, Tom G., Isle, MN
KOØK **Hawkins**, Benjamin F., Hudson, OH
WØMZR **Harstad**, Bernard J., Worthington, MN
WAØNPK **Pruett**, Karl W., Topeka, KS
WØOPS **Hughes**, William L., Rapid City, SD
NØQIF **Miles**, Barbara S., Strasburg, MO
♦ KAØRSU **Hulse**, Patricia A., Lees Summit, MO
KBØSTV **Stanzel**, Kent A., Andover, KS
WBØUZM **Burke**, Roland E., Mission Hills, KS
KØVII **Moran**, Donald M., Burnsville, MN
KAØWTJ **Fager**, Larry, Ozawkie, KS
♦ WØZL **Cramer**, Charles "Bill", Overland Park, KS
VE6ARA **Berger**, Martin, Edmonton, AB
EA3ALD **Sala**, Angel Armemi, Barcelona, Spain

♦♦ Charter Life Member
♦ Life Member, ARRL

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation or to ARRL. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Amy Hurtado, KB1NXO ♦ Silent Keys Administrator ♦ sk@arrl.org

Strays

OREGON HAMS GIVE BANGLADESH AMATEUR A HELPING HAND

◊Generous ham radio operators, clubs and a radio retail store have contributed over $1500 to purchase new radio equipment that will keep a prominent Bangladesh amateur on the air. Nizam Chowdhury, S21B, had used his transceiver for 25 years for more than 20,000 contacts, but it died as a result of a passing electrical storm. Nizam is perhaps the most active HF operator in Bangladesh, passing out new country credits to thousands of hams worldwide. In May 2007, he contacted his QSL manager John Core, KX7YT, to ask for help locating a replacement radio. Since there are no retail Amateur Radio stores and little used HF radio equipment in Bangladesh, equipment must come from abroad.

Nizam has a long history as a prominent DXer, a founder of Amateur Radio in Bangladesh and Past President of the Bangladesh Amateur Radio League. The country is located just east of India at the tip of the Bay of Bengal and is very poor. After the War of Independence from Pakistan in 1971 it took BARL 21 years to get the new government to reactivate Amateur Radio frequency privileges. Finally, in 1992, licenses were issued and Bangladesh was on-the-air. Nizam was the second amateur to be licensed.

He has used his radio equipment for public service and disaster communications on numerous occasions over the years when tropical cyclones have caused widespread damage and loss of life. Nizam's need for replacement equipment was made known to the members of the Willamette Valley DX and the Washington County ARES Clubs; the Northern California DX Foundation and numerous other hams, resulting in generous donations by many. The funds are being used to purchase a new Kenwood TS-480SAT HF transceiver, power supply, filters and a Heil headset. All of this equipment has been shipped to his son in Virginia. It will be hand-carried to Bangladesh by Nizam's family.

JOHN CORE, KX7YT

This 2002 photo shows Nizam, S21B, with his son Farhad.

Special thanks go to the following organizations and amateurs for their generous support and help in keeping Bangladesh on the air: Northern California DX Foundation, Ham Radio Outlet-Portland, KE7KEI, W7KD, KE7JSS, N1KEZ, N2NS, NM7B, KA7OZO, N7TSZ, K7VIT, N7AAM, K7EAJ, KA7VQH, K7KWT, W9ERT, N7QQU, K7PWN, KC7PMU, K2ASP, KA7MOW, WN7O, AD7HO, K7TRP, WB6VIV, W7KXF, W7ZB, W7EYE, KC6MZY. — *J. Core, KX7YT*

75, 50, AND 25 YEARS AGO

September 1932

- The cover photo shows some sparkling new radio tubes, fresh out of their wrappers.
- The editorial discusses the agenda of the international communication conferences, just getting under way in Madrid.
- Jim Lamb discusses "An Intermediate-Frequency and Audio Unit for the Single-Signal Superhet."
- Charles Perrine, W6CUH, tells us how to get "Thirty-Three Watts per Dollar from a Type '52."
- "The Headquarters Gang" collaborates to present practical ideas on building your own antenna supports, in the article "Sticks That Have Stuck."
- "56-Mc. Rolls up Its Sleeves," by E. D. Miller, W8CCJ, reports on the solid traffic work on 5 meters at the National Glider Meet.
- "F.R.C. Absorbs Radio Division," by K. B. Warner, reports that, as of July 20, The Radio Division of the Department of Commerce became part of the Federal Radio Division.
- A photo in a "Strays" item shows the commissioners of the new Federal Radio Commission, and reports that the F.R.C. is staffed by some 120 people. It also mentions that the huge task of radio administration in this country "costs a million a year."

September 1957

- The cover photo shows a pair of hams hard at work at their Field Day position.
- The editorial, "Switch to Safety," reports that two hams were recently electrocuted in their ham shacks and reminds us to be careful around our ham stations.
- Howard Wright, W1PNB, discusses "The Third Method of S.S.B.", which was described in the recent single side-band issue of the *Proceedings of the I.R.E.*
- "V.F.O. Control for the ARRL Model 6-60-90," by Vern Chambers, W1JEQ, describes the V.F.O. pictured on the cover of last month's *QST*.
- Hans Albrecht, VK3AHH, discusses the use of "Transistors in Speech Equipment."
- L. I. Albert, W1PLM, tells us how to get "Greater Selectivity with the C.W. Clipper-Filter."
- David Geiser, W1ZEO, discusses dynamic regulation in power supplies, in "The Effect of Capacitance on Power-Supply Filter Bounce."
- Roger Easton, of the Naval Research Laboratory, gives construction details of an antenna system for satellite tracking, in "Mark II Minitrack Base-Line Components."
- Lew McCoy, W1ICP, tells us how to build "A $1.69 Keying Monitor" for cathode-keyed transmitters.
- T. E. Stewart, W2TBD, tells about what can go awry in 2-meter "hare and hounds" games, in "Transmitter Hunting—South Jersey Style."
- "Side Band," by R. B. Bourne, W1ANA, is a thought-provoking stream-of-consciousness look at Amateur Radio, and especially at the new voice mode of S.S.B.

September 1982

- The cover photo is from the California Balloon Festival, which will feature an Amateur Radio Special Event station this year.
- The editorial, "Phone Expansion II," relates the ongoing process to recommend changes to the HF 'phone bands to the FCC.
- Bob Shriner, WAØUZO, and Paul Pagel, N1FB, present "A Step Attenuator You Can Build."
- Urs Hadorn, HB9ABO, tells us how to "Build a Microprocessor-Controlled L-C Meter That Sends Morse Code."
- Ed Kalin, K1RT, describes "A Programmable Serial-Communication Interface" that will allow your computer and rig to talk with each other.
- "The 'K4YF Special' Antenna," by John Wilson, K4YF, details a compact, broadband antenna for 80 and 160 meters.
- John Belrose, VE2CV, and Doug DeMaw, W1FB, tell us about "The Half-Delta Loop: A Critical Analysis and Practical Deployment."
- Part 2 of Richard Stroud, W9SR's, 220 MHz trilogy tells us how to "Explore '220' with this State-of-the-Art Transverter!"
- John Lindholm, W1XX, discusses "DX Lists—Pros and Cons."
- Ellen White, W1YL, in her "How's DX?" column, salutes the North Jersey DX Association for its accomplishments during its 25 years of activity.

Al Brogdon, W1AB ♦ Contributing Editor

W1AW SCHEDULE

W1AW's schedule is at the same local time throughout the year. From the second Sunday in March to the first Sunday in November, UTC = Eastern US Time + 4 hours. For the rest of the year, UTC = Eastern US Time + 5 hours.

♦ **Morse code transmissions:** Frequencies are 1.8175, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 WPM.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code bulletins are sent at 18 WPM.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. See "Contest Corral" in this issue. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Fees: $10 for a certificate, $7.50 for endorsements.

♦ **Digital transmissions:** Frequencies are 3.5975, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:** Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Notes:** On Fridays, UTC, a DX bulletin replaces the regular bulletins. W1AW is open to visitors 10 AM to noon and 1 PM to 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy. In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

During 2007, Headquarters and W1AW are closed on New Year's Day (Jan 1), Presidents' Day (Feb 19), Good Friday (Apr 6), Memorial Day (May 28), Independence Day (Jul 4), Labor Day (Sep 3), Thanksgiving and the following Friday (Nov 22-23), and Christmas Eve Day and Christmas Day (Dec 24-25).

For more information, see **www.arrl.org/w1aw.html**.

PACIFIC	MTN	CENT	EAST	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	DIGITAL BULLETIN				
4 PM	5 PM	6 PM	7 PM	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	DIGITAL BULLETIN				
6:45 PM	7:45 PM	8:45 PM	9:45 PM	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	CODE BULLETIN				

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Aug 29-Sep 3, 1200Z-2359Z, Youngstown, OH. Twenty over Nine Radio Club, W8F. 160th Annual Canfield Fair. 28.450 21.350 14.250 7.250. QSL. Don Stoddard, KI8SS, 13308 Mahoning Ave, North Jackson, OH 44451. **ki8ss@arrl.net**.

Aug 31-Sep 1, 2100Z-2100Z, Brady, TX. Heart of Texas Ham Operators Group (HOT-HOG), WA5HOT. 33rd Annual World Championship Barbecue Goat Cookoff. 21.360 14.250 7.295 3.875. Certificate. HOT-HOG, c/o Rick Melcer, N5KAO, PO Box 1021, Brady, TX 76825-1021. **www.hothog.org**.

Sep 1-Sep 2, 1200Z-2300Z, St Joseph, MI. Blossomland Amateur Radio Association, N8P. St Joseph Michigan Lighthouse Centennial. 14.270 7.270 3.870 146.48. QSL. BARA — N8P Event, PO Box 175, St Joseph, MI 49085. *Operation will be near ARLHS USA-797 and USA-798.* **www.blossomlandara.org**.

Sep 1-Sep 2, 1600Z-2359Z, Greenbelt, MD. Central Maryland Amateur Radio Club, WC3MAR. Greenbelt Labor Day Festival Special Event Station. 28.320 21.290 14.250 7.190. Certificate. CMARC, PO Box 788, Greenbelt, MD 20768-0788. *Cosponsored by the Prince George's County Amateur Radio Club.* **mysite.verizon.net/jctilton/cmarc**.

Sep 1-Sep 3, 1900Z-1600Z, Paradise, AZ. Cochise ARA, K7RDG. 28th anniversary of trek to Ghost Town of Paradise. 14.265 7.230 18.115 21.305. Certificate. Cochise ARA, PO Box 1855, Sierra Vista, AZ 85636-1855. **www.k7rdg.org**.

Sep 1-Sep 4, 1400Z-0200Z, Wellsville, MO. Community Service Radio Club, KØM. Montgomery City, Missouri Sesquicentennial (150th anniversary). 80 40 20 15 m. Certificate. Howard Hollensteiner, NØXUK, 75 Hwy B, Montgomery City, MO 63361. *Certificate and QSL available.*

Sep 1-Sep 16, 0100Z-2359Z, Salt Lake City, UT. Utah DX Association, K7T. 80th anniversary of the invention of the electronic TV. 14.260. QSL. Wesley Wilkinson, W7WES, 7363 Galaxy Hill Rd, West Jordan, UT 84084. **w7wes@yahoo.com**.

Sep 3, 1200Z-2359Z, Nutley, NJ. Robert D. Grant United Labor Amateur Radio Association, N2UL. CQ Labor Day. 28.420 14.260 449.975. Certificate. RDGULARA, c/o WA2VJA, 112 Prospect St, Nutley, NJ 07110-0716.

Sep 3, 1300Z-1900Z, Milford, MI. Milford Amateur Radio Club, W8YDK. 175th year of the founding of Milford. CW 14.040 7.040 SSB 14.220 7.220. QSL. Milford Amateur Radio Club, PO Box 573, Highland, MI 48357. **www.qsl.net/w8ydk**.

Sept 6-Sept 9 1400Z-0200Z, Hebron, CT. Newington Amateur Radio League, W1H. Lions Hebron Harvest Fair. 28.340, 18.140, 14.240, 50.140. QSL. Rich Lawrence, KB1DMX, 335 Lloyd St, Newington, CT 06111.

Sep 7, 1200Z-2100Z, Kent, OH. Portage County Amateur Radio Service, KD8CKP. 26th Annual Black Squirrel Festval — Kent State University. 21.345 14.245. Certificate. Al Atkins, KB8VJL, 12433 Chamberlain Rd, Aurora, OH 44202. **www.portcars.org**.

Sep 8, 1300Z-2000Z, Starkville, MS. MFJ Amateur Radio Club, K5MFJ. MFJ 35th Anniversary Celebration and Open House. 21.345 14.245 7.238 3.862. QSL. MFJ Amateur Radio Club, 300 Industrial Park Rd, Starkville, MS 39759. *QSL and certificate available.* **k5mfj@mfjenterprises.com**.

Sep 8-Sep 9, 0100Z-2000Z, North Bend, WA. NWAPRS, K7S. Celebrating the 10th Annual NWAPRS Summer Gathering. 144.39 28.340 14.240 7.240. Certificate. David Dobbins, K7GPS, 920 N Fairchild Dr, Medical Lake, WA 99022. **www.nwaprs.info**.

Sep 8-Sep 9, 0100Z-1900Z, Torrance, CA. South Bay Amateur Radio Club, W1AW/6. ARRL Southwest Division Convention 2007. 28.595 21.395 14.295 7.295. QSL. South Bay Amateur Radio Club, PO Box 536, Torrance, CA 90508. **w6sba@arrl.net**.

Sep 8-Sep 16, 0000Z-2359Z, San Bernardino, CA. Citrus Belt Amateur Radio Club, W6A-Q. Route 66 On-the-Air. 21.366 14.266 7.266 3.866. Certificate. Citrus Belt Amateur Radio Club, PO Box 3788, San Bernardino, CA 92413. **www.w6jbt.org**.

Sep 9, 1200Z-2100Z, Arlington, VA. Pentagon Amateur Radio Club, K4AF. 6th anniversary of attack on Pentagon, WTC, PA. 21.400 14.300 7.250 3.950. QSL. Pentagon ARC, PO Box 2322, Arlington, VA 22202. **www.k4af.org**.

Sep 15, 1400Z-2000Z, Hammond, LA. Southeast Louisiana Amateur Radio Club, K5R. 2nd annual comemoration of Hurricanes Katrina and Rita. 14.250 7.250. Certificate. SELARC (K5R), PO Box 1324, Hammond, LA 70404. **groups.yahoo.com/group/K5R**.

Sep 15-Sep 16, 1200Z-2359Z, Reisterstown, MD. Baltimore Amateur Radio Club, W3FT. BARC's 60th Birthday Party. 14.255 7.180 3.903 144.55. Certificate. BARC, PO Box 120, Reisterstown, MD 21136. **w3ft67@yahoo.com**.

Sep 16, 1700Z-2200Z, Parsippany, NJ. Parsippany RACES, WA2UEM. Parsippany Annual Fall Festival. 21.320 14.260. QSL. Barry Schaeffer, WA2UEM, 8 Celtic Way, Parsippany, NJ 07054-1410. *Certificate and QSL available.*

Sep 19-Sep 23, 0000Z-2359Z, Santa Ana, CA. W6APD/Anaheim Police ARC, K6P. POW-MIA Recognition Day, 3rd Friday in September. 21.350 18.150 14.253 7.250. QSL. Mark McMullen, KM6HB, PO Box 27271, Santa Ana, CA 92799. **km6hb@arrl.net**.

Sep 21-Sep 22, 2200Z-2000Z, Tionesta, PA. Forest County Amateur Radio Club, K3M. 1st Annual Hamfest/Flea Market benefiting the Hunting and Fishing Museum of PA. 14.255 7.255 3.865. QSL. KB3OTA, PO Box 72, Tionesta, PA 16353; **forestcounty@verizon.net**.

Sep 22, 1400Z-2000Z, Milton, ON. Mississauga Amateur Radio Club, VE3MIS. Annual special event operation at Halton Country Radial Railway Museum. 14.250 7.210. Certificate. Michael Brickell, VE3TKI, 2801 Bucklepost Cres, Mississauga, ON L5N 1X6, Canada. *Include $2US for postage — US postage cannot be used in Canada.* **www.marc.on.ca**.

Sep 22, 1600Z-2100Z, Herkimer, NY. Fort Herkimer Amateur Radio Association Inc, W2FHA. Celebrating the Bicentennial of the village of Herkimer. 14.280 7.280. Certificate. Chris Bouck, KB4CMF, 28 W State St, Dolgeville, NY 13329. **cbouck01@twcny.rr.com**.

Sep 22-Sep 23, 1300Z-2100Z, Apple Orchard — Mile Post 76.5, VA. Lynchburg Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.215 7.240. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Blue Ridge Music Center — Mile Post 213, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.245 7.270. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Buena Vista — Mile Post 45.6, VA. Covington Amateur Radio Club, W4CA. 13 Stations on the Blue Ridge Parkway. 14.205 7.230. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Cumberland Knob — Mile Post 217.5, NC. Forsythe Amateur Radio Club, W4NC. Blue Ridge Bonanza. 14.250 7.275. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Explore Park — Mile Post 115.1, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.225 7.250. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Fancy Gap — Mile Post 199.5, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.240 7.265. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2000Z, Greenport, NY. Peconic ARC, W2AMC. Greenport Maritime Festival. 3.842 7.270 14.270. QSL. Peconic ARC, PO Box 113, Peconic, NY 11958. **www.peconic-arc.org**.

Sep 22-Sep 23, 1300Z-2100Z, Groundhog Mountain — Mile Post 188.8, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.235 7.260. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Linville Falls — Mile Post 317.4, NC. Forsythe Amateur Radio Club, W4NC. Blue Ridge Bonanza. 14.255 7.280. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Mabry Mill — Mile Post 176, VA. Franklin County Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.230 7.255. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Mount Pisgah — Mile Post 408.6, NC. Forsythe Amateur Radio Club, W4NC. Blue Ridge Bonanza. 14.260 7.285. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Natural Bridge — Mile Post 61.6, VA. Roanoke Valley Amateur Radio Club, W4CA.

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

Blue Ridge Bonanza. 14.210 7.235. Certificate. Ray Crampton, 1670 Catawba Road, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1300Z-2100Z, Rockfish Gap Mile Post 0, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza Work all 13 stations for certificate. 14.200 7.225. Certificate. Ray Crampton, 1670 Catawba Rd, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 22-Sep 23, 1400Z-2000Z, Burke, NY. North Franklin Amateur Radio Society, N2NNY. Boyhood home of Almanzo Wilder, husband of Laura Ingalls. 14.250 14.050 7.250 7.050. Certificate. Jeff Jones, 190 Reagan Flats Rd, Bombay, NY 12914. **k3kyr@arrl.net**.

Sep 22-Sep 23, 2359Z-2100Z, Peaks of Otter — Mile Post 84, VA. Roanoke Valley Amateur Radio Club, W4CA. Blue Ridge Bonanza. 14.220 7.245. Certificate. Ray Crampton, 1670 Catawba Road, Troutville, VA 24175. **ab4yz@arrl.net**.

Sep 23, 1400Z-2100Z, River Falls, WI. St Croix Valley Radio Amateurs, N9T. Autumn Trek Classic 9th Annual Bike Ride. 14.250 14.050 7.200 7.050. QSL. Philip Schweitzer, 611 Oakley Cir, Hudson, WI 54016. **www.pressenter.com/~scvra**.

Sep 24-Oct 1, 1100Z-0300Z, Alexandria, MN. Runestone Radio Club, WØW. Commemorating Discovery of Kensington Runestone. 21.070 14.240 7.240 3.900. Certificate. Bill Klundt, KGØDX, 509 Pine St S, Sauk Centre, MN 56378.

Sep 27-Sep 30, 1400Z-0200Z, Kingwood, WV. Preston County Amateur Radio Operators, W8B. 66th Annual Preston County Buckwheat Festival. 14.040 7.040 14.225 7.175. Certificate. Richard Wolfe, PO Box 512, Kingwood, WV 26537.

Sep 28, 1400Z-1900Z, Marco Island, FL. US Coast Guard Auxiliary, N2K. Special Event Radio Day. 28.390 21.305 14.340 7.228. QSL. Robert B. Witte, PO Box 1814, Marco Island, FL 34146. **cgrob095@embarqmail.com**.

Sep 28-Sep 29, 1200Z-2000Z, Toronto, ON. Mississauga Amateur Radio Club, VE3ISAR. International Search and Rescue Competition 2007, 29th Anniversary of the Canadian Coast Guard Auxiliary, 68th Anniversary of the US Coast Guard Auxiliary. 28.450 21.290 14.250 7.210. Certificate. Michael Brickell, VE3TKI, 2801 Bucklepost Cres, Mississauga, ON L5N 1X6, Canada. *Please include $2US — US postage cannot be used in Canada.* **www.marc.on.ca**; **www.ccga-gcac.org/isar2007**.

Sep 28-Sep 29, 1500Z-1900Z, Henderson, TN. W4FHU Amateur Radio Club, W4FHU. 29th Annual Chester County TN BBQ Festival. 14.205 7.200. QSL. W4FHU Amateur Radio Club, PO Box 173, Henderson, TN 38340. **www.w4fhu.org**.

Sep 28-Sep 30, 0000Z-1800Z, Denver, CO. BSA/Denver Area Council, WB7TNE/DAC. BSA Camporee Denver Area Council. 146.520 21.360 14.290 7.270. QSL. Daryle Brooks, 7114 Ingalls Ct, Arvada, CO 80003. *Foxhunt beacon on 146.520/50 mW contact when heard on 146.505 simplex.* **wb7tne@arrl.net**.

Sep 28-Sep 30, 2200Z-2000Z, Lawrenceburg, KY. Anderson Radio Club, KY4LAW. Anderson County Burgoo Festival. Day time operation only. 3.830 7.210 14.250. QSL. Anderson Radio Club, PO Box 580, Lawrenceburg, KY 40342. **www.andersoncodps.com**.

Sep 29, 1300Z-2000Z, Baltimore, MD. USCG Auxiliary, K3K. 68th Aniv of USCG Auxiliary and ISAR. 7.272 14.307 21.390 28.365. QSL. Tony Kobylski, 1217 Chesaco Ave, Baltimore, MD 21237.

Sep 29, 1300Z-2000Z, Hyattsville, MD. US Coast Guard Auxiliary, K3A. USCGA 68th Anniversary & ISAR 2007. 28.120 14.270 14.070. QSL. W. Joe Saunders, K3UAL, 1520 Jutewood Ave, Hyattsville, MD 20785. **k3ual2@juno.com**.

Sep 29, 1300Z-2000Z, Londonderry, NH. United States Coast Guard Auxiliary, N1C. 68th Anniversary of the USCGAUX and The International SAR Competition. 14.250. QSL. N1BPO, 28 Devonshire Ln, Londonderry, NH 03053. **gstapleford@verizon.net**.

Sep 29, 1300Z-2000Z, Marquette, MI. US Coast Guard Auxiliary, K8G. US Coast Guard Auxiliary Special Event Radio Day. 28.315 21.365 14.295 7.293. QSL. Greg Hanson, 624 W Hampton St, Marquette, MI 49855. *May also operate PSK31 and CW.* **ki8af@arrl.net**.

Sep 29, 1300Z-2000Z, Merchantville, NJ. United States Coast Guard Auxiliary, K2C. 68th Anniversary of the United States Coast Guard Auxiliary. 28.370 14.286 14.270 7.290. QSL. Jim Weidner, K2JXW, 114 Woodbine Ave, Merchantville, NJ 08109. **arlhs.com**.

Sep 29, 1300Z-2000Z, Merritt, NC. US Coast Guard Aux Special Event Radio Day, W1C. US Coast Guard Aux 68th anniv and ISAR 2007. 7.233 14.315 21.355 28.375. QSL. John Radtke, PO Box 8, Merritt, NC 28556. **kb2nnc@arrl.net**.

Sep 29, 1300Z-2000Z, Port Huron, MI. USECA ARC and USCG Auxiliary 9CR-14, N8B. Aboard USCGC *Bramble* — USCG Auxiliary Anniversary and ISAR. 28.405 21.405 14.345 7.240. QSL. USECA, PO Box 46331, Mt. Clemens, MI 48046. **www.useca.net**.

Sep 29, 1400Z-2100Z, Ann Arbor, MI. United States Coast Guard Auxiliary, N8A. 68th anniversary of the US Coast Guard Auxiliary. 28.355 21.380 14.290 7.265. QSL. Tony Morris,WA8TM, 827 Asa Gray Drive #459, Ann Arbor, MI 48105. **www.cgaux.org**.

Sep 29, 1400Z-2100Z, Huntington, WV. US Coast Guard Auxiliary Division 2, K8E. 68th Anniversary of US Coast Guard Auxiliary. 28.350 21.350 14.280 7.282. QSL. Matt Morris, PO Box 134, Cheshire, OH 45620. **kc8jwt@suddenlink.net**.

Sep 29, 1400Z-2100Z, Lighthouse Point, FL. USCG Auxiliary, K4Z. Radio Day commemorating 68th Anniversary of USCG Auxiliary. 28.345 21.385 14.338 7.238. QSL. Liz Clark, 2231 N.E. 46th St, Lighthouse Pt, FL 33064. **captmm@bellsouth.net**.

Sep 29, 1400Z-2100Z, Media, PA. US Coast Guard Auxiliary, K3G. US Coast Guard Auxiliary 68th Anniversary. 28.330 21.330 14.270 7.270. QSL. Daniel Amoroso, 196 Dam View Dr, Media, PA 19063. **nnn0abp@navymars.org**.

Sep 29, 1400Z-2100Z, Milford, OH. United States Coast Guard Auxiliary, W8E. US Coast Guard Auxiliary, commemerating the 68th anniversary. 28.360 21.345 14.320 7.280. QSL. D. F. Stroup, 6095 Drumhill Ln, Milford, OH 45150. **cgaux8@yahoo.com**.

Sep 29, 1400Z-2100Z, Palmyra, NE. Division 33 Marine Safety Officer, USCG Auxiliary, WØERT. 68th Anniv of US Coast Guard Auxiliary. 146.625 — EchoLink. Certificate. W. James Montz, WØERT, PO Box 96, Palmyra, NE 68418-0096. **nspmonster@yahoo.com**.

Sep 29, 1400Z-2100Z, Paris Landing, TN. United States Coast Guard Auxiliary, N4U. 68th Anniversary of USCG Auxiliary & ISAR. 28.340 21.320 14.240 7.230. QSL. Kenny Johns, 52 Buttonwood Dr, Jackson, TN 38305. **a0820810.uscgaux.info**.

Sep 29, 1400Z-1900Z, Pittsburgh, PA. USS Requin SS481 Amateur Radio Club, NY3EC. Reunion for Former Crew Members of ISS *Requin* SS481. 14.265 14.048 7.265 7.048. Certificate. Art Miller, WA3BKD, 1532 Millers Run Rd, McDonald, PA 15057.

Sep 29, 1400Z-2100Z, Trinity, AL. US Coast Guard Auxiliary, N4S. USCG Auxiliary 68th Anniversary and ISAR 2007 Competition. 28.355 14.280 7.280. QSL. Joe Kleri, 105 Meadowview Dr, Trinity, AL 35673. **n8esi@arrl.net**.

Sep 29, 1500Z-2300Z, Kansas City, MO. United States Coast Guard Auxiliary 8WR-30-01, WØZ. United States Coast Guard Auxiliary 68th Anniversary. 28.415 21.415 14.342 7.286. QSL. Michael R. Wilson, 1109 NE 97th Pl, Kansas City, MO 64155.

Sep 29-Sep 30, 1300Z-0000Z Fredericksburg, VA. US Coast Guard Auxiliary, K4F. Coast Guard Auxiliary Special Event Radio Day. 14.260 14.040 7.260 7.035. QSL. Gordon Thomas, 11 Woodlanding Rd, Fredericksburg, VA 22405 3532. **grfthomas@cox.net**.

Sep 29-Sep 30, 1300Z-2200Z, Zanesville, OH. Zanesville Amateur Radio Club, W8ZZV. Commemorating World-Famous Y-Bridge. 7225 7245 14250 14260. QSL. George Sonny Alfman, 1975 N. Moose Eye Rd, Norwich, OH 43767-9755. **zarc.eqth.org**.

Sep 29-Sep 30, 1500Z-0400Z, Dallas, TX. US Coast Guard Auxiliary, 8th Coastal Region, N5G. US Coast Guard Auxiliary 68th Anniversary. 28.333 21.333 14.273 14.070. QSL. John Fullingim, PO Box 796696, Dallas, TX 75379, **ham@absciencemarketing.com**.

Sep 29-Sep 30, 1700Z-0200Z, Arleta, CA. US Coast Guard Auxiliary, W6W. Coast Guard Auxiliary Anniversary. 28.335 21.370 14.285 7.242. QSL. Howard Levine, 9482 Urbana Ave, Arleta, CA 91331-5452. **www.cgaux.org**.

Sep 29-Sep 30, 1900Z-0300Z, Honolulu, HI. United States Coast Guard Auxiliary Dst 14 — Div 1, K6H. 68th Anniversary of USCG Auxiliary. 28.335 21.325 14.330 7.235. QSL. John Vorbau, KH6HAM, 98-1066 Palula Way, Aiea, HI 96701-2823. **kh6ham@hawaii.rr.com**.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Note: Some clubs may ask for a nominal fee to cover the cost of the certificate or QSL. Request will be made on air during the event or on the club's web site.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form, at **www.arrl.org/contests/spevform.html**, or if you prefer, forms are available via Internet (**info@arrl.org**), or for an SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Events Form" in the lower left-hand corner). Off-line completed forms may be mailed, faxed or e-mailed to ARRL, Attn: Special Events. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; that is, a special event listing for Nov *QST* would have to be received by Sep 1. In addition to being listed in *QST*, your event will be listed on the *ARRLWeb* Special Events page. QST

CONTEST CORRAL

W1AW Qualifying Runs are 10 PM EDT Friday, September 7 (0200Z September 8) (10-40 WPM), and 7 PM EDT Wednesday, September 19 (2300Z September 19). The K6YR West Coast Qualifying Run will be at 9 PM PDT Wednesday, September 15 (0400Z September 16). K9JM serves as alternate. Unless otherwise indicated, code speeds are from 10-35 WPM. Check the W1AW Schedule elsewhere in this issue for details.

Abbreviations

SO — Single-Op, M2 — Multiop — 2 Transmitters, MO — Multi-Op, MS — Multi-Op, Single Transmitter, MM — Multi-Op, Multiple Transmitters, AB — All Band, SB — Single Band, S/P/C — State/Province/DXCC Entity, HP — High Power (>100 W), LP — Low Power, QRP (5 W or less), Entity — DXCC Entity.

No contest activity on 60, 30, 17 and 12 meters. Refer to the contest Web sites for information about awards. Unless stated otherwise, regional contests only count QSOs with stations in the region. Publication deadline for Contest Corral listings is the first of the second month prior publication. For updates and additional contests, see the Contest Corral Web page at **www.arrl.org/contests**.

Sep/Oct

Contests like sprints are good ways to try out new equipment or techniques in a short time. This set of sprints covers the all of the bands in an all-band rig + 222 MHz and the microwave bands at 902 MHz and up.

VHF Fall Sprints — CW/Phone/Digital, sponsored by the Southeastern VHF Society as follows: 144 MHz — 7-11 PM local Sep 17; 222 MHz — 7-11 PM Sep 25; 432 MHz — 7-11 PM Oct 3; Microwave — 902 MHz and higher — 6 AM-1 PM Oct 13; 50 MHz — 2300Z Oct 20-0300Z Oct 21. Categories: Fixed and Rover. Exchange: grid square. QSO points: 1 pt/QSO. Score is QSO points × grid squares, score each sprint separately. Rovers add all grids worked from each grid. For more information: **www.svhfs.org**. Logs must be e-mailed or postmarked within four weeks of the contest. 144 MHz logs to **svhfs-beacons@svhfs.org** or Ottmar Fiebel W4WSR , PO Box 957, Hayesville, NC 28904. 222 MHz logs to **w4zst@windstream.net** or Bob Lear, K4SZ, PO Box 1269, Dahlonega, GA 30533. 432 MHz logs to **w4kxy@arrl.net** or Jim Worsham, W4KXY, 1915 Oak Wind Ln, Buford, GA 30519-6766. Microwave logs to **w4dex@arrl.net** or Dexter McIntyre, W4DEX, 16164 Pless Mill Rd, Stanfield, NC 28163. 50 MHz logs to **wa4njp@bellsouth.net** or Ray Rector, WA4NJP, 3493 Holly Springs Rd, Gillsville, GA 30534.

Sep 1-2

All-Asian DX Contest — Phone, 0000Z Sep 1-2400Z Sep 2 (see June *QST*, p 95, or **www.jarl.or.jp/English**).

IARU Region 1 Field Day — SSB, sponsored by IARU Societies from 1300Z Sep 1-1300Z Sep 2 (see June *QST*, p 95). Logs due 16 days after the contest to **ssbfd.logs@rsgbhfcc.org**.

DARC 10-Meter Digital Contest "Corona" — Digital Modes, sponsored by the Deutsche Amateur Radio Committee from 1100Z-1700Z Sep 2. Frequencies (MHz): 28.050-28.150 on RTTY, Pactor, PSK31, AMTOR, Clover. Categories: SO, SWL. Stations may be worked on each mode, but count for multipliers only once. Exchange: RST + serial number. QSO points: 1 pt/QSO. Score: QSO points × WAE countries + DXCC entities + W/VE/JA districts. For more information: **www.darc.de/referate/dx/cqdl-cont/fgdcc.htm**. Logs due 2 weeks after the contest to **dl5nah@darc.de** or M.Henz, DL5NAH, Rochenweg 1, D-70378, Stuttgart, Germany.

MI QRP Labor Day CW Sprint, 2300Z Sep 3-0300Z Sep 4 (see Jan *QST*, p 100 or **www.qsl.net/miqrpclub**).

Russian RTTY WW Contest, sponsored by *Radio Magazine* from 0000Z-2400Z Sep 1. Frequencies: 80-10 meters. Categories: SOAB, SOSB, MS, SWL. Exchange: RST + WAZ zone or Russian Oblast. QSO points: own continent — 5 pts, different cont — 10 pts. Score: QSO points × DXCC entities + Russian oblasts, each counted once per band. For more information: **www.radio.ru/cq/contest/rule-results/index2.shtml**. Logs due Oct 1 to **contest@radio.ru** or Radio Magazine, Seliverstov per 10, 107045 Moscow, Russia.

Sep 8-13

This is a good contest to try roving or mountain-topping. The weather is usually pretty good and the vacation season is winding down, meaning smaller crowds at the overlooks.

ARRL September VHF QSO Party, 1800Z Sep 8-0300Z Sep 10 (see Aug *QST*, p 103, or **www.arrl.org/contests**).

North American Sprint — CW, 0000Z-0400Z Sep 9 (see Feb *QST*, p 99 or **www.ncjweb.com**).

YLRL Howdy Days — CW/SSB, sponsored by the YL Radio League from 1400Z Sep 11-0200Z Sep 13, work 24 out of the 36 hour period. Try frequencies ending in 33 or 88, such as 7.233, 14.288, etc. Exchange: YLRL Member or not. QSO points: non-YLRL member — 1 pt, YLRL members — 2 pts. Score is total points. For more information: **www.ylrl.org**. Logs due 30 days after the contest to **kc4iyd@yahoo.com** or Nancy Rabel Hall, KC4IYD, PO Box 775, North Olmsted, OH 44070.

WAE DX Contest — SSB, 0000Z Sep 8-2359Z Sep 9 (See Aug *QST*, p 96, or **www.darc.de/referate/dx**).

Second-Class Operators Club (SOC) Marathon Sprint — CW, from 1800Z to 2400Z Sep 8. (Most sprints run four hours, but since we're Second Class Op's, we need more time!) Frequencies: 160-10 meter QRP calling frequencies. Categories: SOAB. Exchange: RST + S/P/C + SOC number or power output. QSO points: SOC member — 5 pts, non-member same continent — 2 pts, diff. cont — 4 pts. Score: QSO points × S/P/C counted once per band × Power Multiplier (<250 mW ×15, <1 W ×10, <5 W ×7, >5 W ×1). Multiply by 1.5 if using a homebrew paddle. For more information: **www.qsl.net/soc**. Logs due 30 days after the contest to **n4bp@arrl.net** or Bob Patten, N4BP, 2841 NW 112 Terr, Plantation, FL 33323.

Arkansas QSO Party — CW/SSB/PSK31, sponsored by K1ARK from 1400Z Sep 8 to 0600Z Sep 9 and 1500Z-2400Z Sep 9. Frequencies (MHz): CW — 3.550, 7.050, 14.050, 21.050, 28.050; Phone — 3.980, 7.260, 14.260, 21.360, 28.360, 145-147; PSK — 3580, 7070; 14.070; 21.080; 28.120. Categories: SO, MS, Mobile (HP, LP, QRP), PSK. Exchange: RST, state or province, DX stations send DX. (AR stations send county) QSO points: PSK — 3 pts, CW — 2 pts, SSB — 1 pt. Score: QSO points × AR counties (AR station count S/P, AR counties and DX). Mobile stations may be worked again in each county. See Web site for bonus points. For more information: **www.arkan.us**. Logs due 30 days after the contest to **k1ark@arrl.net** or Bill Smith, K1ARK, 3032 Strawberry Dr, Fayetteville, AR 72703.

Tennessee QSO Party — CW/Phone/Digital, sponsored by the Tennessee Contest Group from 1800Z Sep 9-0300Z Sep 10. Frequencies (MHz): CW — 1.815, 3.540, 7.040, 14.040, 21.040, 28.040; SSB — 1.855, 3.900, 7.240, 14.280, 21.390, 28.390; Digital — 3.585, 7.085, 14.085, 21.085, 28.085; VHF/UHF — 50.195, 144.195, 146.55, 223.5, 446.0. No repeater or digipeater QSOs. Exchange: RS(T) and TN county or S/P/C. QSO points: Phone — 2 pts, CW — 3 pts, Digital — 3 pts. Score: QSO points × TN counties per band (TN stations add S/P/C per band). One bonus multiplier for every five additional QSOs with the same county. Bonus points: add 100 pts. for each QSO with K4TCG. TN mobiles may claim as a multiplier any TN county from which they complete at least 10 QSOs. For more information visit: **www.tnqp.org**. Logs due Oct 11 to **logs@tnqp.org** or TN QSO Party, c/o Doug Smith, W9WI, 1389 Old Clarksville Pike, Pleasant View, TN 37146-8098.

G3ZQS Memorial Straight Key Contest — CW, sponsored by FISTS, from 2300Z Sep 8-2300Z Sep 10. Use straight keys to be eligible for awards. Frequencies: 80-10 meters. Categories: QRO, QRP, Club. Exchange: RST, S/P/C, name, FISTS number or power. QSO points: FISTS member — 5 pts, non-member — 2 pts. Score: QSO points × S/P/C counted once only. For more information: **www.fists.org**. Logs indicating type of key due 30 days after the contest to **HALLINL@lanecc.edu** (ADIF, Excel or ASCII format) or Lee Hallin N7NU, 3413 Walton Ln, Eugene, OR 97408.

Sep 15-16

ARRL 10 GHz Cumulative Contest, 0600 local-2400 local Sep 15-16 (see Aug *QST*, p 103, or **www.arrl.org/contests**).

North American Sprint — SSB, 0000Z-0400Z Sep 18 (see Feb *QST*, p 102 or **www.ncjweb.com**).

Loud signals from the most northern European countries will fill the CW bands this weekend in this good warm-up for the fall contest season!

Scandinavian Activity Contest — CW, sponsored by Suomen Radioamatooriliitto ry (SRAL) from 1200Z Sep 15-1200Z Sep 16 (Phone, 1200Z Sep 22-1200Z Sep 23). Frequencies: 80-10 meters. Categories: SOAB (QRP <5 W, LP <100 W, HP), MS, SWL. Exchange: RS(T) + serial number. QSO points: EU stations — 1 pt,

H. Ward Silver, NØAX ♦ PO Box 927, Vashon, WA 98070 ♦ n0ax@arrl.org

Non-EU — 1 pt on 20-10, 3 pts on 80-40. Score: QSO points × Scandinavian call areas counted once per band. For more information: **www.sk3bg.se/contest/sacnsc.htm**. Logs due Oct 31 to **saccw2007@sral.fi** (SSB to **sacssb2007@sral.fi**) or to SACCW (SSB to SACSSB), Jussi-Pekka Sampola, OH6RX, Tölbyn niittytie 238, FIN-65460 Tölby, Finland.

Washington State Salmon Run — CW/SSB/Digital, sponsored by the Western Washington DX Club from 1600Z Sep 15-0700Z Sep 16 and 1600Z-2400Z Sep 16. Frequencies: 160-6 meters. Categories: SO (CW, SSB, Digital or Mixed Mode; QRP, LP, HP >200 W), MO-ST (WA Club, WA Non-club, Non-WA), Mobile (SO, MO), WA County Expedition. Exchange: RS(T) and S/P/C or county (for WA stations). QSO points: SSB — 2 pts, CW/Digital — 4 pts. Work Expeditions and Mobiles from each county, log county line QSOs as 2 separate QSOs. Score: QSO points × WA counties (WA stations use S/P/C + WA counties) counted once only. QSOs with W7DX add 500 bonus points for each mode — up to 1500 points. For more information: **www.wwdxc.org**. Logs due Oct 31 to **salmonrun@wwdxc.org** (Cabrillo encouraged) or Western Washington DX Club, PO Box 395, Mercer Island, WA 98040.

South Carolina QSO Party — Phone/CW/Digital, sponsored by the Columbia Amateur Radio Club (CARC) from 1300Z Sep 15-2100Z Sep 16. Frequencies (MHz): CW — 1.805 and 50 kHz from band edge; Phone — 1.845, 3.860, 7.260, 14.270, 21.370, 28.370, 50.125, 144.200, 146.58, 223.50, 446.00. No repeater or cross-band QSOs, work mobiles again from each county. Categories: SOAB, SC Mobile. Exchange: serial number and SC county or S/P/C. QSO points: Phone — 1 pt, CW — 2 pts, Digital — 3 pts. Score: Total QSO points × power multiplier (<5 W ×5, <150 W ×2, >150 W ×1) × SC counties (counted only once) × SC counties activated (SC Mobile only). 300 bonus points for QSO with N2ZZ or KF4GHC. For more information: **carc.ham-radio-op.net**. Logs due Oct 17 to **scqp@kf4ghc.net** or CARC SCQP Entry, PO Box 595, Columbia, SC 29202.

QCWA Fall QSO Party — Phone/CW/Digital, sponsored by the Quarter Century Wireless Association from 1800Z Sep 15-1800Z Sep 16. Frequencies (MHz): CW — 1.810, 3.540, 7.035, 14.040, 21.050, 28.050; Phone — 1.845, 3.890, 7.244, 14.262, 21.365, 28.325, all VHF/UHF bands, no crossband or repeater QSOs. Categories: Mixed, Phone, CW/Digital. 15 QSOs with each station maximum and only one QSO with stations in home QCWA chapter. Exchange: Last two digits of year licensed and QCWA chapter or S/P/C. QSO points: Phone — 1 pt, CW/Digital — 2 pts. Score: QSO points × QCWA chapters + S/P/C counted only once regardless of band. W2MM counts as a 3-point multiplier on each band. For more information: **qcwa.org/2007-qso-party-rules.htm**. Send logs to **w2od@aol.com** or Robert Buus, W2OD, 8 Donner St, Holmdel, NJ 07733-2004.

QRP Afield — CW/Phone/Digital, sponsored by the New England QRP Club, 1500Z-2100Z Sep 15. Frequencies: 160-10 meters, QRP calling frequencies. Categories: SOAB, MS. Exchange: RS(T), S/P/C, and NE-QRP number or power. QSO points: HP (>5 W) fixed station — 1 pt, HP mobile or portable — 2 pts, QRP fixed — 5 pts, QRP mobile or portable — 10 pts. Score: QSO points × S/P/C (counted once only). For more information: **www.qsl.net/wq1rp/main.htm**. Logs due Oct 14 to **k1cl@arrl.net** or Chuck Ludinsky, K1CL, 6 Prancing Rd, Chelmsford, MA 01824-1922.

Feld-Hell Monthly Sprint — sponsored by the Feld-Hell Club, 1500Z-1700Z Sep 15 (and every third Saturday). Frequencies: 160-10 meters. Exchange: RST, S/P/C, and Feld-Hell club number or age (YLs may send 00). QSO points: Member — 3 pts, non-member — 1 pt. Score: QSO points × S/P/C counted only once + bonus points (see Web site). For more information and log due date: **www.wa6l.com/contests**. Submit logs via Web site.

Sep 22-23

Scandinavian Activity Contest — SSB, 1200Z Sep 22-1200Z Sep 23 (see Sep 15-16).

Sep 29-30

ARRL EME Competition, from 0000Z Sep 29-2400Z Sep 30. Frequencies: 2304 MHz and up, 50-1296 MHz, Oct 27-28 and Nov 24-25 (see August *QST*, p 104, or **www.arrl.org/contests**).

Extend your participation in the CQ WW family of contests to RTTY in this analog of the CW and SSB contests later in the year.

CQ Worldwide RTTY DX Contest — sponsored by *CQ Magazine* from 0000Z Sep 29-2400Z Sep 30. Frequencies: 80-10 meters. Categories: SOAB (LP, HP>150 W), SOSB, Assisted (AB only), MS (LP, HP), M2, MM. Exchange: RST + CQ Zone (W/VE stations also send state/province). QSO points: own country — 1 pt, different country, same continent — 2 pts, diff cont — 3 pts. Score: QSO points × S/P/C (incl WAE countries) + CQ Zones counted once per band. For more information: **www.cq-amateur-radio.com**. Logs due Oct 26 in Cabrillo format to **rtty@cqww.com**.

Texas QSO Party — CW/Phone/Digital, sponsored by the Northwest Amateur Radio Society (NARS) from 1400Z Sep 29-0200Z Sep 30 and 1400Z-2000Z Sep 30. Frequencies (MHz): CW — 40 to 60 kHz above bottom of band, Phone — 25 kHz above edge of General segments and 28.300-28.500, VHF — 50.2, 144.2. Categories: Fixed Stns— SO-Mixed (HP and QRP <5 W CW, <10 W Phone), SO-CW, Multi-Single, Multi-Multi; Mobile (Texas Only) — SO-Mixed, SO-CW, Multi-Single, Multi-Multi. Exchange: RST + TX county or S/P/C or MM region. QSO points: Phone — 2 pts, CW/Digital — 3 pts. Score: QSO points × TX counties (TX stations add S/P/C). Multipliers counted only once. Add 500 points for every 5 counties from which a specific TX Mobile is worked. Texas mobiles add one thousand (1000) points to final score for every county activated with five or more QSOs. For more information: **www.txqp.org**. Logs due Oct 31 to **no5w@consolidated.net** or Texas QSO Party Committee, 6 Sweetdream Pl, The Woodlands, TX 77381-6009.

TOEC WW Grid Contest — CW, sponsored by the Top of Europe Contesters (TOEC) from 1200Z Sep 29-1200Z Sep 30. Frequencies: 160-10 meters. Categories: SO (no packet) -AB, -SB, LP-AB, QRP-AB), MS (10 minute band change rule), MM, Mobile (SOAB) — work mobiles from each grid field (ie, JP, KO, EM). Exchange: RST + grid square, ie, JP73 (log must show all grid fields activated). QSO points: own continent — 1 pt, other cont — 3 pts, QSOs with mobiles — 3 pts. Score: QSO points × two-letter grid fields. For more information: **www.sk3bg.se/contest/toecwwgc.htm**. Logs due 30 days after the contest to **contest@toec.net** or to TOEC, Box 178, SE-83122 Ostersund, Sweden.

The Irish are coming! Work the Irish wherever they may be to celebrate the 75th anniversary of the founding of the IRTS.

CQIR Ireland Calling — CW/SSB, sponsored by the Irish Radio Transmitters Society from 1200Z Sep 29-1200Z Sep 30. Frequencies: 80-10 meters, work stations once per band and mode, 10 minute band change rule. Categories: Irish and World SOAB (CW, SSB, Mixed). "Irish" includes anyone, anywhere with a direct ancestral link to the island of Ireland and its offshore islands, or whose partner/spouse qualifies. Exchange: serial number or year (see Web site) and county code (Irish only). QSO points: CW — 3 pts, SSB — 2 pts. Total score: QSO points × county codes counted on each band and mode. For more information and special prize announcements: **www.irts.ie**. Logs due Oct 31 to **cq-ir-logs@irts.ie**.

Fall QRP Homebrewer Sprint — CW, sponsored by New Jersey QRP Club from 0000Z-0400Z Sep 25. Frequencies: QRP calling frequencies on 80-10 meters. Exchange: RST + S/P/C + Output Power. QSO points: Commercial Equipment — 2 pts, Homebrew Xmtr or Rcvr — 3 pts, Homebrew Xmtr and Rcvr or Xcvr — 4 pts. Kits okay as homebrew. Power multiplier: 0>250 mW = ×15, 250 mW> 1 W = ×10, 1-5 W = ×7, >5 W = ×1. Score: QSO points × S/P/C (counted once per band) × power multiplier. For more information: **www.njqrp.org**. Logs due 30 days from the contest to **w2lj@arrl.net** (text format) or Larry Makoski, 327 Clinton Pl, South Plainfield, NJ 07080.

FISTS Coast to Coast Contest — CW, sponsored by FISTS Northwest Club, K7FFF, from 1700Z Sep 29-1700Z Sep 30. Frequencies: 80-10 m. Categories: SOAB, MS, (QRP/QRO). Exchange: RST, name, state or DX prefix and FISTS number or power. For more information on QSO points and scoring: **www.tomochka.com/k7fff**. Send logs to **FistsC2C@yahoo.com** within 30 days of the contest.

Break out that "steam radio" and put it on the air to work its peers! Every old radio needs a day in the sun now and then.

Classic Exchange — AM/SSB, from 1300Z Sep 30-0700Z Oct 1 (CW is Oct 7-8). Frequencies (Mc); AM — 1.890 3.880 7.290 14.286 21.420 29.000 50.300 144.300. SSB — 1.885, 3.870, 7.280, 14.270, 21.370, 28.390, 50.125, 144.200. Exchange: RS, name, QTH, TX, RX, XCVR. QSO points: 1 pt/QSO. Total score: QSOs per mode × CX multiplier (age of all RX TX and XCVR used for at least 3 QSOs). For more information: **qsl.asti.com/CX**. Logs to **jmac6235@yahoo.com** or WQ8U, 104 W Queen St, Hillsborough, NC 27278.

Interested in finding out more about contesting and "how they do it"? Try the free, biweekly e-mail newsletter *Contester's Rate Sheet* (**www.arrl.org/contests**) or the bimonthly magazine *National Contest Journal* (**www.ncjweb.com**). QST

Feedback

◊ The antenna-raising photo on the cover of the August 2007 issue shows N6PEQ, W1HIJ, K7JA, CM2OY, CM2KL and CO2II at COØUS during Field Day 2003. It was taken by Janet Margelli, KL7MF. — *tnx K7JA*

◊ In "Six Band Loaded Dipole," by Al Buxton, W8NX [Aug 2007 *QST*, pp 34-36], the author reports that the gain of the antenna on 40 meters is 1.5 dB relative to half-wave ordinary dipole rather than the 3 dB indicated.

COMING CONVENTIONS

WESTERN PENNSYLVANIA SECTION CONVENTION

August 26, New Kensington

F V

The Western Pennsylvania Section Convention, sponsored by the Skyview Radio Society, will be held at the Skyview Radio Society Clubhouse, 2335 Turkey Ridge Rd. Doors are open 8 AM-3 PM. Features include 47th Annual Event, swap 'n shop, VE sessions, VUCC/WAS Card Checking, Skyview Jam (Musicians: bring your instruments), breakfast (6:30 AM). Talk-in on 146.64 (131.8 Hz). Admission is free. Flea market spaces are $5 each (there are no tables). Contact Mac Laing, KB3LYA, 324 Partridge Run Rd, Gibsonia, PA 15044; 724-443-7981; **maclaing@comcast.net**; **www.skyviewradio.net**.

W9DXCC CONVENTION

September 14-15, Elk Grove Village, Illinois

S

The W9DXCC Convention (55th W9DXCC DX Convention and Banquet), sponsored by the Northern Illinois DX Assn, will be held at the Holiday Inn, 1000 Busse Rd (Rte 83). Doors are open Friday eve for Welcome Reception at 7:30 PM, Saturday registration at 8 AM, convention begins at 9 AM. Features include forums and presentations with world-renowned speakers, ARRL News and Views, DXCC QSL card checking, Hospitality Suites (Friday and Saturday eves at 10 PM), banquet (Saturday, 6:30 PM; special guest speaker Glenn Johnson, WØGJ). Talk-in on 147.36. Admission is $50 in advance, $55 at the door (convention and banquet); $28 in advance, $30 at the door (convention only). Contact Bill Smith, W9VA, 1345 Linden Ave, Deerfield, IL 60015; 847-945-1564; fax 847-945-6554; **w9va@aol.com**; **www.w9dxcc.com**.

ROANOKE DIVISION CONVENTION

September 15-16, Virginia Beach, Virginia

F D V S

The Roanoke Division Convention, sponsored by Tidewater Radio Conventions, will be held at Virginia Wesleyan College, 1584 Wesleyan Dr. Doors are open Saturday 9 AM-5 PM, Sunday 9 AM-3 PM. Features include hamfest and electronics flea market, computers, vendors, dealers (Lewis Steingold, W4BLO, **w4blo@arrl.net**), manufacturers, tailgating ($15 per single space), seminars and forums, DX Banquet (Saturday, 7:30 PM, Frankies Place for Ribs; for tickets contact Bob, K4NTO, 757-460-5333; **k4nto@cox.net**), VE sessions. Talk-in on 146.97. Admission is $5 in advance, $6 at the door. Tables are $25 each, while they last. Contact Mr. Lynn Lilla, W9DJQ, 848 Stacey Pl, Virginia Beach, VA 23464; 757-479-1597; fax 757-486-0757; **w9djq2arrl.net** or **hamfest@exis.net**; **www.vahamfest.com**.

GREAT LAKES DIVISION CONVENTION

September 21-22, Independence (Cleveland), Ohio

S

The Great Lakes Division Convention, co-sponsored by the Cleveland ARA, Lake Erie ARA, and the Northern Ohio DXA, will be held at the Sheraton Independence Hotel, 5300 Rockside Rd. Doors are open Friday 7-11 PM, Saturday 9 AM-10 PM. Features include great seminars (Heil Sound, EmComm, Direction Finding, K3LR Multi Multi Station, AMSAT Eagle Project, All About DX), sponsor exhibits, card checking (DXCC, WAS, VUCC Low Bands, VHF), Great Lakes Division Awards Ceremony (hosted by Division Director Jim Weaver, K8JE), Great Lakes Division and Section Officials Banquet Buffet (special guest speaker ARRL President Joel Harrison, W5ZN), Wouff Hong ceremony, Hospitality Suite. Admission fees are: $50 (full ticket), $45 (full ticket for those staying at the Sheraton), $37 (banquet only), $25 (seminars only). Contact Tina Check, W8HBI, c/o Cuyahoga ARS, Box 31264, Independence, OH 44131-0264; 216-524-7711 (days) or 216-520-2621 (eves); **treasurer@2cars.org**; **www.2007gldc.org**.

WASHINGTON STATE CONVENTION

September 22, Spokane Valley

F D V S

The Washington State Convention, co-sponsored by the Kamiak Butte Amateur Repeater Assn, Spokane Radio Amateurs, NW Tri-State ARO, Palouse Hills ARC, Inland Empire VHF Radio Amateurs, Spokane DX Assn, and the University High School ARC will be held at University High School, 12420 E 32nd Ave. Doors are open for setup Friday 7-9 PM, Saturday 8 AM; public Saturday 9 AM-5 PM. Features include commercial and non-commercial vendors, seminars and workshops, Open-Cry Auction, VE sessions (11 AM; Mary, AA7RT, 509-991-2192; **aa7rt@arrl.net**), forums (ARES/RACES, ARRL), radio test gear table, BBQ lunch, post hamfest dinner (5 PM), free off-street parking for cars and RVs, refreshments. Talk-in on 147.24, 146.52. Admission is $5, 18 and under free. Swap tables are $5 before Sep 6, $7.50 after Sep 6; commercial tables are $12 before Sep 6, $15 after Sep 6 (plus admission). Contact Betsy Ashleman, N7WRQ, 3903 E 48th Ave, Spokane, WA 99223; 509-448-5821; **n7wrq@aol.com**; **www.kbara.org**.

ARRL/TAPR DIGITAL COMMUNICATIONS CONFERENCE

September 28-30, Hartford (Windsor Locks), Connecticut

S

Hartford (Windsor Locks), Connecticut is playing host to the 2007 ARRL/TAPR Digital Communications Conference. The three-day conference will be held at the DoubleTree Hotel Bradley International Airport, 16 Ella Grasso Turnpike (800-627-5171; **doubletree1.hilton.com**). The ARRL and TAPR Digital Communications Conference is an international forum for radio amateurs in digital communications, networking, and related technologies to meet, publish their work, and present new ideas and techniques for discussion. The DCC is aimed at digitally-oriented amateurs at all experience levels. Attendees will have the opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results, and practical applications. Beginning, intermediate, and advanced presentations on selected topics in digital communications will be offered. Complete information and a registration form are available from Tucson Amateur Packet Radio, Box 852754, Richardson, TX 75085-2754; 972-671-8277; **tapr@tapr.org**; **www.tapr.org/dcc**.

PACIFIC NORTHWEST VHF CONFERENCE

September 28-30, Bend, Oregon

F S

The Pacific Northwest VHF Conference, sponsored by the Pacific Northwest VHF Society, will be held at the Shilo Inn Suites Hotel, 3105 O.B. Riley Rd. Doors are open Friday 6-8 PM, Saturday 8:30 AM-5 PM, Sunday 7:30-9:30 AM. Features include "Pizza Bash" (Friday eve), technical presentations, society annual meeting, 4th Annual PNWVHFS Rove-In Contest, tailgate swapmeet, Saturday evening dinner (6-8 PM), Sunday morning "Farewell Breakfast" (8-10 AM). Talk-in on 144.200 SSB, 146.58 FM simplex. Admission

August 17-19 **Rocky Mountain Division, Albuquerque, NM***	**October 13-14** **Florida State, Melbourne**
August 18-19 **ARRL National, Huntsville, AL***	**October 14** **Western New York Section, Buffalo**
August 19 **Kansas State, Salina***	**October 18-20** **Microwave Update, King of Prussia, PA**
August 24-25 **Missouri State, Joplin***	**October 19-21** **Pacific Division, San Ramon, CA**
August 25 **West Virginia State, Weston***	**November 3-4** **Georgia Section, Lawrenceville**
September 7-8 **Arkansas State, Mena***	**November 9-10** **Midwest Division, Lebanon, MO**
September 7-9 **Southwestern Division, Torrance, CA***	*See August *QST* for details.

Gail Iannone ♦ Convention and Hamfest Program Manager ♦ giannone@arrl.org

is $40 in advance, $50 at the door (includes lunch). Contact Jim Aguirre, W7DHC, 6820 Tranquil Ln, Lynden, WA 98264; 360-398-9875; **secretary@pnwvhfs.org**; **www.pnwvhfs.org**.

NORTHERN NEW YORK SECTION CONVENTION

October 6, Lake Placid

F D V S

The Northern New York Section Convention (8th Annual Event), sponsored by the Northern New York ARA, will be held at the Lake Placid Horse Showgrounds (Town of N Elba) on Rte 73. Doors are open for setup on Friday eve; public Saturday 8 AM-2 PM. Features include indoor flea market, tailgating, vendors, speakers, special events demo station, QSL card checking, VE sessions, Friday eve barbeque. Talk-in on 145.11 (123 Hz). Admission is $5. Tables are $10. Contact Richard Sherman, WZ2T, 25 Pines Rd, Malone, NY 12953-5600; 518-483-6483; **wz2t@arrl.net**; **www.nnyara.org**.

CONNECTICUT STATE CONVENTION

October 7, Wallingford

F D V S

The Connecticut State Convention (15th Annual Event), sponsored by the Nutmeg Hamfest Alliance, will be held at the MountainRidge Resort, 300 High Hill Rd. Doors are open for setup and tailgating at 6 AM; VIPs 8 AM, general public 8:30 AM-3 PM. Features include the largest flea market in Southern New England, indoor exhibitors, unlimited tailgating space, major vendors (**vendors@nutmeghamfest.com**), new and used equipment, forums, demonstrations, *QST*'s "The Doctor" will be in to answer your technical questions live and in person, D-STAR technology demonstration, VE sessions (10 AM; Joel Curneal, N1JEO, 203-631-1161; **vetest@nutmeghamfest.com**), plenty of free parking, best food and refreshments. Talk-in on 147.36. Admission is $7, under 12 free (children must be with an adult at all times). Tables are $25 until Sep 7, $30 thereafter; outside space $20. Contact John Bee, N1GNV, 30 Tremont St, Meriden, CT 06450; 203-440-4468; **info@nutmeghamfest.com**; **www.nutmeghamfest.com**.

F = FLEA MARKET
D = DEALERS / VENDORS
H = HANDICAP ACCESS
V = VE SESSIONS
S = SEMINARS / PRESENTATIONS

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **September 1** to be listed in the **November** issue. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For detailed directions to the event, see the event Web site or contact sponsor. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

Abbreviations: *Spr* = Sponsor, *Tl* = Talk-in frequency, *Adm* = Admission

Alaska (Anchorage) — Sep 15-16 D V S
9 AM-4 PM. *Spr:* Anchorage ARC. Anchorage Senior Center, 1300 E 19th Ave. National vendors, FCC guest speakers, VE sessions, banquet. *Tl:* 147.27 (103.5 Hz). *Adm:* Free. Tables: $10. H. Hasper, KL7SP, Box 101987, Anchorage, AK 99510-1987; 907-275-7474; fax 907-644-2022; **kl7sp@arrl.net**; **www.kl7aa.net**.

Arkansas (Jacksonville) — Sep 15 F D H V S
8 AM-3 PM. *Spr:* Central Arkansas Radio Emergency Net (CAREN). Jacksonville Community Center, 5 Municipal Dr. Flea market, vendors, forums, VE sessions, handicap access, refreshments. *Tl:* 146.94. *Adm:* $5, under 12 free with paying adult. Tables: $20 (6-ft). Mark Barnhard, KD5AIV, 12563 Southridge Dr, Little Rock, AR 72212; 501-221-3909; **mbarnhard@aristotle.net**; **www.carenclub.com**.

Colorado (Longmont) — Sep 23 F V
8 AM-noon. *Spr:* Boulder ARC. Boulder County Fairgrounds Exhibit Building, 9595 Nelson Rd. 54th Annual AR and Electronics Swapmeet, VE sessions. *Tl:* 146.7. *Adm:* $5, under 13 free with paying adult. Tables: advance $10, door $15. Mike Derr, W3DIF, 13815 Meadowbrook Dr, Broomfield, CO 80020; 303-404-2161; **mderr44995@aol.com**; **www.qsl.net/w0dk**.

Connecticut (Hartford/Windsor Locks) — Sep 28-30, ARRL/TAPR Digital Communications Conference. See "Coming Conventions."

Connecticut (Ledyard) — Sep 29 V
9 AM-1 PM. *Spr:* Radio Amateur Society of Norwich. Gales Ferry Firehouse, 1772 Rte 12. VE sessions (registration 9:30 AM, testing 10 AM). *Tl:* 146.73 (156.7 Hz). *Adm:* $4. Tables: $15 (6-ft × 2.5-ft); $13 (5-ft × 2.5-ft). Wayne Rosenfield, KB1NKK, 206-350-3064; **rason@snet.net**; **www.rason.org**.

Connecticut (Newtown) — Sep 16 F D S
Set up 7 AM; public 8:30 AM-12:30 PM. *Spr:* Candlewood ARA. Edmond Town Hall, 45 Main St (Rte 6). Western CT Hamfest, flea market, new equipment dealers, commercial vendors, tailgating ($8 per space, includes 1 admission), seminars, batteries special, refreshments. *Tl:* 147.3 (100 Hz). *Adm:* $5, under 10 free. Tables: $12.50 (includes 1 admission). Joe de Groot, AB1DO, 30 Sunnyview Dr, Redding, CT 06896-1742; 203-938-4880; fax 203-938-4886; **ab1do@arrl.net**; **www.danbury.org/CARA**.

Connecticut (Wallingford) — Oct 7, Connecticut State Convention. See "Coming Conventions."

Florida (Orlando) — Sep 15 F H
Set up 7 AM; public 8 AM-2 PM. *Spr:* AR Unit of Bahia Shrine. Bahia Shrine Center, 2300 Pembrook Dr. Flea market, tailgating, handicap accessible. *Tl:* 147.39 (103.5 Hz). *Adm:* $3. Tables: $5. Warren Hill, W4WHH, 177 Hanging Moss Dr, Oviedo, FL 32765; 407-365-6682; **w4whh@arrl.net**; **www.bahiashrine.org/~radio/Tailgate.htm**.

Florida (Titusville) — Sep 29 F V
6 AM. *Spr:* North Brevard ARC. Disabled American Veterans, 435 N Singleton Ave. Tailgating, EBS-1 Emergency Communications Motor Home on display, VE sessions. *Tl:* 145.49 (100 Hz). *Adm:* Free. Tables: $10. Bob Jones, N6USP, 4743 Cambridge Dr, Mims, FL 32754; 321-264-2622; **n6usp@gnc.net**; **www.northbrevardarc.org**.

Georgia (Dallas) — Sep 15 F V
8 AM-4 PM. *Spr:* Paulding ARC. Paulding Meadows Park, Hwy 61 N. 17th Annual Hamfest, tailgating, boneyard, VE sessions. *Tl:* 146.895 (77 Hz). *Adm:* Free. Tables: Free. Al Martin, KF4RPQ, 409 Sleepy Hollow Rd, Powder Springs, GA 30127; 770-920-1309 (Home); 404-281-6859 (Cell); **kf4rpq@yahoo.com**; **www.pauldingarc.com**.

Illinois (Belvidere) — Sep 29-30 F D V
Saturday 6 AM-4 PM; Sunday 8 AM-3:30 PM. *Spr:* Chicago FM Club. Boone County Fairgrounds, Rte 76 and BR 20. Radio Expo, large outdoor flea market, two large indoor vendor buildings, VE sessions, camping available, refreshments. *Tl:* 146.76 (107.2 Hz). *Adm:* advance $8, door $10. Tables: $25. Michael Brost, WA9FTS, 5127 N Monterey Ave, Norridge, IL 60706; 708-457-0966 (phone and fax);

Gail Iannone ♦ Convention and Hamfest Program Manager ♦ giannone@arrl.org

mbrost@cin.net; **www.chicagofmclub.org**.

Illinois (Elk Grove Village) — Sep 14-15, W9DXCC Convention. See "Coming Conventions."

Illinois (Peoria) — Sep 15-16 F D V S
Set up Friday; public Saturday 7 AM-dusk, Sunday 7 AM-2 PM (Commercial buildings open Saturday and Sunday at 8 AM). *Spr:* Peoria Area ARC. Exposition Gardens, 1601 W Northmoor Rd. Peoria Superfest, Amateur Radio Hamfest and Computer Show, giant outdoor flea market, commercial dealers, technical forums, VE sessions, DXCC card checking, acres of free parking. *Tl:* 147.075 (103.5 Hz). *Adm:* advance $6, door $8. Tables: $10-$30. John Coker, N9FAM, 133 Vonachen Ct, E Peoria, IL 61611-1578; 309-369-7428; **n9fam@insightbb.com**; **www.peoriasuperfest.com**.

Indiana (Bedford) — Oct 7 F D V
Set up Saturday (Oct 6) noon-9 PM; public Sunday 6 AM-2 PM. *Spr:* Hoosier Hills Ham Club. Lawrence County Fairgrounds, US Hwy 50 W. Indoor and outdoor spaces, vendors, VE sessions, free parking. *Tl:* 146.73 (107.2 Hz). *Adm:* $8. Tables: $10. Keith Harris, N9KH, 1618 Windwood Dr, Bedford, IN 47421; 812-275-3415 (before 9 PM EST); **n9kh@insightbb.com**; **www.w9qyq.org/hamfest/**.

Indiana (Greenfield) — Sep 23 F D
8 AM-1 PM. *Spr:* Hancock ARC. Hancock County 4-H Fairgrounds, 400 N Apple St. Outside pavilion area ($5 per space, plus admission), vendors, breakfast and lunch available on grounds. *Tl:* 145.33. *Adm:* $4. Tables: $10. Mike Mallory, NE9O, Box 335, Greenfield, IN 46140; 317-861-1916; **tinman@on-net.net**; **w9atg.org**.

Iowa (Missouri Valley) — Sep 16 F
8 AM-noon. *Spr:* Boyer Valley ARC. Eagles Club Hall, 118 S 5th St. Flea market, tailgating, refreshments. *Tl:* 145.13 (136.5 Hz). *Adm:* $2 (family members under 16 free). Tables: $2. John Pixley, AB0VX, Box 181, Logan, IA 51546; 402-636-2001 (days); **ab0vx@arrl.net**; **bvarc.net**.

Iowa (West Liberty) — Oct 7 F V
7 AM. *Sprs:* Muscatine and Washington Area ARCs. Muscatine County Fairgrounds, 101 N Clay St. Large flea market area, VE sessions, camping. *Tl:* 146.91, 146.85 (192.8 Hz), 146.52. *Adm:* $5. Tables: $8. Vance Davisson, WA0MNA, Box 283, Riverside, IA 52327; 319-330-7625; **vanced1@mchsi.com**; **kc0aqs.org/hamfest.html**.

Kansas (Chanute) — Oct 6 F
8 AM-noon. *Spr:* Chanute Area ARC. Zion Lutheran Church Activity Center, 1202 W Main St. 16th Annual Hamfest, exhibits. *Tl:* 146.745 (100 Hz). *Adm:* $2. Tables: 3 free. Gary Sherard, WA5FLV, 20 N Plummer Ave, Chanute, KS 66720; 620-431-1667; **wa5flv@hotmail.com**; **www.caarc.org**.

Kansas (Wichita) — Oct 6 V
8 AM-1 PM. *Spr:* Valley Center ARC. Sweetbriar Bingo Hall, 2349 Amidon. VE sessions. *Tl:* 146.94. *Adm:* $2. Tables: $5. Jim Cochran, K0RH, 3600 W 77th St N, Valley Center, KS 67147; 316-755-2283; **k0rh@cox.net**; **vcarc.org**.

Kentucky (Hazard) — Sep 22 F D
8 AM-1 PM. *Spr:* Kentucky Mountains ARC. Civil Air Patrol Bldg, Wendell Ford Airport, Regional Airport Rd (KY Hwy 15). Swapfest, free outdoor tailgating, inside vendors.

Tl: 146.67 (103.5 Hz). *Adm:* $5. Tables: $5 (very limited). John Farler, K4AVX, 109 Hall St, Hazard, KY 41701; 606-436-5354; **k4avx@alltel.net**; **home.alltel.net/jfarler/hf.html**.

Louisiana (Lake Charles) — Sep 15 F V S
8 AM-3 PM. *Spr:* Southwest Louisiana Amateur Repeater Club. Habibi Temple, 2928 Pack Rd. "Swampfest," ARRL forum, ARES information, WINLINK demo, VE sessions. *Tl:* 146.73. *Adm:* Free. Tables: $15. Doug Phelps, WB5OZA, 8020 Collette Rd, Lake Charles, LA 70605; 337-477-4909; **cajungeese@yahoo.com**; **swlarclub.bravehost.com**.

Maine (Alexander) — Sep 15 V
8 AM-5 PM. *Spr:* St Croix Valley ARC. Alexander Elementary School, Rte 9. VE sessions. *Tl:* 147.33 (118.8 Hz). *Adm:* $5. Roger Holst, W1LH, 70 Cooper Rd, Alexander, ME 04694; 207-454-2174; **pct@nbnet.nb.ca**; **stcroixvalleyamateurradioclub.org**.

Maryland (West Friendship) — Oct 7 F V
6 AM-4 PM. *Spr:* Columbia ARA. Howard County Fairgrounds, 2210 Fairgrounds Rd. Flea market, tailgating ($10 per space), auction, VE sessions. *Tl:* 147.135 (156.7 Hz). *Adm:* $6. Tables: $20 (indoors). David Prestel, W8AJR, 10160 Tanfield Ct, Ellicott City, MD 21042-5808; 410-552-2652; fax 410-981-5146; **w8ajr@arrl.net**; **www.carafest.org**.

Massachusetts (Cambridge) — Sep 16. Nick Altenbernd, KA1MQX, 617-253-3776 (9 AM-5 PM); **w1gsl@mit.edu**; **www.swapfest.us**.

Massachusetts (Feeding Hills) — Oct 6 F V
11 AM-5 PM. *Spr:* Mt Tom Amateur Repeater Assn. Springfield Turnverein Club, 176 Garden St. 19th Annual AR and Electronics Hamfest, VE sessions. *Tl:* 146.67, 146.94 (both 127.3 Hz). *Adm:* $5. Tables: $15. John Stark, N1JIO, 75 Elmwood Ave, W Springfield, MA 01089; 413-563-1605; **n1jio_qrp@yahoo.com**; **www.mtara.org/flea07.html**.

Michigan (Adrian) — Sep 16 F V
5:30 AM-5:30 PM. *Spr:* Adrian ARC. Lenawee County Fairgrounds, 602 Dean St. 35th Annual Ham Radio Swap, VE sessions. *Tl:* 145.37. *Adm:* $5. Tables: $10. Marjie Willey, KB8TMM, 307 Pentecost Hwy, Onsted, MI 49265; 517-467-6303; **maggie214@frontiernet.net**; **www.w8tqe.com**.

Michigan (Lowell/Grand Rapids) — Sep 8 F V
Set up Friday eve, Saturday 6 AM; public 8 AM to 1 PM. *Spr:* Grand Rapids ARA. Kent County Fairgrounds, 225 S Hudson. Annual Electronics/Computer/Ham Radio Equipment Swapmeet, flea market, trunk sales (no extra charge, admission required), VE sessions (10 AM, all walk-ins), on-site overnight camping ($10-$15; electricity available), Friday eve Potluck dinner. *Tl:* 147.26 (94.8 Hz), 146.52. *Adm:* $6 (K-12 students free). Tables: $10 (8-ft, reserve by Sep 4). Jack Amelar, NY8D, c/o GRARA, Box 3282, Grand Rapids, MI 49501-3282; 616-897-6885; **grahamfest07@w8dc.org**; **www.grahamfest.org**.

Michigan (Owosso) — Sep 16 F V
8 AM-noon. *Spr:* Shiawassee ARA. Bennington Township Hall, 5849 S M-52. Trunk Sale/Hamfest, AR equipment, ARRL session (9:30 AM), VE sessions (11 AM). *Tl:* 147.02 (100 Hz). *Adm:* $5 (per car space; parking and sales included). Tables: Bring your own. Don Warner, WB8GUS, 10008 Lehring Rd, Byron, MI 48418; 810-266-4897; **wb8gus@arrl.net**.

Minnesota (Shoreview) — Sep 16. Erik Westgard, NY9D, 612-308-5321; **ny9d@arrl.net**; **home.att.net/~wd0hwt/**.

Missouri (Macon) — Sep 28-29 F V
Friday 4 PM through Saturday 8 PM. *Spr:* Macon County ARC. Macon County Park, US Hwy 63 S. "Amateur Radio Rendezvous 2007," free flea markets, camping, VE sessions. *Tl:* 146.805. *Adm:* Free. Tables: Free. Dale Bagley, K0KY, 1402 Eastern Dr, Macon, MO 63552; 660-385-3629; **dbagley@cvalley.net**; **www.qsl.net/n0pr**.

Nebraska (Omaha) — Oct 7 V S
9 AM-1 PM. *Spr:* Ak-Sar-Ben ARC. Millard American Legion Hall, 4618 S 139th St. Forums, speakers, VE sessions. *Tl:* 146.94. *Adm:* $4. Tables: $10. Todd LeMense, KK0DX, 9336 Y St, Omaha, NE 68127-4062; 402-216-8633; **kk0dx@cox.net**; **www.aksarbenarc.org**.

New Jersey (Mullica Hill) — Sep 16 F V
8 AM-2 PM. *Spr:* Gloucester County ARC. 4-H Fairgrounds, Rte 77. Free tailgating, DXCC/VUCC card checking, VE sessions. *Tl:* 146.865 (131.8 Hz). *Adm:* $6. Tables: $10. Harry Bryant, AA2WN, Box 496, Pennsville, NJ 08070; 856-678-6091; **aa2wn@arrl.net**; **users.tellurian.com/freddie/w2mmd/**.

New Jersey (Township of Washington) — Oct 6 F V
8 AM-3 PM. *Spr:* Bergen ARA. Westwood Jr/Sr High School, 701 Ridgewood Rd. Fall Hamfest, VE sessions, DXCC card checking, refreshments. *Tl:* 146.79 (141.3 Hz). *Adm:* $5. Tables: $15. Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Township of Washington, NJ 07676; 201-664-6725; **k2zo@arrl.net**; **www.bara.org**.

New Jersey (Wall Township) — Oct 6 F V
6:30 AM-2 PM. *Spr:* Ocean-Monmouth ARC. InfoAge Learning Center, Project Diana Site, Marconi Rd. Tailgate Hamfest, VE sessions. *Tl:* 145.11 (127.3 Hz). *Adm:* $3. Tables: $10. Jeff Harshman, N2LXM, c/o OMARC, Box 267, Oakhurst, NJ 07755; 732-922-0816; **n2lxm@juno.com**; **www.omarc.org**.

New York (Horseheads) — Sep 29 F V
6 AM-2 PM. *Spr:* ARA of the Southern Tier. Chemung County Fairgrounds, Fairview Rd. 32nd Annual Elmira International Hamfest, free flea market, VE sessions. *Tl:* 147.36. *Adm:* advance $5, door $6. Tables: $15. Kenneth Kent, KA2LIM, 516 Pine Valley Rd, Pine Valley, NY 14872; 607-739-7305; **ka2lim@yahoo.com**; **www.arast.org/index.php?pr=September_Hamfest**.

New York (Lake Placid) — Oct 6, Northern New York Section Convention. See "Coming Conventions."

New York (Pompey/Syracuse) — Sep 15 F D H V
Set up Friday 4-9 PM, Saturday 6:30-7:45 AM; public 8 AM-2 PM. *Spr:* Radio Amateurs of Greater Syracuse. Pompey Hills Fire Department, Henneberry Rd. 52nd Annual Hamfest, indoor/outdoor flea market (outdoor space $5 plus admission), buy and sell ham radio and computer equipment, dealers, vendors, exhibitors, ARRL forum (10 AM), NTS and RAGS tables, awards, VE sessions (10:30 AM, walk-ins), breakfast and lunch served, handicapped accessible, refreshments. *Tl:* 147.3. *Adm:* $5, under 17 free. Tables: 8-ft $10 (reserve early; or bring your own, space $5). Viv Douglas, WA2PUU, c/o RAGS, Box 88, Liverpool, NY 13088; 315-698-4558; **ragsonline@hotmail.com**; **www.ragsinreview.com**.

New York (Queens) — Oct 7 F D H V
Set up 7:30 AM; public 9 AM-2 PM. *Spr:* Hall of

Science ARC. NY Hall of Science Parking Lot (Flushing Meadows Corona Park), 47-01 111th St. Electronics and computer equipment, tailgating, dealers, tune-up clinic, "Drop and Shop" available, VE sessions (10 AM; Lenny Menna, W2LJM, 718-835-1548), Museum Exhibit Station WB2JSM, free parking, handicapped accessible, refreshments. *Tl:* 444.2 (136.5 Hz), 146.52. *Adm:* buyers $5, sellers $10 (per space); under 12 free. Stephen Greenbaum, WB2KDG, 85-10 34th Ave, Apt 323, Jackson Heights, NY 11372; 718-898-5599; **wb2kdg@arrl.net**; **www.HOSARC.org**.

North Dakota (Grand Forks) — Oct 6 **F D V S**

9 AM-2 PM. *Spr:* Forx ARC. Zion United Methodist Church, 1001 24th Ave S. Swap tables, vendors, seminars, VE sessions. *Tl:* 146.94. *Adm:* $5. Tables: Free. Karen Noss, NØTKP, 1113 4th Ave N, Grand Forks, ND 58203; 701-775-7781 (phone and fax);**klnoss@gra.midco.net**; **www.qsl.net/wa0jxt**.

Ohio (Berea) — Sep 23 **F V**

8 AM-2 PM. *Spr:* Hamfest Assn of Cleveland. Cuyahoga County Fairgrounds, 164 Eastland Rd. Hamfest/Computer Show, flea market, ARRL forum, VE sessions, refreshments. *Tl:* 146.73 (110.9 Hz). *Adm:* $6. Tables: $20. William Beckman, N8LXY, c/o Hamfest Assn of Cleveland, Box 81252, Cleveland, OH 44181-0252; 800-CLE-FEST; **www.hac.org**.

Ohio (Cincinnati) — Sep 16 **F D V S**

Set up 6 AM; public 8 AM-3 PM. *Spr:* Greater Cincinnati ARA. Diamond Oaks Career Development Center, 6375 Harrison Ave. Flea market, commercial vendors (Tom Denham, K8VOE, 513-779-3851), forums, hidden transmitter hunt, ARRL booth and forum, VE sessions, refreshments. *Tl:* 145.37, 146.88. *Adm:* advance $5, door $6. Tables: $8 (flea market space), $20 (commercial). Stan Cohen, W8QDQ, 2301 Royal Oak Ct, Cincinnati, OH 45237-2939; 513-531-1011; fax 513-531-3834; **stanco49@aol.com**; **gcara.org/**.

Ohio (Independence/Cleveland) — Sep 21-22, Great Lakes Division Convention. See "Coming Conventions."

Oklahoma (Tulsa) — Sep 30 **F**

8 AM. *Spr:* Green Country Hamfests Inc. AEP-PSO Parking Lot, 600 S Frankfort. Swapmeet/Tailgate. *Tl:* 146.88 (88.5 Hz). *Adm:* Free. Tables: Free. Merlin Griffin, WB5OSM, Box 470132, Tulsa, OK 74147-0132; 918-272-0066; **wb5osm@hotmail.com**; **www.greencountryhamfest.org**.

Oregon (Bend) — Sep 28-30, Pacific Northwest VHF Conference. See "Coming Conventions."

Oregon (Pendleton) — Aug 18 **F**

9 AM-3 PM. *Spr:* Pendleton ARC. Hawthorne School Multipurpose Room, SW 13th St and SW Emigrant Ave. Swapmeet, AR gear. *Tl:* 146.52. *Adm:* Free. Tables: $5. Alan Polan, KE4TRR, Box 563, Pendleton, OR 97801; **ke4trr@bmi.net**; **w7pl.com**.

Pennsylvania (Brownstown) — Oct 6 **F**

Set up 6 AM; public 7 AM. *Spr:* Red Rose Repeater Assn. West Earl Community Park, Rte 772 E. Tailgating ($3), limited indoor space ($5, sellers fees include admission), AR and electronics equipment. *Tl:* 147.015 (118.8 Hz). *Adm:* $1. Tables: $5. Dave Phillips, W3CWE, 344 N George St, Millersville, PA 17551; 717-872-6578; **w3cwe@comcast.net**; **www.qsl.net/rrra**.

Pennsylvania (New Kensington) — Aug 26, Western Pennsylvania Section Convention. See "Coming Conventions."

Pennsylvania (Tionesta) — Sep 22 **F V**

8 AM-4 PM. *Sprs:* Forest County ARC and Hunting and Fishing Museum of PA. Hunting and Fishing Museum of PA Grounds, 1 Highland St. 1st Annual Hamfest, flea market, VE sessions, foxhunt, special event station. *Tl:* 146.58, 3.865. *Adm:* $10. Tables: $25. Randy Keith, KB3AFZ, Box 72, Tionesta, PA 16353; 814-758-8677; fax 814-755-2981; **rwkeith1@verizon.net**; **www.forestcountyarc.com**.

Pennsylvania (Wrightstown) — Sep 30 **F**

6 AM-2 PM. *Spr:* Mt Airy VHF Club (PACKRATS). Middletown Grange Fairgrounds, Penns Park Rd. 36th Annual Flea Market, VHF Conference (Sep 29). *Tl:* 146.52. *Adm:* $6. Tables: $10. Ed Finn, WA3DRC, **packrats_w3ccx@yahoo.com**; **members.ij.net/packrats/Hamarama/hamarama.html**.

Rhode Island (Forestdale/N Smithfield) — Sep 15. Rick Fairweather, K1KYI, 401-864-9611 (leave message); **k1kyi@arrl.net**; **www.qsl.net/riafmrs/auction**.

South Carolina (Rock Hill) — Oct 6 **F D V**

7 AM-3 PM. *Spr:* York County ARS. American Legion Post 34, 199 S Cherry Rd. Dealers, ARRL forum, auction, tailgating, VE sessions, barbeque. *Tl:* 147.03. *Adm:* advance $6, door $7. Tables: inside $20 each (1-2 tables); $15 each (3 or more tables). Sheila Parrish, KG4CDF, 2358 J P Dirt Rd, Edgemoor, SC 29712; 803-328-5983; **coy@cetlink.net**; **www.rockhillhamfest.com**.

Tennessee (Gladeville) — Aug 25 **F D V**

Set up 6 AM; public 8 AM. *Spr:* Short Mountain Repeater Club. Gladeville Community Center, 95 McCreary Rd. Vendors, tailgating, VE sessions, foxhunt, refreshments. *Tl:* 146.91. *Adm:* $5. Tables: $10. Tony Singleton, KI4HMC, 107 Lealand Ln, Lebanon, TN 37087; 615-444-6547; **ki4hmc@arrl.net**; **shortmountain.org**.

Tennessee (Sevierville) — Sep 28-29 **F V**

Friday 3-8 PM; Saturday 9 AM-3 PM. *Spr:* Ten-Tec, Inc. Ten-Tec Inc, 1185 Dolly Parton Pkwy. 8th Annual Hamfest, VE sessions, CW copying contest, tailgating. *Tl:* None. *Adm:* Free. Tables: Free. Scott Robbins, W4PA, 1185 Dolly Parton Pkwy, Sevierville, TN 37862; 865-453-7172; fax 865-428-4483; **sales@tentec.com**; **www.tentec.com**.

Texas (Belton) — Oct 6 **F V**

7 AM-2 PM. *Spr:* Temple ARC. Bell County Expo Center, 301 W Loop 121. "The friendliest ham swapfest in the world!" VE sessions. *Tl:* 146.82 (123 Hz). *Adm:* $2. Tables: $10-$25. Mike LeFan, WA5EQQ, 1802 S 13th St, Temple, TX 76504; 254-773-3590; fax 254-231-4128; **mlefan@vvm.com**; **www.beltonhamexpo.org**.

Virginia (Virginia Beach) — Sep 15-16, Roanoke Division Convention. See "Coming Conventions."

Washington (Spokane Valley) — Sep 22, Washington State Convention. See "Coming Conventions."

Wisconsin (Cedarburg) — Sep 15 **F V**

8 AM-noon. *Spr:* Ozaukee Radio Club. Fireman's Park, W65 N796 Washington Ave. 2nd Annual Outdoor Hobby and Ham Swapfest, VE sessions. *Tl:* 146.97 (127.3 Hz). *Adm:* $5. Tables: None (sell from the back of your vehicle or whatever). Tom Ruhlmann, W9IPR, 465 Beechwood Dr, Cedarburg, WI 53012; 262-377-6945 (phone and fax); **teruhlmann@sbcglobal.net**; **www.ozaukeeradioclub.org**.

F = FLEA MARKET
D = DEALERS / VENDORS
H = HANDICAP ACCESS
V = VE SESSIONS
S = SEMINARS / PRESENTATIONS

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as an announcement in these listings, donated ARRL publications, handouts, discounted rates for display advertising, and other support.

It's easy to become sanctioned. Contact the Convention and Hamfest Branch at ARRL Headquarters, 225 Main St, Newington, CT 06111, 860-594-0262, or send e-mail to **giannone@arrl.org**.

Promoting your event is guaranteed to increase attendance. As an approved event sponsor, you are entitled to special discounted rates on *QST* display advertising and *ARRLWeb* banner advertising. Call the ARRL Advertising Desk at 860-594-0207, or e-mail **ads@arrl.org**. QST

JURGEN CAROW, DF3OL

Strays

Spotted in a small town near Magdeburg in northern Germany.

JOTA — Jamboree on the Air 2007

Debra Johnson, K1DMJ

The Fun Begins October 19

Jamboree on the Air celebrates its 50th year October 19-21, 2007. In recognition of this milestone, JOTA's normal 48 hour operating event will be extended to 50 hours. The fun begins at 2200 local time October 19 and ends at midnight, 2400 local time, October 21.

Visit the World Scout Bureau Web site at **www.scout.org/jota/** to review the special activities suggested for this anniversary event, read the JOTA Story, and brush up on the rules for the Scouting 100 Radio Award, for which JOTA contacts will apply. You'll also find promotional materials as well as golden jubilee souvenir articles available through the World Scout Shop.

An on-the-air operating event sponsored by the World Scout Bureau, Jamboree on the Air was founded in 1958 by Les Mitchell, G3BHK. It has grown to become the largest international Scout event. JOTA now boasts the participation of nearly a half million Scouts and Guides in over 100 countries, involving as many as 10,000 Amateur Radio stations.

The event relies on the Amateur Radio community and local hams for its success. Getting Boy and Girl Scouts (including Cubs and Brownies) on the air to talk with other Scouts around the world provides a great opportunity to expose youth to Amateur Radio. Some troops and clubs team up to make a big splash with lots of activities, radios, antennas and offering a variety of modes to experience. For others, the event provides an opportunity to coach a smaller group of Scouts and to just have fun talking on the radio. Scouts usually enjoy communicating by speaking into a microphone, but some radio amateurs are able to provide other modes of operation for Scouts to experience, such as slow-scan TV or amateur TV, satellites, packet radio or radioteletype, or even earth-moon-earth contacts.

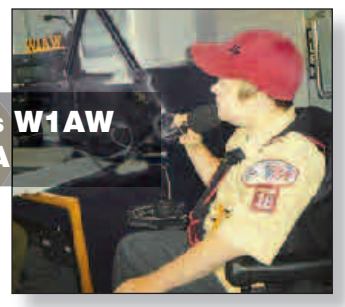
JOTA can provide a great opportunity to teach the Boy Scout merit badge. For materials and ideas on how to provide a Radio Merit Badge seminar, check out some of the resources on the ARRL Web site. You'll also find general rules and other information at **www.arrl.org/scouts/jota**, including how to file a JOTA report, and how to obtain JOTA QSL cards and pocket patches.

JOTA is an annual event in which Scouts and Guides all over the world speak to each other by means of Amateur Radio contacts. Scouting experiences are exchanged and ideas are shared, via the radio waves.

Suggested Worldwide JOTA Frequencies

Band (MHz)	Phone (MHz)	CW
80 meters	3.940	3.590
40 meters	7.270	7.030
20 meters	14.290	14.070
17 meters	18.140	18.080
15 meters	21.360	21.140
12 meters	24.960	24.910
10 meters	28.390	28.190

LARRY WOLFGANG, WR1B



A Boy Scout activates **W1AW** during a recent **JOTA**

Debra Johnson, K1DMJ, is Manager of the ARRL Education Services Department. She can be reached at **djohnson@arrl.org**.

2007 Simulated Emergency Test

Get ready for SET on October 6-7.

Steve Ewald, WV1X

The 2007 Simulated Emergency Test (SET) will be taking center stage this fall and October 6-7, is the main weekend to focus on. ARRL Section Leaders, Emergency Coordinators, and Net Managers are planning an event that will involve all radio amateurs and especially members of the ARRL Field Organization, the Amateur Radio Emergency Service® (ARES®), the Radio Amateur Civil Emergency Service (RACES), the ARRL National Traffic System (NTS) and other public service-minded groups. Amateur Radio cooperation with public service agencies and organizations in communities around the country is a key component to a successful exercise.

How to Join the SET

To participate in this year's emergency test, contact your local ARRL emergency coordinator or net manager to find out the details. ARRL Sections, ARES teams and nets may conduct their exercises anytime during September through December. If you don't know who to call, please touch base with your ARRL Section Manager for assistance. See page 16 of *QST* for contact information or check the ARRLWeb (**www.arrl.org/sections/**). From there, you'll find links to ARRL section home pages with names and contact information for your Section Leaders including the Section Emergency Coordinator and Section Traffic Manager. Whether you're a new licensee or an experienced radio amateur, the SET is a golden opportunity to learn or practice useful skills in traffic handling, net operation and emergency communications protocols and management.

National Preparedness Month

National Preparedness Month is an annual nationwide effort held each September to encourage Americans to take simple steps to prepare for emergencies in their homes, businesses and schools. Once again this year, ARRL is a coalition member. National Preparedness Month 2007 is sponsored by the US Department of Homeland Security. The goal is to increase public awareness about the importance of preparing for emergencies and to encourage individuals to take action. Throughout September and the months preceding it, Homeland Security will work with a wide variety of organizations, including local, state and federal government agencies and the private sector, to highlight the importance of family and business emergency preparedness as well as to promote individual involvement through events and activities across the nation. More information can be found at **www.ready.gov.**

The ARRL is affiliated with Citizen Corps, an initiative within the Department of Homeland Security to enhance public awareness and safety. Your local or section-wide SET might involve the local representatives of Citizen Corps, its many affiliates, and a Community Emergency Response Team (CERT). For details on these programs, visit **www.citizencorps.gov** and **www.citizencorps.gov/programs/cert.shtm**.

ARRL's longstanding relationships with national organizations will be tested this fall, too. American Red Cross, Salvation Army, National Weather Service, National Communications System, Association of Public Safety Officers–International (APCO) as well as Civil Air Patrol (CAP) and Radio Emergency Associated Communications Teams (REACT) are among the groups that have working relationships. More details are at **www.arrl.org/FandES/field/mou/**.

You are encouraged to consider this year's ARRL Simulated Emergency Test and all preparations as well as post-exercise evaluations as a demonstration of your readiness and Amateur Radio's readiness. Be an active participant in SET and join the nation in National Preparedness Month.

Additional background on the annual SET is presented in "2006 Simulated Emergency Test Results" [Jul 2007, pp 71-74]. Also, guidelines and specific SET reporting forms for the ARRL Section and Field Leaders will be posted on the ARRLWeb at **www.arrl.org/FandES/field/forms**.

MICHAEL PALMER, N9FEB

This site at the Muscatatuck Urban Training Center in Butlerville, Indiana, served as the Incident Command during the 2007 Ardent Sentry training exercise in May. A multitude of civilian and governmental agencies, including Amateur Radio, participated.

Update to 2006 ARES SET Results

Here's an update to the 2006 SET Results article [Jul 2007, pp 71-74].

An ARES activity report from Eastern Massachusetts should have appeared in the table of results. Eastern Massachusetts SEC Rob Macedo, KD1CY, reported 692 points in the Eastern Massachusetts Section-wide 2006 Simulated Emergency Test.

Subscribe to the ARES E-Letter — It's Free!

If you're interested in public service and emergency communications, subscribe to the *ARES E-Letter* at **www.arrl.org/ares-letter**. It's free to ARRL members.

DXCC Honor Roll

Bill Moore, NC1L
DXCC Branch Manager

The DXCC Honor Roll is earned by amateurs who submit confirmation for contacts reached within the numerical top 10 of the overall number of entities on the DXCC List. There were 337 entities on the list for the period with 328 being required for the Honor Roll. The period for this list is from April 1, 2006 to March 31, 2007. The **boldface** number indicates total current DXCC credits. The number next to the call signs represents an individual's overall total.

MIXED
337
Top of the Honor Roll
4X1FQ/377
4X4DK/388
4X6UO/343
9A8A/343
AA1V/350
AA4H/348
AA4S/360
AA6G/351
AA7A/350
AB0X/350
AB8K/354
AD5A/342
AF2C/347
AI9Y/342
AJ6V/348
CT1BH/365
CT1BOH/343
CT1EEB/341
CT1ZW/356
CX4CR/357
DF3CB/344
DF9ZP/344
DJ5JK/356
DJ6RX/365
DJ8NK/359
DJ9ZB/359
DU9RG/344
EA6NB/343
EA8AKN/343
EA8ZS/343
ES1AR/380
ES1RA/350
F2VX/359
F3AT/382
F6ANA/343
F6AOI/361
F6EXV/348
F9RM/379
F9XL/356
G0DQS/343
G3GIQ/370
G3HTA/365
G3KMA/372
G3NDC/352
G3NLY/369
G4IUF/345
G4SOZ/337
GM3YTS/344
GW3CDP/349
HA0DU/354
HB9BGV/344
HB9BZA/344
HB9CIP/344
HL3IUA/342
I2PEI/350
I2PJA/354
I4EAT/350
I4IKW/343
I4IZZ/342
I4MKN/363
I5FLN/361
I7RIZ/351
I8ACB/351
I8KNT/350
IK0AZG/343
IK1GPG/343
IK4NQL/342
IK5BAF/343
IK6DLK/343
IK8HJC/339
JA0CRG/344
JA0DWY/351
JA0HXV/345
JA0LXP/351
JA0SC/353
JA0UH/350
JA0UUA/343
JA1AAT/365
JA1BK/376
JA1BLC/367
JA1BNL/346
JA1BRK/374
JA1BWA/370
JA1CNM/348
JA1CZI/353
JA1FGB/351
JA1FNA/357
JA1GRM/342
JA1GV/367
JA1HEE/344
JA1IFP/365
JA1JAN/362
JA1MOH/354
JA1OND/354
JA1PCY/353
JA1QXY/357
JA1RWI/351
JA1SGU/351
JA1SHE/342
JA1SVP/352
JA1TRL/354
JA1UQP/362
JA1VLK/350
JA2ADY/345
JA2AH/362
JA2AHH/346
JA2AXB/350
JA2BAY/353
JA2BY/371
JA2CXH/351
JA2DLM/348
JA2DSY/359
JA2EWE/345
JA2JRG/343
JA2KVD/353
JA2QPY/344
JA2VPO/349
JA2WYN/344
JA3AZD/364
JA3EMU/357
JA3FYC/355
JA3GM/358
JA3GN/347
JA3LDH/343
JA3NTE/354
JA4AFT/362
JA4DEN/346
JA4DLP/357
JA4DND/354
JA4IYL/346
JA4JBZ/347
JA4LKB/346
JA4UQY/346
JA4XZR/343
JA4ZA/370
JA5BEN/345
JA5IU/354
JA6BDB/346
JA6BZI/362
JA6CBG/345
JA6LCJ/351
JA6MWW/342
JA6VQA/344
JA6VU/346
JA7AQR/355
JA7BJS/351
JA7EMH/346
JA7GDU/354
JA7IC/345
JA7JH/361
JA7JM/357
JA7MA/364
JA7MFL/343
JA7MSQ/343
JA7PL/353
JA7ZF/357
JA7ZP/349
JA8ADQ/368
JA8GMZ/343
JA8MS/361
JA8OW/354
JA9BEK/345
JA9LSZ/337
JD1AMA/343
JE1GMM/352
JE2LUN/346
JE8BKW/343
JF2MBF/343
JF7XKY/349
JH1AFD/345
JH1HGC/353
JH1JNR/342
JH1LMG/348
JH1XYR/344
JH2RMU/343
JH2UVL/350
JH4IFF/348
JH4UYB/344
JH5BHP/343
JH5FTY/343
JH7FMJ/349
JH8MXH/345
JH8UQJ/342
JI1DHY/342
JI1MNT/343
JI1UHZ/342
JJ1TEA/343
JK1OPL/358
JM1VRW/343
JO1WKO/342
JP1NWZ/344
JR1BLX/352
JR1MLU/352
JR1TNE/355
JR1XIS/345
JR2KDN/343
JR4VMS/342
JR5VHU/342
JR6EXN/343
JR7BDQ/348
JR9LKE/338
K0CA/343
K0CS/351
K0CX/346
K0EOU/348
K0EPE/366
K0EU/348
K0FF/351
K0GX/338
K0IEA/358
K0JUH/344
K0QQ/358
K1AC/345
K1BW/359
K1EU/343
K1KI/357
K1LD/345
K1MO/350
K1NY/352
K1RM/365
K2CL/365
K2PLF/348
K2TQC/376
K2XF/345
K3BEQ/349
K3PH/349
K3UA/352
K3VN/344
K3ZO/353
K4AU/343
K4CN/346
K4FJ/371
K4IQJ/346
K4MQG/373
K4MZU/372
K4PI/356
K4TEA/368
K4XO/363
K4XP/351
K4YYL/370
K5AQ/364
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K5LP/355
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K5OVC/362
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K5XX/358
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K6AM/345
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K6FM/354
K6GAK/363
K6GXO/349
K6KII/381
K6KLY/343
K6RIM/361
K6RQ/380
K6SQL/348
K6TA/371
K6YRA/371
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K7ABV/367
K7AR/345
K7LAY/351
K7NN/361
K7OM/347
K7VV/352
K7XB/357
K7ZD/343
K8AJR/342
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K8EJ/369
K8GG/349
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K8RR/362
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K9AJ/355
K9BWQ/356
K9CW/356
K9IR/343
K9MM/364
K9NU/343
K9OW/353
K9QVB/351
K9RJ/367
K9ZO/352
KB5GL/347
KC5P/343
KC7V/344
KE4YD/343
KF2O/355
KH6HH/358
KJ9I/344
KL7J/344
KL7RA/351
KM1R/345
KN4F/345
KP4BJD/354
KR5C/349
KU4J/348
KY7M/346
KZ2P/346
LA7QI/351
LU2NI/343
LU3MCJ/345
N0XA/348
N1DCM/343
N2TK/349
N2TU/343
N3II/355
N3SL/345
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N4CH/344
N4JA/354
N4WW/368
N4XM/351
N4XO/376
N4XR/379
N5AR/372
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N6FX/376
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N1DG/351
N2OO/352
N2QT/342
N2WB/342
N3US/351
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N4AA/354
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SM6DYK/349
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VE3LDT/348
VE7YL/342
W0AWL/344
W0BW/390
W0FK/348
W0RI/372
W0RT/349
W0SR/354
W1DIG/341
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W1HEO/351
W1NU/382
W2BIE/343
W2HTI/384
W2KKZ/344
W2OKM/387
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W2RQ/347
W2RS/357
W2TO/350
W3AP/361
W3KB/344
W3NV/359
W3OOU/344
W4AG/361
W4AO/362
W4AXO/344
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HAMSPEAK

The following are brief descriptions of Amateur Radio related terms found in this month's issue of *QST*. More information on most can be found in *The ARRL Handbook*, or other specialized ARRL publications.[1] See also **www.arrl.org/qst/glossary.html**.

The Doctor is IN

Tone modulated radio telegraphy (MCW) — Telegraphy in which a steady carrier signal is transmitted accompanied by amplitude or frequency modulated code characters, as if someone were whistling Morse on a commercial broadcast station.

Yagi antenna — Multielement directional antenna with a driven element connected to the transmission line and one or more unconnected (parasitic) elements that serve to focus the antenna energy in a particular direction.

Scope — Short for oscilloscope. Test instrument that displays voltage as a function of time on a television-like display screen.

Frequency counter — Test instrument that measures and displays the frequency of signals or repetition rate of pulses.

Hands-on Radio

Temperature coefficient — Amount a component value changes as a function of change in temperature.

Oscilloscope — See definition of SCOPE above.

Tolerance — Amount the value of a component can be different than nominal value and still be considered "good."

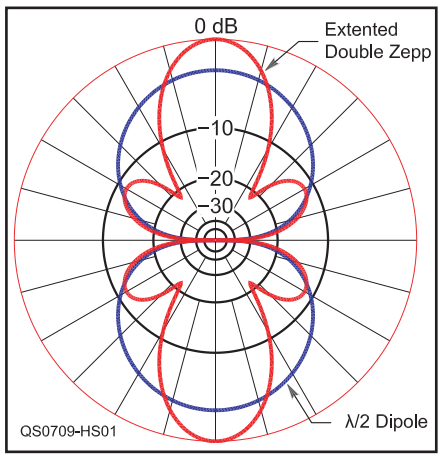
The K9JM 40 and 20 Meter Field Day Wire Yagi

Directivity — Measure of how much of the energy from an antenna is radiated in a particular direction

Double extended Zepp — Center-fed antenna in which each side is somewhat more (usually 0.625 wavelengths) than 0.5 wavelength. This is in comparison to the usual half-wave dipole in which each side is just 0.25 wavelengths long. This antenna has a much narrower response (half-power beamwidth 34° vs 78°) than a dipole with a signal in the peak of its beam almost twice the intensity of a half-wave dipole.

Sunspot minimum — It has been found that there is a repetitive pattern to sunspot activity in a period of about 11 years. At the high point, long distance HF radio propagation via the ionosphere is generally good. At the low point it is much poorer. See **www.arrl.org/tis/info/propagation.html** for more information.

[1] *The ARRL Handbook for Radio Communications,* 2007 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 9760. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.



Operating D-STAR

Gateway — Interconnection between two or more networks allowing the passage of selected traffic.

Landline — Telecommunications path that is interconnected via wire or fiber rather than a radio link.

Networked repeater — Radio retransmission system that is connected to a similar repeater via an outside radio or landline link so that a conversation retransmitted directly by the first is simultaneously retransmitted by the connected repeater. This effectively extends the communication range.

Packet network — Network in which messages are broken into small data packets for transmission. In the amateur world, this was a popular communication mode until largely superseded by the Internet. See **www.arrl.org/tis/info/digital.html** for more information.

Picket-fencing — Effect noticed by a mobile VHF station in which signals arriving from multiple directions with different delays alternately add and subtract as the car moves a short distance. This is noticeable while listening to a weak FM broadcast station as well.

QSO — One of the more than 40 popular "international Q signals" in use by Amateur Radio operators. Originally developed to speed up telegraphy, they are often used by voice operators as well. Each, if followed by a question mark, asks a question — if not, it provides an answer. QSO W1ZR? means "can you communicate directly with station W1ZR?" QSO W1ZR (without question mark) means "I *can* communicate with W1ZR directly." QSO has informally come to mean "an Amateur Radio communication," as "I had a QSO with W1ZR yesterday." Scroll down to INTERNATIONAL Q-SIGNALS on **www.arrl.org/FandES/field/forms/fsd218.html** for the complete list.

VoIP — Voice over Internet protocol. Generic term for any of the many different implementations of digitizing and packetizing of voice information for transmission over the Internet. See **en.wikipedia.org/wiki/VOIP** for more information or, for amateur applications see Steve Ford's article in February 2003 *QST*.[2]

Power Packing for Emergencies

Deep-cycle flooded batteries — Type of lead-acid storage battery especially designed to be repeatedly discharged part way down and recharged without damage.

Inverter — A kind of power converter that generates (typically) 120 V ac 60 Hz power from a dc supply such as an automotive 12 V system.

Starting batteries — Storage batteries designed to provide a short burst of high current to start an internal combustion engine. These will not survive the multiple heavy discharge/recharge cycles that a deep cycle battery will.

Uninterruptible power supply (UPS) — Kind of power system that primarily provides power from the usual ac mains, but will continue to provide power without interruption (for a limited time) in the event of mains failure.

The Remote Power Controller

Gate — Control element of a field effect transistor (FET). It has roughly the effect of a bipolar transistor's *base*, or a vacuum tube's *control grid*.

LED — Light emitting diode. Solid state diode that emits light when current flows. Early LEDs were used mainly as panel indicators. Newer "super-bright" LEDs have replaced small light bulbs in many applications, however.

MOSFET — Metal oxide semiconductor field effect transistor. One of a number of technologies designed to implement a field effect transistor (FET).

Power relay — Electromechanical device in which a relatively small current in an electromagnetic coil pulls together heavy contacts designed to switch a high power circuit on and off.

Solid state — Description of electronic devices constructed of solid semiconductor material in contrast to those made in the form of vacuum tubes.

A Resonance Probe for the Ham Shack

IF transformers — Coupled, fixed frequency radio components designed to interconnect signals in radio intermediate frequency (IF) stages.

RF probe — Adjunct device to a measuring instrument that removes the amplitude modulation from an RF signal to allow measuring the modulating signal. Basically a small AM detecting radio receiver.

Toroid coil — Inductor wound on a donut shaped core of magnetic material. A toroid has the property that the signal is entirely within the core and thus is self-shielding.

[2] S. Ford, WB8IMY, "VoIP and Amateur Radio," *QST,* Feb 2003, pp 44-47.

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*cell bands blocked
*816-901.995 MHz blocked; unblocked versions available to FCC approved users. FM video range for the IC-R3 is 900-1300 MHz & 2250-2450 MHz

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www.arrl.org/expo

Program Highlights

- **ARRL EXPO 2007** – This special exhibit area will feature ARRL program representatives, activities, presentations and the huge ARRL bookstore.
- **Huntsville Hamfest** – Featuring equipment dealers, manufacturers, forums and more!
- **GAREC-2007** – The third Global Amateur Radio Emergency Communications Conference will be held at the Embassy Suites Hotel in Huntsville, August 16-17.
- **DX Banquet** (sponsored by the North Alabama DX Club) featuring K4UEE – Lakshadweep DXpedition.
- **DXCC Card Checking**
- **Contest Forums** – NQ4I, VE7ZO, K9LA, K1GU + ACG Allstars.
- **ARRL Youth Activities and Youth Lounge**
- **ARRL Wouff Hong Ceremony** – Steeped in ritual and mystery, this ceremony also promises to be great fun.
- **W1AW/4 Special Event Station** – Bring a copy of your license to operate.

…and much more!

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- ✓ U.S. Space & Rocket Center and U.S. Space Camp
- ✓ NASA Marshall Space Flight Center Tour
- ✓ Huntsville Botanical Garden
- ✓ Huntsville Museum of Art
- ✓ Cathedral Caverns State Park
- ✓ Historic Huntsville Depot Museum and Alabama's Constitution Village

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Group/Convention code: HAM.Reservations: 1-800-362-2779 or **www.embassysuiteshuntsville.com**

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See www.arrl.org/expo for additional lodging options and links to travel information.

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DIGITAL

D-STAR

The effectiveness of any voice or data communications system is directly influenced by those it serves. While there are many communications tools available, D-STAR is the newest tool for both tactical and strategic communications in our emergency communications (EmComm) toolbox. Turn the page and discover a whole new perspective on amateur radio...

- **Deployment Concepts**
- **Practical Applications**
- **Spectrum Usage**

ICOM®

Putting D-STAR to work...

The Three P's of EmComm

Some would say the three P's of EmComm are Planning, Planning, and more Planning. While Planning is extremely important, equal consideration to Preparation and Practice must be observed. The most well thought out plans can make a simple situation a complete disaster without the right execution.

So, how do the three P's tie into D-STAR? Many clubs already include D-STAR as well as other Digital Voice (DV) modes in their EmComm readiness.

Types of EmComm

EmComm can be broken down into two main categories: Tactical and Strategic.

Tactical Communications: Deals with short term needs or immediate action items to achieve an objective, milestone, or goal.

Whether it is to dispatch hot shot crews and aerial water tankers for fire suppression, food deliveries for shelters, or areas requiring immediate medical crews, precision is key here. Unfortunately, inflections in a voice, radio operator experience, or things beyond our control can slow things down. Therefore, to be effective we must always utilize the three P's and look to new ways to improve.

With the capability of combining voice and data in the same transmission, as well as adding a faster data stream with universal standards such as serial and Ethernet data, D-STAR can greatly increase radio's effectiveness and efficiency.

Strategic Communications: Deals with long term, broad of scope needs. These items do not require immediate action.

While not as time sensitive as tactical comms, strategic communication plans and practice solve emergency issues. We will commonly see communications such as shelter plans and locations, or safety warnings, as well as items required for problem solving.

Why say what you can send?

As technology evolves, so do the comm requirements in times of an emergency. Many of us have become extremely reliant on these new technologies. Just think back to the last time you tried to purchase groceries and the computer system was down. A normal daily process – simply buying food – probably ground to a halt. Many of us, especially the younger generations, are not reliant on data communications. Data comms, such as text messaging, e-mail, and document transfers are common in both our personal and professional worlds. Now, Amateur Radio will be tasked to maintain this level of "connectivity". So, new tools to assist in keeping us connected to the rest of the world must be developed and adopted. And they are!

We as amateur radio operators are seeing changes in our role from communicators to IT solution technicians. The new mantra is "Why send what you can show?"

Additionally, we see voice comm improvements as we migrate to digital communications. Due to the inherent nature of RF physics, analog radio will suffer from several limitations that affect the range and clarity of voice. Environmental and range factors will effect every RF transmission. But, in an analog system, everything in the environment that disrupts or interferes with the signal itself has a direct effect to the voice quality at the receiving end. While technology exists to boost and retransmit an analog signal, what comes in, goes out. Which means a degraded signal in will remain a degraded signal as there is no way to recover the original voice quality.

Digital systems incorporate built-in error-correction techniques that reconstitute the voice at nearly its original fidelity throughout most of the RF coverage area.

D-STAR: Let's Get Digital

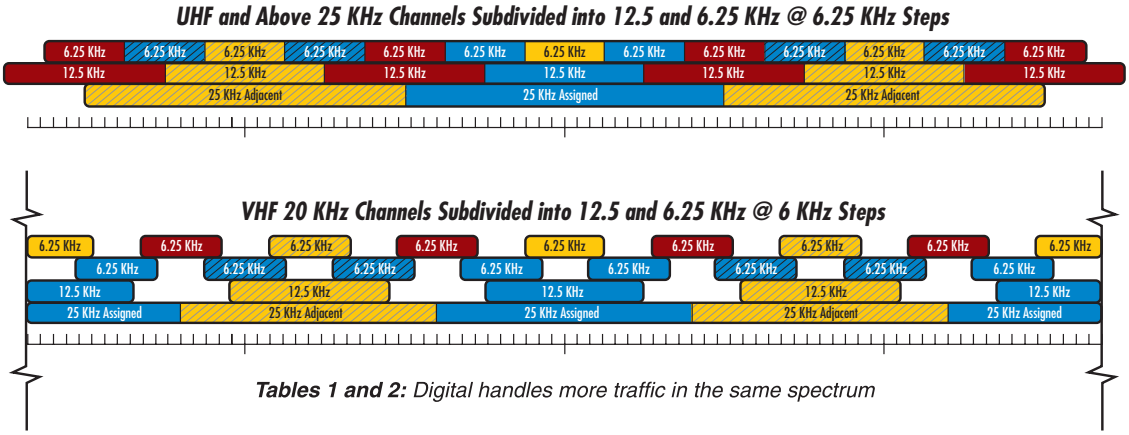
With all the infrastructure supporting analog FM communications, why would anyone want to change or implement digital voice (DV)? Really there are four reasons:

1. Spectrum efficiency
2. Greater range and clarity
3. Routing of voice and data communications
4. Simultaneous data and voice communications

Spectrum Congestion

We all understand the pitfalls of population growth; in many areas, what was once a 10 minute trip

...during emergencies!



Tables 1 and 2: *Digital handles more traffic in the same spectrum*

across town now takes a half hour! We see a similar congestion issue in amateur radio, but rather than a trip taking longer, we hear "Sorry, there are no repeater pairs available."

The migration to more efficient modes of communication helps open up repeater pairs. Repeater councils are adopting and implementing new band plans as the ham radio community migrates to address the more efficient DV modes. Tables 1 and 2 demonstrate how many 6.25kHz digital systems can be deployed in the place of a single analog repeater.

In addition to the increased repeater pairs, the Digital Voice mode increases the number of simplex frequencies that can be used in an emergency. Frequency management becomes more important as we see our roles increase in proportion to the size of the incident and the number of agencies increases.

Frequency Coordination

In many emergency plans, both Amateur Radio Emergency Service (ARES) and Radio Amateur Civil Emergency Service (RACES) members will assist in emergencies. ARES operates under written "Statements of Understandings" with these "Served Agencies":

- The Federal Emergency Management Agency (FEMA)
- The American Red Cross
- The Salvation Army
- The National Weather Service (NWS/NOAA/ Skywarn)
- The Association of Public-Safety Communications Officials International, Inc. (APCO)
- The National Communications System (NCS)

With so many different entities, you can see why frequency coordination is important!

Many organizations look at a primary and secondary frequency, some will go as far as a third. But what happens in a situation that covers a thousand plus miles, multiple counties, states, even multiple branches of the same organizations? How important does an efficient EmComm plan become?

Multiple agencies will require separate frequencies for their local traffic, yet, there are times when communications to coordinate efforts of various counties and agencies will be required.

Routing of Voice and Data Communications

There are two types of routing in amateur radio: ***site routing*** and ***user routing***. Site routing is used in technologies such as EchoLink® and IRLP. While this has opened VHF and UHF global communications, one downside is if you are looking for a specific person....you have to know where they are!

User routing was introduced to the amateur radio community with the introduction of D-STAR. With D-STAR, the signal will be routed to the last location where that user was heard.

D-STAR radios require 4 call signs to be programmed into the radio for communications other than simplex communications. These four call signs are:

1. Mycall
2. Urcall
3. RPT 1
4. RPT 2

While the Mycall and Urcall are self explanatory, RPT 1 is the call sign of the local system you use, while RPT 2 directs what type of communications are used. RPT 2 will be one of three choices:

1. Not Used. *Signal repeated on the same band*
2. Port Address. *Signal repeated on the same band and band assigned to the port address.*
3. Gateway. *Signal repeated on the same band and routed to location of call sign in the Urcall location.*

D-STAR Factoid: *Did you know that a user can select whether their communications are repeated on a single repeater pair or multiple repeater pairs?*

Either the RPT 2 or Urcall can route a transmission to another repeater pair. As an example, say we're working with two separate agencies for shelter and food coordination. One organization is operating on VHF (2m) and the other organization is on UHF (70cm). I have an immediate need for an available bed count from both. I can make my request simultaneous to both organizations!:

Mycall:	N9JA	N7IH B	70cm DV
RPT1:	N7IH B	N7IH C	2m DV
RPT2:	N7IH C		
Urcall:	CQCQCQ		

The UHF call from N9JA would be heard on both VHF (2m) as well as UHF (70cm). Note: any 4 modules can be used on a single controller, therefore a system could consist of 2 (VHF) 2m and 2 (UHF) 70cm systems, or any band combinations.

Simultaneous Voice and Data Communications

In addition to all the routing capabilities of the DV mode, the simultaneous transmission of serial data is possible while operating in the DV mode. While the data rate is not plausible for large data transfers, this feature allows simple serial communications, such as keyboard-to-keyboard text messaging to occur on the same infrastructure as the voice communications.

DV Benefits Over Packet Radio

As the 1kbps data stream is part of the entire DV data stream; if voice gets through, the data will get through. Also, there is only one infrastructure system to maintain. Thus it reduces the head count required to support the voice and data systems.

DV + GPS

While hams have had both voice and position reporting capability for years, D-STAR combines these two communication methods into one seamless system. Knowing where your in-the-field workers are offers a variety of benefits to dispatchers, supervisors and managers, and offers an extra level of safety for in-the-filed workers as well as faster extradition of any victims being rescued. GPS data is extremely helpful in SAR/USAR activities.

Ham-Brewed Software & Hardware

Integrating D-STAR Position Reporting System (D-PRS®) information into older, existing systems becomes a challenge. Fortunately, several people have stepped up the challenge and have solved the issues of compatibility with legacy technology.

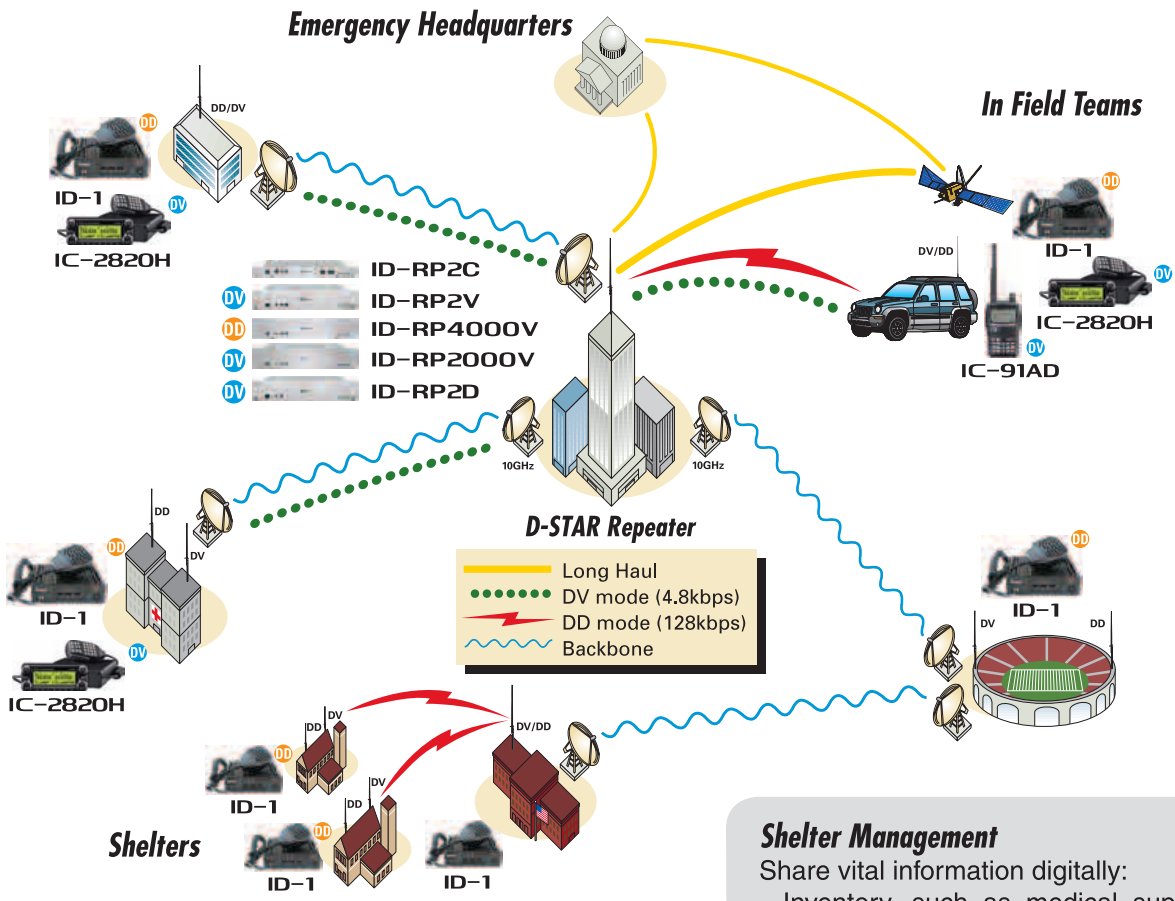
D-PRS Interface/javAPRSSrvr: D-PRS applications allowing the use of standard APRS clients to map D-STAR GPS activity. Both applications have the ability to gate the translated D-STAR->APRS packets to APRS-IS where they can be displayed by remote clients or gated to the local APRS frequency. *More information @ http://www.dstarusers.org/solutions*

Pete Loveall, AE5PL, developed several software packages to integrate D-PRS® with APRS®.

µSmartDigi™ D-Gate™ D-STAR Gateway: a compact, portable TNC designed to gateway position packets between a D-STAR digital network and a conventional analog APRS network via a D-STAR radio and a conventional radio. *More information at: http://www.dstarusers.org/solutions*

Rich Painter, ABØVO, developed a hardware solution to integrate D-PRS® with APRS®.

Example System



Shelters

128kbps, 23cm wireless data, allows faster communication over areas of several miles* for Ethernet-based communications while offering HIPAA-compatible receive and transmit information.

**Line of sight communications.*

Shelter Management

Share vital information digitally:
- Inventory, such as medical supplies, fuel supplies, food and water availability, bed counts, etc.
- Logistics and Coordination
- Staff and Schedule

Determine if shelters are filled or empty, in need of supplies or can spare them. Personal information is not transmitted in the clear, satisfying HIPAA standards.

Repeater compatibility chart with Icom digital transceivers

	ID-1	IC-2820H*	ID-800H	IC-91A*/AD	IC-V82*	IC-U82*	IC-2200H*
ID-RP2000V	–	✓	✓	✓	✓	–	✓
ID-RP4000V	–	✓	✓	✓	–	✓	–
ID-RP2V/IDRP2D	✓	–	–	–	–	–	–

*Optional plug-in digital module is required. Check with your authorized Icom dealer for details.

While the entire data stream is 4800kbps, this is split into three areas:

2400kbps	Voice
1200kbps	Voice FEC
1200kbps	Serial Data

(Note: Actual data throughput is approximately 1kbps.)

While it does not sound very fast, the data stream that is available in the DV mode of D-STAR offers many possibilities.

What We Learned

During the introduction of the first D-STAR system in the U.S., K5TIT in Dallas, TX, one of the local amateur radio operators who attended the unveiling asked the question, "Why would I want Internet connectivity in my vehicle?" Now, Hurricane Katrina has helped answer that question: The value of being able to show real-time data being generated from the in-field 1st responders is obvious. Additionally, the ability to access information from the National Weather Service and other EmComm related web sites as well as send e-mail and share files with others on the system is most valuable. In addition to being able to connect to the Internet, IT systems like file, e-mail and chat servers, can be deployed.

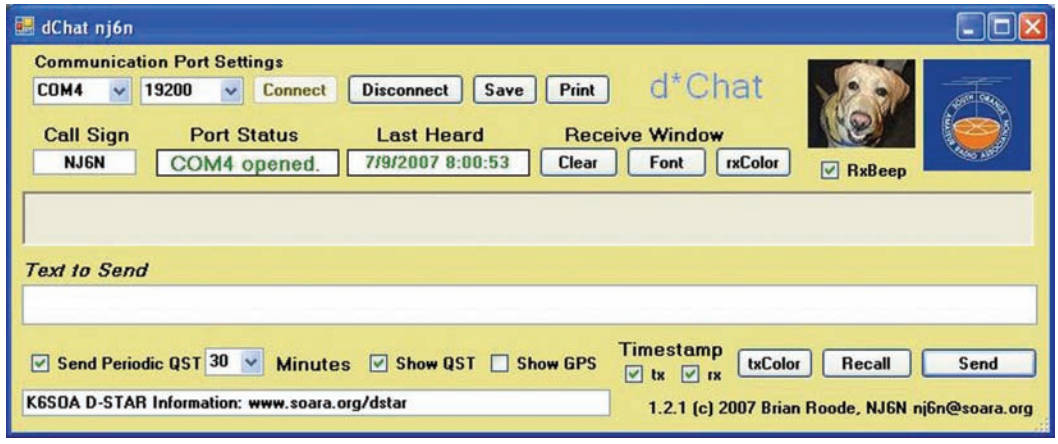


Figure 1: *D*Chat's user-friendly interface contains the critical info needed to make a D-STAR call.*

D*Chat or DCHAT: Windows® based keyboard to keyboard communication application with the ability to enable text-based communication between multiple stations simultaneously on a single simplex or repeater channel. *More information at: http://www.dstarusers.org/solutions*

Brian Roode, NJ6N, developed a software package to integrate keyboard-to-keyboard text messaging via the 1kbps data stream.

DStarQuery: Application that executes predetermined programs and sends the output of the programs to the low speed serial data channel. Using a preformatted query string on the low speed data channel, DStarQuery will look up the command, append any received parameters, execute the program, and send the generated data back to RF. This can be used for simple text responses or can be used to run scripts and programs for more dynamic responses. *More information at: http://www.dstarusers.org/solutions*

Pete Loveall, AE5PL, also developed several software packages utilizing text messages.

While working out your deployment strategy, there are key things to remember.

- Propagation on 23cm can be tricky. It is truly line-of-sight, and does not work around buildings and environmental obstructions.
- As the frequency bandwidth of the digital data (DD) mode is 130 kHz, the total data bandwidth is 128kbps, not per user/connection. So deployment plans with multiple DD systems to cover areas with many users should consider expanding to systems operating different frequencies.

...for you!

- Unlike the DV modules on a D-STAR system, the 128kbps module, or the DD module, is really an access point. While the DD module is user programmable for the selected frequency, operation is in a half duplex, single frequency. If deployed in a system with the 23cm DV module, or with other DD modules, a pass band filter is highly recommended. This keeps other 23cm transmissions from interfering.

D-STAR in Action Around the U.S.

(Dallas, TX) In 2003, Jim McClellan, N5MIJ and Bill Moore, N5ZPR, became the first D-STAR customers in the U.S. Since then, Jim and Bill, along with their club, the Texas Interconnect Team, have expanded their D-STAR presence to cover the entire Dallas/Fort Worth area. The club hosts critical functions for the D-STAR network, including the main D-STAR Trust Server, and a popular web site, www.D-STARUsers.org. "Simultaneous voice and data [is] a capability unique to the amateur service today, and gives us the opportunity to provide a service not available anywhere else", says Jim.

(Washington, DC) In 2006, race organizers for the 31st annual Marine Corps Marathon turned to the National Capital Amateur [Radio] Council (NCAC) for race day communications help. D-STAR digital data provided broadband communications support. At 10 to 100 times the bandwidth of previously used packet systems and supporting native TCP/IP applications delivered AID station performance that was so stunning the D-STAR demo stations became the primary method to manage runner medical info using the native, interactive race web application.

(Southeastern U.S.) Hams working with emergency organizations, the Alabama Section of the American Radio Relay League (ARRL) and the Southern Baptist Disaster Relief Group have together launched a D-STAR technology project. This aggressive project is using D-STAR as part of the Disaster Relief package. Internet access, digital data, automatic ID and position coordinates are just a few of the enhanced capabilities provided in disaster relief operations. Alabama is a leader in D-STAR systems, infrastructure, users and activity. Innovation, networks, applications, tools, training, users, and emergency disaster readiness are essential parts of the Alabama project. The team provides expertise to help amateur operators in the Hurricane zone, before the next disaster.

Responder Kit Equipment

IC-V82/U82
DIGITAL OPTIONAL WITH UT-118 DV

- 7W output power (IC-V82)
- 5W output power (IC-U82)
- 200 memory channels

IC-91A/AD
ADVANCED ANALOG & DIGITAL DUAL BANDER DV

- 5W (typ.) output power (VHF/UHF)
- V/V, U/U dual watch receive capability
- Optional PC remote control software

ID-800H
2M DUAL BANDER DV

- 55/50W output power (VHF/UHF)
- Wideband receiver
- Detachable front panel

IC-2820H
GO DIGITAL ON 2m & 70cm

UT-123
GPS MODULE AND ANTENNA DV

- 50W output power (VHF/UHF)
- Wideband receiver with V/V, U/U dual watch capability
- D-STAR + GPS receiver capability (UT-123 required)

IC-2200H
DIGITAL UPGRADEABLE FOR 2m DV

- 65W output power
- 207 memory channels
- Simple operation

ID-1
DD
GO DIGITAL ON 1.2GHz DV

- Analog, DV & DD modes available
- PC remote control software included
- Separate remote controller and speaker

Frequently held myths and questions asked...

D-STAR Myths

"D-STAR only works on 1.2 GHz."
Low-speed DV D-STAR voice and data works fine at 144 and 440 MHz. 1.2 GHz supports the bandwidth needs of high-speed DD data. Choose the technology that meets your needs.

"There's no difference between D-STAR and packet."
Even D-STAR's lowest speed is competitive with the highest-performance packet systems available. (See page 7 for detailed comparisons.) D-STAR's simultaneous digital voice and data is beyond the capability of any packet technology. High-speed D-STAR systems are ten times faster than the highest packet speeds.

"D-STAR is no different from IRLP or EchoLink®."
All three use the Internet, but the similarities end there. The crucial differences are two-fold. D-STAR systems provide data transmission at up to 128kbps. IRLP and EchoLink do not transfer data at all. D-STAR routes transmissions from repeater to repeater based on the call signs included in every data packet. Both IRLP and EchoLink utilize site routing. This is where users must know the repeater information of where they want to talk. D-STAR can use both Site and User routing. User routing is where you use an individual's call sign and the system will route the call based on the last location the call sign was heard.

"D-STAR is just a digital party line!"
The ability of D-STAR repeaters to route data and digitized voice worldwide sets it apart from a simple party line. Sophisticated D-STAR controllers and gateways implement modern telecommunications functions in an amateur package.

"D-STAR is a replacement for broadband home Internet."
D-STAR can connect a user to the Internet, true, but all of the amateur radio restrictions on commercial activity still remain in place. D-STAR will provide the tools for a lot of great amateur innovation, but it's not intended to replace Internet providers.

"I'll be locked into Icom equipment forever."
While Icom is the first to implement the JARL's D-STAR protocol, any manufacturer can implement this protocol. As the D-STAR technology grows, look for other manufacturers to implement this protocol into their products.

D-STAR Q & A

How do I get started?
To learn more about amateur radio, or to find a club in your area, contact the American Radio Relay League (ARRL.org). Most amateur radio operators will welcome the chance to discuss emergency communications.

What does D-STAR stand for?
The "D-STAR" stands for Digital Smart Technologies for Amateur Radio. It is an open protocol digital communication established by the JARL.

Who can use D-STAR equipment?
Any ham station requires a licensed operator to act as controller. With a controller present at all times and managing the equipment, anyone may use the amateur airwaves.

Who owns and maintains the system?
While anyone may purchase the D-STAR equipment, by law it takes an amateur radio operator (ham) to transmit. Hams may purchase D-STAR equipment in cooperation with local or state agencies.

What range will the system offer (footprint?)
Range always varies due to terrain and antenna height, but 20-40 miles* from the repeater is normal. Due to digital technology, benefits of up to 20% have been experienced over comparable analog systems.

*20-40 miles is a best case measurement, distances will vary based on frequency used and other terrain obstacles. (23cm can easily be only 2-3 miles based on topography)

Does D-STAR tie-in with P25 interoperability?
D-STAR and P25 are both digital protocols, this is the only similarity between the two protocols and are not compatible protocols. D-STAR compliments agency interoperability. But D-STAR is not compatible with P25 mode communications.

As a collective group, amateur radio operators control the direction of the hobby and its relevance (and service) in today's world. Get involved! For more information on D-STAR, visit the D-STAR forums pages on www.icomamerica.com/support/forums, check out www.dstarusers.org/solutions, and, most of all, bring it up at your next ham club meeting!

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☐ **Canada $49.**
☐ **Elsewhere $62.**

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[1] 1-year membership dues include $15 for a 1-year subscription to QST. International 1-year rates include a $10 surcharge for surface delivery to Canada and a $23 surcharge for air delivery to other countries.

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- 2 antenna alternative to DX Engineering's Receive Four-Square antenna
- Combine two antennas to create a directional pattern
- The NCC-1 enables you to adjust the antenna array pattern as if you were moving the antennas
- Use for direction finding

Special Features

- Exceptional dynamic range, nearly 1000 times better than nearest competitor
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- Separate controls for reversing channel and phase
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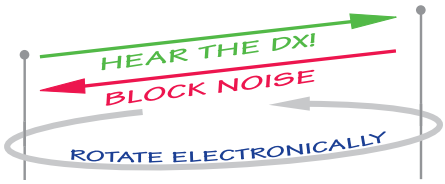
- Provides power for external active antennas
- Input for mute on transmit

DXE-NCC-1 Noise Canceling/Phasing Controller **$495.00**



Phase any two antennas at any spacing. For optimal results, use identical antennas.

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- Now available with relay protection from transmitter overload when used with TVSU-1
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- Operates from 100 kHz to 30 MHz
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- Easy installation
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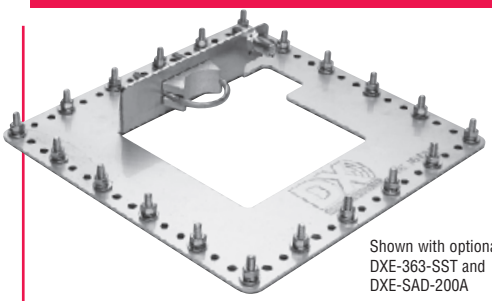

Shown with optional DXE-363-SST and DXE-SAD-200A

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Makes radial attachment a snap!

- Fits pipe, 4x4 and 6x6 posts
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DXE-RADP-1P Complete with 20 stainless bolt sets **$49.95**
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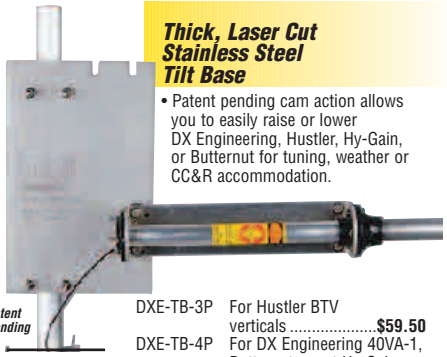
DXE-SAD-200A Saddle Clamp for 2.0" O.D. **$9.30**



Patent Pending

Thick, Laser Cut Stainless Steel Tilt Base

- Patent pending cam action allows you to easily raise or lower DX Engineering, Hustler, Hy-Gain, or Butternut for tuning, weather or CC&R accommodation.

DXE-TB-3P For Hustler BTV verticals **$59.50**
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See DXEngineering.com for details!

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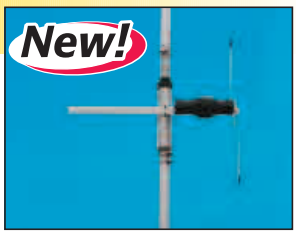
Feedline Current Chokes

- Reduce RFI and pattern distortion

Starting at just $69.95 for FCC050-H05-A

17m Add-On Kit



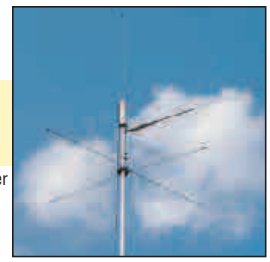
- Full band under 1.5:1 SWR
- Minor adjustments for other bands
- Simple installation
- 500W SSB/CW power rating

Patent Pending

DXE-AOK-17M 17m add-on kit for BTV.....**$49.95**

New!

60m Add-on Kit for Hustler BTV Antennas



- 60m coverage for Hustler BTV series antennas
- Operates across the complete 60m band
- SWR of 1.5:1 or less
- No disassembly of the existing antenna required
- Retain all bands at full performance—not a conversion kit

DXE-AOK-60M 60m Add-on Kit for Hustler BTV.....**$69.95**

Universal Wire Antenna Hardware Kit

- Multi-purpose center-T and end insulators to create many types of wire antennas
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- Works with DX Engineering's 300 Ω ladder line for both the feed and elements
- Use with doublet, inverted-V, off-center fed, Zepp, long wire, rhombic, V-beam, and loop antenna configurations
- Kits available for coax or ladder line feed
- Center-T attaches to all DX Engineering baluns

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High Power Operators: Just Key and It Tunes!

Building on the success of the AT-1000, LDG Electronics has refined and expanded its flagship 1KW tuner. First and foremost, the AT-1000Pro has an Auto mode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Also, there are provisions for two antennas; you can switch between them any time you need. For each antenna, there are 2,000 memories that store tuning parameters for almost instantaneous tuner setting when you transmit on or near a frequency you've used before. **Just key and it tunes!** The AT-1000Pro will operate at any power level between 5 and 1,000 watts peak RF input.

The AT-1000Pro has a much larger, easier to read cross-needle meter with two selectable scale ranges (100 and 1,000 watts). Each control button has a built-in LED indicator so you can see the tuner's status at a glance. The AT-1000PRO will interface with many popular transceivers, enabling their TUNE button to control the AT-1000Pro's operation. Dedicated control buttons allow you to fine-tune capacitance and inductance on those rare occasions when the AT-1000Pro can't find a perfect match by itself. Relay protection software prevents tuning at greater than 125 watts.

The AT-1000Pro will tune from 1.8 to 54.0 MHz (including 6 meters, and will match an amazing range of antennas, from Yagis and dipoles to inverted-Vs and slopers; virtually any coax-fed antenna from 6 to 1000 ohms impedance (16 – 150 ohms on 6 meters). Tuning time is usually under 4 seconds. If you're transmitting near a frequency with stored tuning parameters, it will set those parameters in under 0.2 seconds. Longwires or antennas fed with ladder line require an external balun.

All LDG products include the new 2-year warranty on parts and labor. LDG products also include all necessary cables; you're ready to operate right out of the box. Contact your favorite dealer for more information, or visit www.ldgelectronics.com.
List Price $599

Z-11Pro

Everything you always wanted in a small, portable tuner

The original portable Z-11 was one of LDG's most popular tuners, accompanying adventurous hams to their backyards, or to the ends of the earth. Now meet the Z-11Pro, everything you always wanted in a small, portable tuner designed from the ground up for battery operation.

Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters.

LDG Now Includes All Cables Ready to go!

The Z-11Pro uses LDG's state-of-the-art processor-controlled Switched-L tuning network. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna.

Two Year Warranty. Cables Included.

List Price $179

AT-200Pro

The first auto tuner specifically designed for today's high-powered transceivers.

The AT-200 features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MH **(including 6 meters)**. ***Two Year Warranty. Cables Included.***

List Price $249

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Contact Your Favorite Dealer to Purchase

AT-7000

The Hottest Radio in the Industry! Now with It's Own Autotuner!

The AT-7000 is the ideal tuner for IC-7000 & other ICOM Radios: Covers all frequencies from 1.8–54 MHz **(including 6 meters),** and will automatically match your antenna in a flash. Requires just 0.1 W for operation, but will handle up to 125 W (100 W on 6 m), making it suitable for everything from QRP (IC- 703Plus) to a typical 100 W ICOM transceiver. ***Ready to go right out of the box! No extra cable to buy.***

LDG ELECTRONICS Two-Year Warranty

Tune with the AT-7000 or use your radio. Includes over 2,000 memories, uses latching relays, tuning range is 4-800 ohms, powered by your radio. Includes ICOM interface cable.

List Price $169

AT-100Pro

Automatic Antenna Tuner

This desktop tuner covers all frequencies from 1.8 – 54 MHz **(including 6 meters)**, and will automatically match your antenna in no time. It features a two-position antenna switch, allowing you to switch instantly between two antennas. The AT-100Pro requires just 1 watt for operation, but will handle up to 125 watts.

List Price $219

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DR-635T 2M/440MHZ Mobile/Base Transceiver

Dual Band Transceiver with Full Duplex Capability

Alinco's new DR-635T is an easy-to-use, high-quality transceiver for simplex and repeater operations on the VHF and UHF bands. With cross-band repeat, full duplex capability and a remote mountable control head, the DR-635T features newly designed RF circuitry that delivers increased resistance to interference from adjacent signals. Plus, a new protection circuit automatically lowers the power setting whenever the internal temperature rises. This protects the radio when used as a cross-band repeater. But, that's just the beginning:

- Large, 6 character alphanumeric display with freely and separately selectable three color display illumination in blue, violet or orange for TX/RX/stand-by
- TCXO that is stable to ±2.5 ppm
- Narrow FM mode
- Power supply voltage display
- Ignition key on/off feature & theft alarm feature
- CTCSS, DCS encode/decode and DTMF encode functions plus European Tone Bursts
- Multiple scan modes and extended receive capabilities including broadcast FM
- Backlit DTMF microphone allows direct frequency entry and more
- VHF: 50/20/5, UHF: 35/20/5 watt power output settings
- 200 Memory channels that can operate in splits of 80ch/VHF, 80ch/UHF and 40ch freely programmable with 1 call channel each for VHF and UHF operation
- Extended receive from 108.000 ~173.995MHz / 335.000 ~ 479.995MHz / 87.5 ~ 107.995MHz, transmits from 144.000 ~ 147.995MHz / 430.000 ~ 449.995MHz, plus reception on AM aircraft band and the ability to operate on MARS frequencies
- Can also operate with Alinco's optional EJ-50U digital data packet board that fits inside or the EJ-47U digital voice board

Thanks to Alinco, you can have a dual band dynamo in your pocket AND in your car!

DJ-C7T 2M/440MHZ "Pocket-size" HT

Hams are packing some serious radio power in their pockets with the DJ-C7T, the new dual band mini HT. Alinco led the way in breakthrough miniature electronics technology with its revolutionary "credit card" size transceivers. Now, the DJ-C7T offers a "pocket size" HT that's small in size but BIG in added memories and modes.

Check out the features of this "new generation" DJ-C7T

- Internal speaker with great audio!
- 200 Memories
- VFO, Memory and Scan modes
- 39 CTCSS tone squelch (encode+decode) settings
- Split function
- SMA antenna port
- As thin as 0.57in. and just 3.59 oz. total weight with antenna and battery
- Cloning feature
- Lithium-ion battery
- Wide-band receive; includes FM broadcast and AM aircraft bands
- Auto repeater setting

The DJ-C7T can fit in a pocket or purse, but it's a versatile dual band HT with an enhanced receiver. So, you can enjoy twice the operating fun in half the size.

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VHF & UHF HANDHELDS

IC-T90A IC-V82/U82

IC-V82 ***2M High Power 7W Digital Capable Handheld*** – 7W output @ 7.2V DC; 6.0 - 10.3V DC input; 136-174 MHz RX; **D-Star** upgradable with optional UT-118 Digital Voice Unit Ⓡ **$119.99**

IC-U82 – Same as IC-V82, but TX: 420-450, RX: 400-479 MHz; 5W. Ⓡ **$119.99**

IC-T90A ***6M/2M/70cm FM Handheld*** – 7.4V Lithium-ion battery; 5 Watt output; Wideband RX 495 kHz to 999.990 MHz (cell blocked), in AM, FM or WFM modes; 555 memories. Ⓡ **$249.99**

VHF & UHF MOBILES

IC-V8000 ***2M FM Mobile*** – 75W output; Covers 144-148 TX with 136-174 MHz RX; 207 alpha memories; WX Alert. Ⓡ **$179.99**

IC-2820H ***2M/440 Analog Dual Bander with Digital and GPS Optional*** – Covers 144-148 & 430-450 MHz with wideband receive (Left Band) 118-549.95 / (Right Band) 118-173.995, 375-549.995 and 810-990.990 MHz (cell blocked). 522 memories; Power: 50/15/5W 2M & 440. Removable front panel, built-in CTCSS Encode/Decode, PC compatibility. Two antenna jacks support diversity reception in the 127, 136, 146, 375, 440 and 500 MHz bands (two antennas required). Upgradable **D-Star** DV (digital voice) and GPS capabilities with the optional UT-123. Packet ready (9600 BPS – 6-pin DIN). **$649.99**

GET READY FOR THE CONTEST SEASON!

IC-706 MK II-G IC-7000

IC-706 MK II-G ***Multi band Multimode Mobile Transceiver*** – Covers HF/6M/2M/440 MHz and has 107 memories; Power: 100W on 160-6M, 50W on 2M, 20W on 440 MHz; AF-DSP; IF shift; Preamp/attenuator; 2 filter slots. Free RMK-706 Ⓡ **$899.99**

IC-7000 ***Multi band Multimode Mobile Transceiver*** Covers HF/6M/2M/440 MHz and has 503 memories. Power: 100W on 160-6M, 50W on 2M, 35W on 440 MHz; 2.5 inch color TFT; 41 bandwidths with sharp or soft filter shape. Free RMK-7000 © **$1299.99**

IC-718 ***HF All Band Transceiver*** – Now includes DSP! Covers 160-10M with 0.03-30 MHz receive in SSB, CW, RTTY and AM modes; 100W (40W AM); 101 memories. Ⓡ **$549.99**

IC-746PRO ***HF/VHF All Mode Transceiver*** – Covers HF/6M/2M with 0.03-60 MHz, and 108-174 MHz RX; 100W output on all bands; 100 memories; Built-in HF/6M auto antenna tuner; 32-bit DSP and 24-bit AD/DA converter. Free PS-125 © Ⓡ **$1499.99**

IC-756PRO III ***HF/50 MHz All Mode Transceiver*** – Covers HF/6M; 100W output all bands; User defined filter settings; Soft & sharp filter shapes; Real time spectrum scope; Improved 3rd order intercept point; Automatic Antenna Tuner. © **$2699.99**

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HANDHELDS & MOBILES

VX-170 ***2 meter FM Sub-mersible handheld*** – RX coverage: 136-174 MHz and 200 memories. Power: 5W. © **$119.99**

VX-6R ***Dualband Sub-mersible HT*** – 5W output on 144 and 440 MHz FM. Also 1.5W output on 220 MHz. 504 kHz to 998.9 MHz continuous RX (cellular blocked); 900 memories. **$249.99**

VX-170/177 VX-6R

FT-2800M ***2M FM Transceiver***
Covers: 144-148 MHz TX with 137-174 MHz RX and WX Alert; Power: 65/25/10/5W; CTCSS & DCS Encode/Decode; WIRES™ capability. © **$139.99**

(FT-8900R shown)

FT-8800R ***2M/440 MHz FM Mobile*** – Covers 2M (50W)/440 MHz (35W) with 108-520 & 700-999 MHz RX (cell blkd); Crossband repeat. Free YSK-8900 **$374.99**

FT-8900R ***Quad Band FM Mobile*** – Like the FT-8800R but also covers 10M & 6M at 50W output. Free YSK-8900 **$424.99**

GET READY FOR THE CONTEST SEASON!

FT-2000 ***100W HF/6M Transceiver*** – Covers 160–6M (TX) and 30 kHz – 60 MHz (RX), all modes. Power output: 100W. Features: Built-in automatic antenna tuner; 32-bit Floating Point DSP-based variable IF Bandwidth, IF shift and Contour Tuning; First IF Roofing Filters (3 kHz/6 kHz/15 kHz included); Dual In-band Receive; External display port with optional DMU-2000 unit for viewing of RF scope, Audio scope and Oscilloscope displays. © **$2469.99**

FT-2000D ***200 Watt version of the FT-2000 series*** – Same as the FT-2000 except RF output is 200W and the power supply is external instead of internal. FP-2000 power supply included. © **$3099.99**

FT-450 ***100W HF/6M All-Mode Portable/Base Transceiver***
Covers HF + 50 MHz with 100W output, all mode, 500 memory channels; 10 kHz roofing filter and 400 MHz IF DSP technology. Selectable AGC, IF width & shift, contour, digital noise reduction, manual notch filter and clarifier. Digital voice announcement of frequency, mode and S-meter. Loaded with many more outstanding features! Optional internal antenna tuner (ATU-450) & carrying handle available. © **$899.99**

FT-817ND ***HF/VHF/UHF Backpack Transceiver***
Covers 160-10M, 6M, 2M, 70CM; RX: 100 kHz - 56 MHz, 76-154 MHz, 420-470 MHz. Power: 5W SSB/CW/FM (13.8V ext. DC), 1.5W AM, 2.5W SSB/CW/FM (9.6V NiMH pack or 8 AA's), 0.7W AM, up to 5W SSB/CW/FM. 1400mAh NiMH battery & charger. **$599.99**

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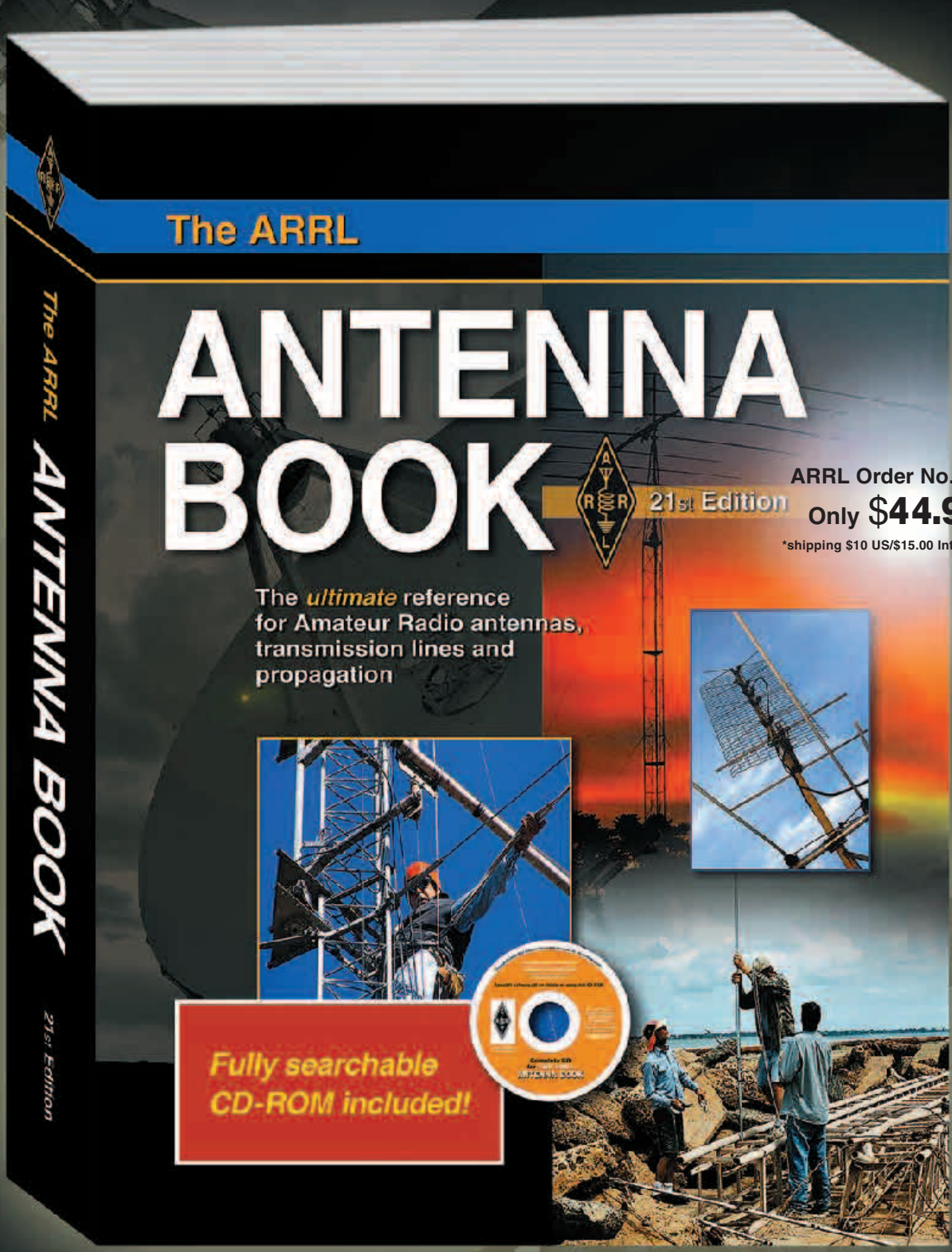

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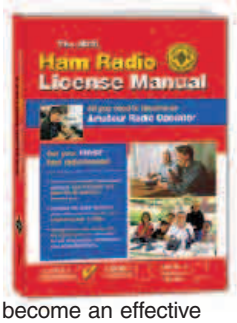

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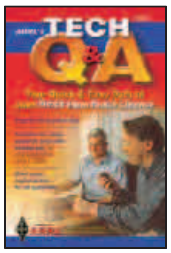

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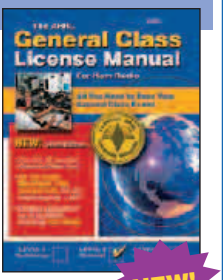

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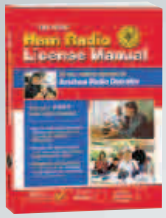

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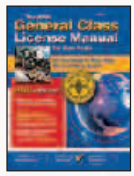

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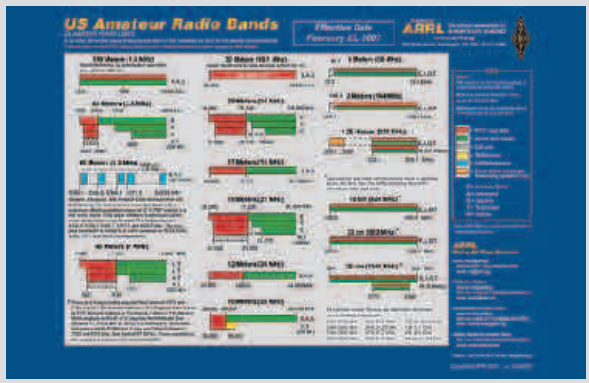

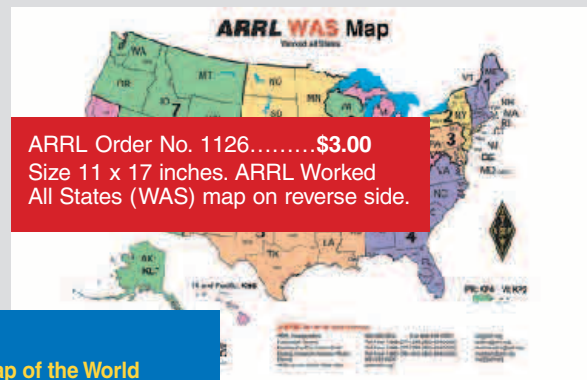

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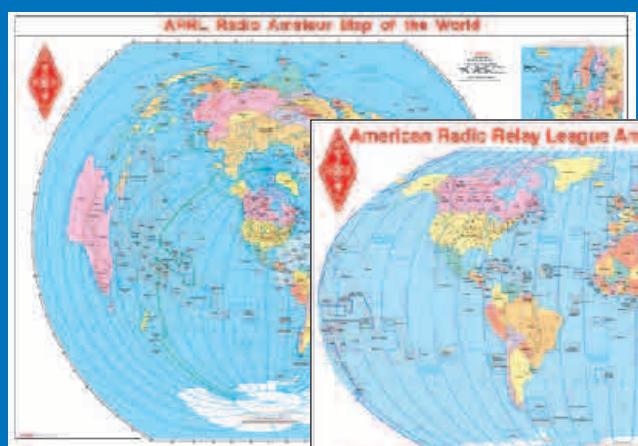

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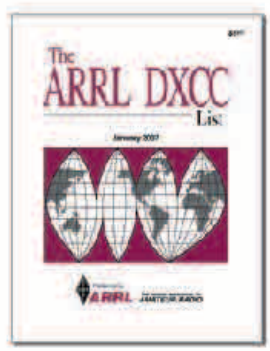

The ARRL DXCC List

January 2007 Edition
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Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer. . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

The MIRAGE B-5018-G gives you 160 Watts output for 50 Watts input on all modes -- FM, SSB, or CW!

Ideal for 25-50 Watt 2 Meter mobile or base. Weak signals pop out with its low noise *GaAsFET* preamp and its excellent 0.6 dB noise figure. Selectable 5, 8 or 14 dB preamp gain.

Exclusive MIRAGE *ActiveBias*™ circuit gives *crystal clear SSB* without splatter or distortion.

B-5018-G is legendary for its ruggedness and is fully protected -- high SWR or excessive input power automatically bypasses the B-5018-G to prevent damage.

Heavy-duty heatsink spans entire length of cabinet. Power transistors protected by MIRAGE's *Therm-O-Guard*™.

Has adjustable delay *RF sense* Transmit/Receive switch *and* remote external keying. 16-20 Amps at 13.8 VDC.12x3x5½ inches.

B-5018-G **$329.95**

B-1018-G, $409.95. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.25-10 Watt rigs.

B-2518-G, $329.95. Same as B-5018-G but for 10 to 25 Watt mobile or base. 160 Watts out for 25 Watts in.

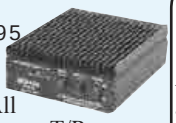
RC-2, $49.95. Remote Control. On/Off,pre-amp On/Off, selects SSB/FM. With 25 foot cable.

Power Curve -- typical output power in Watts										
B-1018-G	25	50	140	150	160	160	--	--	--	--
B-2518-G	5	7	40	60	80	100	125	160	160	160
B-5018-G	--	2	15	25	40	50	70	100	130	160
Watts In	.25	.5	3	5	8	10	15	25	35	50

35 Watts for 2 Meter HT

For handhelds up to 8 Watts. 35 Watts out for 3-8 Watts in (18 W out/1W in)! 18 dB *GaAsFET* preamp. All modes: FM, SSB, CW. RF sense T/R switch. Reverse polarity protection. Includes mobile bracket, 1 year warranty. 5¼Wx1¾Hx4¾D in.

B-34-G **$109.95**



35 Watts, $89.95, FM only

B-34, $89.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛Wx1¾Hx4¼D in

MIRAGE Dual Band 144/440 MHz Amp

Boost your *dual band* 144/440 MHz handheld to a powerful mobile/base -- 45 Watts on 2 Meters/ 35 Watts on 440 MHz! Works with all FM handhelds to 7 Watts. Includes *full duplex* operation -- lets you talk on one band, listen on other at same time. Auto band selection, RF sense T/R switch, single connector, reverse polarity protection, 5Wx1¾Hx5D in. Mobile bracket. One year warranty.

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100 Watts for 2M HT

100 Watts out for 2-8 Watts in! Great for HTs up to 8W. FM, SSB, CW. 15 dB *GaAsFET* preamp, RF sense T/R, high-SWR protected.

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. . . the VECTRONICS HFT-1500

- ***High Current Roller Inductor***
- ***SSB*Analyzer Bargraph™***
- ***Cross-Needle Meter***
- ***6 Position Antenna Switch***
- ***Built-in 4:1 Balun***
- ***Gear driven Turns Counter***

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a super durable paint that won't scratch or chip.

Attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the front panel. You won't leave a mark!

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Two 4.5 kV transmitting variable capacitors and a massive roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you quickly fly from band to band. A precision 5-digit gear driven turns counter lets you accurately retune.

HFT-1500 **$469.95**

Large comfortable knobs and smooth vernier drives make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

You can tune your SWR down to the absolute minimum! **Why?** Because all network components -- roller inductor and variable capacitors are fully adjustable.

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You can tune any *real* antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, Yagis, quads, long-wires, whips, G5RVs, and more.

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Exclusive 21 segment bargraph lets you visually follow your instantaneous voice peaks. Has level and delay controls.

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Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

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THANK YOU!

August 1, 2007

Dear Fellow Hams,

MFJ modestly began in a small downtown Starkville, Mississippi hotel room in October of 1972. The original product, a CW Filter Kit CWF-2, sold for $9.95.

Today, MFJ remains an *all American* company and manufactures well over 2500 different products, more than any other ham radio company in the world!

This October, 2007 is the 35th Anniversary of our ham radio adventure and I am deeply thankful for the overwhelming support our fellow hams have given us.

I would like to humbly thank all my fellow hams who have helped MFJ reach this monumental milestone.

Without *your* support, the hard work and dedication of our employees and the tremendous support of so many MFJ friends, this 35th Anniversary milestone could not have been achieved.

Thank you again for your tremendous support!

73s,

Martin F. Jue, K5FLU

Martin F. Jue, K5FLU
President and Founder
MFJ Enterprises, Inc.

P.S. Come and help us celebrate our 35th Anniversary, September 7 & 8, 2007. Factory tours, Free lunch, Major Prizes, VE Exams, K5MFJ Special Event Station.
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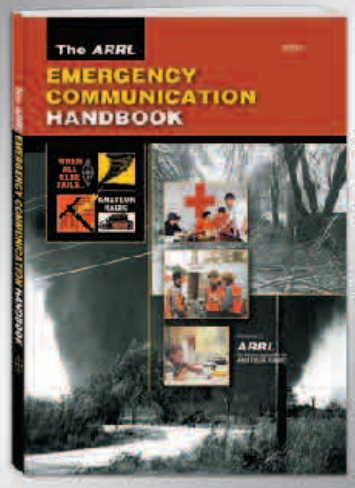

The ARRL Emergency Communication Handbook

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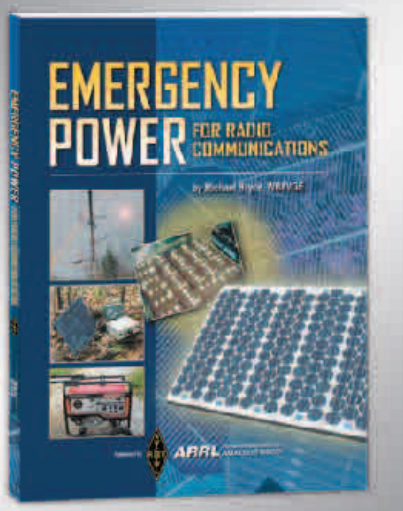
Serving Your Community Through Amateur Radio… When All Else Fails!

"As hams, we have a unique ability to assist in times of trouble. We're experienced communicators. We know how to make radios work. We have the skill to efficiently communicate helpful and even life-saving information when other communication systems fail."
– David Sumner, K1ZZ,
ARRL Chief Executive Officer

This handbook is intended for all hams that volunteer their skills in public service applications (or who are interested in doing so). It includes details on basic emergency communication skills, message handling, and more. Understand what to expect and what to take along.



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Energy Independence!
Portable Energy!

Emergency Power for Radio Communications

by Michael Bryce, WB8VGE
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With this comprehensive guide you can explore the various means of electric power generation—from charging batteries, to keeping the lights on. This book covers the foundation of any communications installation—the power source. Use this book to plan ways to stay on the air when weather or other reasons cause a short-term or long-term power outage. **When all else fails…how will you communicate?** Find ways to reach beyond the commercial power grid. Identify methods for alternative power generation that will work best in your particular situation, perhaps taking advantage of possibilities already on hand.

Contents

- Keeping the Signals on the Air
- Hey, I Am In The Dark: Keeping The Lights On In The Ham Shack With Emergency Power
- Solar Power
- Charge Controllers for PV Systems
- Generators: Gas, Wind and Water
- Load Sizing
- Holding Your Volts: Battery Systems and Storage
- Systems for Emergency Power
- Inverters
- Station Instrumentation
- Safety
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Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

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Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up our power supplies!

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25 Amp
$149.95 plus s&h

MFJ-4245MV
45 Amp
$199.95 plus s&h

No RF Hash!

They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¾Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

***New!* MFJ-4175, $359.95.** 75 Amps *continuous*. 13.8-14.2 VDC. 7.8 pounds. 6½Wx3½Hx10D inches.108-132 VAC. *No RF hash!*

NEW! 25 Amp *MightyLite*™

MFJ-4125
25 Amp
$109.95 plus s&h

Super light, super compact switching power supply delivers 25 Amps maximum/22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 2.86 lbs. 5¾Wx3Hx5¾D inches.

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

MFJ-4035MV
$149.95

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$79.95 plus s&h

MFJ-1116
$54.95 plus s&h

MFJ-1112
$39.95 plus s&h

MFJ-1117
$59.95 plus s&h

MFJ-1118, $79.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $54.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $39.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

MFJ-1117, $59.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

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Clubs or organizations may honor their club name or call sign, or celebrate a Ham of the Year, founding member or special achievement.

Each Diamond Club contribution of $250 or more includes all ARRL member and Diamond Club benefits, including *QST*, plus a Lucite replica of your brick depicting an inset of the Diamond Terrace graphic and your engraved information.

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If you are traveling near ARRL Headquarters stop in and see for yourself!

MFJ-259B *1.8-170 MHz* SWR Analyzer

World's most popular SWR analyzer is super easy-to-use

Reads SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . frequency counter . . . side-by-side meters . . . Battery charger . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . .

World's most popular SWR analyzer! ***The famous MFJ-259B gives you a complete picture of your antenna's performance. You can read your antenna's SWR and Complex Impedance from 1.8 to 170 MHz.***

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously.

You can read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-MH/Ni-CD charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance from HF to VHF -- 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Call your favorite dealer for your best price!

MFJ-259B
$279.95

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and more!

Free Manual: call, write or download

MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1312D, $15.95. Its rugged all metal cabinet is a compact 4x2x6¾ in.

How good is the MFJ-259B?

MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

More MFJ SWR Analyzers™

MFJ-249B, $259.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $149.95. Like MFJ-249B but SWR meter only. No LCD/frequency counter.

MFJ-219B, $119.95. UHF *SWR Analyzer* covers 420-450 MHz. External frequency counter jack. 7½x2½x2¼ in. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $24.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Takes guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*.

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MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories. Made of special foam-filled fabric -- cushions blows, deflects scrapes, and protects knobs, meters and displays from harm. Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends. Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case.

MFJ-99, $60.85. Accessory Package for MFJ-259/B/249/B/209. Includes MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1312D 110VAC adapter. ***Save $5!***

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MFJ-731, $89.95. *Exclusive* MFJ tunable RF filter allows accurate SWR and impedance measurements 1.8-30 MHz in presence of strong RF fields. Virtually no effect on measurements. Works with *all* SWR Analyzers.

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All-in-one handheld antenna test lab lets you quickly check/tune HF, VHF, ***UHF*** antennas anywhere. Measures: SWR, Return Loss, Reflection Coefficient, R, X, Z, Phase Angle, Coax cable loss, Coax cable length, Distance to short/open in coax, Inductance, Capacitance, Resonant Frequency, Bandwidth, Q, Velocity Factor, Attenuation, more!

MFJ-269
$379.95

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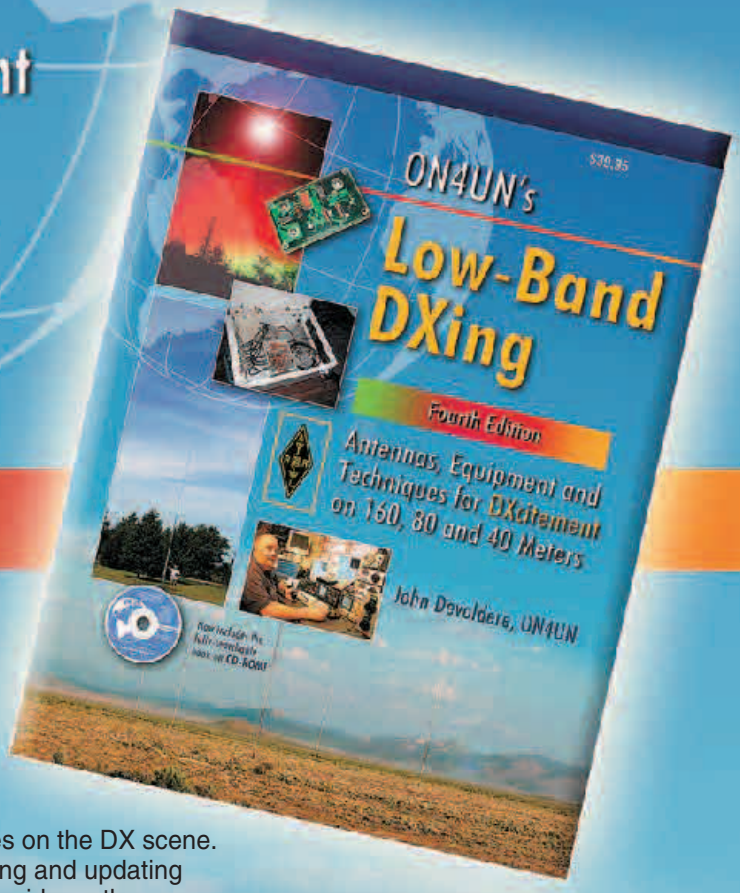
ON4UN's Low-Band DXing

Antennas, Equipment and Techniques for DXcitement on 160, 80 and 40 Meters



by John Devoldere, ON4UN

Thoroughly updated with entirely new material on low-band antennas and high-gain transmitting arrays. Includes new insights and new design techniques for receiving antennas and vertical arrays.

"John is one of the most recognizable figures on the DX scene. He has spent more than 1,500 hours rewriting and updating **ON4UN's Low-Band DXing**, known far and wide as the 'low-bander's bible.'"—R. Dean Straw, N6BV, Editor

CD-ROM included! This edition is bundled with the fully searchable and complete book on **CD-ROM** for *Windows*® and Macintosh® systems. (Also contains additional **ON4UN software** and over 2000 quality pictures.)

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MFJ Compact 200 Watt *IntelliTuners*™

Automatically tunes any unbalanced antenna . . . Ultra fast . . . 20,000 VirtualAntenna™ Memories . . . Antenna Switch . . . Efficient L-network . . . Matches 6-1600 Ohms at 200 Watts . . . 1.8-30 MHz . . . Digital SWR/Wattmeter . . . Audio SWR meter . . . Radio interface . . .

The MFJ-929 *IntelliTuner-Compact*™ lets you *automatically* tune any coax fed or random wire antenna 1.8-30 MHz at full 200 Watts SSB/CW. It can match 6-1600 Ohms (SWR up to 32:1) - - that's a 50% wider matching range at a higher power level than lesser competing products.

You get a *digital* SWR/Wattmeter with backlit LCD, antenna switch for 2 antennas, built-in radio interface and built-in internal BiasTee for remote tuner operation.

MFJ's exclusive *IntelliTune*™, *Adaptive Search*™ and *InstantRecall*™ algorithms give you ultra-fast automatic tuning with over 20,000 *VirtualAntenna*™ Memories.

MFJ VirtualAntenna™ Memory

MFJ new *VirtualAntenna*™ Memory system gives you 4 antenna memory banks for *each* of 2 antenna connectors. You can select up to 4 antennas on each antenna connector. Each antenna has 2500 memories.

New!

MFJ-929
$219.95

4 Times the Solutions!

MFJ-929 gives you 256 values each of capacitance and inductances for 131,072 matching solutions. That's *4 times* the 32,768 matching solutions of competing products with only 128 L/C values each!

Highly intelligent, ultra-fast tuning!

Don't be fooled by competing products claiming fast search times -- if you have a *quarter* of the matching solutions, of course, it takes less time to search but it's *not* faster.

MFJ's much faster speed comes from advanced technology and software algorithms *not* from fewer matching solutions.

MFJ's *IntelliTuner-Compact*™ actually *measures* complex impedance -- *R* and *X* -- of your antenna, computes the L-network values needed and snaps in those components to give you an *instant* match.

If the load is out of measurement range, *AdaptiveSearch*™ determines the *smaller* subset from all solutions that can match a safe load -- and then searches *only* that subset -- others search through far more solutions.

Digital LCD SWR/Wattmeter

An easy-to-read, two-line, 16-character backlit LCD displays SWR, peak or average forward/reflected power, frequency, antenna 1 or 2, L/C tuner values, on/off indicators and other info. They are selected from easy-to-understand menus -- *not* complex combinations of buttons you can't remember.

A fast-response, high-resolution bargraph gives you an auto-ranging 20/200 Watt power meter. You get 60 segments each for forward and reflected power and 36 segments for SWR -- *try that with an 8 segment bargraph that makes you change power ranges and doesn't even give you reflected power!*

You can read inductance and capacitance *directly* in uH and pF. This turns you into an expert *L-network designer!* Match your load, read the resulting L/C values, then use them to build your fixed L-network.

Or, knowing the L/C values you can determine R and X of the load impedance.

Plus Much More!

***StickyTune*™** mode gives you one-hand tuning by locking the TUNE button -- just transmit to tune regardless of SWR.

Has audio SWR meter and audio feed back. Competing products don't.

Built-in 50 MHz frequency counter.

Its built-in radio interface lets you use a simple wire cable to compatible rigs. Others require a cable with expensive electronics.

Binding post for random wire. Self-test.

Highly efficient L-network. 10 Amp/1000V relays, RF duty silver mica capacitors. 6½ Wx2¾Hx7½D in. 2.4 lbs. 12-15 VDC/1Amp or 110 VAC with MFJ-1316, $21.95.

MFJ-928, $199.95. **Like** MFJ-929, less LCD, manual tune buttons.

MFJ-927, $259.95. **Weather** protected *remote* auto tuner for coax/wire ant., includes MFJ-4116 Power Injector. Most MFJ-929 features, no LCD/buttons.

MFJ-5114 K/Y/I/A, $19.95. Prewired Radio Interface cable for MFJ-929/928.

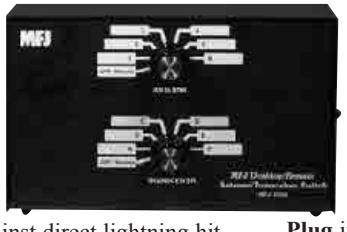
MFJ-4116, $24.95. Power Injector for remote MFJ-929/928 use. Sends DC/RF down coax.

Desktop/Remote Antenna and Antenna/Transceiver Switches

MFJ-4716
$89.95
6-position *Antenna* Switch

New!

MFJ-4726
$159.95
6-position *Antenna/Transceiver* Switch



Place these MFJ antenna or antenna/transceiver switches on your *desk* or use them *remotely*. You can place them out-of-the-way under your desk, in your garage or closet -- saves cable, eliminates cable mess.

Super easy-to-use rotary switches -- no complicated computer buttons to learn or microprocessors to fail or generate RFI that covers up rare DX.

Select 1 of 6 antennas and/or 1 of 6 transceivers in any combination. All unused inputs are grounded. Automatically grounds all inputs when you turn off your transceiver -- simply connect a sense line to your transceiver. When rotary switches are in OFF position, all inputs are grounded or control is transferred to the optional remote control.

Ultra-fast gas discharge tube *lightning surge protector* protects transceiver and safely shunts static electricity and lightning induced surges safely to ground. Does not protect against direct lightning hit.

SO-239 connectors. 1500 Watts/50-75 Ohm load, 1-60 MHz. Useable to 150 MHz. Connects to remote control with common CAT 5 cable, not included (available from WalMart, etc.). Use 12 VDC or 110 VAC with MFJ-1312D, $14.95. For indoor use, not weather protected.

Antenna Switches - - 6 and 4 positions

• MFJ-4716, $89.95, ***6-positions***; **• MFJ-4714, $79.95,** ***4-positions***. 8Wx2¾Hx4¼D in.

Remote Controls:
• MFJ-4716RC, $39.95, ***6-positions***;
• MFJ-4714RC, $39.95, ***4-positions***.
2¾Wx3¾Hx1D inches.

Antenna/Transceiver Switches - - 6 and 4 positions

Select one of 6 antennas *and* one of 6 transceivers in any combination with just two easy-to-use rotary switches.

Plug in antenna tuner, SWR/Wattmeter or other into its common ports, so it's always connected to the antenna and radio selected.

• MFJ-4726, $159.95, ***6-positions***; **• MFJ-4724, $139.95,** ***4-positions***. 8Wx5Hx4¼D"

Remote Controls: • MFJ-4726RC, $59.95, ***6-positions***; **• MFJ-4724RC, $59.95,** ***4-positions***. 2¾Wx3¾Hx1D"

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MFJ TUNERS

New, Improved MFJ-989D 1500 Watt *legal limit* Antenna Tuner

World's most popular 1500 Watt Legal Limit Tuner just got better -- much better -- gives you more for your money!

New, improved MFJ-989D *legal limit* antenna tuner gives you better efficiency, lower losses and a new *true* peak reading meter. It easily handles *full* 1500 Watts SSB/CW, 1.8 to 30 MHz, including MARS/WARC bands.

New dual 500 pF *air variable capacitors* give you twice the capacitance for more efficient operation on 160 and 80 Meters.

New, improved *AirCore*™ *Roller Inductor* gives you lower losses, higher Q and handles more power more efficiently.

New *TrueActive*™ peak reading Cross-Needle *SWR/Wattmeter* lets you read *true* peak power on all modes.

MFJ-989D $369.95

New high voltage *current balun* lets you tune balanced lines at high power with no worries.

New *crank knob* lets you reset your roller inductor quickly, smoothly and accurately.

New larger 2-inch diameter *capacitor knobs* with easy-to-see dials make tuning much easier.

New cabinet maintains components' high-Q. Generous air vents keep components cool. $12^{7}/_{8}$Wx6Hx$11^{5}/_{8}$D inches.

Includes six position ceramic antenna switch, 50 Ohm dummy load, indestructible multi-color Lexan front panel with detailed logging scales and legends.

The MFJ-989D uses the superb time-tested T-Network. It has the widest matching range and is the easiest to use of all matching networks. Now with MFJ's new 500 pF air variable capacitors and new low loss roller inductor, it easily handles higher power much more efficiently.

***No Matter What*™ Warranty**

Every MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

MFJ-986 $339.95

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. $10^{3}/_{4}$Wx$4^{1}/_{2}$Hx15 in.

MFJ-962D *compact* kW Tuner

MFJ-962D $279.95

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. $10^{3}/_{4}$x$4^{1}/_{2}$x$10^{7}/_{8}$ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 $199.95

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. $3^{1}/_{2}$Hx$10^{1}/_{2}$Wx$9^{1}/_{2}$D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E $169.95

More *hams use MFJ-949s than any other antenna tuner in the world!* Handles 300 Watts. Full 1.8 to 30 MHz coverage, custom inductor switch, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. $3^{1}/_{2}$Hx$10^{5}/_{8}$Wx7D inches. **MFJ-948, $139.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E $129.95

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek $10^{1}/_{2}$Wx$2^{1}/_{2}$Hx7D in.

MFJ-945E HF/6M *mobile* Tuner

MFJ-945E $119.95

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $6.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 $109.95

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x$6^{1}/_{2}$x$2^{1}/_{2}$ in.

MFJ-901B *smallest* Versa Tuner

MFJ-901B $89.95

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-902 *Tiny Travel* Tuner

MFJ-902 $89.95

Tiny $4^{1}/_{2}$x$2^{1}/_{4}$x3 inches, full 150 Watts, 80-10 Meters, has tuner bypass switch, for coax/random wire.

MFJ-904H, $139.95. Same but adds Cross-needle SWR/Wattmeter and 4:1 balun for balanced lines. $7^{1}/_{4}$x$2^{1}/_{4}$x$2^{3}/_{4}$ inches.

MFJ-16010 *random wire* Tuner

MFJ-16010 $59.95

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 $89.95

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $59.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921/924 $79.95

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x$2^{1}/_{2}$x3 in.

MFJ-931 *artificial* RF Ground

MFJ-931 $99.95

Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. Creates artificial RF ground or electrically places far away RF ground directly at rig. **MFJ-934, $199.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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MFJ 2500 Watts *ContinuousCarrier*™ Tuner

Silver plated Edge-Wound Roller Inductor . . .1000/500 pF Variable Capacitors . . . Antenna Switch . . . 4-Core Balun . . . true Peak Cross-Needle SWR/Wattmeter . . . Dummy Load . . . Extremely Wide Matching Range . . . Patent Pending . . .

New!

MFJ-9982

$699.95

The MFJ-9982 ContinuousCarrier™ antenna tuner handles 2500 Watts continuous carrier output on all modes and all HF bands into most unbalanced antennas -- even on 160 Meters where even the best antenna tuners fail!

The MFJ-9982 gives you every feature you'll ever want in a high power tuner -- wide matching range, 1.8 to 30 MHz coverage, 6-position antenna switch, 4-core balun, dummy load, true peak/average lighted SWR/Wattmeter, 6:1 reduction drives with detailed logging scales, 3-digit turns counter, extra large knobs.

New Components, New Technologies

The *Heart and Soul* of the MFJ-9982 is its roller inductor and variable capacitors.

MFJ's high power, high-Q *continuous current AirCore*™ roller inductor is no ordinary roller inductor! It's edge wound from thick .06-inch *silver-plated* solid copper strap.

It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn up ordinary roller inductors.

Self-insulating construction reduces stray capacitance -- keeps self-resonant frequencies high and out-of-the-way. Dual, *silver-plated* compression wheels give ultra low-resistance contacts. New fast-tune crank knob.

High-current, *high-capacitance* 1000 pF and 500 pF air variable capacitors have low minimum capacitance and are self-insulating.

These newly developed air variable capacitors give you *very high efficiency* on 160/80 Meters *and* MFJ's patent pending innovation gives you *extremely wide matching range* on 10/12/15 Meters at 2500 Watts -- a feat *only* the MFJ-9982 has achieved.

Hi-Voltage/Current Antenna Switch

The antenna switch is completely isolated to handle high-voltage, high impedance antennas. High-current, low impedance antennas are handled by parallel sets of high-current contacts of *two* ceramic switches.

New 4-Core Balun

Powerful balun -- Four 2½ inch cores, 12-gauge *Teflon*™ wire. Run balanced lines at full 2500 Watts SSB/CW continuous, 24/7.

New Balanced Line Feed-Thru Insulator

Allows massive transmitter currents to flow directly to the antenna without passing through lossy screws or bolts.

TrueActive™ *Peak Reading Circuit*

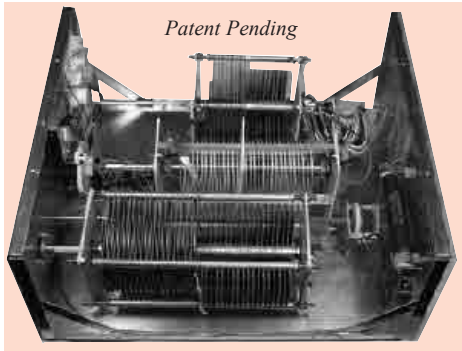
New *TrueActive*™ circuit reads *true* peak or average power on all modes. *Cross-Needle* meter reads SWR/forward/reflected power.

1500 Watt Dummy Load

1500 Watt air-cooled non-inductive 50 Ohm resistor. 100W/10 min., 1.5kW/10 sec.

New Cabinet maintains high Q

New roomy cabinet maintains high Q. Vent holes. Heavy gauge, .08 inch aluminum braced chassis. Vinyl cover, non-stripping PEM nuts, heavy 10-gauge and copper strap wiring throughout. 13¾Wx7Dx16¼D inches. 15 pounds.



MFJ 1500 Watt *Fully Balanced* Antenna Tuner

Fully balanced MFJ-976 handles 1500 Watts legal limit . . . Extra-wide 12-2000 Ohms matching range . . . continuous 1.8 to 30 MHz coverage including all WARC bands . . . Four separate 500 pF in two gangs gives you a total of 2000 pF capacitance . . . Heavy duty 1:1 current balun . . . more!

New!

MFJ-976

$499.95

The MFJ-976 is a 1500Watt full Legal Limit *fully balanced* antenna tuner.

You get *superb* current balance, very wide matching range (12-2000 Ohms) and *continuous* 1.8-30 MHz coverage including all WARC bands. Handles *full* 1500 Watts SSB *and* CW.

You can tune *any* balanced lines including 600 Ohm open wire line, 450/ 300 Ohm ladder lines, 300/72 Ohm twin lead -- shielded or unshielded. Also tunes random wires and coax fed antennas.

MFJ's *fully balanced* extremely wide-range T-network gives you simple, fast three knob tuning. No complicated switching between high and low impedance and switching in additional capacitance of L-networks.

Four separate 500 pF in two gangs gives you a total of 2000 pF for highly efficient low loss operation on 160 Meters.

You get excellent 10 Meter performance because of MFJ's low minimum capacitance and exclusive *Self-Resonance Killer*™ high-Q *AirCore*™ roller inductor with silver plated contacts.

Heavy duty 1:1 current balun gives you *superb balance* and stays cool even at 1.5kW.

True *active* peak reading lighted Cross-Needle SWR/Wattmeter lets you read SWR, *true peak* or average forward and reflected power all at a glance on 300/ 3000 Watt ranges. 12Wx6Hx15¾D inches.

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MFJ . . . The World Leader in Ham Radio Accessories

QSL Cards/Call Sign Novelties

General

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

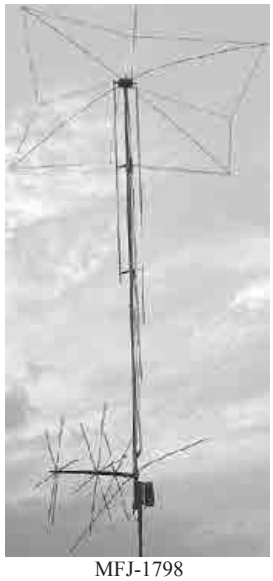
Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.



MFJ-1798
$289.95
Ship Code F

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

No Ground or Radials Needed

You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

No Feedline Radiation to Waste Power

The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

Built to Last

Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$399.95

MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics, or mobile homes.

Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency*.

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

MFJ-1788, $449.95. Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $359.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $259.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

MFJ Apartment Antenna

MFJ-1622 $99.95

Covers 40 thru 2 Meters. Mounts outdoor to windows, balconies, railings. Works great indoors mounted to desks, tables, bookshelves. Highly efficient air wound *bug catcher* loading coil and telescoping 5½ foot radiator lets you really get out! Radiator collapses to 2½ feet for easy storage/carrying. Includes coax RF choke balun, coax feed line, counterpoise wire, safety rope. 200 Watts PEP.

MFJ's G5RV Antenna

MFJ-1778
$39.95

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed

MFJ-1796
$219.95

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

MFJ-1792, $179.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $199.95. Like MFJ-1792 but has full size 20 Meter ¼ wave also.

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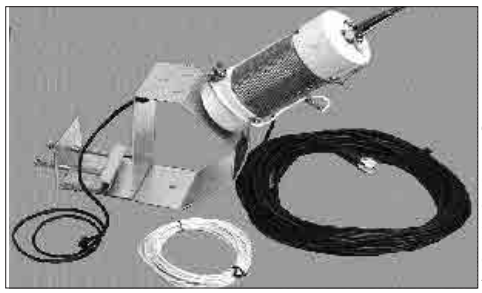
MFJ *Apartment* Antenna

Covers 40 thru 2 Meters . . . Mounts outdoor to windows, balconies, railings . . . works great indoors mounted to desks, tables, bookshelves



MFJ-1622
$99.95
New!

New MFJ-1622 Apartment Antenna lets you operate 40 thru 10 Meters on HF and 6 & 2 Meters on VHF with a single antenna!

Its universal mount/clamp lets you easily attach it to window frames, balconies and railings. It also works great indoors mounted to a bookshelf, desk, or table. It's not a 5 element yagi, but you'll work your share of exciting DX!

Highly efficient air wound "bug catcher" loading coil and telescoping 5½ foot radiator lets you really get out! Radiator collapses to 2½ feet for easy storage and carrying.

It includes coax RF choke balun, coax feed line, counterpoise wire and safety rope. Handles 200 Watts PEP.

Operating frequency is adjusted by moving the "wander lead" on coil and adjusting counterpoise for best SWR.

MFJ Ground-Coupled Portable Antenna Base

Provides effective RF ground and stable mount for 160-10M vertical antennas

MFJ-1904
$99.95

Capacitive coupling to ground is a *well-proven* principle. Needs no tuning. Provides excellent antenna performance with low SWR on all bands.

Provides permanent, temporary or portable installation/RF ground system for lightweight multi-band verticals like 160-10 Meters Hy-Gain AV-18AVS and 40-10 Meters MFJ-1795.

Makes verticals easy to set up and take down for stealth operation. Cover base with dirt to hide. Super-strong 2x2 foot *stainless steel* square has reinforcing bends. 6-inch *stainless steel* legs firmly anchor it into the ground.

Versatile *stainless steel* vertical antenna mount with built-in coax connector accepts standard and homebrew vertical antennas.

Built-in 3/8-inch x 24 mobile mount for MFJ Mobile Whips, bug catchers, *Hustlers* and screwdriver antennas. Handles make carrying/removing base fast and easy. You can also attach radials for improved performance.

Whip Tuner/Artificial Ground

Gives instant 80-10M, 150W Antenna

MFJ-1644
$149.95

Short whip and counterpoise wire gives you *instant* 150 Watt antenna. Efficient variable loading coils resonates short whip and tunes counterpoise. Operate 30-10M with included 4½ft. telescoping whip and counterpoise. For 80-40M operation, add longer whip or random wire and external loading coil. L-network gives low SWR.Current balun decouples radiating elements. Has RF current meter.

33 Feet Telescoping fiberglass Mast . . .

Collapses to 3.8 feet, weighs 3.3 lbs.

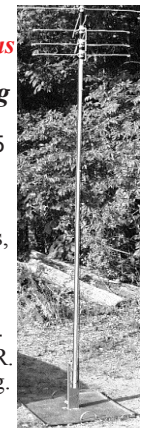
MFJ-1910
$79.95

Super strong fiberglass mast has huge 1¾ inch bottom section. Flexes to resist breaking. Resists UV. Put up *full size* inverted Vee dipole/vertical antenna in minutes and get *full size performance!*

MFJ Vertical

for Antenna Restricted Areas

40, 20, 15, 10 Meters, Automatic Band Switching



MFJ-1795
$159.95

Perfect for permanent or portable operation in antenna restricted areas. Hide behind trees, fences, buildings, *in* bushes -- only 7 to 10 feet tall (adjustable).

Low angle of radiation for DXing, omni-directional, handles 1500 watts PEP, low SWR.

Highly efficient end-loading. Entire length radiates.

Ground mounts with suitable ground such as MFJ-1904 *Ground-Coupled Antenna Base*, radials or ground rods. Or roof mount with radials.

MFJ LoopTuner™

MFJ-935B
$199.95

Drape a wire around a bookcase or window and attach both ends to this MFJ-935B Small *LoopTuner™*. It instantly turns into a small, high efficiency multi-band transmitting loop antenna!

Radiates low angle DX signal that rivals full size dipoles. Lets you operate 5.3 to 30 MHz with full 150 Watts. No ground, radials or counterpoises needed.

Very quiet receiving antenna. High-Q reduces QRM, overloading, harmonics. Perfect for apartments, antenna restricted areas and portable operation. Has relative RF current meter with sensitivity control for tuning.

MFJ Portable Antenna

MFJ-1621
$99.95

Operate from apartments, homes, hotels, campsites, beaches or any antenna restricted area. Work all bands 40, 30, 20, 17, 15, 12 and 10 Meters.

DXCC, *WAZ, WAC, WAS have been won with the MFJ-1621!* Compact 6x3x6 inch cabinet has 4½ foot telescoping whip, built-in antenna tuner, field strength meter and 50 feet coax. Handles 200 Watts.

MFJ Super High-Q Loop

MFJ-1786
$399.95

MFJ's *tiny* 36-inch diameter *high-efficiency* loop antenna performs like a *full-size* dipole! Operate 10 to 30 MHz *continuously* -- including WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics or mobile homes.

Mounts vertically or horizontally. Low angle radiation gives you excellent DX.

Super easy-to-use! Remote control auto-tunes to desired band, then beeps. No control cable needed. Handles 150 watts.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you highest possible efficiency*. Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

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Jobs

MFJ *giant* SWR/Wattmeter

World's *largest HF SWR/Wattmeter has* ***giant*** *6½ inch meter!*

This one you can SEE! Extra-long scales gives you highly accurate SWR and power measurements. Huge numbers makes reading easy across your shack.

Like your analog watch, one glance at the meter needle gives you fast and accurate readings without actually examining the scale. New!

MFJ's exclusive *TrueActive*™ peak reading circuit captures *true* peak or average forward and reflected power readings.

MFJ-868 $139.95

Has 20/200/2000 Watt ranges for accurate QRP or QRO operation.

Exclusive MFJ Wattmeter *Power Saver*™ circuit turns on meter only when RF power is being measured.

Covers 1.8-30 MHz. Use 9 volt battery or 12 VDC or 110 VAC with MFJ-1312D, $15.95. 7Wx5 1/2Hx5D in. SO-239 connectors.

New!

Giant 144/220/440 MHz SWR/Wattmeter

MFJ-867, $149.95. Similar to MFJ-868 giant SWR/Wattmeter, but for 144/220/440 MHz.

MFJ *Weather-Proof* Antenna *Feedthrough* Panel

New! ***Bring three coax-fed HF/VHF/UHF antennas, balanced line, random wire and ground into your hamshack without drilling through walls . . .*** MFJ-4602 $59.95

MFJ's Weather-proof *Antenna Feedthrough Panel* mounts in your window sill. Lets you feed three coax-fed antennas, balanced line, random wire and ground without drilling through walls.

Simply place in window sill and close window. One cut customizes it for any window up to 48 inches. Use horizontally or vertically. High-quality pressure-treated wood with excellent 3/4 inch thick insulating properties is painted with heavy coat of white outdoor enamel paint. Edges sealed by weather-stripping. Seals and insulates against all weather conditions. Gives years of trouble-free service. 3/4Dx3 1/2Hx48W in.

Inside/outside stainless steel plates bond all coax shields to ground. Stainless steel ground post brings outside ground connection inside. Three *Teflon*® SO-239 coax connectors, *ceramic* balanced line/randomwire feedthru insulators.

Stainless Steel Bonding Plate

Indoor View

Outdoor View

6-Band ***Rotatable*** mini-Dipole for 40,20,15,10,6,2 M

Low profile 14 ft . . . 7 ft. turning radius . . . 1.5 kW . . . Directivity focuses signal, reduces QRM/noise . . .

You can hardly see this mini 14 foot rotatable dipole from across the street!

Tiny 7-foot turning radius fits the smallest roof -- perfect for houses, apartments/condos.

The low-profile MFJ-1775 is not much bigger than a TV antenna and nicely blends into the sky. It's easily turned by a lightweight TV rotator.

It's no Wimp! Its *directivity* reduces QRM/noise and lets you *focus* your signal in the direction that you want -- so you can work some *real* DX.

Operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters. Run *full 1500 Watts* SSB/CW on all HF bands!

Its entire length radiates. Each HF band uses a separate, highly-efficient end-loading coil wound on fiberglass forms with *Teflon*™ wire with capacitance hats at each end (no lossy traps). 6 and 2 meters are *full-length* halfwave dipoles.

Built-to-last -- incredibly strong solid rod fiberglass center insulator and 6063 T-6 aircraft strength aluminum tubing radiator. Assembles in an afternoon. Adjusting one band has little effect on other bands.

MFJ-1775W, $239.95. WARC band version for 12, 17, 30, 60 Meters only.

80/40/20 Meter Rotatable Dipole

MFJ-1785, $359.95. DX the *low bands* on 80, 40, and 20 Meters with an efficient full 33 foot *rotatable* dipole! Handles a full 1500 Watts. Balun included. 6063 T-6 aircraft strength aluminum tubing with a solid center fiberglass insulator. Requires a medium-duty rotator such as Hy-gain's AR-40.

Compact SWR/Wattmeter

MFJ-822
MFJ-842
$59.95
New!

Compact SWR/Wattmeter has huge 3 inch *lighted* Cross-Needle Meter, easily viewable from across shack. Read forward/reflected power, SWR *simultaneously*. 3 1/4Wx3 1/4Hx3 1/4D in.

MFJ-822 for 1.8-200 MHz, 30/300 Watts.
MFJ-842 for 140-525 MHz, 15/150 Watts.

2-Position *Remote* Ant. Switch

MFJ-4712 $79.95

Switch any two antennas remotely! *Single* coax feeds two antennas, DC power, control signals -- *no extra cable needed*. Use 1.8-150 MHz antennas. 1500 Watts. 50-75 Ohms. 4W x2 5/8Hx1 1/2D in. fully enclosed, *weather protected* outside switch box has stainless steel bracket for 1 1/2 in. mast. 3 *Teflon*® SO-239s.

16-Element 2.4 GHz WiFi Yagi

MFJ-1800 $29.95

16-element WiFi Yagi antenna greatly extends range of 2.4 GHz, 802.11b/g WiFi signals. Turns slow/no connection into fast, solid connection. Highly directional -- minimizes interference. N-female connector. Tripod screw-mount. Wall/desk/shelf mounts. Use vertically or horizontally. 18Wx2 3/4Hx 1 1/4D in. 2.9 oz.

MFJ-5606SR, $24.95. Cable connects MFJ-1800/WiFi antennas to computer. Reverse-SMA male to N-male, 6 ft. RG-174.

MFJ-5606TR, $24.95. Same as MFJ-5606SR but Reverse-TNC male to N-male.

Glazed *Ceramic* Insulators

MFJ-16C06, $4.56, package of 6 authentic glazed *ceramic* antenna insulators. Extra-strong -- long antennas will not break, will not arc over or melt under full legal power. Extra-long ridges prevent high-voltage breakdown. Smooth wire holes prevent wire damage.

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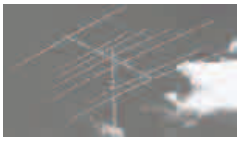

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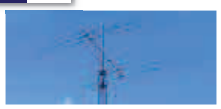

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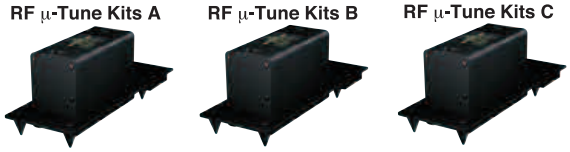

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