SPECIAL DXING ISSUE

QST

DEVOTED ENTIRELY TO AMATEUR RADIO

October 2010 WWW.ARRL.ORG

OCTOBER 2010 QST Vol 94 No 10

QST reviews:

A Harrowing DXpedition to a Remote Arctic Island (VY0)

Inside:

Plus: DX Adventures to Tropical Tokelau (ZK3) and Super-Rare Grid Square CM79

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200 Watt Output (50W AM),
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2 Completely Independent Receivers

+40dBm 3rd Order Intercept Point

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- Dualwatch Receive
- 4-hour Digital Recorder

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IC-RX7 TRACK READY

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*Frequency specs may vary. Refer to owner's manual for exact frequency specs. [1]Optional CT-17 required. [2]Optional CS-RX7 required.

hy-gain ROTATORS

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HAM-IV

HAM-IV $649.95

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.**

HAM-V

HAM-V $1099.95 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, $109.95. Heavy duty mast support for T2X, HAM-IV and HAM-V.
MSLD, $49.95. Light duty mast support for CD-45II and AR-40.
TSP-1, $34.95. Lower spacer plate for HAM-IV and HAM-V.

Digital Automatic Controller

DCU-1 $749.95

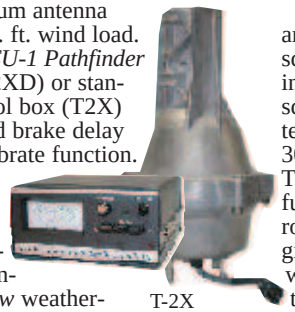
Automatically controls T2X, HAM-IV, V rotators. 6 presets for favorite headings, 1° accuracy, 8-sec. brake delay, choice for center of rotation, crisp *plasma* display. Computer controlled with many logging/contest programs.

RBD-5 $29.95

NEW! Automatic Rotator Brake Delay

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.

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 $799.95

T-2XD $1229.95 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.**

AR-40

AR-40 $349.95

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.**

AR-35 Rotator/Controller

AR-35 $89.95

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

CD-45II

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 $449.95

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.**

HDR-300A

HDR-300A $1499.95

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.**

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Choose a mount depending on the antenna size and vehicle mounting location space.

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Maldol **EM-5M** SO-239 / PL-259
Footprint: 1.1"x .75"
Max Antenna: 40"

For Medium Size Antennas

MODEL / ANT CONN / COAX CONN

COMET **CP-5M** SO-239 / PL-259
COMET **CP-5NMO** NMO / PL-259
Footprint: 3.4" x 1.25"
Max Antenna: 60"

For Tall or Multi-band HF Antennas

MODEL / ANT CONN / COAX CONN

COMET **HD-5M** SO-239 / PL-259
COMET **HD- 5 3/8-24** 3/8-24 / PL-259
Footprint: 3.75" x 1.1 "
Max antenna: 80"

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

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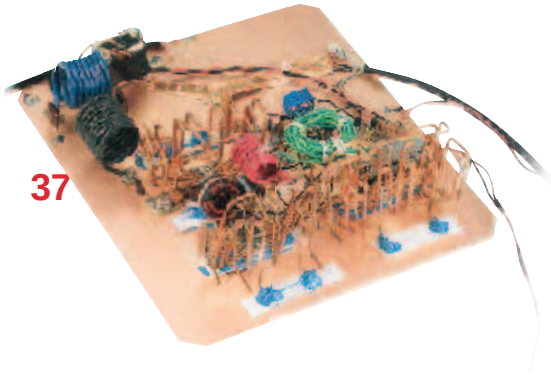

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News and Features

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Our Cover
Located off the shore of Ontario in the southwestern portion of Hudson Bay, East Pen Island is one of several uninhabited Canadian arctic islands in Nunavut. In April, Cezar Trifu, VE3LYC, reached East Pen (NA-231) via sled and activated the much-needed entity, making almost 2700 QSOs. But as the weather unexpectedly turned warmer, quickly thawing the ice, Trifu knew he was in trouble. Beginning on page 67, read his nail-biting account of how he got VYØV on the air — and himself off the island. Photos by VE3LYC.

Departments

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QST (ISSN:0033-4812) is published monthly by the American Radio Relay League, Inc, 225 Main Street, Newington, CT 06111-1494, USA. Periodicals postage paid at Hartford, CT, USA and at additional mailing offices.

POSTMASTER: Send address changes to: QST, 225 Main St, Newington, CT 06111-1494, USA. Canada Post: Publications Mail Agreement #40612608. Canada Returns to be sent to Bleuchip International, PO Box 25542, London, ON N6C 6B2.

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Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.

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Introducing the Yaesu FT-950 transceiver for DX enthusiasts
Superb receiver performance
Direct lineage from the legendary FT DX 9000 and FT-2000

HF/50 MHz 100 W Transceiver

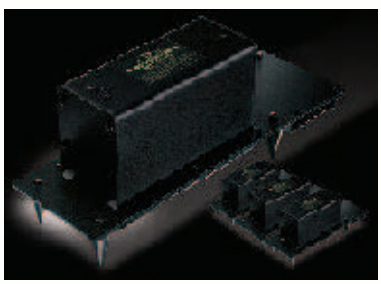
FT-950

- Triple-conversion super-heterodyne receiver architecture, using 69.450 MHz 1st IF
- Eight narrow, band-pass filters in the RF stage eliminate out of band interference and protect the powerful 1st IF
- 1st IF 3 kHz Roofing filter included
- High-speed Direct Digital Synthesizer (DDS) and high-spec Digital PLL for outstanding Local Oscillator performance
- Original YAESU IF DSP advanced design, provides comfortable and effective reception. IF SHIFT / IF WIDTH / CONTOUR / NOTCH / DNR
- DSP enhancement of Transmit SSB/AM signal quality with Parametric Microphone Equalizer and Speech Processor
- Built-in high stability TCXO (±0.5 ppm after 1 minute@77 ° F)
- Built-in automatic antenna tuner ATU, with 100 memories
- Powerful CW operating capabilities for CW enthusiasts
- Five Voice Message memories, with the optional DVS-6 unit
- Large Multi-color VFD (Vacuum Fluorescent Display)
- Optional Data Management Unit (DMU-2000) permits display of various operating conditions, transceiver status and station logging.
- Optional RF μ -Tune Units for 160 m, 80/40 m and 30/20 m Bands

Optional, YAESU Exclusive, Fully-Automatic μ -Tuning Preselector System!

Fully automatic, Ultra-sharp, External μ -Tuning Preselector (optional) features a 1.1" (28 mm) Coil for High Q

On the lower Amateur bands, strong signal voltages impinge on a receiver and create noise and intermod that can cover up the weak signals you're trying to pull through. YAESU engineers developed the μ (Mu) Tuning system for the FT DX 9000/FT-2000, and it is now available as an option for the FT-950. Three modules are available (MTU-160, MTU-80/40, MTU-30/20); these may be connected externally with no internal modification required! When μ -Tuning is engaged, the VRF system is bypassed, but the fixed Bandpass Filters are still in the received signal path.



Optional External Data Management Unit (DMU-2000) Provides Many Display Capabilities

Enjoy the ultimate in operating ease by adding the DMU-2000! Enjoy the same displays available with the FT DX 9000 and FT-2000: Band Scope, Audio Scope, X-Y Oscilloscope, World Clock, Rotator Control, Extensive Transceiver Status Displays, and Station Logging Capability. These extensive functions are displayed on your user-supplied computer monitor.

Shown with after-market keyer paddle, keyboard, and monitor (not supplied).

DMU-2000
Data Management Unit (option)

"The Best of the Best Just Got Better"

Introducing the new FT-950 Series with PEP-950 (Performance Enhancement Program)

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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:

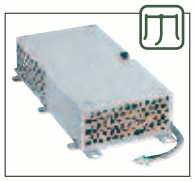
- **CONTOUR Control Operation**
  The Contour filtering system provides a gentle shaping of the filter passband.
- **Manual NOTCH**
  Highly-effective system that can remove an interfering beat tone/signal.
- **Digital Noise Reduction (DNR)**
  Dramatically reduces random noise found on the HF and 50 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

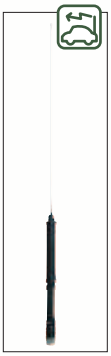
The rugged aluminum die-cast chassis with cooling fan

■ 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
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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 ●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

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Superb 3rd-Order Dynamic Range and 3rd-Order Intercept Point (IP3)

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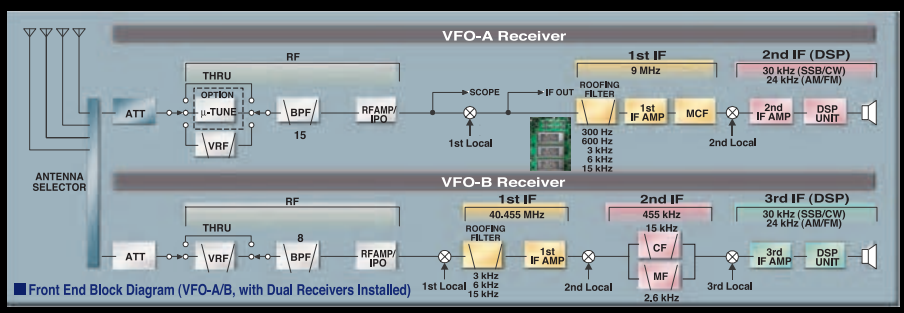
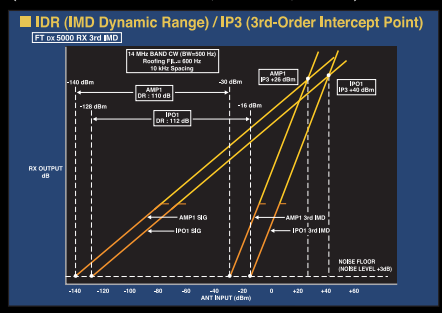


Front End Block Diagram (VFO-A/B, with Dual Receivers Installed)



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Say Yes

Kay Craigie, N3KN
President, ARRL

"Did you ever stop and reflect on how you got to where you are today? A few days after the ARRL Officer elections last January, I asked myself how I became the fourteenth person to follow in the footsteps of the League's founding president Hiram Percy Maxim, W1AW. I thought the answer would be a long, convoluted story of my life, but I was wrong. It's simple, really. I'm president of the ARRL today because twenty-six years ago, someone else said "no."

Shortly after getting my ticket in 1983, I volunteered to re-start the newsletter for my home radio club in the Philadelphia suburbs. I didn't know much about ham radio yet and knew nothing about doing a radio club newsletter. When did a little thing like not quite knowing what you're doing ever stop a ham radio operator? Undaunted, or maybe just oblivious, I started re-inventing the journalistic wheel, and club members liked the results.

A year later, the ARRL Eastern Pennsylvania Section Manager decided to start a newsletter for his Field Organization volunteers and Affiliated Club officials. He asked the Section Emergency Coordinator, who knew everybody in Eastern PA and was himself a former newsletter editor, to find an editor for the new publication.

The first person to whom the SEC offered the Eastern Pennsylvania job said "no." He added, however, "Why don't you talk to Kay?"

By that time I had upgraded to Advanced, was working on my WAS and DXCC awards, and knew which end of the soldering iron gets hot. I didn't know much about the League, though, apart from what I read in *QST* every month. But when the SEC asked if I would be interested in doing a newsletter for the ARRL's Eastern Pennsylvania Section, I said, "Yes, sure, I can do that."

The next thing I knew, I was appointed Assistant Section Manager, and one thing led to another. The line between saying "yes" to that newsletter opportunity and becoming ARRL president twenty-six years later is as straight as a line ever is in a person's life story.

It chafes my ego to admit it, but I know I was not the first choice to do the Eastern Pennsylvania newsletter. I wasn't the first person they asked.

But I was the first one who said "yes."

That's what leaders in our Amateur Radio family have in common. No matter how we differ in our educational or occupational backgrounds, whatever the demographic details of our personal lives, regardless of our license class or favorite things to do in Amateur Radio, we are the first ones who say "yes."

Yes, I'll do the public service event. Yes, I'll sell tickets at the hamfest. Yes, I'll help you study for your license. Yes, I'll give a talk at the club meeting. Yes, I'll be a net control. Yes, I'll join ARES®. Yes, I'll show you how to operate a contest. Yes, I'll help clean up after Field Day. Yes, I'll teach you the Morse code. Yes, I'll go on the DXpedition. Yes, I'll run for office in the club.

Yes, I'll organize the antenna work party.

I don't care if you are so new you have to sneak a peek at your license to remember your callsign, or have been licensed so long you can copy code in ancient Egyptian hieroglyphics. You can be a leader in Amateur Radio. It all begins with saying "yes."

What you invest in the stock market can disappear. The property you bought may be worth less today than what you still owe on it. Amateur Radio is different. What you invest in Amateur Radio — your willingness to lead, to serve, to work, and to learn — can never be lost. It will pay you back many times over and in ways you can't imagine. All I did was agree to edit a newsletter, and look what happened to me! I'm sure many of you have a story to tell about how your life changed when ham radio presented an opportunity and you were the first one who said, "Yes, sure, I can do that."

ARRL President Kay Craigie, N3KN, lives in Blacksburg, Virginia, with her husband Carter Craigie, N3AO, and their Jack Russell Terrier, Frodo.

Originally from Atlanta, Georgia, Kay graduated from Georgia State College (now Georgia State University) in 1968 and then moved to Pennsylvania to earn a PhD from the University of Pennsylvania in Philadelphia. She taught at the University of Maryland for three years in the 1970s. Later, she taught part-time at Cabrini College in Pennsylvania and worked on the non-instructional staff at a high school. She moved to Virginia in 2007.

First licensed in 1983, Kay has been a Volunteer Examiner for more than 20 years. She became ARRL Section Manager for Eastern Pennsylvania in 1986 and Atlantic Division Vice Director in 1990. Six years later she became Atlantic Division Director, in 2000 was elected Vice President, moved up to First Vice President in 2006, and in 2010 was elected President.

On the air Kay enjoys DXing, award-hunting — she just earned VUCC on 6 meters from her new grid square, EM97 — and contesting on CW, phone, and digital modes, and is involved with Skywarn. Her husband Carter, N3AO is a retired college professor. Their daughter Jenny Riffe, KA3WVD, lives in Virginia with her husband and two children.

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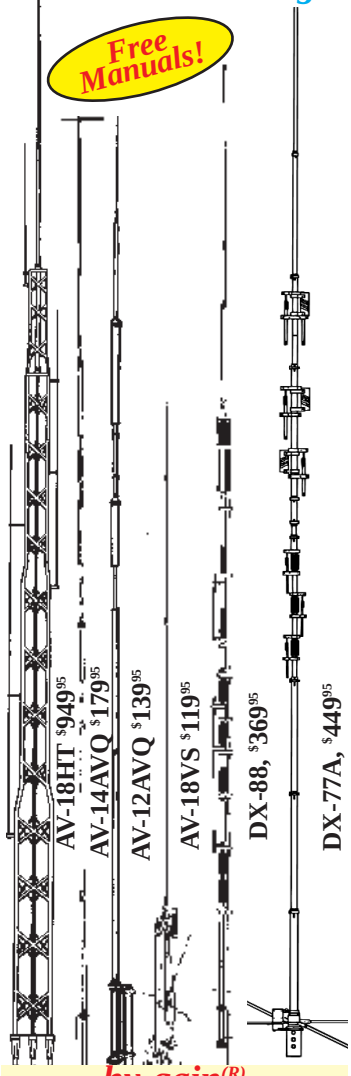
Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . 1500 Watts . . . Low SWR . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connect . . . Two year limited Warranty . . .



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They offer remarkable DX performance with their extremely low angle of radiation and omnidirectional pattern.

All handle 1500 Watts PEP SSB, have low SWR, automatic band-switching (except AV-18VS) and include a 12-inch heavy duty mast support bracket (except AV-18HT).

Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators.

Includes all stainless steel hardware.

Recessed SO-239 prevents moisture damage.

Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low.

Two year limited warranty.

AV-18HT, $949.95. (10,12,15,20,40,80 M, 160, 17 Meters optional). 53 ft., 114 lbs.

Standing 53 feet tall, the famous *Hy-Gain HyTower* is the world's best performing vertical! The AV-18HT features automatic band selection achieved through a unique stub-decoupling system which effectively isolates various sections of the antenna so that an electrical 1/4 wavelength (or odd multiple of a 1/4 wavelength) exists on all bands. Approximately 250 kHz bandwidth at 2:1 VSWR on 80 Meters. The addition of a base loading coil (**LC-160Q, $109.95**), provides exceptional 160 Meter performance. **MK-17, $89.95**. Add-on 17 Meter kit. 24 foot tower is all rugged, hot-dip galvanized steel and all hardware is iridited for corrosion resistance. Special tilt-over hinged base for easy raising & lowering.

AV-14AVQ, $179.95. (10,15,20,40 Meters). 18 ft., 9 lbs. **The** Hy-Gain AV-14AVQ uses the same trap design as the famous Hy-Gain Thunderbird beams. Three separate air dielectric Hy-Q traps with oversize coils give superb stability and 1/4 wave resonance on all bands. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

AV-12AVQ, $139.95. (10, 15, 20 Meters). 13 ft., 9 lbs. **AV-12AVQ** also uses Thunderbird beam design air dielectric traps for extremely Hy-Q performance. This is the way to go for inexpensive tri-band performance in limited space. Roof mount with AV-14RMQ kit, $89.95.

AV-18VS, $119.95 (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs.

All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $199.95. Ground Radial System, GRK-88, $99.95. Roof Radial System, RRK-88, $99.95.

DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

***No** ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$179.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$139.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$119.95**	**10 - 80 M**	**1500 W PEP**	**18 feet**	**4 pounds**	**80 MPH**	**1.5-1.625"**
DX-88	$369.95	10 - 40 M	1500 W PEP	25 feet	18 pounds	75 mph no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph no guy**	**1.5-1.625"**

Hy-Gain 160-6 Meters Self-Supporting Vertical

Full 1500 Watts, 43 feet, includes base mount

New! AV-6160
$399.95
UPS SHIPPABLE

Operate all bands 160-6 Meters at full 1500 Watt with this self-supporting, 43 feet high performance vertical! It assembles in less than an hour and its low profile blends in with the sky and trees -- you can barely see it . . .

Exceptional Performance

The entire length radiates to provide exceptional low angle radiation 160-20 Meters and very good performance on 17-6 Meters. You can shorten it by telescoping it down for more effective low angle radiation on higher bands.

Just talk with automatic tuner!

A wide-range automatic or manual antenna tuner *at your rig* easily matches this antenna for all bands 160-6 Meters. There's no physical tuning adjustments on the antenna -- you simply put it up!

An optimized balun design allows *direct coax feed* with negligible coax loss (typically less than 1/2 dB 60-6 Meters and less than 1 dB 160-80 Meters with good quality, low-loss coax).

Extremely low wind loading

With just 2 square feet wind load, the AV-6160 has the lowest wind-loading and lowest visibility of any vertical antenna! The key is a six foot section of tapering diameter *stainless steel* whip that flexes in strong wind instead of stressing the bottom sections. Its 2-inch O.D.and .120 inch thick walled tubing bottom section makes it incredibly strong.

Just 20 lbs., uses super-strong *6063 aircraft aluminum tubing.* Stainless steel hardware.

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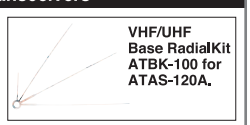

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This Just In

Joel P. Kleinman, N1BKE
jkleinman@arrl.org

In Brief

- On August 4, the ARRL filed a *Petition to Deny Applications* with the FCC to deny 68 pending Public Safety Pool license applications associated with the ReconRobotics Video and Audio Surveillance System.
- After ARRL General Counsel Chris Imlay, W3KD, wrote a letter to Midwest City, Oklahoma officials pointing out that RFI is a federal, not a local, responsibility, the city withdrew its RFI complaint against a local ham.
- Following publication in the *Federal Register* of a summary of a *Report and Order*, the effective date of the new rules regarding government entities that sponsor disaster and emergency drills was set for September 3.
- The FCC has denied two *Petitions for Rule Making:* one to prohibit what the petitioner called "the false or unauthorized use of an Amateur Radio call sign" and one wishing to expand privileges on the 15 meter phone band for General and Amateur Extra class licensees.
- Thanks to the efforts of hundreds of volunteers, Amateur Radio once again had a strong presence at the 2010 National Scout Jamboree at Fort AP Hill, Virginia.
- The 2010 Field Day logs received list was posted to the ARRL Web site.
- Member polls have returned to the ARRL Web, in the form of a new QuickStats page on the ARRL Web site (**www.arrl.org/quickstats**) and in *QST*, beginning on page 130 in this issue.
- The theme of the 2011 Dayton Hamvention® is *Global Friendship*.
- A group of six Swiss hams have set a new record for the longest contact (based on GPS coordinates) made on 10 GHz using SSB — 2696 km (1675 miles).
- The ARRL Facebook page has more than 10,000 friends, making it the most popular Amateur Radio page on the most popular social networking site.
- After a long wait, it's official: A minor planet has been named for the ARRL. See Happenings, this issue, for details.
- Two ARRL Teachers Institute sessions were held at ARRL HQ, wrapping up this year's series.
- The 29th annual ARRL/TAPR Digital Communications Conference will be September 24-26 near Portland, Oregon.
- *Two federal initiatives:* Two government agencies have launched a new and improved online *Federal Register*, named *Federal Register 2.0*. In addition, the FCC has rolled out its new online Consumer Help Center.

Media Hits

Allen Pitts, W1AGP
Media & Public Relations Manager

- The use of Amateur Radio in emergencies continues to be the major theme of media hits around the country and especially around Washington, DC. Erin Podolny nailed it in "Amateur Radios: Salt-cured Interoperability," which appeared in the University of Maryland's Center for Health and Homeland Security and was e-mailed to subscribers. "Ham radio use provides practical and concrete benefits to emergency managers in situations where conventional lines of communication can and do fail." This message was repeated to the DC area in "Amateur-Radio Operators, Emergency-Management Staff Prove Winning Combination" in the *Sun Gazette*. "Because amateur-radio equipment is independent of commercial radio services like telephones and cell phones, and is not channelized like police and fire radio services, it is seen as ideal for emergency communications." Walt Palmer, W4ALT, got Field Day publicity with Delaware Senator Tom Carper, and even the *Washington Post* got in on the theme when Phillip Lucas highlighted the Loudon Amateur Radio group: "In a world filled with texts, tweets and e-mails, amateur radio operators know that when disaster strikes, they are some of the select few still capable of communicating when power grids and cellular signals fail."
- Hams and Skywarn® operations got special notice in the past months. Cheryl Anderson wrote "Volunteer storm spotters key in battle against severe weather" in the Appleton (WI) *Post Crescent* and Michigan's NPR Station ran a Skywarn interview of Hal Thomas, N8HAL, by Michael Louden. Farther south, as Tropical Storm Alex was starting to look like trouble, the National Hurricane Center with Julio Ripoll, WD4R, went on alert along with the VoIP Hurricane Net and Rob Macedo, KD1CY. The HWN activation was noted by several news organizations including Colorado's KKTV and even the national FEMA Citizen Corps e-mail digest.
- Amateurs' role in not only reporting problems, but in preventing them was the TV news in "State Fair will utilize amateur radio operators for safety" by Amy West on KHAS-TV5 in Nebraska.
- Then when Merle Elson, K5MT, had a heart attack on a remote Alaskan island DXpedition, it began a life-saving relay for the records. "Basically it was a link from Alaska to Siberia, then Moscow, from Moscow to the United States and then we got somebody from California and Alaska," Yuri Sushkin said in the *Anchorage Daily News*. Their radio relay call for help was also reported in the *Alaska Dispatch* and *Kodiak Daily Mirror.*
- The arrest of several people accused of being spies led to a curious media situation. How do you explain HF radio to non-technical readers? As Seattle's KING-TV5 news reported, "Some people have wondered how they could get away with sending radio messages, but not the millions of amateur radio operators who are in constant communication around the world." TechNewsDaily.com also weighed in on this with "Russian Spies Show Old School Spy Tech Still Works" and linked it to "Ham Radio Gets Upgraded with Modern Technology"
- But the biggest news of all was the national Jamboree for the Boy Scouts held in Virginia. The K2BSA contacts with astronaut Doug Wheelock, KF5BOC, aboard the International Space Station as it streaked across the skies above Fort AP Hill, using a ham radio link arranged with NASA by Amateur Radio operators at the Jamboree, made for several hits. Not only was it good press, it got the attention of a *lot* of scouts. Excellent work!
- PR-101 is the ARRL course for Public Information Officers and others interested in promoting Amateur Radio through the media (**www.arrl.org/shop/PR-101-Course-on-CD-ROM**). It provides the training and ideas to successfully bring positive attention to local Amateur Radio groups. Many Section Managers are now requiring it for ARRL PIO appointments and our thanks go to those who have taken it (**www.arrl.org/pr101-grads**). By their efforts, they help all of us.

Celebrating the Contributions of Radio Amateurs to the Pacific War Effort

James Lindley MD, K5EWS

A small central Texas city seems an unusual location for a museum related to the War in the Pacific, but Fredericksburg is the boyhood home of Fleet Admiral Chester Nimitz. The National Museum of the Pacific War is dedicated to perpetuating the memory of the Pacific Theatre of WWII and insuring that the sacrifices of those who contributed to our victory there may never be forgotten.

We set up a special event station to coincide with the opening of a new facility, the George H. W. Bush Gallery. Several manufacturers and local hams contributed gear, antennas and historical artifacts. Twelve storyboards told the story of Amateur Radio and the efforts of hams during the war. Some described the individual contributions of hams, including those of Congressional Medal of Honor recipient Vice Admiral Lawson P. "Red" Ramage, KB3DE (SK), Brigadier General Paul W. Tibbets, K4ZVZ (SK) and General Curtis LeMay, W6EZV (SK). In addition, some boards described the contributions to our country by hams who have been awarded the Nobel Prize.

From December 4-7, N5P was operational on voice, CW and digital modes, from 8 AM until museum closing at 5 PM. The use of large video monitors helped the public observe the FlexRadio equipment in action. Representatives of the Hill Country ARC acted as docents to explain the storyboards, the WWII radio equipment and the modern station in operation. Representatives of Texas Army MARS provided an explanation of MARS activities. Informational material from ARRL was available so that the public could learn more about Amateur Radio.

The operation brought 923 SSB contacts, 110 CW contacts plus 15 on digital modes. Forty-nine US states were worked as well as 17 other countries.

COURTESY JAMES LINDLEY MD, K5EWS

N5P made over 1000 contacts during the special event at the National Museum of the Pacific War in Fredricksburg, Texas.

Inside HQ

Our First Ever Special DXing Issue

Welcome to the special DX issue of *QST*. Whether you are an avid DXer, a casual DXer like me, or just starting out, we hope you enjoy it. With apologies to experienced DXers, DXing, or seeking out and working distant stations, is one of the most popular Amateur Radio activities. A distant station is called (the) DX. Those of us who pursue these contacts and awards are called DXers.

Along with their sense of personal accomplishment and pride, DXers receive awards that the ARRL and other organizations give out for confirming these contacts. There are many different types of DX Awards. The premier award for confirming 100 countries (called entities) is the ARRL DX Century Club Award (DXCC). About 31,000 amateurs are active in this program. You can learn about DXing on our Web site at **www.arrl.org/dxcc**. There are also 3700 participants in the VHF/UHF Century Club Award (VUCC) program. VUCC Awards are given out for confirming Grid Squares. Information on VUCC can be found at **www.arrl.org/vucc**. See page 85 of this issue for the VUCC standings.

For international stations in particular, and many of us here in the States, working and confirming stateside stations is also considered DXing. The award recognizing those who have confirmed all 50 states is, unsurprisingly, called The Worked All States Award or WAS: **www.arrl.org/was**. It's popular — more than 54,000 amateurs participate in this award program.

Amateurs often operate from rare locations, sometimes at great peril, to provide contacts for DXCC awards. We call these DXpeditions. We have three DXpedtion stories in this issue. Bill Vanderheide, N7OU, tells the story of his expedition to Tokelau, a territory of New Zealand located in the Pacific Ocean north of Samoa. However, you don't need to need go to quite such an exotic Pacific location to have a great DXpedition. Russell Dwarshuis, KB8U, starting on page 70, writes about his 6 meter VUCC trek to a rare grid square, CN79, located within a California wildlife preserve also mostly located in the Pacific. Finally, there is the harrowing story of a DXpedition to East Pen Island in Hudson Bay by Cezar Trifu, VE3LYC, on page 67.

We are starting a new feature in this issue — QST Quick Stats — featuring some fascinating statistics and facts about the ARRL and Amateur Radio. It is based on data that we keep here at HQ and information taken from our Web surveys located at **www.arrl.org/quickstats**. In line with the DX theme, this month's QuickStats page features The Top 20 Most Confirmed and Least Confirmed DXCC Entities. You'll find it on page 130.

Also in this issue, we've expanded the Coming ARRL Conventions box to include all conventions that occur during the previous, current and upcoming month. This will make it easier for you to find ARRL Conventions in your area. (It's also online at **www.arrl.org/hamfests-and-conventions-calendar**.) We are now also listing ARRL Division Conventions in the carousel box at the top of our Web site's home page.

73,

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

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540-552-3903; n3kn@arrl.org

First Vice President
RICK RODERICK, K5UR*
PO Box 1463, Little Rock, AR 72203
501-988-2527; k5ur@arrl.org

Vice President
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1553 County Rd T, Colby, KS 67701
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1925 Bidwell St,
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Atlantic Division

Bill Edgar, N3LLR
22 Jackson Ave, Bradford, PA 16701
(814-362-1250); **n3llr@arrl.org**

Vice Director: **Tom Abernethy, W3TOM**
PO Box 73, Accokeek, MD 20607
(301-292-6263); **w3tom@arrl.org**

Central Division

George R. Isely, W9GIG*
736 Fellows St, St Charles, IL 60174
(630-584-3510); **w9gig@arrl.org**

Vice Director: **Kermit Carlson, W9XA**
1150 McKee St, Batavia, IL 60510
(630-879-0983); **w9xa@arrl.org**

Dakota Division

Gregory P. Widin, KØGW
13457 Sixth St N, Stillwater, MN 55082
(651-436-8811); **k0gw@arrl.org**

Vice Director: **Kent R. Olson, KAØLDG**
7702 Forest River Rd, Fargo, ND 58104-8004
(701-298-0956); **ka0ldg@arrl.org**

Delta Division

Mickey D. Cox, K5MC
754 Cheniere Drew Rd, West Monroe, LA 71291
(318-397-1980); **k5mc@arrl.org**

Vice Director: **David A. Norris, K5UZ**
640 Josephine Dr, Batesville, AR 72501
(870-793-6431); **k5uz@arrl.org**

Great Lakes Division

Jim Weaver, K8JE
5065 Bethany Rd, Mason, OH 45040-8130
(513-459-1661); **k8je@arrl.org**

Vice Director: **Gary L. Johnston, KI4LA**
3056 Hergott Dr, Edgewood, KY 41017
(859-391-6399); **ki4la@arrl.org**

Hudson Division

Frank Fallon, N2FF
30 E Williston Ave, East Williston, NY 11596
(516-746-7652); **n2ff@arrl.org**

Vice Director: **Joyce Birmingham, KA2ANF**
235 Van Emburgh Ave, Ridgewood, NJ
07450-2918 (201-445-5924); **ka2anf@arrl.org**

Midwest Division

Cliff Ahrens, KØCA
65 Pioneer Trail, Hannibal, MO 63401
(573-221-8618); **k0ca@arrl.org**

Vice Director: **Rod Blocksome, KØDAS**
690 Eastview Dr, Robins, IA 52328-9768
(319-393-8022); **k0das@arrl.org**

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New England Division

Tom Frenaye, K1KI*
PO Box J, West Suffield, CT 06093
(860-668-5444); **k1ki@arrl.org**

Vice Director: **Mike Raisbeck, K1TWF**
85 High St, Chelmsford, MA 01824
(978-250-1235); **k1twf@arrl.org**

Northwestern Division

Jim Fenstermaker, K9JF
1545 NW 57th St, Unit 410, Seattle, WA
98107-5645 (360-256-1716); **k9jf@arrl.org**

Vice Director: **Grant Hopper, KB7WSD**
PO Box 3318, Everett, WA 98213
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Bob Vallio, W6RGG*
18655 Sheffield Rd, Castro Valley, CA 94546
(510-537-6704); **w6rgg@arrl.org**

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13450 Skyline Blvd, Oakland, CA 94619;
(510-569-6963); **k6jat@arrl.org**

Roanoke Division

Dennis Bodson, W4PWF
233 N Columbus St, Arlington, VA 22203
(703-243-3743); **w4pwf@arrl.org**

Vice Director: **Dr James Boehner, N2ZZ**
525 Barnwell Ave NW, Aiken, SC 29801-3939
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Rocky Mountain Division

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PO Box 20186, Albuquerque, NM 87154-0186
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Vice Director: **Dwayne Allen, WY7FD**
82 Wenger Dr, Devils Tower, WY 82714
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Southeastern Division

Greg Sarratt, W4OZK
230 Latigo Loop, Huntsville, AL 35806;
(256-337-3636); **gsarratt@arrl.org**

Vice Director: **Jeff Beals, WA4AW**
PO Box 1584 Loxahatchee, FL 33470
(561-252-6707); **wa4aw@arrl.org**

Southwestern Division

Richard J. Norton, N6AA
21290 West Hillside Dr, Topanga, CA 90290
(310-455-1138); **n6aa@arrl.org**

Vice Director: **Marty Woll, N6VI**
21301 Candice Pl, Chatsworth, CA 91311-1404
(818-773-9655); **n6vi@arrl.org**

West Gulf Division

Dr David Woolweaver, K5RAV*
2210 S 77 Sunshine Strip, Harlingen, TX 78550
(956-425-3128); **k5rav@arrl.org**

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Eastern Pennsylvania: Eric Olena, WB3FPL, 284 Blimline Rd, Mohnton, PA 19540 (610-775-0526); **wb3fpl@arrl.org**
Maryland-DC: James E. Cross III, WI3N, 16013 Dorset Rd, Laurel, MD 20707-5314 (301-725-6829); **wi3n@arrl.org**
Northern New York: Thomas Dick, KF2GC, 11 Jenkins St, Saranac Lake, NY 12983 (518-891-0508); **kf2gc@arrl.org**
Southern New Jersey: George Strayline, W2GSS, 10 E Pacific Ave, Villas, NJ 08251-2630 (609-741-8322); **w2gss@arrl.org**
Western New York: Scott Bauer, W2LC, 1964 Connors Rd, Baldwinsville, NY 13027 (315-638-7551); **w2lc@arrl.org**
Western Pennsylvania: John Rodgers, N3MSE, 803 S Main St, Butler, PA 16001 (724-287-0424); **n3mse@arrl.org**

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Illinois: Tom Ciciora, KA9QPN, 1887 Irene Rd, Sandwich, IL 60548 (815-498-4929); **ka9qpn@arrl.org**
Indiana: John Poindexter, W3ML, 204 S Main St, Knox, IN 46534-1620 (574-772-2772); **w3ml@arrl.org**
Wisconsin: Donald Michalski, W9IXG, 4214 Mohawk Dr, Madison, WI 53711 (608-274-1886); **w9ixg@arrl.org**

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North Dakota: Lynn A. Nelson, WØND, 6940 4th St SW, Minot, ND 58701 (701-839-8200); **w0nd@arrl.org**
South Dakota: Scott Rausch, WAØVKC, 15362 Canyon Trl, Piedmont, SD 57769-7286 (605-787-7566); **wa0vkc@arrl.org**

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Louisiana: Gary L. Stratton Sr, K5GLS, 8424 Kaw Court, Shreveport, LA 71107 (318-309-0023); **k5gls@arrl.org**
Mississippi: Malcolm Keown, W5XX, 64 Lake Circle Dr, Vicksburg, MS 39180 (601-636-0827); **w5xx@arrl.org**
Tennessee: Glen Clayton, W4BDB, 238 Old Parksville Rd NE, Cleveland, TN 37323; (423-472-7751); **w4bdb@arrl.org**

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Michigan: Dale Williams, WA8EFK, 291 Outer Dr, Dundee, MI 48131 (734-529-3232); **wa8efk@arrl.org**
Ohio: Frank J. Piper, KI8GW, 496 Hillview St, Pickerington, OH 43147-1197 (614-589-4641); **ki8gw@arrl.org**

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NYC-Long Island: Mike Lisenco, N2YBB, 1635 E 46th St, Brooklyn, NY 11234-3604 (718-258-7830); **n2ybb@arrl.org**
Northern New Jersey: Richard Krohn, N2SMV, 23 Sweetmans Ln, Manalapan, NJ 07726; **n2smv@arrl.org**

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Missouri: Dale C. Bagley, KØKY, PO Box 13, Macon, MO 63552-1822 (660-385-3629); **k0ky@arrl.org**
Nebraska: Art Zygielbaum, KØAIZ, 6601 Pinecrest Dr, Lincoln, NE 68516-3573 (402-421-0839); **k0aiz@arrl.org**

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Eastern Massachusetts: Michael P. Neilsen, W1MPN, 5 Otsego Dr, Hudson, MA 01749-3127 (978-389-0558); **w1mpn@arrl.org**
Maine: William Woodhead, N1KAT, 68 Madison St, Auburn, ME 04210 (207-782-4862); **n1kat@arrl.org**
New Hampshire: Alan K. Shuman, K1AKS, PO Box 681, New Boston, NH 03070-3520 (603-487-3333) **k1aks@arrl.org**
Rhode Island: Bob Beaudet, W1YRC, 30 Rocky Crest Rd, Cumberland, RI 02864 (401-333-2129); **w1yrc@arrl.org**
Vermont: Paul N. Gayet, AA1SU, 11 Cherry St, Essex Junction, VT 05452 (802-878-2215); **aa1su@arrl.org**
Western Massachusetts: Ed Emco, W1KT, 37 Bullard Ave, Worcester, MA 01605 (508-853-3333); **w1kt@arrl.org**

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Alaska: Jim Larsen, AL7FS, 3445 Spinnaker Dr, Anchorage, AK 99516-3424 (907-345-3190); **al7fs@arrl.org**
Eastern Washington: Mark Tharp, KB7HDX, PO Box 2222, Yakima, WA 98907-2222 (509-965-3379); **kb7hdx@arrl.org**
Idaho: Edward Stuckey, AI7H, 2300 W Polo Green Ave, Post Falls, ID 83854-9680 (208-457-0354); **ai7h@arrl.org**
Montana: Doug Dunn, K7YD, 216 Fiddle Creek Rd, Livingston, MT 59047-4116 (406-686-9100); **k7yd@arrl.org**
Oregon: Bonnie Altus, AB7ZQ, 7770 Harmony Rd, Sheridan, OR 97378 (971-237-0711); **ab7zq@arrl.org**
Western Washington: Jim Pace, K7CEX, PO Box 1602, Centralia, WA 98531 (360-508-8437); **k7cex@arrl.org**

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Nevada: Joe Giraudo, N7JEH, 720 Holyoke Dr, Spring Creek, NV 89815-5306 (775-738-7110); **n7jeh@arrl.org**
Pacific: Bob Schneider, AH6J, PO Box 131, Keaau, HI 96749-0131 (808-966-8146); **ah6j@arrl.org**
Sacramento Valley: Ronald D. Murdock, W6KJ, 998 Bogue Rd, Yuba City, CA 95991-9221 (530-674-8533); **w6kj@arrl.org**
San Francisco: Bill Hillendahl, KH6GJV, PO Box 4151, Santa Rosa, CA 95402-4151 (707-544-4944); **kh6gjv@arrl.org**
San Joaquin Valley: Dan Pruitt, AE6SX, 4834 N Diana St, Fresno, CA 93726 (559-779-2974); **ae6sx@arrl.org**
Santa Clara Valley: Bill Dale, N2RHV, 142 N Milpitas Blvd #264, Milpitas, CA 95035 (408-263-5325); **n2rhv@arrl.org**

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South Carolina: Marc Tarplee, N4UFP, 4406 Deer Run, Rock Hill, SC 29732-9258 (803-327-4978); **n4ufp@arrl.org**
Virginia: Carl Clements, W4CAC, 4500 Wake Forest Rd, Portsmouth, VA 23703 (757-484-0569); **w4cac@arrl.org**
West Virginia: L. Ann Rinehart, KA8ZGY, 1256 Ridge Dr, South Charleston, WV 25309 (304-768-9534); **ka8zgy@arrl.org**

Rocky Mountain Division (CO, NM, UT, WY)

Colorado: Jeff Ryan, KØRM, 9975 Wadsworth Pky K2-275, Westminster, CO 80021 (303-432-2886); **k0rm@arrl.org**
New Mexico: Donald D. Wood, W5FHA, 9100 Wimbledon Dr NE, Albuquerque, NM 87111 (505-828-0988); **w5fha@arrl.org**
Utah: Mel Parkes, NM7P, 2166 E 2100 North, Layton, UT 84040 (801-547-1753); **nm7p@arrl.org**
Wyoming: Garth Crowe, N7XKT, 1206 Avalon Ct, Gillette, WY 82716-5202 (307-686-9165); **n7xkt@arrl.org**

Southeastern Division (AL, GA, NFL, PR, SFL, VI, WCF)

Alabama: Jay Isbell, KA4KUN, 2290 Quail Dr, Bessemer, AL 35022 (205-424-9993); **ka4kun@arrl.org**
Georgia: Gene Clark, W4AYK, 1604 Lynwood Lane, Albany, GA 31707 (229-888-1090); **w4ayk@arrl.org**
Northern Florida: Paul L. Eakin, KJ4G, PO Box 625, Panacea, FL 32346 (850-591-0442); **kj4g@arrl.org**
Puerto Rico: Roberto Jimenez, KP4AC, PO Box 360536, San Juan, PR 00936-0536 (787-756-7276); **kp4ac@arrl.org**
Southern Florida: Sharon T. "Sherri" Brower, W4STB, 736 34th Ter, Vero Beach, FL 32968-1226 (772-562-3240); **w4stb@arrl.org**
Virgin Islands: John Ellis, NP2B, PO Box 24492, Christiansted, St Croix, VI 00824 (340-773-9643); **np2b@arrl.org**
West Central Florida: Dee Turner, N4GD, 10132 64th St N, Pinellas Park, FL 33782 (727-548-7474); **n4gd@arrl.org**

Southwestern Division (AZ, LAX, ORG, SDG, SB)

Arizona: Thomas J. Fagan, K7DF, 10650 E Bridgeport St, Tucson, AZ 85747-5925 (520-574-1129); **k7df@arrl.org**
Los Angeles: David Greenhut, N6HD, 21781 Ventura Blvd, #243, Woodland Hills, CA 91364 (818-992-5507); **n6hd@arrl.org**
Orange: Carl Gardenias, WU6D, 20902 Gardenias St, Perris, CA 92570 (951-443-4958); **wu6d@arrl.org**
San Diego: Stephen M. Early, AD6VI, 4724 Maple Ave, La Mesa, CA 91941 (619-461-2818); **ad6vi@arrl.org**
Santa Barbara: Robert Griffin, K6YR, 1436 Johnson Ave, San Luis Obispo, CA 93401-3734 (805-543-3346); **k6yr@arrl.org**

West Gulf Division (NTX, OK, STX, WTX)

North Texas: Jay Urish, W5GM, 1711 Buckeye Dr, Flower Mound, TX 75028-1259 (972-691-0125); **w5gm@arrl.org**
Oklahoma: Kevin O'Dell, NØIRW, 464 Majestic Hills Rd, Ardmore, OK 73401-8362 (580-220-9062); **n0irw@arrl.org**
South Texas: Lee H. Cooper, W5LHC, 2507 Autrey Dr, Leander, TX 78641 (512-260-7757); **w5lhc@arrl.org**
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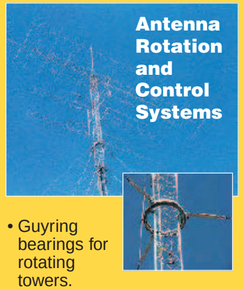

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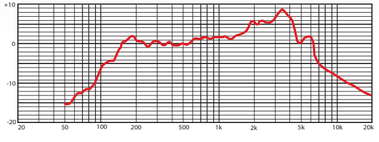

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- Open MDARC Meeting - Friday evening
- QRP Activities - Friday Evening & Saturday
- HFpack Activities - Friday Eve, Saturday, Sunday
- Breakfast/Keynote & Evening Banquet - Saturday
- Great Swap Meet - Sunday Morning
- Outstanding Technical Forums - Saturday & Sunday
- Amateur Television (ATV) - Saturday and Sunday
- Ham Radio Gear on Exhibit - Saturday & Sunday
- One-Day Technician License Class - Saturday
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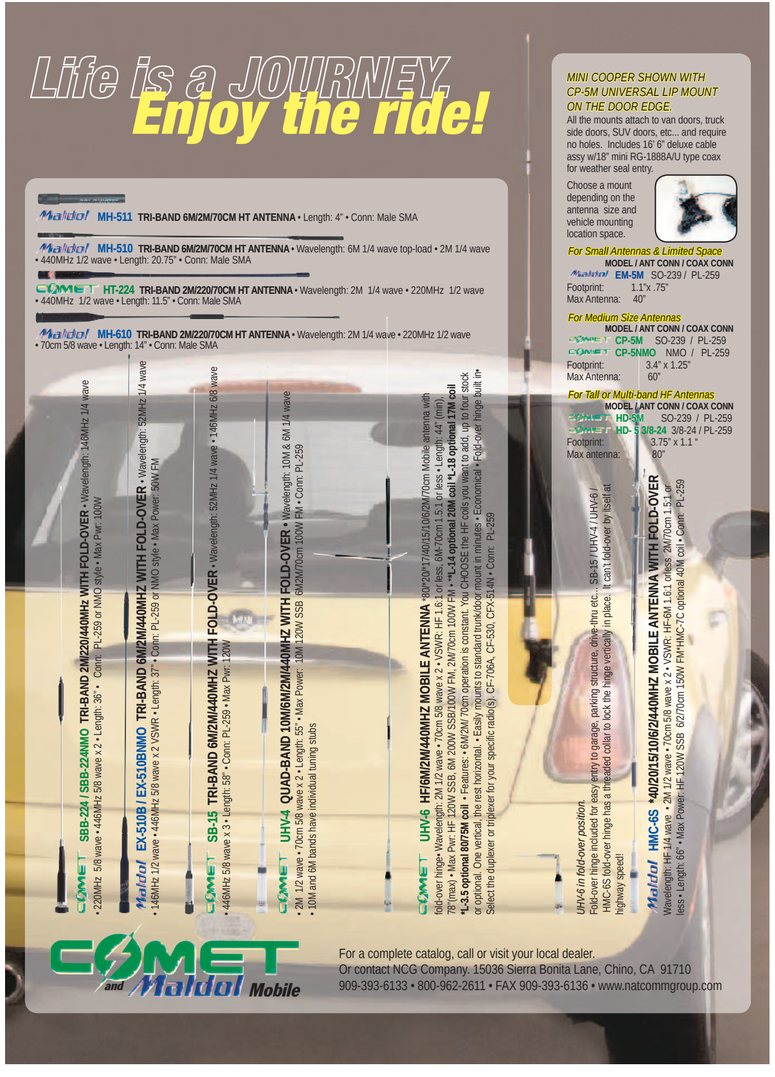

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COMET SBB-224 / SBB-224NMO **TRI-BAND 2M/220/440MHz WITH FOLD-OVER** • Wavelength: 146MHz 1/4 wave • 220MHz 5/8 wave • 446MHz 5/8 wave x 2 • Length: 36" • Conn: PL-259 or NMO style • Max Pwr: 100W

Maldol EX-510B / EX-510BNMO **TRI-BAND 6M/2M/440MHZ WITH FOLD-OVER** • Wavelength: 52MHz 1/4 wave • 146MHz 1/2 wave • 446MHz 5/8 wave x 2 VSWR • Length: 37" • Conn: PL-259 or NMO style • Max Power: 50W FM

COMET SB-15 **TRI-BAND 6M/2M/440MHZ WITH FOLD-OVER** • Wavelength: 52MHz 1/4 wave • 146MHz 6/8 wave • 446MHz 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

COMET UHV-4 **QUAD-BAND 10M/6M/2M/440MHZ WITH FOLD-OVER** • Wavelength: 10M & 6M 1/4 wave • 2M 1/2 wave • 70cm 5/8 wave x 2 • Length: 55" • Max Power: 10M 120W SSB 6M/2M/70cm 100W FM • Conn: PL-259 • 10M and 6M bands have individual tuning stubs

COMET UHV-6 **HF/6M/2M/440MHZ MOBILE ANTENNA** •80*20*17/40/15/10/6/2M/70cm Mobile antenna with fold-over hinge• Wavelength: 2M 1/2 wave • 70cm 5/8 wave x 2 • VSWR: HF 1.6:1 or less, 6M-70cm 1.5:1 or less • Length: 44" (min) 78"(max) • Max Pwr: HF 120W SSB, 6M 200W SSB/100W FM, 2M/70cm 100W FM • **1.14 optional 2SM coil *L-18 optional 17M coil **L-3.5 optional 80/75M coil • Features: • 6M/2M/ 70cm operation is constant. You CHOOSE the HF coils you want to add, up to four, stock or optional. One vertical, the rest horizontal. • Easily mounts to standard trunk/door mount in minutes • Economical • Fold-over hinge built in • Select the duplexer or triplexer for your specific radio(s). CF-706A, CF-530, CFX-514N • Conn: PL-259

UHV-6 in fold-over position.

Maldol HMC-6S ***40/20/15/10/6/2/440MHZ MOBILE ANTENNA WITH FOLD-OVER** • Wavelength: HF 1/4 wave • 2M 1/2 wave • 70cm 5/8 wave x 2 • VSWR: HF-6M 1.6:1 or less 2M/70cm 1.5:1 or less • Length: 66" • Max Power: HF-120W SSB 6/2/70cm 150W FM*HMC-7C optional 40M coil • Conn: PL-259

SB-15 UHV-4 / UHV-6 / HMC-6S in fold-over position. Fold-over hinge included for easy entry to garage, parking structure, drive-thru etc... HMC-6S fold-over hinge has a threaded collar to lock the hinge vertically in place. It can fold-over by itself at highway speed!

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Suggested Retail
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ALS-500M
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Suggested Retail

500 Watts
PEP/400W CW output, 1.5-22 MHz, instant bandswitching, no tuning, no warm-up. SWR, load fault, thermal overload protected. On/Off/Bypass switch. Re-mote on/off control. DC current meter. Ex-tremely quiet fan. 13.8 VDC. 9Wx3½Hx15D in., 7 lbs. **ALS-500RC, $49,** Remote Head.

ALS-600 Station 600 Watt FET Amp

ALS-600
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Whisper quiet *desktop* amp plugs into

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ALS-1300 Solid State 1200 Watt Amp

ALS-1300
$2899
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Ameritron's *highest power* solid state FET no-tune amplifier gives you instant bandswitching, no tuning, no warm-up, no tubes to baby and no fuss! Outstanding reliability is insured by using eight rugged MRF-150 power FET's mounted on the dual heavy duty heat sink. Run up to 1200 Watts of clean SSB output power (just 100 Watts drive gives full rated power) for continuous coverage between 1.5-22 MHz. Compact 10Wx6½Hx18D in.

Near Legal Limit ™ *Amplifier*

AL-572
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New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *60%* of price of a full legal limit amp! 4 rugged 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 14½Wx 8½Hx15½ D inches fits on desktop. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

HF Amps with Eimac 3CX800A7

Suggested Retail

AL-800
$2045
1 *Eimac*(R) tube, 1250 W

AL-800H
$3045
2 *Eimac*(R) tubes, 1.5 kW *Plus With Imported Tube*

AL-800F, $1875
AL-800HF, $2745

These *compact* desktop amplifiers with 3CX800A7 tubes cover 160-15 Meters including WARC bands. Adjustable slug tuned input circuit, grid protection, front panel ALC control, vernier reduction drives, heavy duty 32 lb. silicone steel core transformer, high capacitance computer grade filter capacitors. Multi-voltage operation, dual lighted cross-needle meters. 14¼Wx8½Hx16½D in.

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AMERITRON legal limit amps use a super heavy duty Peter Dahl Hypersil(R) power transformer capable of 2.5 kW!

Most powerful -- 3CX1500/8877

AL-1500
$3495
Eimac(R) Tube

AL-1500F
$3095
Imported tube

Suggested Retail

Ameritron's *most powerful* amplifier uses the herculean 3CX1500/8877 ceramic tube. 65 watts drive gives you full legal output -- it's just loafing with a 2500 Watts power supply.

Toughest -- 3CX1200A7

AL-1200
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Paradise Found

G. Hilton Dean, W4GHD

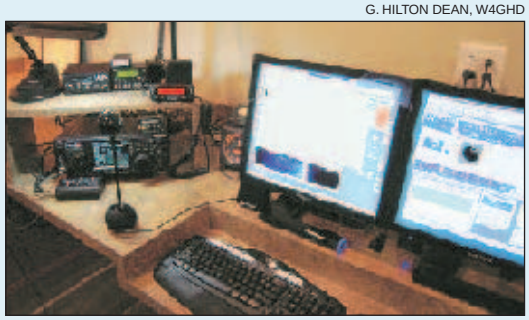
After 36 years as a CPA (and a hiatus from ham radio), my wife and I retired to Nashville. The house we liked had restrictive covenants, so I strung up some attic antennas and hooked up a new ICOM IC-706 MKIIG, later upgrading to an IC-756PROII. The contacts really started to multiply and I started working toward my DXCC and WAS. If only I could have a tower and a beam.

I read a couple of articles on *remote operation* and wondered if it would be possible to have a remote setup with a tower and beam. I started to learn how to set up and operate a station remotely. I obtained early versions of several radio control software packages and began to experiment with them. A lot of additional pieces would fall in place later — how to remotely turn the remote station on or off, monitor SWR and output power, switch and ground antennas, and so on.

G. HILTON DEAN, W4GHD

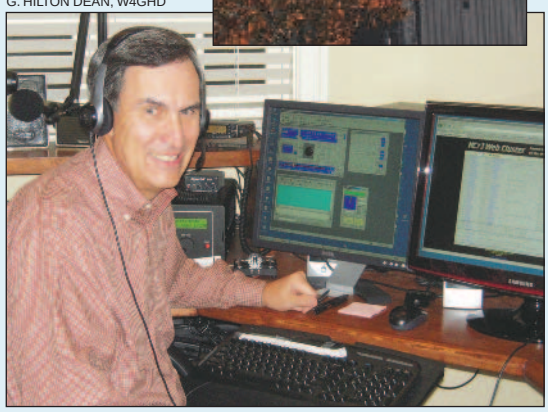
The finished remote location with the tower and beam.

G. HILTON DEAN, W4GHD



The W4GHD remote station can be operated from anyplace with good Internet access. The lights and computer monitors are normally off.

G. HILTON DEAN, W4GHD



W4GHD operating the remote station from his home station.

My son-in-law had a small business on a nice high hill. I was able to buy his current building and we made plans to build another building next door for his expansion. This gave me a small office/ham shack with a tower and beam.

In the fall of 2008 I ordered a US Tower TX-455, a 55 foot self-supporting, crank-up tower and an ICOM PROIII and PW1 amplifier. For the beam, I selected the SteppIR 3 element Yagi with the 30/40 meter option. An off center fed dipole would provide 75 meter coverage and serve as an alternate on other bands.

I found a remote control switch with four 110 V outlets on the Web. Dave, KI4PSR, designed a circuit that could control the 220 V line for the amplifier using one of the controllable outlets. One issue — when I turned the PW1 on, it would not return to a full-on condition unless I physically pushed the ON button. KI4PSR came up with a circuit that senses power on, waits about 10 seconds and activates the ON button.

By March 2009, the project was complete. In the first 12 months of use, I worked more than 100 new countries including FT1GA — Glorioso on 15 meter SSB — which I worked remotely from Destin, Florida. Now that's fun — even for an old retired CPA!

JEFF WOLF, K6JW

A thing of beauty: **I was most surprised, writes Jeff Wolf, K6JW, of Rolling Hills Estates, California, when in early July a representative of the local homeowners' association rang our doorbell to inform us that we'd been chosen to receive this summer's yard beautification award. I am convinced that the award was given in recognition of the 55 foot tree with its beautiful horizontal branches in the backyard.**

MARK PHILLIPS, NI2O

Ham selling jeans? **Sounds like a good business to be in, but in this case, it's a company that sells skateboard apparel. My daughter knew right away that the "call sign" was in fact a creative way of spelling "Crew." — *Mark Phillips, NI2O***

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- Clearly displayed APRS® Beacon Messages
- Selective Message Received indicated by Flashing LED

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CORRESPONDENCE

SHARING SPECTRUM

♦ In reference to the letter from Mark Spencer, WA8SME [“Correspondence,” Aug 2010, page 24], I find it very interesting that some hams feel that they have an exclusive right to some frequencies because they are using a satellite system. When I was first licensed (about 35 years ago), I was taught that no ham or group of hams have exclusive rights to any frequency; they were available to all on a first come basis. Have things changed that much in 35 years?

DAVE RICKERSON, K9DAR
ARRL Life Member
Coral Gables, Florida

ARRL Regulatory Information Manager Dan Henderson, N1ND, comments: While no amateur is “entitled” to exclusive use of a frequency, keep in mind that we have shared usage of a finite resource. A non-satellite QSO can take place in numerous other places on the bands, but a satellite QSO can only take place in a limited frequency range during a limited time. While both are entitled to use the spectrum, considerate operators understand the limits of satellite operation and can easily move their conversation to another frequency. While the ARRL Band Plans are recommendations, not rules, following them allows us to use the spectrum more efficiently. Considerate satellite users also understand that if there is an ongoing contact on the desired frequency at the time of the satellite pass, they have the responsibility not to cause interference to that QSO.

2 METER TEMPEST

♦ Jules Thompson, KI6PBA, complained that the 2 meter transceivers available for sale were too complicated to operate [“Correspondence,” Sep 2010, page 24]. He stated, “I am not a ‘ham,’ or a ‘radio amateur’ or ‘enthusiast’” as the reason for his need for an easy-to-use 2 meter transceiver.

Is this view common among new licensees? I find it bizarre that someone would go to the trouble to become a ham, a holder of an Amateur Radio license and then deny that they were one! If this is a common opinion of newcomers, it might explain why we actually hear fewer people on the air even as the FCC’s license count increases.

It also seems odd to complain that the 2 meter FM rigs on the market are too complicated, as models are available from several manufacturers that are among the most simple of all ham radio equipment. Amateur Radio is by its nature a technical hobby. There are other radio services that focus on communications and seek to minimize the technology, such as the Citizens Band or Family Radio Service, that would be a better choice for persons who don’t want *any* technical challenges.

STEVE JOHNSTON, WD8DAS
Fitchburg, Wisconsin

♦ Jules Thompson, KI6PBA, bemoaned the lack of “simplified” 2 meter radio equipment designed for “emergency use only.” He further went on to state “I am not a ‘ham,’ or a ‘radio amateur’ or ‘enthusiast’; the only time I would get on the air would be in an emergency.”

In those words, Mr Thompson answers his own problem: In denying himself the opportunity to engage in other “ham” or “radio amateur” activities (other than “in an emergency”), he has denied himself the opportunity to learn from scores of other licensed amateurs who have the experience and knowledge to guide him in his choice of radios and operating practices.

The last time and circumstance that anyone should be trying to employ a new device — radio or otherwise — is in an emergency. Prior planning and practice are the foundation of a robust and viable emergency plan, and that includes knowing your equipment, how to employ it and preparing it for deployment.

Even for a neophyte amateur, programming the few necessary local repeaters and/or local simplex channels requires the investment of no more than an hour or two of time and effort. That’s a small price to pay for being prepared.

Mr Thompson further indicates that he is part of an emergency response communications team in his retirement community. I respectfully suggest to him — and anyone else in a similar role — that they will best serve their respective organizations by taking full advantage of all of the opportunities that being a “radio amateur” has to offer!

Amateur Radio is the ultimate “social networking” resource for emergency communicators. Members and officials from ARES®, RACES, MARS, the Red Cross, the Salvation Army, FEMA, REACT, DHS, DoD and scores of other local, state and federal organizations count themselves as “radio amateurs.” Why shouldn’t he?

STEVEN ROBESON, K4YZ
Winchester, Tennessee

HAMS IN SPACE

♦ On July 23, I left work around 4 PM. I turned on my 2 meter mobile rig and pushed the scan button. The radio immediately stopped on the International Space Station downlink frequency, showing full scale signal strength. I thought somebody was fooling around and I ignored it.

It didn’t take me long, though, to realize this was the real thing! I put the rig on high power and gave a call. The astronaut immediately came back to me. As astronaut Doug Wheelock, KF5BOC, was recognizing stations, he would say location or some other thing, and in my case his comment was “Cedar Rapids coming in clear.” I nearly drove off the road! Cedar Rapids is the call sign used by the former Collins Radio Company (now Rockwell Collins).

Keep up the effort to maintain the ARISS program — the educational aspects for youth are worth it. I’m hoping to get a QSL card from the ISS because it was a thrilling ham radio moment.

DAVE MALEY, WAØZZG
Marion, Iowa

TAX LIST

♦ The letter from Thomas Donohoe, W2NJS, with advice for choosing a treasurer for your Amateur Radio club brings to mind an important point [“Correspondence,” Jul 2010, page 24]. Some radio clubs are chartered as non-profit organizations under IRS rules. The IRS now requires all non-profits to submit IRS Form 990 each year. This requirement has been in place for about three years, and clubs with receipts under $25,000 per year are no longer exempt. The IRS rules are at **www.irs.gov/charities/article/0,,id=169250,00.html**.

A club that is not in compliance by October 2010 will lose its tax-exempt status. A list of organizations currently at risk of tax exemption revocation is available at **www.irs.gov/charities/article/0,,id=225889,00.html**.

I searched the list for my home state and found four ham radio clubs listed. Clubs with non-profit status might be well advised to check that their 990 filings are up to date.

WILLIAM J. ECCLES, KE4VT
Terre Haute, Indiana

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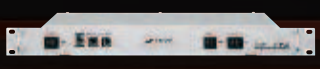

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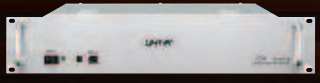

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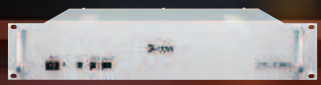

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An Orthogonally Steered Antenna that Reduces Interference

You may be able to eliminate interference more effectively than by just shifting antenna azimuth.

Tony Preedy, G3LNP

Directional receiving antennas, such as small loops that can be steered in azimuth, have traditionally been used to help separate radio signals that arrive from different directions. If two transmissions share both frequency and bearing, this technique is not effective. If the signals originate from different distances relative to the receiver and are propagated via ionospheric reflection, however, they will generally arrive at different angles of elevation. An antenna having a reception pattern that is steerable in the vertical plane can then help to separate the signals. In the general situation of receiving in the presence of interference, if signals arrive from different distances, but on the same channel, we need an orthogonally steered, or OS antenna.

The Solution

Gary Breed, K9AY, described a terminated triangular wire loop antenna in 1999 that offered to improve reception on the lower HF bands by virtue of its directivity.[1] Figure 1 shows a typical azimuth plot for a K9AY loop at 45° elevation with a termination of 470 Ω. This design is popular because it is quieter than many antennas designed primarily for transmitting on 160 meters and the lower HF bands. To cover more than one band usually requires careful choice of both antenna dimensions and the termination impedance. Commercial versions are available that use pairs of reversible crossed loops to give four null directions. The effectiveness of such antennas is dependent on both the vertical and horizontal arrival angles of the interference.

[1]Notes appear on page 33.

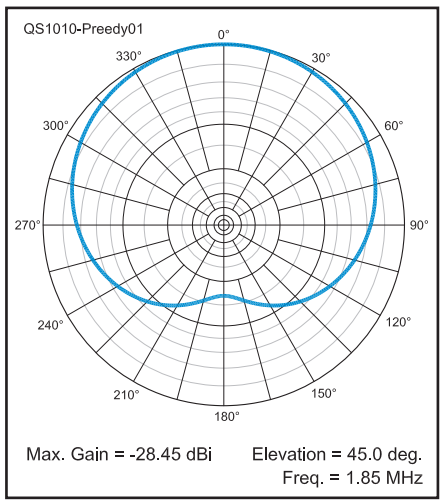


Figure 1 — 160 meter azimuth pattern of K9AY loop at 45° elevation.

Refining the K9AY Loop

A computer simulation of the K9AY antenna indicated that the optimum termination impedance depends on frequency, ground conductivity and resistance of the ground connection. In one commercial version this dependence is accommodated by making the termination resistance variable from the operating position. By making the termination a complex impedance (reactance plus resistance), not only can the frequency range be extended and compensation made for ground conditions, but the null can be controlled in the elevation plane as shown in Figures 2 and 3. Here we see null elevations of 20 and 60°, respectively. The

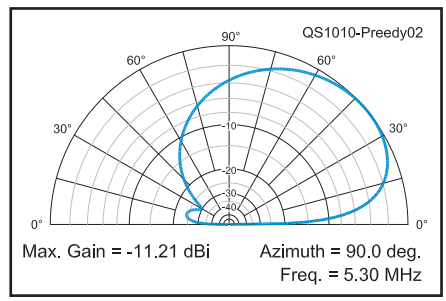


Figure 2 — 60 meter elevation pattern of K9AY loop terminated for maximum front to back ratio at 30° elevation.

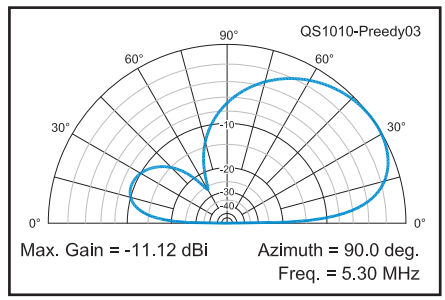


Figure 3 — 60 meter elevation pattern of K9AY loop with terminated adjusted for elevation null in rearward lobe.

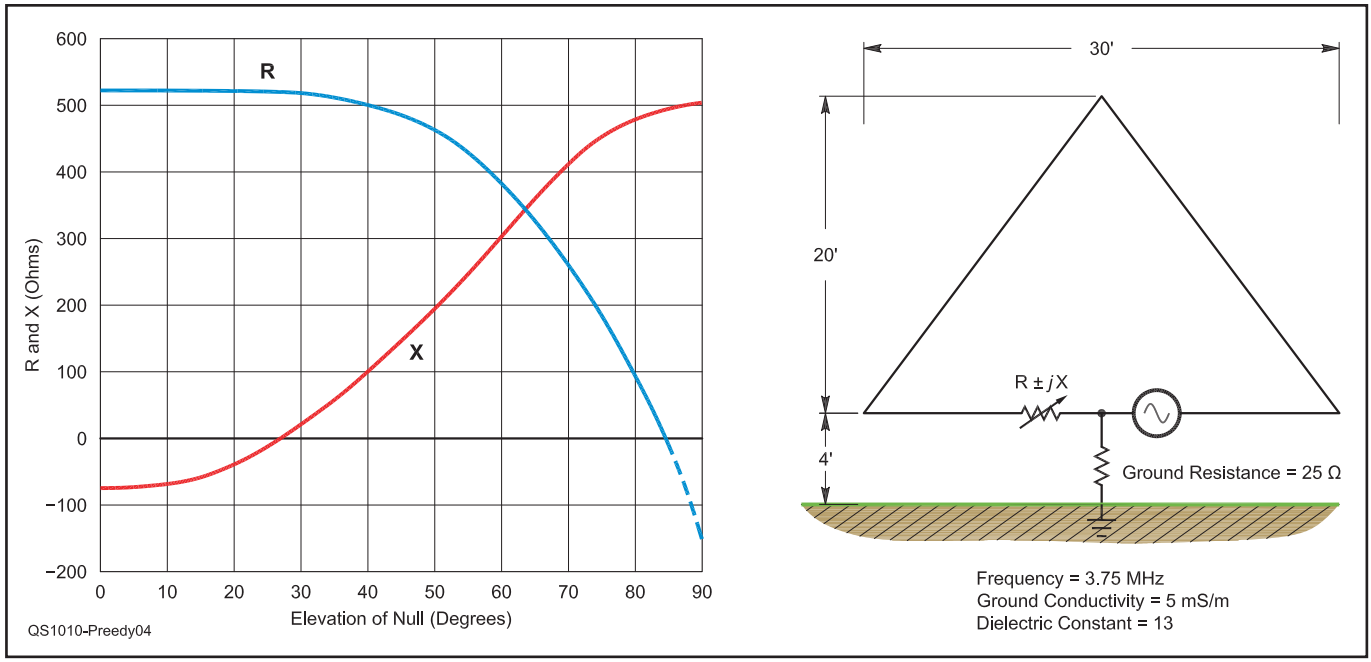


Figure 4 — Plot of angle of elevation null versus complex termination impedance at 3.75 MHz.

corresponding horizontal patterns remain substantially the same as that shown in Figure 1. Once you have control of the termination impedance, the dimensions of the antenna also become less critical.

My modeled loop had apex height of 20 feet and base of 30 feet. In this case, the null could be steered from 0° to at least 80° elevation over the range 1.8 to 10.2 MHz. Above 85° an unrealizable negative resistance is required. A null depth greater than 60 dB could be achieved for a wide range of ground parameters and for anticipated values of ground connection resistance. Figure 4 is a plot showing the typical relationship between termination impedance R +*j*X and null elevation of the modeled antenna.

Remote Control of the Termination

By replacing the usual termination resistor with a wideband transformer and transmission line, such as is used on the feed side, it is possible to provide a remote variable termination in which values are modified both by the square of the turns ratio and by the transformation due to the length of the transmission line. A wide range of reactance values down to 0 Ω can be obtained from a series resonant L-C circuit as it is tuned away from resonance. This principle is used in the remote termination unit of the OS antenna. If combined with a rotation system it is thus possible to place a null on an interfering signal arriving from any likely angle of azimuth or elevation.

Construction

The OS antenna does not require a large area or much height. A version of half the size of my design will be suitable for 3.5 MHz and above if you accept 12 dB less sensitivity. Figure 5 shows the circuit of the termination unit and how it interfaces to the loop. The unit is built in a metal screening box that fits below the rotator controller.

The X control is a 470 pF air dielectric variable capacitor. The inductor, nominally 30 µH, for 1.8 MHz, consists of 32 turns of 0.5 mm (#24 AWG) enameled copper wire, close wound on a 32 mm diameter photographic 35 mm plastic film can. Taps are provided at 23, 19, 16 and 13 turns, with unused turns shorted by a single pole switch, for the 80, 60, 40 and 30 meter bands, respectively. A sixth switch position shorts the inductor and capacitor for less critical, resistance only, wideband operation. A 220 Ω noninductive linear variable resistor serves as the R control. A double pole reversing switch is used to swap feeders.

The antenna, as shown in Figure 6, was made rotatable by attaching it to a Yaesu TV antenna rotator. This rotator has filters built into the servo system that help make it immune to transmitted fields. The use of an ac motor avoids commutator interference. Plastic netting and bricks were added to prevent rabbits from chewing on the cables. The

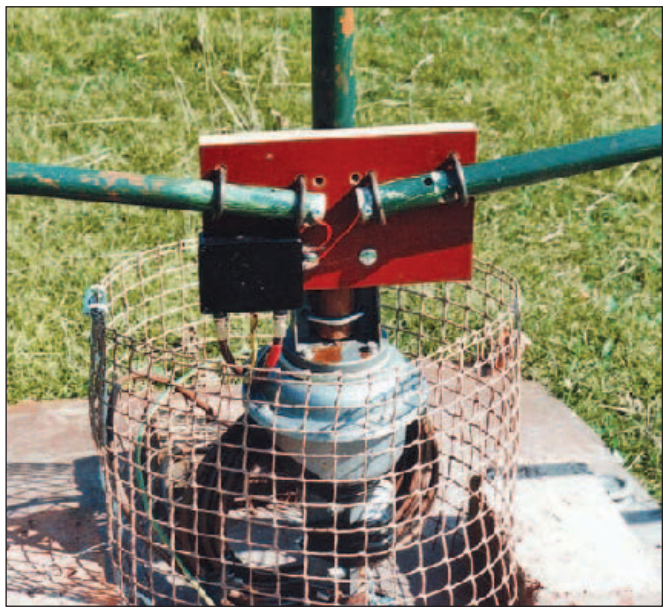


Figure 6 — Antenna base mechanical construction details showing TV rotator for azimuth control.

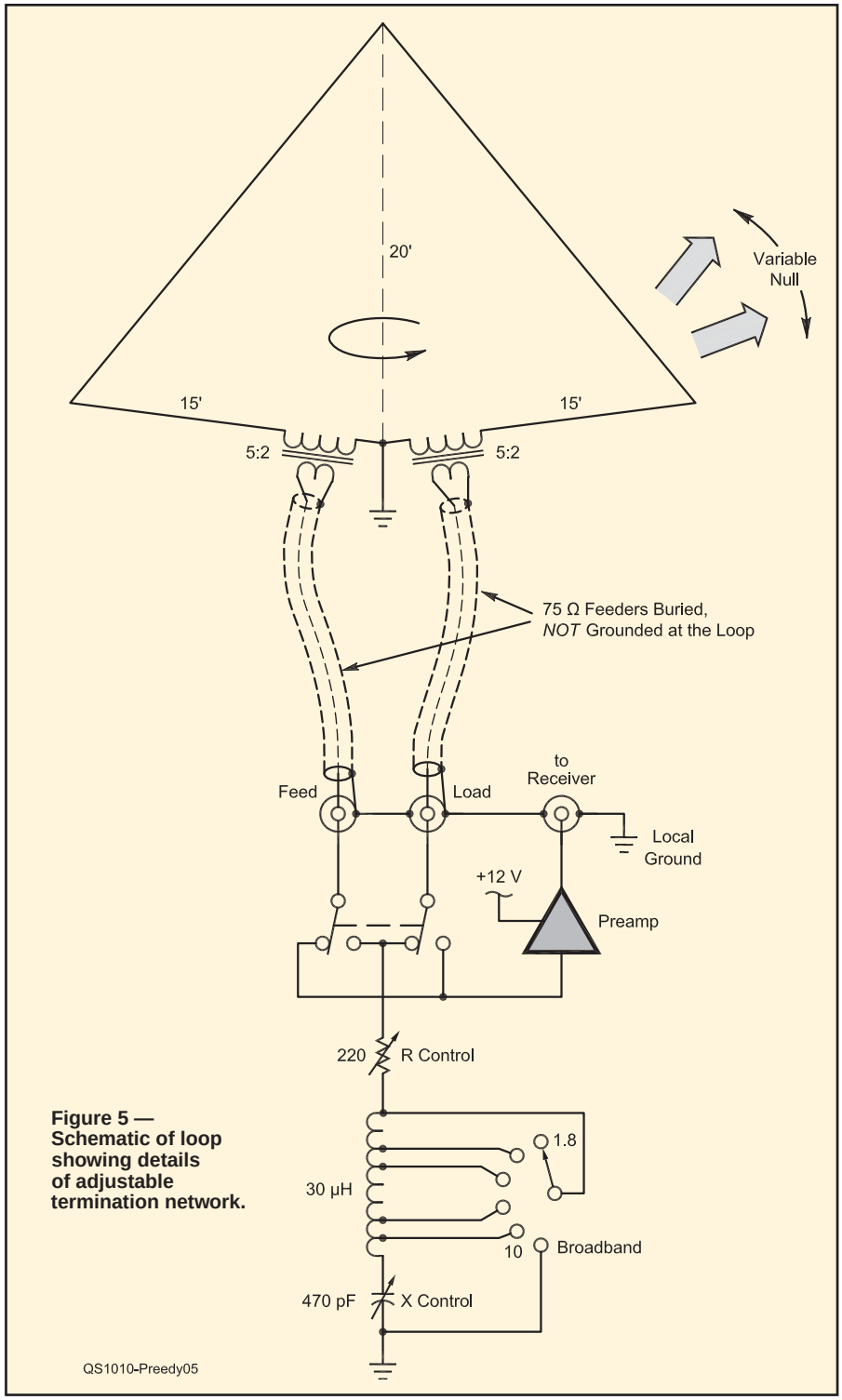


Figure 5 — Schematic of loop showing details of adjustable termination network.

rotator is fixed to a 4 foot length of steel pipe driven vertically into the soil with a 6 inch projection. This has its lower end flattened to resist rotation but is not connected to the copper ground system because of the risk of electrolytic corrosion. Four 4 foot ground rods at the corners of a 3 foot square copper sheet are used for the loop's ground connection. This is all that is necessary because a better ground connection only makes the feed VSWR excessive for higher elevation null angles.

The horizontal arms of the antenna are each made from aluminum tubing salvaged from an HF Yagi antenna. The dimensions tapered from ⅞ inch to ¼ inch. These and the 20 foot vertical pole are clamped to a central 8 inch square plate of ⅝ inch thick SRBP (Paxolin) insulating material using pairs of U bolts.[2] Almost any rigid insulating material, even varnished plywood, will be suitable here. The U bolts set the slope of the arms to 10°, to put their tips about 3 feet above ground. I used another piece of the Yagi, extended with a 4 feet insulating bamboo top section for the vertical pole. The pole, which is not an active part of the antenna, is insulated from the rotator casing. The SRBP panel is fixed to the upper rotator clamp with 6 mm bolts by using the holes intended for the rotator's upper U bolt. Sloping arms use 45 feet of wire. Wire diameter is not electrically significant.

If a larger rotator is available you can use more rugged construction or even add rope guys that terminate above the wire elements on a bearing at the top of the vertical pole.

The antenna transformers are wound with 5 turn primaries and 2 turn secondaries on twin hole ferrite cores, about ⅝ inch square, housed in a small plastic box fixed to the SRBP panel. Cores should be the smallest obtainable, wound with thin insulated wire to minimize static capacitance between windings. Mine measured 5 pF but even this is probably too much for optimum performance on the higher frequencies.

Cable Decoupling

A significant potential problem with this type of relatively insensitive antenna is the effect of pick-up on the outer conductor of the feeders. This can introduce unwanted signal voltages into the radio via the ground connection impedance or the capacitance between transformer windings. Cables should therefore be buried and the outer conductors not grounded at the antenna but where they emerge at or near the radio. The rotator cable was decoupled by winding as many turns of cable as possible through a 2 inch ferrite toroid near the rotator before it joined the buried coaxial cables. Because the motor only consumes 10 W, the cable is thin six core alarm type that allowed 16 turns on the ferrite core.

Feeders are 75 Ω foam dielectric TV type and should not exceed 200 feet in length or losses may make it impossible to get sufficient range of load control on the higher frequencies. Waterproof PF100 type cable is recommended if they are buried directly. Mine are in an MDPE water pipe for protection from moles. Identical feeders allow switched interchange between load and feed connections so that the antenna can be reversed without rotation or load adjustment.

Operation

Be sure to connect the OS control unit in a receive only path to the radio. If your transmitting antenna is nearby it may be necessary to ground the feeder to protect the 220 Ω resistor and preamplifier while transmitting. You may also need to detune the transmitting antenna when receiving in order to achieve the deepest null. Relays

controlled by the PTT line can automate these functions if desired.

If R is set to ⅓ of maximum, around 75 Ω, and the band switch is at the BROADBAND position, the antenna termination will be near 500 Ω, regardless of feeder length or frequency. These settings should allow the antenna to work as originally designed by K9AY. Use this condition to find the bearing of a signal you want to eliminate, or for general listening. As the controls are moved from these settings the load will become complex but actual values will be influenced by feeder length unless it is a multiple of 180° at the operating frequency.

Adjustment is straightforward. Just select the band, rotate the loop for minimum interference, or use the great circle bearing if you know the direction of the interfering signal. Now adjust the R and X controls successively to further minimize an unwanted signal or noise. Use the reversing switch to satisfy yourself that the antenna is effective or to confirm that the interference is still there!

Results

Forward gain with 180 feet of feeder, assuming a 2:1 VSWR, was predicted to vary from –28.6 dBi at 1.8 MHz to –6.4 dBi at 10.1 MHz and this appears to have been achieved. On all bands noise from the OS antenna exceeded that due to the receiver. Additional amplification above that from the preamplifier in the radio may not have been necessary if the antenna was only used in the forward direction. In this application, while receiving off the back, an additional amplification stage may be needed, especially on the lower bands.

The antenna was very effective at locating the source and reducing the effect of local interference. Because of the intermittent nature of amateur signals I found AM broadcast signals more useful while getting familiar with the controls. The antenna worked well in the broadcast band with the switch in the 160 meter position.

Daytime ground wave signals at MF could be reduced by more than 60 dB, such that it was possible to completely separate a distant radio station from a closer one sharing the same frequency. The reversing switch then gave a choice of programs, both free of interference. Daytime rejection was often more than 50 dB on 1.8 MHz, falling to about 30 dB at 10 MHz. In late afternoon I could reduce S9 German signals on 1.8 MHz to inaudibility while being able to copy more distant Polish stations on the same frequency and bearing. I tried this on 3.7 MHz with a pair of French stations, one in the north and one in the south, both on the same bearing. Again I could control the vertical null to attenuate one relative to the other. On 3.7 MHz the daytime sky wave signals from stations in Jersey, Scotland, Ireland and the Isle of Man could all be reduced by more than 40 dB without significant loss on closer near vertical incidence skywave (NVIS) signals.

As dusk descended, results on 1.8 MHz remained good. I could still reject East European stations, but I found 7 MHz propagation at this time to be unstable making it difficult to obtain a consistent null because the apparent arrival direction was changing. On a 7 MHz East European broadcast station, for example, the front to back ratio would change rapidly from a worst case 10 dB to troughs of 40 dB, even though in the forward direction fading was only a few dB. After midnight, when 7 MHz propagation was more stable, I could get continuous 30 to 40 dB rejection of Russian and other East European stations. Before dawn I listened on the transmitting antenna to an eastern USA net on 1.85 MHz. It was obliterated by a Russian station on that frequency. Using the OS, I could choose which contact to listen to. Near sunrise, on 3.7 MHz, I found it impossible to reduce an Italian by more than 20 dB, presumably because there was more than one propagation mode, whereas at the same time I could reduce USA stations by about 30 dB.

With experience and logging of termination settings I could estimate arrival elevation of signals and follow this as propagation changed. The loop was not quite as quiet as a Beverage antenna but this loop can be rotated.

Table 1

Parts Used for the Orthogonally Steered Antenna

Aluminum tubing. From surplus Yagi half elements, three pieces required.
Bamboo bean pole.
Box, small ABS. RS or Maplin.*
Box, small steel. (RS 232-780).
Cable, coaxial 75 Ω, PF100.
Cable, rotator, 6 conductor.
Capacitor, variable, 470 pF (Jackson type L).
Connectors, F type. Sockets, panel mounting, five required. Plugs, screw on, size L.
Copper roofing or expanded sheet, 3 feet square.
Ground rods, 4 feet, four required.
Ground rod clamps, four required.
Insulating plate, 8 × 8 × ⅝ inches.
Potentiometer, 220 Ω linear (RS 162-782).
Steel pipe up to 1.5 inch diameter × 4 feet.
Switch, double pole, 2 way (RS 330-985).
Switch, 6 way (RS 320-685).
TV Antenna Rotator, Yaesu G-250.
U bolts for 1 inch muffler pipe, with nuts and washers; six required.
Wire 0.5 mm enameled copper (for inductor, antenna and transformers).

*RS parts from RS components at **www.rswww.com/electronics**. Other parts may be used.

Parts

Total cost, using UK sourced materials, was about $400, which I felt reasonable for a 1.8 to 10 MHz rotary beam. This included the rotator, hardware, preamp, cables and all components except the parts salvaged from the Yagi. Possibly surplus CB antennas, fiberglass whips or bamboo with added conductors could be substituted here. I understand that alternatives are available in the US for the components listed in Table 1.

Notes

[1]G. Breed, K9AY, "The K9AY Terminated Loop — A Compact, Directional Receiving Antenna," *QST*, Sep 1997, pp 43-47.

[2]A rigid plastic insulating material available in Europe. See **www.croylek.com/download/49_srbp_(paxolin).pdf**.

Photos by the author.

Tony Preedy, G3LNP, was first licensed in 1957. In addition to his current call, he has held calls ZD8ARP, 9M2BQ, 6O/G3LNP, A45ZZ and EI6AS while working abroad. He has also operated briefly from 5B4, ZC4 and 5H0. Tony is a Chartered Electrical Engineer and a Fellow of The Institution of Engineering and Technology. Tony trained in the defense industry and spent most of his working life in broadcast transmission.

In 1996, Tony retired to a sheep farm on the border of England and Wales. He enjoys operating the lower amateur bands. You can reach Tony at New Mills Farm, Worthen, Shrewsbury, SY5 9JQ, UK or at **preedy216@btinternet.com**.

Feedback

◊A couple of gremlins crept into the item about the PVRC/CARA Field Day effort [This Just In, Sep 2010, p 13]. Frank Donovan's call sign is W3LPL, and Maurice Cahill's is KA3EJJ. Furthermore, the club is known far and wide as the Potomac Valley Radio Club (PVRC), not PVRA. The Field Day operation described was a joint effort of the PVRC and CARA, the Columbia Amateur Radio Association. They used about 17 HF antennas in all — on 13 towers.

◊In "Product Review — Software Research Laboratories QS1R" [Sep 2010 pp 41-44], second and third order IMD dynamic range were inadvertently omitted. The ARRL Laboratory measured the second and third order IMD dynamic range at "up to 95 dB" depending on the number and level of signals in the passband. The dynamic range improved as more and stronger signals were processed with the behavior very much like that found in measuring the RF Space SDR-IQ, and described in detail in the sidebar in that review (Feb 2010 *QST*, p 52).

A Signal Generator for the VHF Operator

Every now and then it's good to be able to generate a test signal — especially on VHF.

John Pivnichny, N2DCH

This generator develops a clean fundamental signal for experimenting in the VHF range. It can be used to perform receiver and filter alignment tasks, serve as a source for measuring antenna patterns and, along with a return loss bridge, for evaluating antenna SWR. The unit shown in Figure 1 covers the 200 to 250 MHz range, but a change in a single inductor can easily shift operation to 2 meters or 70 cm.

The key ingredient in this signal generator is a military surplus dual 5 to 15 pF variable tuning capacitor shown in Figure 2. The toothed detent disk shown on the right end is not needed. It is easily removed and discarded. This capacitor can be found in many amateurs' junk boxes. It was formerly available from Fair Radio Sales, Lima, Ohio as their #358-3164. It is common enough that several are offered for sale at practically every hamfest I have attended in the last 5 years. Typical asking price is in the $5 range — a real bargain. If you want to build this generator and can't find this capacitor, other types could be adapted to the task, or write me. I have several, so I can send you one at nominal cost.

Figure 1 — Front panel view of VHF signal generator. This version is for the 1.25 meter band. It can also be made for 2 meters or 70 cm.

The Oscillator Design

This capacitor resonates in the 1.25 meter band with an air wound coil of three turns as shown in the interior view of the generator (Figure 3). Wind the coil on a 7⁄16 inch drill bit keeping the turns tight. Then remove and spread out the turns by pulling outward on the ends.

The oscillator circuit is shown in Figure 4. This circuit is built with the components hanging in air by their leads before mounting the capacitor, coil and oscillator components in a small metal box. Capacitors C1, C3 and C4 must be NPO type to prevent frequency drift. I used a Ten-Tec TG-34 box as the enclosure. As a check, the oscillator can be powered up to verify operation before mounting it in the box. The frequency range will change somewhat after mounting it in the box, but not as much as you think. The shift is easily corrected by separating the turns on the inductor slightly.

An amplifier circuit helps to isolate the oscillator from the driven load. The amplifier circuit shown in Figure 5 is built onto the back end of a BNC panel jack (J1) with the components hanging in air by their leads. A type 7805 three terminal voltage regulator

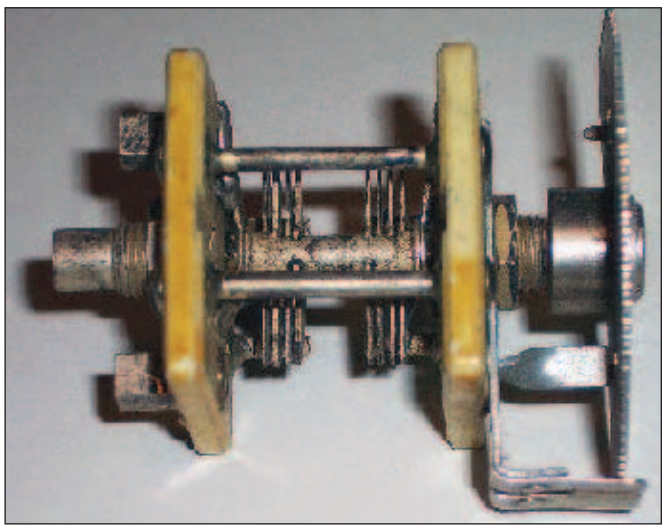


Figure 2 — Dual section 5 to 15 pF air variable capacitor used for generator frequency selection. The gear on the right side is unused so other types may be employed. The silver oxide on the surplus capacitor will not impede operation.

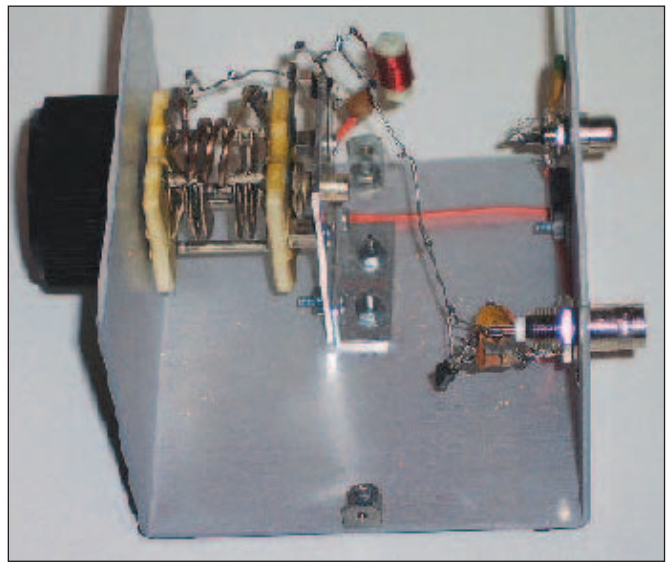


Figure 3 — The assembled signal generator. Note that the oscillator is assembled on C2, while the amplifier section is built on J1.

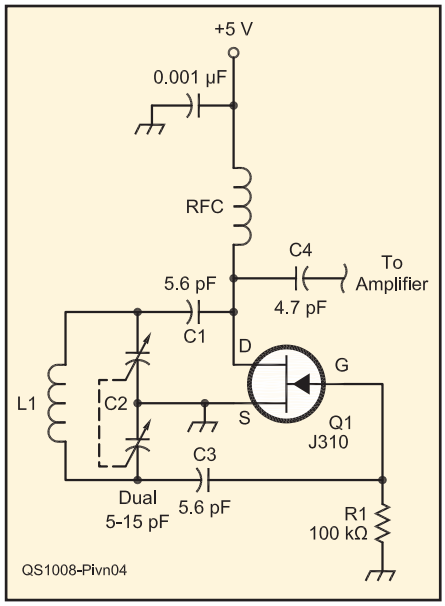


Figure 4 — Schematic of oscillator portion of VHF signal generator.
C1, C3 — 5.6 pF NPO capacitor.
C2 — 5-15 pF two section air variable, see text.
C4 — 4.7 pF NPO capacitor.
L1 — For 2 meters, tunes 130-155 MHz, 6 turns #14 AWG copper wire or brass rod 7⁄16 inches inside diameter spread to occupy a length of ¾ inches.
For 1.23 meters, tunes 200-250 MHz, 3 turns #14 AWG copper wire or brass rod 7⁄16 inches inside diameter spread to occupy a length of ½ inches.
For 70 cm, tunes 400-450 MHz, copper plate made from two sided circuit board 0.040 inches thick, 13⁄16 × ½ inches length × width with two ½ inch brass pins 3⁄32 inches in diameter spaced ½ inch soldered to both sides of circuit board.
Q1 — J310 FET.
R1 — 100 kΩ, ¼ W resistor.
RFC — 20 turns #22 AWG enameled wire tightly wound on ¼ inch polystyrene rod.

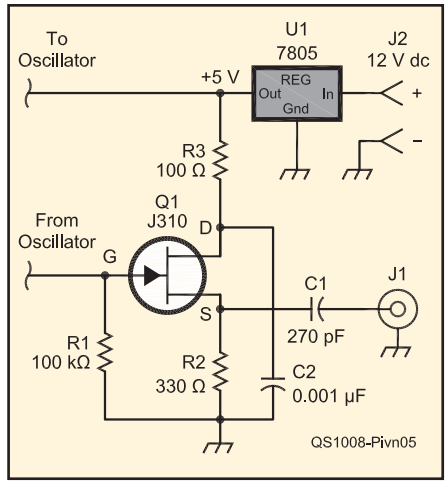


Figure 5 — Schematic of amplifier portion of VHF signal generator.
C1 — 270 pF polystyrene capacitor.
C2 — 0.001 µF, 50 V ceramic capacitor.
J1 — Panel mount BNC jack.
J2 — Panel RCA connector or other power jack.
Q1 — J310 FET.
R1 — 100 kΩ, ¼ W resistor.
R2 — 330 Ω, ¼ W resistor.
R3 — 100 Ω, ¼ W resistor.
U1 — 5 V, 1 A voltage regulator IC type.

Table 1
Conversion from Return Loss to SWR

Return Loss (dB)	*SWR*
1	17.39
2	8.72
3	5.85
6	3.01
10	1.93
15	1.43
20	1.22
30	1.07

adjacent to J2 drops the externally applied 12 V supply to a steady 5 V for both the oscillator and amplifier circuits.

Construction

The capacitor is mounted on the front panel of the Ten-Tec TG-34 box. A support bracket is constructed of 1⁄16 inch thick aluminum sheet and a short piece of half inch aluminum angle stock. This bracket supports the back end of the variable capacitor as shown in Figure 6. An RCA jack for the external 12 V dc supply and a BNC jack for the RF output are mounted on the rear panel of the box.

Calibration

A receiver or frequency counter can be used to calibrate the dial. I used the counter input of my MFJ-259 Antenna Analyzer. Note that although the generator in the MFJ-259 only goes up to 170 MHz, the counter easily reads the 250 MHz needed for the 1.25 meter version. A dial scale using Microsoft *Word* is provided on the QST-In-Depth Web site.[1] This should be good enough for general use as long as the generator frequency is set at mid scale by compressing or expanding the turns on the three turn oscillator coil. Output level varies from –4 to –8 dBm into a 50 Ω load across the tuning range.

How to Measure SWR at 222 MHz

Most antenna analyzers and SWR bridges do not work at 222 MHz. One exception is the MFJ-862 SWR wattmeter. A signal of at least 10 W is required for measurement, ruling out this generator as well as handheld transceivers. You can also measure SWR using a return loss bridge, a generator such as this one, and a sensitive RF voltmeter or milliwatt meter that operates at 222 MHz. Figure 6 shows a test setup with this generator driving a Black Forest Products return loss bridge and wideband milliwatt meter.[2]

Measure the RF level in dBm at the detector with no load connected to the return loss bridge. Then connect the unknown load such as the feed line going to a 222 MHz antenna. Read the RF level at the detector again. Subtract the two readings. Then determine the SWR using Table 1. If you need an antenna for 1.25 meters, a simple loop antenna can easily be built using the information in an article in *QRP Quarterly*.[3]

Radios for 222 MHz

There is not much ham gear offered commercially for the 1.25 meter band because

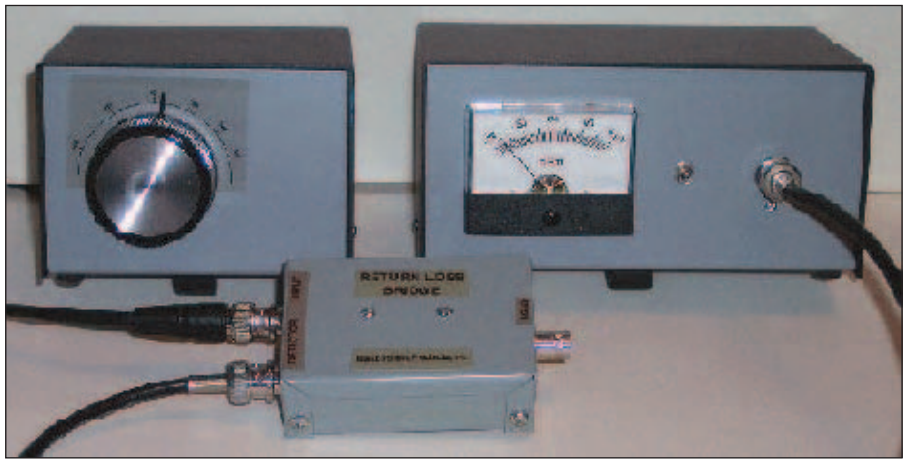


Figure 6 — Typical setup for measuring SWR using the generator and a return loss bridge.

[1]Notes appear on page 36.

much of the world does not have an amateur allocation in this band. Some current handhelds cover 1.25 meters as did some early VHF multimode transceivers. Alinco offers their DR-235 FM mobile transceiver for 222 MHz.

A real opportunity exists for hams to build and experiment with homebrew gear on this band. Repeaters for 1.25 meters are listed in *The ARRL Repeater Directory*.[4] There is always 222 MHz SSB activity during the VHF and UHF contests and the spring and fall sprint contests. You can increase your score in these contests by adding 222 MHz capability.

Notes

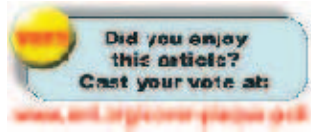
[1]**www.arrl.org/qst-in-depth**

[2]Black Forest Products units are available in kit form from Unicorn Electronics, 1 Valley Plaza Dr, Johnson City, NY 13790. 607-798-0206 or **www.unicornelex.com**.

[3]J. Pivnichny, N2DCH, "A Loop for 222 MHz," *QRP Quarterly*, Winter 2008, p 41.

[4]*The ARRL Repeater Directory,* 2010-2011 Edition. Available from your ARRL dealer or the ARRL Bookstore in either desktop-sized edition, ARRL order no. 0861, or pocket-sized edition, ARRL order no. 0854. Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

ARRL member John Pivnichny has been licensed since 1956. He holds advanced degrees in electrical engineering. John has written several articles that have been published in Amateur Radio magazines and is the author of Ladder Crystal Filters, *a book published by MFJ Enterprises. John is currently involved with promoting experimentation and operation on the 1.25 meter amateur band. You can reach John at 3824 Pembrooke Ln, Vestal, NY 13850 or at* **johnpivn@aol.com**.



New Products

MFJ TNC-X FOR VHF PACKET AND APRS

◊The MFJ-1270X (TNC-X) is a low power, self-contained TNC that plugs into a USB port or RS-232 serial port on your computer. The TNC-X USB connection works with software running on *Windows*, *Mac OS* or *Linux* systems. TNC-X can be used for APRS and emcomm applications with appropriate software (such as MFJ-1284EC, $29.95, or *EmComm Ops* from **www.cssincorp.com**). With the optional MFJ-1270DG ($29.95), TNC-X becomes a standalone, full-featured digipeater for APRS or routine packet use. Price: $129.95. To order, or for your nearest dealer, call 800-647-1800 or see **www.mfjenterprises.com**.

60 W, 23 CM POWER AMPLIFIER KIT FROM KUHNE ELECTRONIC

◊The KIT MKU PA 1360 from Kuhne Electronic (DB6NT) includes all components needed to build a 60 W linear power amplifier for the 1240-1300 MHz band. The amplifier uses an LD-MOSFET and requires a 27 V, 5 A dc power supply. Input power is rated at 3 W. An optional enclosure is available. Prospective kit builders should have experience with microwave construction and SMD components (this is not a beginner's project). For pricing and additional information, visit **www.kuhne-electronic.de**.

Strays

QST congratulates…

◊ARRL Life Member Jim Fagan, KE7IDC, of Tucson, Arizona, on attaining the rank of Eagle Scout, the highest rank in Boy Scouts. An Assistant Section Manager, Jim has been teaching the Electricity, Electronics and Radio merit badges.

◊Meredith M. Peruzzi, W4BVV, of Vienna, Virginia, a member of the Gallaudet University academic competition team, who with her teammates won the National Association of the Deaf College Bowl championship in Philadelphia in July. The team's coach is ARRL Life Member Robert B. Weinstock, W3RQ, of Takoma Park, Maryland, who is Special Assistant to the Provost at Gallaudet.

POTENTIAL PIRATE

◊Bob Avrutik, N1RA, reports that someone may be pirating the call sign C6ARA, which he used while operating on several cruise ships. Bob hasn't operated as C6ARA since April 2006, so hams should be wary of any contacts after that date.

TOM WARAKSA, AF8P

Surprise!: **My son, a recent graduate of the University of Michigan, asked mom and dad for a university vanity license plate as a graduation present, and this is what he got — by the luck of the draw. He is not a ham, but the son of a long time ham… me. —** ***Tom Waraksa, AF8P***

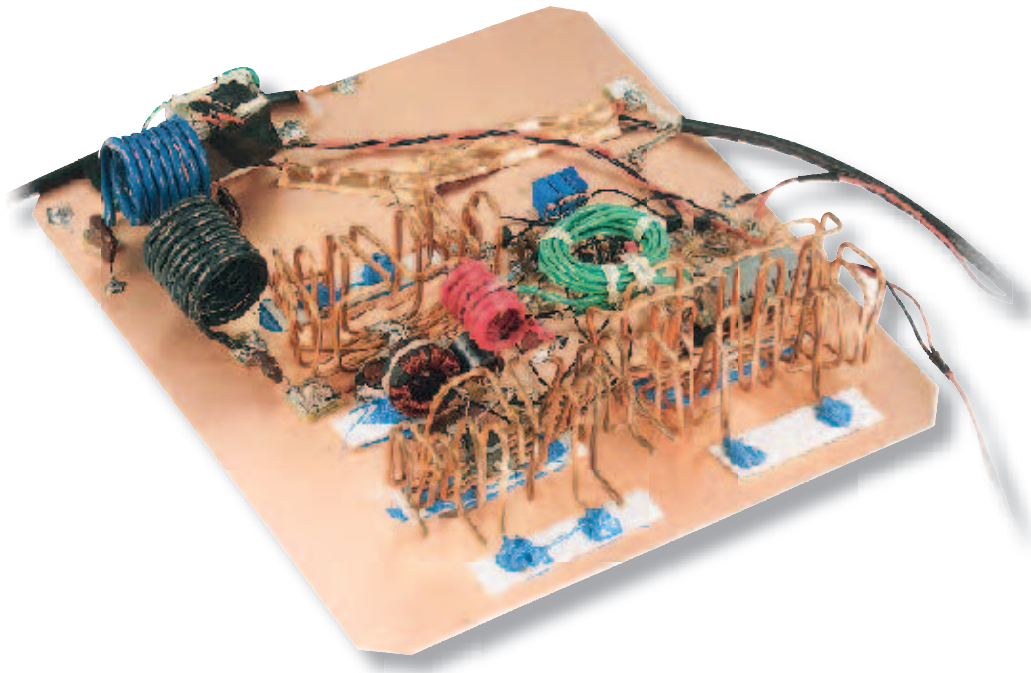
MIKE FURREY, WA5POK

Code wine: **Mike Furrey, WA5POK, found this attractive bottle at a Denver wine shop. "It is a pretty good wine too!" he reports.**

Homebrew Challenge II Co-Winner — The Lowest Cost Entry

Two amplifiers came through at almost the same low cost. This one made use of some especially interesting concepts.

David W. Cripe, NMØS



As a hardcore homebrewer, I was excited and pleased to read that the ARRL had issued a second Homebrew Challenge.[1] I had greatly enjoyed the first challenge, to design a low cost 5 W, voice and CW transceiver for 40 meters. This second challenge was to design a low cost companion, 50 W linear amplifier to mate with the transceiver from the previous challenge.[2] Although many of my low power (QRP) buddies might shake their heads at this, sometimes that extra power really does come in handy.

The Challenge

The challenge was simple: design a 50 W linear amplifier that could be duplicated for less than $125, and still meet operational and regulatory requirements. There have been a handful of amplifier projects published in *QST* over the past years that could probably be reproduced for less than the challenge maximum of $125 from which design inspiration could be taken. As I contemplated possible designs, I wondered what would be required to actually win the challenge. Just as there are strategies contesters use during the ARRL Sweepstakes, there are strategies that might be exploited in a design contest as well.

Given the criteria for contest scoring, the contest rules must be analyzed to find the directions most likely to provide an advantage. Assuming all other technical requirements are met, the primary criterion for evaluation of entries for the contest was to be cost. So, the design for the amplifier was undertaken with cost reduction as a main goal. To meet this goal, every preconceived notion of amplifier practice was abandoned, and the design began from a blank page.

Design Approach

Looking at a conventional solid-state HF power amplifier, and its bill of materials, the major cost elements are concentrated in two main areas, the power amplifier (PA) transistors and their heat sinks. Radio frequency power transistors are generally expensive, typically $35 or more. Some contain hazardous beryllium oxide materials. As Class AB linear RF power amplifiers operate at perhaps 50 to 60% efficiency, a heat sink capable of dissipating a significant portion of the 50 W must be provided. In a typical design, this would consist of a large aluminum extrusion. With prices of metals soaring in recent years, this would be a considerable additional expense, perhaps upward of $20. With these two cost drivers identified, a design strategy was defined:

- Use a low-cost PA device.
- Operate the PA in an efficient mode to reduce heat generation and heat sink requirements.
- Look for alternative cooling methods that would not require large amounts of expensive heat sink metal.

PA Active Device Selection

Since the amplifier was to operate within the 40 meter amateur band, the use of lower cost MOSFETs intended for power supply

[1]Notes appear on page 41.

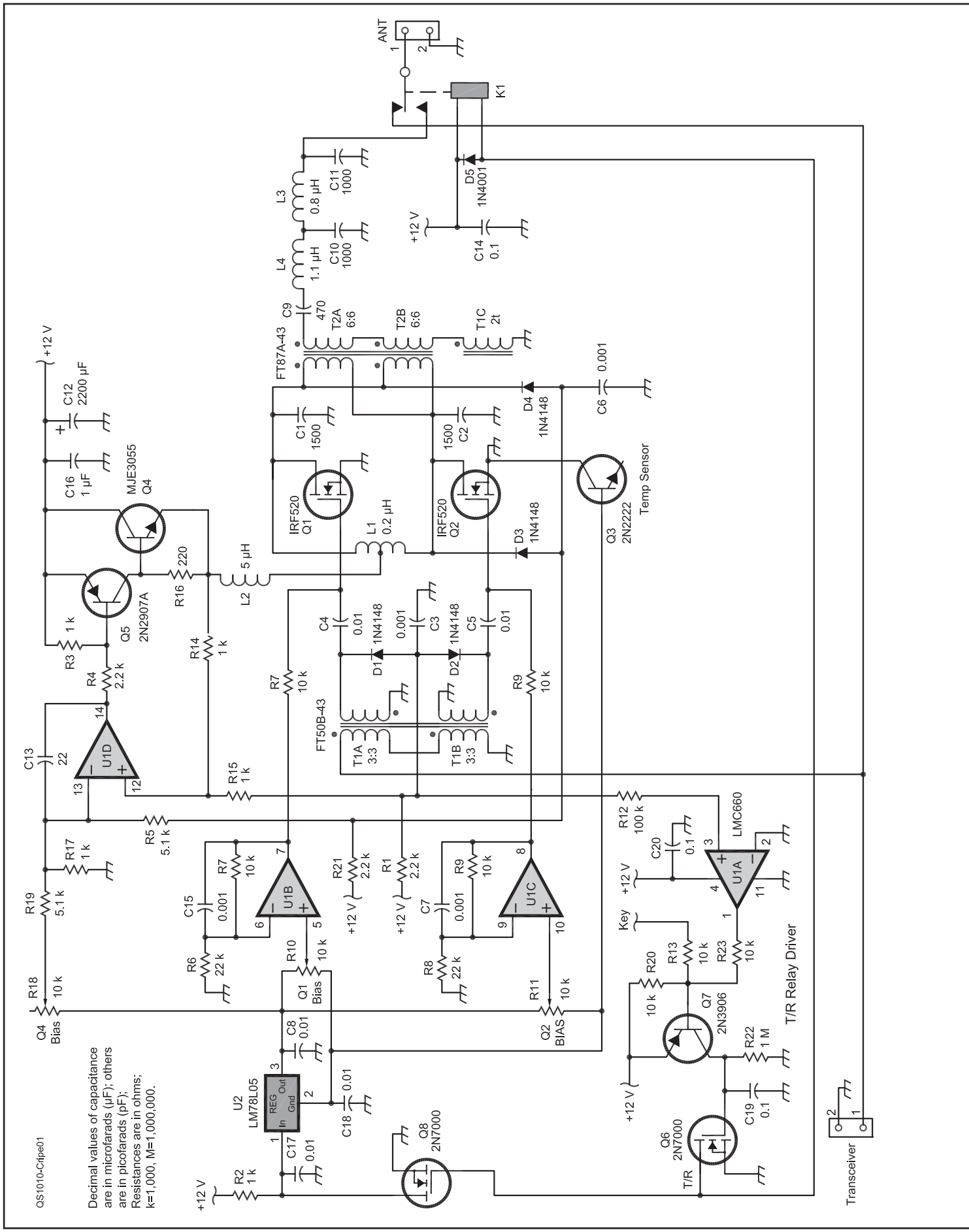

ANT
K1
D5 1N4001
+12 V
C14 0.1
L3 0.8 µH
C11 1000
L4 1.1 µH
C10 1000
C9 470
T2A 6:6
T2B 6:6
T1C 2t
FT87A-43
C12 2200 µF
C16 1 µF
MJE3055 Q4
C1 1500
C2 1500
D4 1N4148
C6 0.001
IRF520 Q1
IRF520 Q2
L1 0.2 µH
D3 1N4148
Q3 2N2222
Temp Sensor
R16 220
L2 5 µH
Q5 2N2907A
R3 1 k
R4 2.2 k
R14 1 k
C4 0.01
C3 0.001
C5 0.01
D1 1N4148
D2 1N4148
R7 10 k
R9 10 k
FT50B-43
T1A 3:3
T1B 3:3
C13 22
U1D
R15 1 k
R5 5.1 k
R17 1 k
R19 5.1 k
R18 10 k
Q4 Bias
C15 0.001
R6 22 k
U1B
R21 2.2 k
R1 2.2 k
C7 0.001
R8 22 k
U1C
R10 10 k
Q1 Bias
R11 10 k
Q2 BIAS
R12 100 k
C20 0.1
LMC660
U1A
Key
R20 10 k
R13 10 k
R23 10 k
Q7 2N3906
R22 1 M
T/R Relay Driver
C8 0.01
C18 0.01
U2 LM78L05
REG
In
Out
Gnd
C17 0.01
R2 1 k
Q8 2N7000
Q6 2N7000
C19 0.1
T/R
Transceiver
Decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); Resistances are in ohms; k=1,000, M=1,000,000.
QS1010-Cripe01

Figure 1 — Schematic diagram and parts list of the completed low cost amplifier. Suggested suppliers are listed with Amidon parts available at www.amidoncorp.com, Digi-Key at www.digikey.com, Jameco at www.jameco.com and Mouser at www.mouser.com.

C1, C2 — 1500 pF, 100 V, 5% surface-mount silver mica capacitor (Cornell Dublier MC22FA152J-F, Mouser).
C3, C6, C7, C15 — 0.001 µF ceramic capacitor (Jameco).
C4, C5, C8, C17, C18 — 0.01 µF ceramic capacitor (Jameco).
C9 — 470 pF, 500 V, 5% silver mica capacitor (Jameco).
C10, C11 — 1000 pF, 500 V, 5% silver mica capacitor (Jameco).
C12 — 2200 µF, 16 V aluminum electrolytic capacitor (Jameco).
C13 — 22 pF ceramic capacitor (Jameco).
C14, C19, C20 — 0.1 µF ceramic capacitor (Jameco).
C16 — 1 µF ceramic capacitor (Jameco).
D1-D5 — 1N4148 silicon diode (Jameco).
K1 — SPDT, 5 A relay (Omron G5LA-14 DC12, Digi-Key).
L1 — 0.2 µH air wound inductor, 6 turns, 0.5 inch diameter, #12 AWG house wire.
L2 — 5 µH air wound inductor, 12 turns, 1 inch diameter, #18 AWG insulated wire.
L3 — 0.84 µH air wound inductor, 7 turns, 1 inch diameter, #12 AWG house wire.
L4 — 1.1 µH air wound inductor, 8 turns, 1 inch diameter, #12 AWG house wire.
Q1, Q2 — IRF520 power MOSFET (Jameco).
Q3 — 2N2222 bipolar transistor (Jameco).
Q4 — MJE3055 bipolar transistor (Jameco).
Q5 — 2N2907A bipolar transistor (Jameco).
Q6, Q8 — 2N7000 bipolar transistor (Jameco).
Q7 — 2N3906 bipolar transistor (Jameco).
R1, R4, R21 — 2.2 kΩ, ¼ W, 5% resistor (Jameco).
R2, R3, R14, R15, R17 — 1.0 kΩ, ¼ W, 5% resistor (Jameco).
R5, R19 — 5.1 kΩ, ¼ W, 5% resistor (Jameco).
R6, R8 — 22 kΩ, ¼ W, 5% resistor (Jameco).
R7, R9, R13, R20, R23 — 10 kΩ, ¼ W, 5% resistor (Jameco).
R10, R11, R18 — 10 kΩ, 10 turn potentiometer (Jameco).
R12 — 100 kΩ, ¼ W, 5% resistor (Jameco).
R16 — 220 kΩ, ¼ W, 5% resistor (Jameco).
R22 — 1.0 MΩ, ¼ W, 5% resistor (Jameco).
T1 — RF transformer wound on Amidon FT50B 43 ferrite core; see text.
T2 — RF transformer wound on Amidon FT87A 43 ferrite core; see text and Figures 2 and 3.
U1 — LMC660 integrated circuit 15 V general purpose op-amp (Jameco).
U2 — LM78L05 integrated circuit (Jameco).
PCB — 8 × 8" inch single sided copper clad board (Jameco).

operation seemed like a feasible choice for the PA devices. I frequently use an IRF510 as a PA device for QRP and, with sufficient heat sinking, it chugs along happily at up to 20 W output within the HF frequencies. To achieve 50 W PEP, you need something more than an IRF510, so the choice was made to use two IRF520 devices, operating as a push-pull pair. The IRF520 is ubiquitous, cheap and has essentially twice the power capability of an IRF510. These are TO-220 packaged devices with no beryllium in their construction, which completely eliminates the concern over toxicity.

The MOSFET Downside — and a Way Around It

Why wouldn't I want to use a power MOSFET as a linear RF PA? Well, for one reason, they really aren't that linear. Unlike a bipolar junction transistor (BJT) that has its collector current proportional to its base current, a MOSFET has a drain current proportional to the square of gate voltage. Without feedback and careful tweaking, a MOSFET power amplifier will create a great deal of intermodulation distortion.

Because of their high gain and excellent switching characteristics, MOSFETs are commonly applied as switching power amplifiers, operating in Class D or Class E modes. Compared to a conventional Class AB linear power amplifier, which may have 50% dc to RF conversion efficiency, a Class E power amplifier commonly operates with efficiencies exceeding 90%. Compared to a Class AB amp, this would result in a 75 to 80% reduction in heat dissipation within the power amplifier device. This would in turn greatly reduce the heat sinking requirement, as well as improve the reliability of the PA transistors.

Class E power amplifiers are, however, not linear. As the transistors are operated as switches, the RF output voltage of the PA is directly proportional to the supply voltage. Most commonly, a Class E power amplifier is used as a CW amplifier, in which its fixed output power is not a limitation. It is possible, though, to force a Class E power amplifier to operate as a linear amplifier by varying its drain supply voltage to form the desired RF envelope of the signal being amplified. This technique is called *envelope elimination and restoration* (EER) and is a perfect match for a Class E PA.[3]

A separate linear transistor amplifier is used to create the envelope signal modulation supply voltage for the PA. The linear pass transistor is an MJE3055, the TO-220 packaged version of the familiar 2N3055. In this mode of operation, the pass transistor will dissipate no more than 12.5 W, well within its rating.

The technique of EER is not completely new to Amateur Radio. SGC had at one time advertised a 500 W amplifier, the *Mini-Lini*, using a Class E power amplifier and EER.[4] Although this product was never released for sale, it still received quite a bit of interest for its unconventional design.

Amplifier Thermal Design

Although the power devices selected for the amplifier are rated to operate at junction temperatures of 150°C, a good rule of thumb for keeping transistors operating reliably is to keep their junction temperature at or below 100°C. Despite the high efficiency of the PA and modulation amplifier transistors, they require some heat sinking to maintain safe temperatures. Because of the high cost, a conventional heat sink was out of the question. Other options were considered, such as water cooling, but were rejected as being impractical.

Reviewing the contest rules, I noted that wire and other consumables were not considered as part of the overall cost of the amplifier. Copper heat sinks are often used in high-performance, cost is no object, power amplifiers. If a copper heat sink were to be made of solid copper bus wire, it would have zero cost per the contest rules. Looking around the workshop, I spotted the box of wire scraps from a basement wiring project — bingo! So, heat sinks made of six 20 cm segments of stripped #12 AWG house wire were soldered directly to the tabs of the IRF520 PA MOSFETs, and a sink made of nine similar segments of wire was soldered to the tab of the MJE3055 envelope modulation transistor.

It took a 150 W soldering gun to generate enough heat to melt the solder to these heavy copper wires. This dispelled any concern that this improvised heat sink would not provide sufficient cooling! After the wires cooled enough to handle safely, they were bent into a zigzag pattern to occupy less volume.

Amplifier Bias and Linearity Design

Biasing circuitry was added to keep the MOSFET gate voltage centered around the threshold voltage for device conduction to ensure that the PA does not exhibit nonlinearity at low power output. Since the threshold voltage varies with temperature, a thermally compensated bias circuit was necessary. First a means of measuring the MOSFET temperature was required. This was obtained by directly soldering the metal can of a 2N2222A transistor to the source lead of MOSFET Q2. This provides thermal coupling from the MOSFET to the transistor. The case of the 2N2222A is connected to the transistor's collector terminal, so soldering it to the MOSFET source places it at ground

potential. The base collector connection of the transistor is a PN junction, which, while conducting a constant current, exhibits a –2.2 mV/°C temperature coefficient. The temperature of the MOSFET may thus be estimated by measuring the voltage drop of the 2N2222A.

The temperature coefficient of the gate-threshold voltage of the IRF520 MOSFET is roughly –3 mV/°C, so amplifying the base to collector voltage of the 2N2222A by 1.5 in an op-amp circuit will yield a temperature correction term to be summed in with the bias voltage.

The envelope waveform of the input RF signal is determined by using diodes D1 and D2 to rectify the output of the driver transformer. This signal is input to one section of U1, an LMC660 op-amp. The feedback signal to the op-amp comes from the emitter of Q4, the MJE3055 envelope modulation transistor. Using feedback in this manner results in a very stable amplifier, even as the MOSFETs warm up and increase their transconductance.

There is a further temperature related effect of MOSFETs, in which their conduction resistance increases with temperature. Without compensation, this effect would cause the output power of a Class E power amplifier to diminish with increasing temperature, as this increased drain resistance causes a reduction in output voltage. To compensate for this, another pair of diodes, D3 and D4, detect the conduction voltage of the MOSFETs and provide a feedback sample to the envelope modulation amplifier driver op-amp to correct for this effect.

Output Filter Design

The selection of the filter capacitors in the output filter circuit requires some consideration at these power levels. At full PEP output, the capacitors in the pi network would conduct 2 A RMS. Common ceramic capacitors in this application would quickly overheat. Silver-mica capacitors, which have high current handling capacity, were selected instead.

Other Aspects of the Design

In constructing a Class E power amplifier, it is particularly important to minimize any inductance in the circuit between the power amplifier MOSFETs and their shunt capacitors. Initially, a through hole component was selected, but tests indicated a nasty 100 MHz ringing at the MOSFET drains. These capacitors were then replaced with SMT mica capacitors which, while more expensive than the leaded variety, eliminated the ringing.

Designing such an amplifier for multiple band use is a real challenge because of the necessity of close mounting the band specific shunt capacitors to their respective MOSFETs. I thus decided to trade multiband capability for the benefit of greater efficiency. The resulting amplifier design is shown in Figure 1.

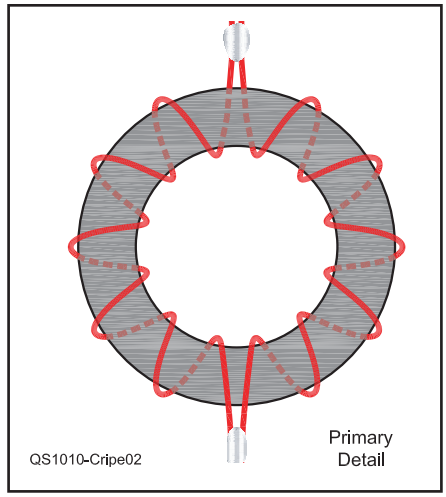


Figure 2 — Illustration of winding primary of transformer T2; see text for details.

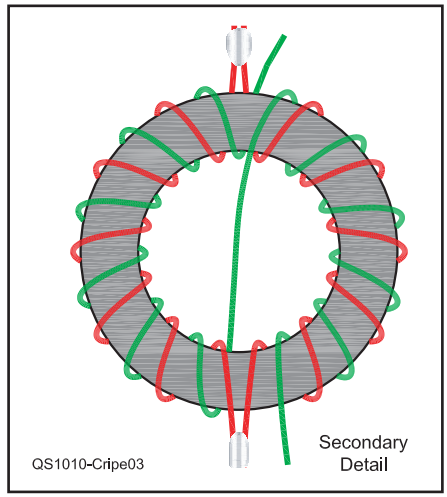


Figure 3 — Illustration of winding secondary of transformer T2; see text for details.

Putting the Pieces Together

There are two ferrite toroids used in the amplifier, one to provide the push-pull drive signal to the two MOSFETs and the second to couple the MOSFET outputs to the harmonic filter.

Transformer Fabrication

Drive transformer T1 is built around an FT43-50B core. Its windings consist of a primary of 6 turns #22 AWG magnet wire, and two, three turn secondaries, also of #22 AWG wire, each twisted in a bifilar manner with the primary. The center connection of the secondary windings is grounded, and the ends provide the push-pull MOSFET drive signals.

The output transformer, T2, is built around an FT43-87A core. The construction of this transformer is somewhat unusual. The primary and secondary windings use a multi-strand cable formed of seven paralleled strands of #30 AWG enameled magnet wire twisted at about one turn per inch. This multi-strand cable is called Litzendraht, or *Litz* wire, and has much lower resistance to RF currents than an equivalent solid conductor of equivalent cross-sectional area. Additionally, the stranded construction is much easier to wind on the toroid than a solid conductor would be.

The primary of T2 consists of two six-turn Litz-wire windings, each occupying opposite 180° halves of the toroid. These two windings are tied in parallel, and connect directly to the drain leads of the respective PA MOSFETs. The secondary winding consists of 12 turns of Litz-wire wound around the toroid, crossing over the center after six turns. Splitting the primary in this manner improves the coupling between the primary and secondary windings and provides a more symmetrical coupling between the two PA MOSFETs and the output. The construction of the transformer is actually more difficult to describe than it is to wind, so details of the winding of T2 are depicted in Figures 2 and 3.

Because of the high gain of the MOSFETs, less than 1 W of drive power is required to produce 50 W output. This means it is necessary to dissipate some of the drive power. Rather than dump it into a resistive load, it is instead coupled into the output of the PA, by passing the ground side pigtail of the secondary of T2 twice through the T1 toroid. It is important to observe the proper winding polarity as depicted in the schematic; otherwise, the amplifier turns into a power oscillator.

Inductors

The inductors used throughout the PA are inexpensive air core coils. L1, which resonates the drains of Q1 and Q2, is a 0.2 µH coil consisting of six turns of #12 AWG insulated house wire, close wound around a 1 cm diameter mandrel (I used a ballpoint pen). A segment of the insulation was removed at the center of the coil to provide a connection point for the drain choke, L4. The legs of the coil were soldered directly to the heat sink wires of Q1 and Q2. The stiffness of the #12 AWG wire allows it to be self-supporting.

Inductor L2, a 5 µH inductor, serves as the drain decoupling choke for the PA. It is fabricated from 12 turns of insulated, stranded, #18 AWG wire jumble wound

into a 2.5 cm diameter bundle. It is held in shape by cable ties and is strapped to the heat sink wires of Q4 to hold it in position. It should be oriented so that its axis is at right angles to that of L1.

Inductor L3 is a 0.8 µH choke, part of the output pi network of the PA. It is formed from seven close wound turns of #12 AWG house wire, wound on a 2.5 cm diameter former — I used a broom stick.

Inductor L4 is a 1.1 µH choke, part of the output band-pass filter of the PA. It is made from eight close wound turns of insulated #12 AWG wire, wound on the same form as L3.

The PVC insulation was left on L1, L3 and L4 to keep adjacent turns from shorting. Even though PVC tends to be lossy at RF, extended full-power tests of the amplifier showed only slight warming of the coils.

Final Assembly

An SPDT relay was added for TR switching, alternately connecting the antenna between the PA output and the transceiver input. A carrier detector was added at U1a to switch the relay in the absence of a keying signal. Also, during the receive mode Q8, a 2N7000 MOSFET, removes the bias from the PA transistors to reduce quiescent power dissipation.

The entire amplifier was breadboarded upon a 20 × 20 cm piece of copper clad PC material. The power transistors were glued to the board using strips of 1 mm thick polystyrene plastic as insulating spacers. Surface mount capacitors C1 and C2 were mounted on edge to bridge between the ground plane and the respective MOSFET drains. A combination of dead-bug, Manhattan and ugly construction techniques were used with plenty of cyanoacrylate and nonacidic silicone adhesives.

Firing it Up

With a design this unusual, I had quite a bit of concern that it would prove difficult to get it up and running. After assembling the PA section and output filter, I tested it from a fixed 5 V power supply. I found that the value of L1 needed tweaking, so it was re-wound. After that, the envelope modulation circuitry was connected, and amazingly, it worked right off the bat. This is extremely unusual.

The bias voltage to the MOSFETs Q1 and Q2 are adjusted with potentiometers R10 and R11 initially at their minimum voltage settings. The amplifier is connected to a dummy load, the RF input terminated in 50 Ω, and the KEY line shorted to engage the TR relay. R10, which controls bias on Q2, is advanced until the amplifier draws 0.15 A while you monitor the current from the 13.6 V supply. Then, R11, which controls bias on Q1, is advanced until the total amplifier current increases to 0.30 A. If the currents are imbalanced, the second harmonic will not null properly. If the bias is too low, the amplifier will have higher distortion, and if bias is too high, there is a risk of oscillation.

Then the bias of the Q4 envelope amplifier circuit is adjusted. The bias control potentiometer R18 is adjusted until the voltage at the emitter of Q3 is 4.75 V. You are now ready to get on the air.

Finding all the Parts

As cost was the primary consideration with the design of the amplifier, vendor selection was important. While I purchase electronics from many different suppliers, I have found that Jameco is a reliable source of inexpensively priced components. The mica SMT caps, on the other hand, are only sourced through Mouser. Details and a suggested source are shown in Figure 1, although most parts are available from many sources. When the cost of all the electronic components and the PC board was totaled, it came out to less than $32. For someone with a well-stocked junk box, it could be much less. Additional cost saving was provided by building the amplifier without an enclosure — you may want to put it in one for a few dollars more.

Notes

[1]J. Hallas, W1ZR, "Announcement — Second ARRL Homebrew Challenge," *QST,* Feb 2009, p 75.

[2]"Up Front in *QST* — ARRL Homebrew Challenge!" *QST,* Aug 2006, p 20.

[3]L. Kahn, "Single Sideband Transmission by Envelope Elimination and Restoration," *Proceedings of the IRE*, vol 40, Jul 1952, pp 803-806.

[4]**www.sgcworld.com/500watt.html**

ARRL member David W. Cripe, NMØS, has been licensed since 1981 and holds an Amateur Extra class license. He received a BS in physics from the University of Illinois in 1984 and is employed as an electrical engineer at Rockwell Collins in Cedar Rapids, Iowa.

His interests include AM and shortwave broadcast DXing, high performance crystal radios, Class E power amplifiers, magnetics and antennas. You can reach David at 118 Hilltop Dr, Mt Vernon, IA 52314 or at **nm0s@arrl.net**.

New Books

GET ON THE TRAIL WITH *THREE HUNDRED ZEROES*

By Dennis R. Blanchard, K1YPP

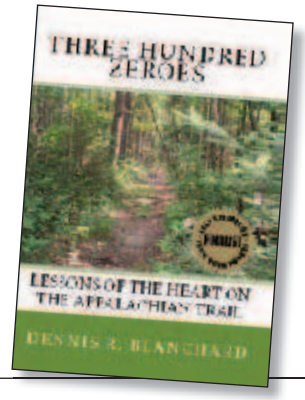
Self-published. Available at **https://www.createspace.com/3428889** *or at* **www.amazon.com**. *Copyright 2010. Three Hundred Zeroes, PO Box 18364, Sarasota, FL 34276,* **dennis@threehundredzeroes.com**, **threehundredzeroes.com**.

Reviewed by Steve Ewald, WV1X

♢How would you like to go on hike? How about a real long hike that is 2176 miles long and covers 14 states in the eastern United States?

Three Hundred Zeroes by Dennis Blanchard, K1YPP, captures the adventure of hiking the Appalachian Trail (AT) all the way from Springer Mountain in Georgia to Mt Katahdin in Maine. Because of heart surgery, Blanchard's excursion took place over a two-year period, even though he had first set out to hike the AT in one extended hiking season.

What challenges and difficulties did he face along the way? What personal goals kept him going forward when circumstances beyond his control seemed to dictate otherwise? These questions about life on (and off) the Appalachian Trail are answered in a very interesting, informative and entertaining manner. Dennis' writing style takes the reader right along for the hike.



One begins to understand the joys and rigors of living in the wilderness, facing the elements and meeting fellow hikers. The book's subtitle, "Lessons of the Heart on the Appalachian Trail," is most appropriate.

In addition to his hiking equipment, K1YPP carried and operated his homebrew low power CW transceiver with a wire antenna. The book provides a good general explanation of Amateur Radio for newcomers, and it and gives references for further information. (See his "An Appalachian Journey" in the March 2010 issue of *QST*, pp 67-69 for details about his on-the-trail radio operations.) After reading this enjoyable book you just might be inspired to "hit the trail" in your own personal way.

A Long Range J-Pole Antenna for Your 70 cm Handheld Transceiver

Less expensive and more portable than an amplifier, this antenna may work just as well, if you need longer range.

Don Thomas, W6LRG

If you need to extend the range of your 70 cm handheld transceiver, consider making this simple J pole. This 440 MHz antenna only adds 20½ inches to the top of my handheld and gets me a lot farther.

The antenna mounting plate is attached to the belt-loop screw holes on my elderly RadioShack HTX-404 transceiver with new screws ⅛ inch longer than the originals. If your transceiver is set up differently and doesn't have the handy holes, you may use hook and loop fasteners to attach the mounting plate to the handheld.

The longer driven element and line section is about 19½ inches long while the short line section is about 6½ inches long. While I used some surplus stainless 0.1 inch diameter, 22 inch whips from a Hustler MO-4 short mast kit, any mechanically suitable rod or tubing should work. [Note that if it is made of rods of significantly different diameter, the length of the longer rod may need to be adjusted — shortened slightly if thicker. — *Ed.*] They are spaced about 11⁄16 inch between centers. The two spacers that keep the two elements separated are ¼ inch Plexiglas spaced 4½ inches apart (see Figure 1). They can be glued or holes can be drilled slightly smaller than small screws and the screw threads will cut into the plastic. The main mounting plate of ⅛ inch Plexiglas is 2 × 11 inches.

The bottoms of the two elements are shorted together with two forked crimp-on connector ends with the forks bolted together at the bottom spacing plate. The round body of the connectors are squeezed down and then forced onto the lower end of the whips at the bottom spacer.

The feeding attachment to the whips also uses a pair of forked wire connector ends to shunt feed the antenna elements about 1½ inches up from the bottom spacer plate. One fork on each connector is snipped off.

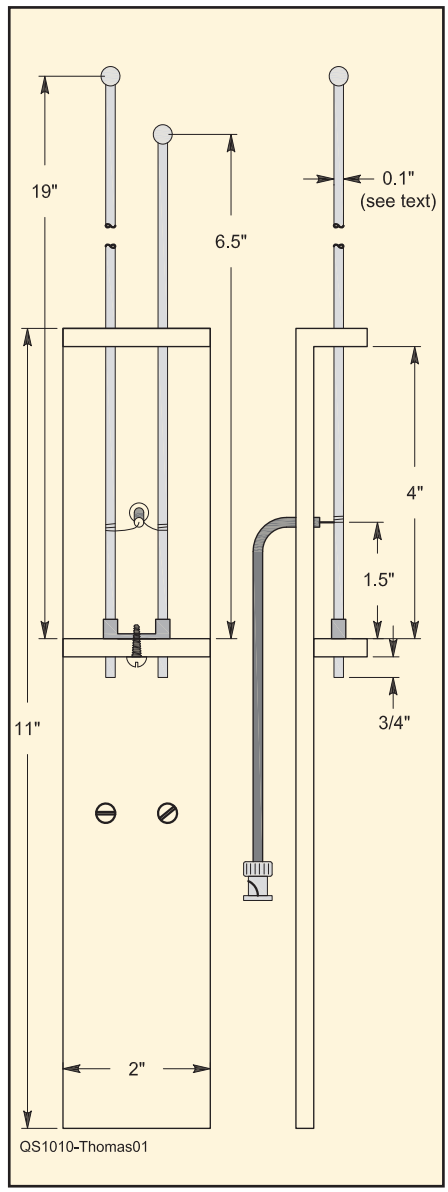


Figure 1 — Dimensions of 70 cm portable J-pole antenna.

Figure 2 — View of antenna feed connection details.

Solder the center of the coax to the remaining connector fork on the long element and the braid to the connector on the short one. The coax is only 4 inches long. I used an antenna analyzer to determine where to slide the feed connectors for the lowest SWR, which for me was at 1⅝ inches up from the bottom. You may want to start there or if you don't have an analyzer it will probably work if positioned at that point. Figure 2 shows the connections.

The antenna adds about 4 ounces to the handheld and works like "gangbusters."

Photos by the author.

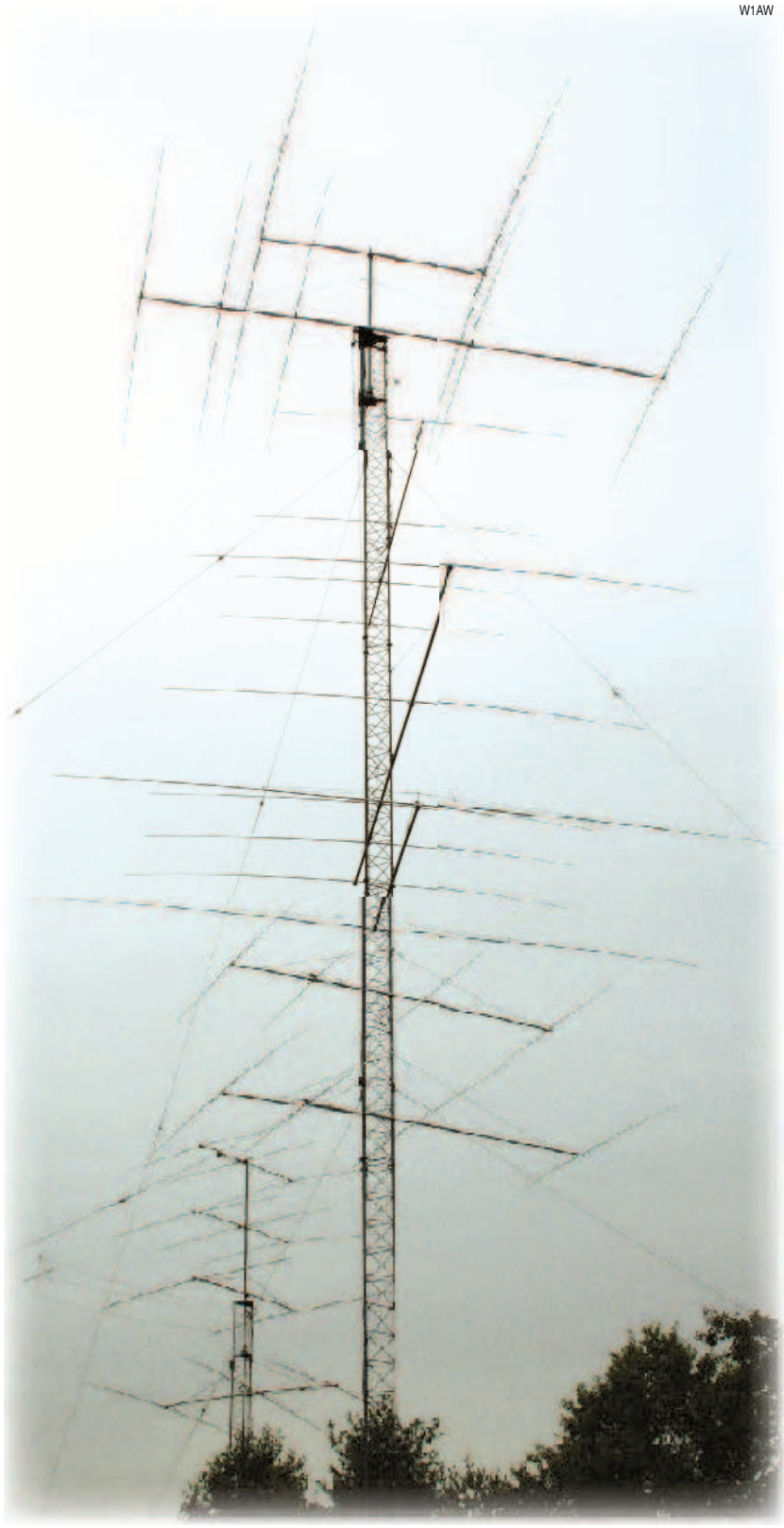
Amateur Extra class licensee Don Thomas, W6LRG, is 78 and has lived in California all his life except for a career in the US Army from 1947 to 1967. He entered the service at age 15 and first served in the occupation of Germany. His second enlistment took him to Korea. One Purple Heart and nine months later he was back in the states.

Don is a member of the ARRL and the Turlock Amateur Radio Club. He has served seven years as its president. You can reach Don at **w6lrg@sbcglobal.net**. QST

Is Your Tower Still Safe?

Galvanic corrosion — what it can do to underground structural tower components, and ways the problem can be avoided.

Tony Brock-Fisher, K1KP


W1AW

Guyed towers are one of the most common and practical ways to support antennas for HF and VHF use. Many hams go through the exciting process of planning, gaining approval, purchasing and installing guyed towers for their ham antenna installations. The process of selection, approval and installation of such towers is usually the subject of intense focus and discussion with hams fortunate enough to be able to afford them.

Once the tower is installed its condition and that of its support structures is often ignored as the ham's attention naturally turns to installing antennas. Over the years, antennas may come down for repair or replacement, but seldom does the tower itself receive the attention it needs to keep it in safe and working condition. Any type of extensive antenna support structure, be it a simple roof-mounted tripod or a large guyed or self-supporting tower, should be inspected regularly for safety.

What You Can't See Can Hurt You

This inspection should be conducted annually at least, and it is prudent to conduct some sort of inspection anytime before climbing a tower. Often this inspection will include checking the visible parts of the tower for rust, corrosion, tightness of hardware and other key structural points. But what about the parts of the tower that are not easily visible? Even though they are more difficult to inspect, they should be checked as well. This article discusses one critically important aspect of tower inspection and maintenance for guyed towers: the inspection of the underground parts that provide vital support for the guyed tower.

A guyed tower is a unique engineering structure. The vertical load of the weight of antennas (and climbers) is supported by a very strong and rigid structure — the metal braced tower itself. The tower is, however, held in a vertical orientation by a system of guy wires that serve to keep the tower upright. If more than one set of guys are used, they also serve to keep the tower *in column* or straight, which prevents bending forces from acting on the tower. The guys are a critical part of the tower — as anyone who has had a tree fall on a guy wire can attest.

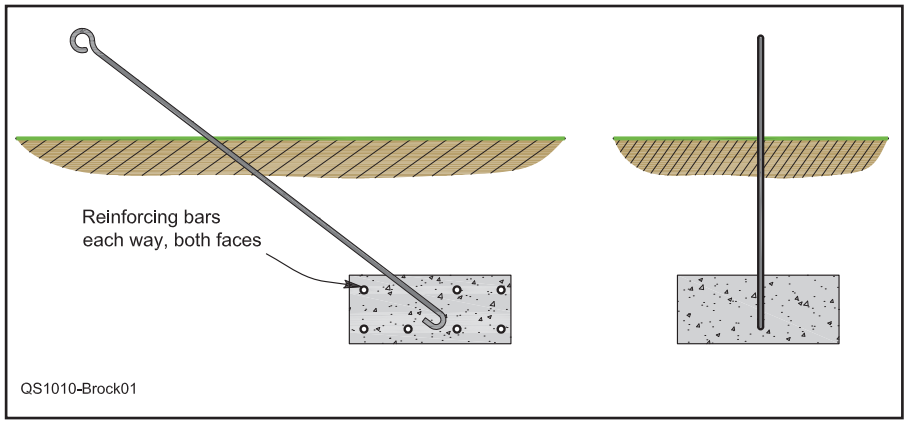


Figure 1 — Detailed views of typical concrete encased buried guy anchor and rod. See www.rohnnet.com for detailed information about anchoring their towers.

K1KP

Figure 2 — Guy anchor rod inspection. This rod has lost all of its galvanized coating, exposing the steel to corrosion.

The guys typically are made of extra high strength stranded (EHS) steel wire. They run from the tower to ground-mounted anchors at three locations equally spaced (120°) around the base of the tower. In most amateur installations, even though multiple guy wires may be used at each of the three directions, they often terminate in a single anchor point at ground level. The single guy anchor point, if not properly maintained, can be a single point failure with catastrophic results.[1] [Note that multiple anchor points will add a measure of redundancy. — *Ed.*]

A typical guy anchor consists of an equalizing plate that combines the loads of multiple guy wires into a single point. The single point is then attached to a guy anchor rod. The guy anchor rod extends from the equalizer plate to a concrete anchor, which is usually partially or completely buried in the ground to a depth extending below the frost line. See Figure 1.

If installed according to the manufacturer's instructions, the guy anchor rods have the majority of their length buried underground in the soil. The end of the guy anchor rod has some sort of structural element, such as a simple bend or a welded plate, that is embedded in the concrete base to provide positive support for the load the guy anchor rod must support. As with most tower components, the guy anchor rod is galvanized to prevent corrosion.

The portion of the anchor rod that is below ground level can be subject to corrosion that goes unnoticed in a normal tower inspection. For this reason, it is important that the guy anchor rods be excavated for inspection down to the concrete level, so their condition can be evaluated over their entire length.

It is not uncommon for guy anchor rods to be installed in ways other than per the manufacturer's directions. In most cases, the manufacturer has already discovered the best way to install and use the product, so in general it is good practice to follow the manufacturer's directions. This is K7LXC's Prime Directive: "Do what the manufacturer says!"[2] While some manufacturers recommend that the concrete base be installed below ground level and backfilled with earth, it is not uncommon practice to simply dig a hole down to below the frost line, perhaps install some forms, add the guy anchor rod in the desired position, and fill the hole/forms with concrete back up to grade level.

This has the advantage of not leaving any portion of the guy rod buried in direct soil contact. Since the entire rod is not encased in concrete, it can be inspected without excavation. The high resistivity of the concrete offers protection against corrosion of the portion of the rod that is encased in the concrete, as little or no current flow occurs through the concrete. This would seem to be a case where deviating from the manufacturer's directions may be a good idea — even Steve, K7LXC, condones the pouring of concrete for guy anchors above grade level.

Real Life Examples

I've had a 78 foot guyed tower installed at my present location for 16 years. The guy anchors were installed exactly per the manufacturer's recommendations, with the exception that after the concrete was poured and set, the rods were given a coating of bituminous tar. Recently I had become aware of the potential dangers of anchor-rod corrosion, and finally this spring the nagging fears led me to pick up a shovel and actually inspect the guy anchor rods.

Following the recommendations of experts, I excavated the rods from ground level down to the top of the concrete. After exposing the rods, I scraped them carefully with a garden trowel to be sure to remove any adhering soil (and, potentially, rust accumulation). I paid particular attention to the point at which the rod entered the concrete, as this can be the area that suffers the most serious corrosion. For two of my anchor rods, I discovered that the tar coating had not provided sufficient protection, as the tar and the galvanizing underneath it were essentially gone. The rods had visible rust on them, but fortunately they were not rusted sufficiently to reduce the strength (see Figure 2). I tapped the rods along their length, especially near the concrete, to make sure there were no large amounts of rust that would look normal but actually be a serious weakening of the rods. One of the rods looked essentially like the day it was installed; the tar coating was intact, along with the galvanizing underneath it. Interestingly enough, that rod was in the wettest location.

What Happened?

What had occurred was a classic case of corrosion. The chemical composition of the soil, along with oxygen and moisture, had led to the conversion of metal, first zinc and then steel, to oxides. The components used in tower construction are typically made of steel for strength. Steel rusts very quickly when left exposed to the elements. To prevent this rapid corrosion and prolong the useful life of tower components, the manufacturer usually galvanizes the components by hot-dipping them in zinc. While the galvanization does protect the steel as long as it is intact, the two metals involved, zinc and steel, can actually accelerate corrosion, once there is a break in the zinc coating, as described below.

Even though the coating of zinc may appear complete, wear, stress at load bearing points and corrosion of the zinc always result in the exposure of some of the steel. Therefore, there are two dissimilar metals in electrical contact, and also in contact with an electrolyte (water). We have the familiar components of a battery, as shown in Figure 3.

If two dissimilar metals are electrically connected and immersed in an ionic solution, a process known as *galvanic corrosion* occurs.

[1]Notes appear on page 47.

In this case, an electric current flows from one of the conductors, through the electrical connection to the other conductor, and back to the first conductor through the ionic solution (electrolyte). Essentially, a battery is formed by the two conductors and the electrolyte. The direction of current flow is determined by the types of metals involved and their relative positions in the galvanic series. The galvanic series is a list of conductive materials in order of their electrical activity, from most negative to most positive.[3] In the case of zinc and steel, zinc is more negative (–1.0 V) compared to steel (–0.6 V). This means that if a battery is formed with zinc and steel, current flows in a loop from the steel, through the electrical connection to the zinc, and then through the electrolyte (moist earth) back to the steel. Electric current flow in an electrolyte occurs through the migration of ions.

The negatively charged hydroxide ions migrate to the positively charged zinc (anode). The positively charged zinc ions combine with the hydroxide ions to form zinc oxide and hydrogen gas. The zinc corrodes because the different electric potential means the zinc gives up its electrons to form ions more easily than the iron. Note that in this case, the zinc corrodes but the electric potential protects the iron from corroding. This is an example of a sacrificial anode (zinc) in a cathodic protection system. If instead of zinc, a more noble material (more positive in the galvanic series) such as copper were used, the reaction would go in the opposite direction: The iron would be corroded while the copper would be protected.

Such is the undesirable but typical case in which a guy anchor rod is protected against lightning by the connection of a nearby copper ground rod. It is often recommended that the guy anchors be grounded for lightning protection using a ground rod that is electrically connected to the guy anchor. Usually, such ground rods are copper or copper clad steel.

In the event of a lightning strike, this allows the current to bypass the anchor rod and concrete anchor. If the lightning were allowed to pass through the rod and anchor, the concrete could be shattered by the sudden heat and steam generated by the strike. The copper of the ground rod is, however, much more positive than steel or zinc in the galvanic series, so the connection of the copper ground rod would actually increase the rate at which the zinc galvanizing is consumed. So while it is good practice from the lightning point of view to add the copper ground rods, it is detrimental from a corrosion point of view. It would be better to use a galvanized steel ground rod, or provide additional corrosion protection for the anchor rod.

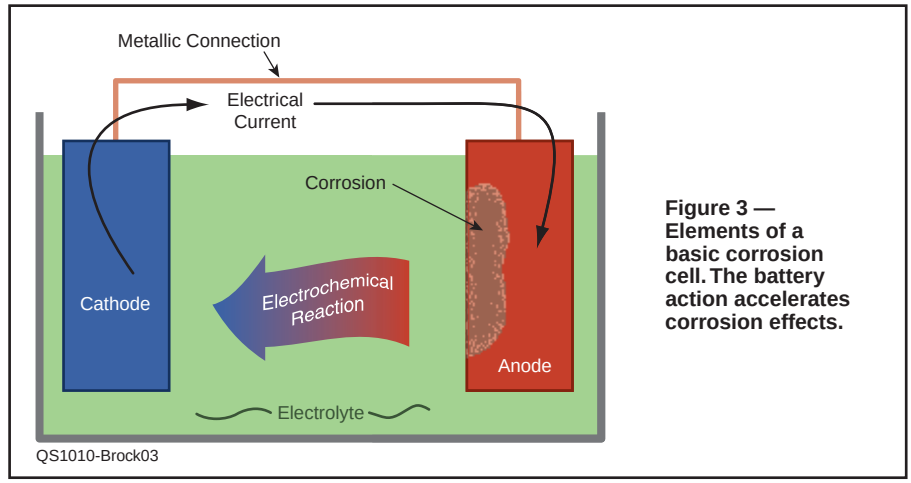


Figure 3 — Elements of a basic corrosion cell. The battery action accelerates corrosion effects.

K1KP

Figure 4 — All the materials required to build six sacrificial anodes.

Difference in Electrolytes

In addition to different metals, galvanic corrosion can also be caused by a difference in electrolytes. Consider the fact that the guy anchor rod is located in at least two and possibly more different electrolytic environments. There may be layers of different types of soil, with differing chemical compositions and pH levels. A portion of the guy rod is encased in concrete, which has higher resistance and is often more cathodic than the soil above. This explains why the most severe corrosion often occurs right at the point at which the rod enters the concrete base. In fact, this condition was evident on my guy anchor rods. This is why it is critical to excavate all the way to the base while performing inspections of the guy anchor rods. It is not sufficient to dig down a foot or so and check the condition of the rod — you must always inspect the rod over its entire length, paying close attention to the point at which it enters the concrete.

In the case of two of my tower anchor rods, the zinc had been completely expended doing its job protecting the steel structural member of the rod. It's important to note that covering the rod with tar had probably been a bad idea. This is because the tar coating could never be perfect, and any small imperfections would expose a small area of zinc. Because of the small area, the electric current would be concentrated at that point, and cause the zinc to be corroded rapidly there. The zinc corrosion was probably actually accelerated by the tar coating. This is an excellent example of the corollary of the K7LXC Prime Directive: "*Don't* do what the manufacturer doesn't tell you." Likewise, it would be a bad idea to attempt to coat the rod with a thin layer of concrete, or to retrofit an existing below-grade anchor by adding new concrete up to ground level. Either approach can leave cracks or gaps into which water can enter and cause corrosion. In these cases, there is no way to inspect the potential corrosion visually.

What's Next?

With the zinc nearly totally gone from the anchor rods, there is nothing to prevent the steel from turning to rust, leading to an eventual failure of the tower. At the present time there is adequate strength in the steel rods to support my tower — so it would be desirable to somehow protect the rods in their existing state. What is needed is a means of stopping the corrosion process.

I was aware that sacrificial zinc anodes are used in marine environments, and that the zinc electrodes are user replaceable. In this case, because the electrolyte is so good, either fresh or saltwater, there is no need to completely cover the surface to be protected with zinc galvanizing — a small chunk of zinc, immersed in the water and connected to the metal to be protected is all that is needed to create cathodic protection for the structural metal. The zinc anodes are rapidly corroded, but easily replaced. Could such a system work for anchor rods?

I conducted an Internet search and found that there are companies that market systems specifically for this purpose. The system consists of a technique to restore the cathodic protection that is lost when all the zinc has been used up. Because they are designed for commercial applications, the cost was prohibitively high for amateur use.[4] Nevertheless, I had verified that the idea of cathodic protection using a sacrificial anode could be made to work for guy anchor rods. After more research, I learned how the system should be constructed, and where the materials could be located inexpensively.

The Solution

The system for cathodic protection of guy anchor rods is fairly simple. It consists of the addition of a sacrificial anode that is electrically connected to the structure to be protected and chemically connected to the electrolyte involved. Each of these elements present special requirements for the case of underground corrosion protection.

Sacrificial Anode Material

First, the sacrificial anode material should be magnesium, not zinc. The reason for this choice is that magnesium is much farther away electrically in the galvanic series from steel than zinc, being the most negative metal in the series. This provides several advantages. First, it provides a much larger driving voltage potential for the electrical cell. Given that the electrolyte in this case can be much higher impedance than the case of immersion in water typical of boats, this provides an additional measure of protection. Second, the potential difference of the magnesium would serve to protect not only the steel of the structural element, but the zinc coating as well. In a system with more than two types of metal, the metal with the most negative potential will be the site of corrosion, and its generated electrical potential will serve to protect all the other metals in the system with more positive potentials.

Connection of Anode to Electrolyte

In the case of underground cathodic protection, the sacrificial anode needs to make good electrical contact with the electrolyte. This cannot be reliably achieved by simply burying the anode in the ground. Typically this connection to the electrolyte is facilitated by surrounding the anode with a special material that is engineered for this purpose. Although many different materials might be appropriate, the most commonly used material for local underground corrosion protection is a mixture of gypsum, Bentonite and sodium sulfate. This material effectively reduces the electrical resistance of the connection by increasing the surface area.

Additionally, the ionic behavior of sodium sulfate provides excellent electrical connection in an environment without using a chemical that is completely soluble, such as common salt, which would dissolve quickly and simply leach away into the soil. The Bentonite serves to maintain water content and soil contact in the area of the electrode even under dry conditions. This mixture is called #6 by the supplier.[5]

Commercially Available Materials

It may seem that magnesium anodes and the special backfill material might be hard to procure. However, the Internet once again comes to the rescue. I found a company that sells exactly the materials needed, in reasonable quantities and at reasonable prices.[6] The backfill material is available in 50 pound bags. The electrodes are 1.312 × 12 inch magnesium rods, which come with a 3 foot long lead of #12 THHN wire with a hose clamp connector at the end. I placed an order via e-mail, and received the electrodes and backfill via UPS the following week. The cost for materials to protect an average size amateur tower was under $150.

I found a source of cotton bags on an auction site as well. I was able to buy 8 × 16 inch cotton bags with a drawstring top very cheaply.[7] I used two electrodes per guy anchor for a total of six anodes (see Figure 4). The anodes are prepared by filling the bag with the backfill mixture, then inserting the electrode into the center of the bag full of backfill and closing the drawstring at the top (see Figure 5). One 50 pound bag of backfill was the perfect amount to fill six bags of the specified size.

Anode Location and Installation

The recommended installation of the sacrificial anodes is one on either side of the guy anchor rod, about midway between the concrete anchor and the point where the rod exits the ground. The location is not critical, so if you have to dodge large rocks it is okay to relocate the hole a bit. The installation should be as deep as possible, up to 6 feet, in order to make the best electrical contact with the underground electrolyte environment. Simply use a power auger or post hole digger to make a small round hole on each side of the anchor rod. The bags are placed at the bottom of the hole with the lead wire coming to the surface. It's a good idea to backfill around the bag with soil to the top of the bag, then tamp the soil around the bag with a tool handle before filling the remainder of the hole to grade level.

Electrical Connection

The sacrificial anodes need to be electrically connected to the guy anchor rod by #12 AWG THHN wire. The wire supplied on the electrodes was not long enough to reach a connection point above ground, so I made a twisted/soldered splice to another piece of #12 AWG wire. I made no attempt to weatherproof the splice, as it will be protected by the system. The leads are buried a few inches below the soil to keep them out of the way of the lawnmower. The electrical connection to the anchor should be in an accessible location for testing later on, so bring the wires from the anodes up the ground rod, secured by nylon ties, to a point above grade where they can be connected. I simply attached the wires to the existing ½ inch turnbuckle bolts with an additional ½ inch nut (see Figure 6).

Is it Working?

In order for the system to provide cathodic protection to the ground anchors, there has

K1KP

Figure 5 — Bag filled with backfill material and magnesium electrode before closing.

Table 1

My Voltage Measurements Used to Verify and Monitor Cathodic Protection

Day	*NE Guy Anchor*			*S Guy Anchor*			*NW Guy Anchor*		
	N BLK (V)	*E WHT (V)*	*Current (mA)*	*E BLK (V)*	*W WHT (V)*	*Current (mA)*	*W BLK (V)*	*N WHT (V)*	*Current (mA)*
0	0.313	1.287	1.135	0.908	0.810	3.50	1.461	1.420	1.35
1	0.971	0.935	1.220	0.587	0.558	3.13	1.233	1.238	3.37
2	0.894	0.860	1.331	0.577	0.548	3.15	1.203	1.199	3.32
4	0.810	0.792	1.112	0.563	0.533	3.02	1.172	1.160	2.55
10	0.732	0.703	1.171	0.507	0.490	1.872	1.069	1.069	3.17
29	0.619	0.570	1.212	0.508	0.511	1.77	0.848	0.859	3.95

K1KP

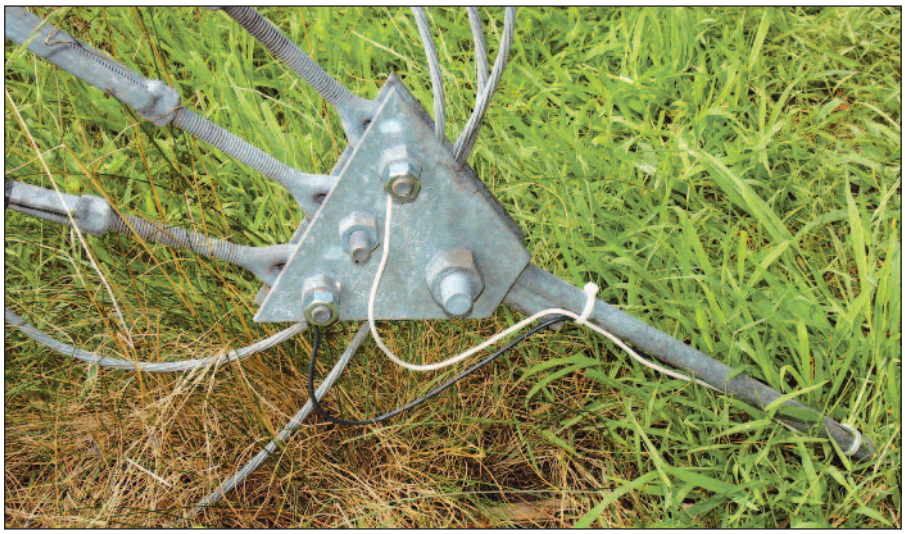


Figure 6 — View of electrical connection to guy anchor.

to be an electric potential generated by the system. To check for this, temporarily disconnect the anode leads from the guy rod. Connect a digital voltmeter (DVM) between each of the anodes and the guy anchor rod, with the ground lead of the DVM to the guy anchor rod. You should see a negative voltage. The exact voltage you read will depend on many factors, including the soil conductivity, the moisture content of the soil and electrode bag, and the condition of the guy anchor rod.

Next, set the DVM to measure current between the guy anchor rod and the leads from the anodes (connect them together for this measurement). You should see a current flowing from the cathode (guy anchor) to the anodes. These voltages and currents can be measured and recorded over time to check the efficiency of the system. Typically the efficiency will increase gradually after installation, as the electrical conductivity of the disturbed soil is reestablished and the bags' moisture content increases. Table 1 shows the measurements I made immediately following installation.

The measurements I made on day zero showed a wide disparity, even between electrodes at the same guy anchor. After one day (with frequent rain), the measurements become much more similar between electrodes at the same guy anchor, with the difference between electrodes becoming less than 30 mV. When measuring the voltage potential with the electrodes disconnected, you are measuring the electrical potential of the corrosion cell formed by the magnesium anode and the guy anchor cathode. This will depend on the metals involved — so if the guy anchor rod is in good shape, and still has the zinc galvanized coating, the potential will be lower than if the guy anchor rod has lost the zinc coating. In that case the potential will be determined by magnesium and steel.

In my case, I had two guy anchor rods that had lost much or all of the zinc galvanization (NE and NW), with the third anchor rod (S) still retaining the zinc. The voltage measured on the good anchor was much lower than the others, indicative of the fact that I was seeing the potential difference between magnesium and zinc, not magnesium and steel. If the current is seen to decrease a long time after installation, this may be an indication that the anodes are completely used up and need to be replaced.

You should make a test sheet on which you can record the electrode voltages and currents over time. You should see the voltages increase after installation, then stabilize. Measuring the electrode voltages should definitely be part of your regular tower inspection process.

The installation of a cathodic protection system does not in any way obviate the need for regular inspections of the guy anchor rods. You should still excavate and inspect the rods periodically to be sure that they are not corroding and becoming unsafe.

Conclusions

The important points of this article are as follows: First, buried components of tower structures are susceptible to corrosion, and therefore should be excavated and visually inspected on a periodic basis. The appropriate time period will depend on the exact installation and soil conditions; it is this author's opinion that the first inspection should occur no more than five years after initial installation, and the interval between inspections can be adjusted based on the amount of corrosion found. Second, a sacrificial anode can be installed to create a cathodic protection system to prevent corrosion of buried tower components. This sacrificial anode can be a commercially available unit, or the components can be purchased individually and installed by the ham at a much lower cost.

Notes

[1]C. Snyder, "Understanding and Preventing Guyed Tower Failure Due to Anchor Shaft Corrosion," Sioux Falls Tower Specialists.
[2]S. Morris, K7LXC, "UP THE TOWER — The Complete Guide to Tower Construction," 2009, Champion Radio.
[3]**www.corrosionsource.com/handbook/galv_series.htm**, or **www.ocean.udel.edu/seagrant/publications/images/corrosion.pdf**.
[4]**www.anchorguard.com**
[5]**www.brancekrachy.com**
[6]See Note 5.
[7]**www.organzabagg.com**

ARRL Member and Amateur Extra class licensee Tony Brock-Fisher, K1KP, was first licensed in 1967 as WA1IKP. After receiving his Master's degree in ocean engineering, he worked at Hewlett-Packard, Agilent and (currently) Philips Electronics for 32 years in the field of diagnostic medical ultrasound. He enjoys Contesting, DXing, classic tube equipment, antenna design and construction and ARRL Field Day. He is trustee and treasurer of the Philips Amateur Radio Club in Andover, Massachusetts. Tony can be reached at 15 Webster St, Andover, MA 01810 or at **barockteer@aol.com**.

PRODUCT REVIEW

RF Concepts Alpha 9500 Linear Amplifier

Reviewed by Norm Fusaro, W3IZ
w3iz@arrl.org
Assistant Manager, Membership and Volunteer Programs Department

For decades, the name *Alpha* has stood for quality built, high power HF amplifiers. Rugged construction and proven designs combined with outstanding customer service are the things that make an Alpha amplifier very desirable. The Alpha brand has gone through several changes over the past 40 years, including an off-shore manufacturing venture and several different owners. Most recently, the Alpha brand was acquired in 2009 by RF Concepts, LLC.

One of the first things that the new owners did was to lower the price of the Alpha 9500, as well as the prices of all other products in the line. RF Concepts President Michael Seedman, AA6DY, said in a press release that the new company will continue producing amplifiers and accessories to the same high standard that has been the benchmark of the Alpha brand.

Another goal of the new management was to streamline the production process to be able to fill customer orders more quickly than previous production schedules had allowed. That goal has been met. As this review was being prepared, the RF Concepts Web site announced that amplifiers are in stock for immediate delivery, and that Alpha products are also available through Amateur Electronic Supply and Ham Radio Outlet.

Beauty, Brains and Brawn

The Alpha 9500 is the company's top-of-the-line auto-tune model that uses a single 8877 (3CX1500) ceramic triode tube to deliver 1500 W of continuous (no time limit) RF output from approximately 60 W of drive power. The RF deck is very similar to the venerable Alpha 87A, which used a pair of 3CX800 triodes instead of the single 8877.[1] The 8877 tubes are readily available from multiple sources, and replacement cost is lower than a pair of 3CX800s. Another welcome upgrade is the use of vacuum relays for RF switching and full break-in (QSK) CW operation. The PIN diode RF switch in the 87A proved problematic for more than a few owners.

The 9500 is a real heavy hitter that employs microprocessor control circuitry to handle band switching, antenna selection and tuning of the amplifier's output circuit, as well as for several types of amplifier protection. The user can override the automatic control for special situations or during initial configuration of the amplifier in your station with your various antennas. Once configured, band changes take place in milliseconds.

The exterior of the 9500 is very sharp looking with lots of LED bar graph displays to indicate parameters such as RF power output, voltage, current and gain. The multifunction numeric display is large and easy to read. It indicates numeric values for many of the bar graph parameters. For example, with the Lab's power meter indicating 1500 W output, this display showed 1545 W and the first red LED on the bar graph (1.5 kW) lit up.

The numeric display will also let the user know when there is a problem by displaying fault codes. When the controller senses a problem, it places the amp in standby mode and displays a number to indicate the fault. The fault codes and suggested resolutions are listed in the manual. For example, suppose that the amplifier automatically shifts to standby mode and the number 12 is displayed. A quick check of the fault codes in the manual shows that fault 12 indicates that reflected power is too high and you should check antennas and connections and make any necessary corrections or repairs.

Speaking of the manual, the Alpha 9500 *User Manual* is a very nice document. It is spiral bound to lay flat when open and to endure a lot of opening and closing. The information is clear and well written. Text is supported with photos, drawings and icons to indicate important items or notes or warnings. The pages are printed on coated paper that helps keep them clean. Schematics fold out to reveal nice large drawings that are easy to follow. Our amplifier arrived without a manual, but a call to RF Concepts quickly brought a replacement. A PDF version of the manual is also available for download from the RF Concepts Web site.

Bottom Line

The Alpha 9500 is worthy of its place at the top of the Alpha product line. Once configured for your station, automatic tune up is effortless and nearly instantaneous. It will operate at 1500 W output for long periods with no apparent effort and is ready to serve in the most demanding amateur applications.

Four Antenna Ports

The 9500 also has four antenna outputs that, after initial configuration, will automatically select the right antenna for the desired band. The 9500 has a pushbutton that activates the antenna switch circuitry to allow automatic antenna selection when you want to operate barefoot without using the amplifier.

Antenna switching is independent of the

[1]M. Wilson, AA2Z, "ETO Alpha 87A MF/HF Linear Amplifier," Product Review, *QST*, Jun 1992, pp 53-56. Past *QST* reviews are available to ARRL members at **www.arrl.org/product-review**.

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

transceiver because it senses the RF input to determine the frequency, then the antenna that is set in memory for that band is selected for operation. This is all done at snap-of-a-finger speed. Manual antenna switching can be done simply by poking the appropriate button on the front panel.

Installation and Setup

In keeping with the Alpha tradition, the 9500 employs a robust power supply which means a very heavy transformer — in this case, 35 pounds. To avoid damage, the transformer, main chassis and power tube are shipped in separate cartons and strapped to a small pallet.

Installing the heavy duty power transformer is not difficult and only requires opening the cabinet, sliding the transformer into place, tightening a few ¼ inch bolts and plugging together a few electrical connectors. There are no tap connections to make because the 9500's microprocessor will sample the primary voltage then automatically trigger relays to select the correct high voltage tap for your line voltage. Power outlet types will vary from installation to installation, so the user must supply an appropriate plug for the line cord. The whole operation took about 30 minutes in the ARRL Lab.

With the transformer installed the desktop package weighs in at 82 pounds, so it is a good idea to perform the installation close to where you intend to use the amp. The manual cautions that the amplifier should not be transported with the transformer in place. Doing so risks damage to the chassis.

After installing the transformer and ensuring the 8877 tube and chimney are firmly seated, the covers are replaced and the amp is ready to go. Unless you are currently running a 1.5 kW station there are a few things that must be done before plugging in the amp and settling in to generate a pileup. These are but a few guidelines. The manual contains a section about preparing your station before installing the amplifier.

- While the Alpha 9500 can operate over a wide range of voltages, it is strongly recommended that you use a properly wired 240 V ac connection rated for 20 A or more. High power operation at 120 V is not really feasible, even with a dedicated line, as the current requirements exceed the typical 15 or 20 A house wiring.
- Position the amp so that it can get proper air flow on all sides of the cabinet. Don't block the intake or exhaust hole with papers, manuals or other equipment.
- Make sure that your antennas are tuned for minimum SWR and that all cables and feed lines are capable of handling 1500 W of power. Coax cable, PL-259 connectors, antenna switches, tuners and other items not rated for high power can break down and even cause a fire. If you spent the money to get an Alpha, don't be cheap on the back end of your station.

Table 1
RF Concepts, Alpha 9500, serial number 95009490143

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency range: All amateur frequencies in the range of 1.8 to 29.7 MHz.	Tested on 160, 80, 40, 30, 20, 17, 15, 12 and 10 meters. 60 meters not tested.
Power output: 1500 W minimum.	Tested to 1500 W output on all bands.
Driving power required: 65 W nominal.	50-75 W typical (max 90 W at 29.7 MHz).
Spurious and harmonic suppression: Not specified.	–45 dBc, worst case (10 meters), typically –61 to –66 dBc. Meets FCC requirements.
Third order intermodulation distortion (IMD): <–30 dBc.	3rd/5th/7th/9th: 45/49/56/57 dB below PEP (14 MHz, 1500 W output).
Primary power requirements: 100/120/120/200/220/240 V ac (automatic power tap).	
Size (height, width, depth): 7.5 × 17.5 × 19.75 inches; weight, 76 pounds.	
Price: $7950.	

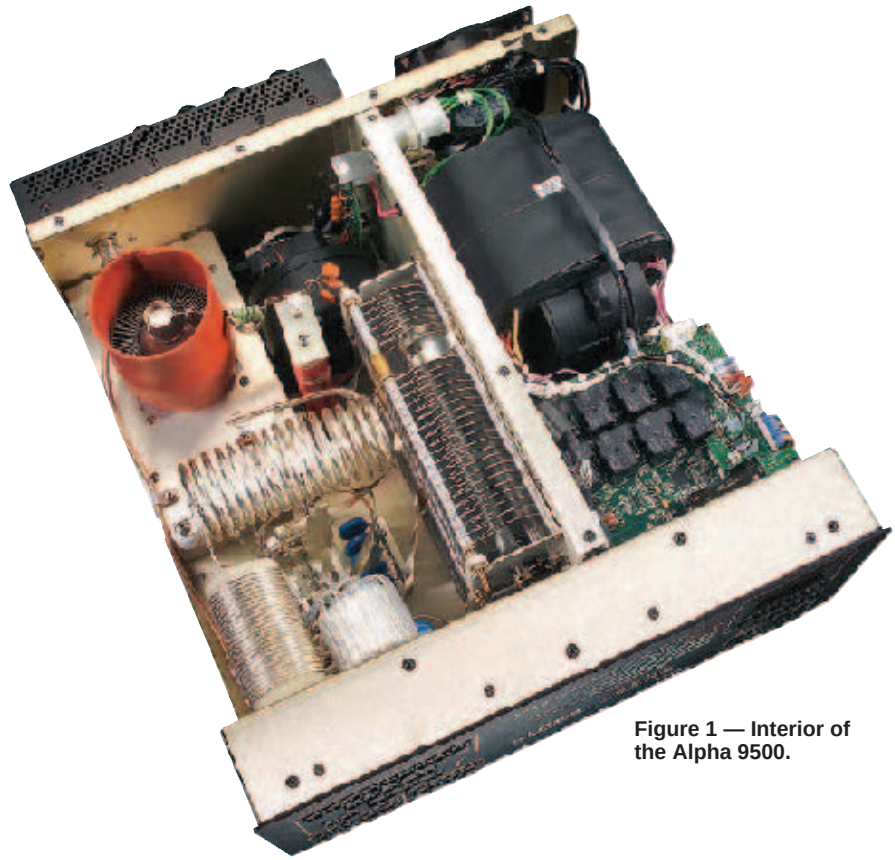


Figure 1 — Interior of the Alpha 9500.

Operation

Once everything is set and you have a resonant antenna connected to one of the four antenna outputs, turn the amp on and it comes to life with a whir of the capacitor motors and a clunk of the band switch as they set to nominal values. The cooling fan purrs away while the multifunction display counts down the 180 seconds required to warm up the 8877 tube. If you are listening to a DX pileup, this can be the longest three minutes of your life.

The amp is preset at the factory and the microprocessor will handle many minor adjustments. You may have to customize some of the settings to fit your station. This is easy to do and only involves pushing a button or two and then locking the new settings into the memory.

Operating the 9500 is easy and intuitive. Set your transceiver output to approximately 50 W. Press the amp's OPERATE button to move the amp from standby mode to operate mode. Key the transceiver and the amp will make a quick chunk and whir (don't be startled) and the display will indicate the RF output. The amp can be activated using any mode — CW, RTTY or even a few spoken syllables in SSB mode. It doesn't get any easier than that. The amplifier adjusts automatically to compensate for changes in drive

power without a separate ALC connection.

Whether band hopping in a contest, DX-ing or keeping that sked with your buddy, using the Alpha 9500 doesn't require much from the operator beyond powering it on.

Remote Operation

Because of advanced microprocessor control circuitry the Alpha 9500 amplifier can be controlled from a remote location. Remote can be from another room in the house or anywhere else in the world using an internet connection. To do this the user must download and install the *Alpha Remote AR9500* PC application. When I went to the RF Concepts Web site I naturally clicked on the link for DOWNLOADS AND SUPPORT then followed the next link for SOFTWARE AND FIRMWARE. The page had a number of files but not the *AR9500* that I was looking for. After a telephone call to RF Concepts I was able to download the file from the REPLACEMENT PARTS AND INFO section on their Web site. (The file is now available in the SOFTWARE AND FIRMWARE section as well.)

Using the instructions in the manual, the software installed quickly and easily. A USB cable connects the amplifier to the PC. The *AR9500* program displays a simulation of the 9500's front panel and all controls can be made with a click of the computer's mouse. Want to switch antennas? Mouse over the ANTENNA button and click. Key your transceiver to activate the amp and the output is displayed on your computer screen. Remote operation is really slick and can run in the background when using other programs. Yes, the Alpha 9500 is fully automatic but having the option for remote control greatly expands the possibilities of this amplifier.

The same USB connection can be used to upgrade firmware anytime a new version is released. The Lab tested this function with a firmware upgrade released after we received the review unit, and it worked as advertised.

Nits — There Must Be a Few

The Alpha 9500 is a solid performer and is rated to work with loads up to 3:1 SWR. In the Lab, it had no trouble finding a match on any band with a high power 25 Ω resistive load (2:1 SWR). I found operation a bit finicky with my 15 meter antenna, though. That antenna has higher than 2:1 in the phone band, and the autotune function could not find a solution there. Without manual adjustment the amplifier would display a high SWR fault code and switch to standby. After manual adjustment it worked fine.

The cooling fan seemed a bit noisy with the amplifier set in the usual location nearby on the operating desk. That proved not to be a distraction when I was using headphones. In addition, the amplifier is fully automatic so it can be set farther away from the operating position than a unit that requires attention from the operator.

There is little room to get fingers beneath the chassis to move or pick up the unit. At 82 pounds this would be designated a two man lift in any industry, so a set of recessed handles on the sides might be a nice addition.

Conclusion

Anyone who has seen the Alpha advertisements or who has seen the display at conventions with the brick on the key knows that Alpha amplifiers are built to deliver 1500 W of RF power at 100% duty cycle with no time limit. The Alpha 9500 lives up to the family tradition and with state-of-the-art microprocessor control the flagship 9500 can hammer away day and night without operator intervention.

Manufacturer: RF Concepts, 6185 Arapahoe Rd, Boulder, CO 80303; tel 303-473-9232; **www.rfconcepts.com**.

Yaesu FT-7900R Dual Band Mobile Transceiver

Reviewed by Gary Pearce, KN4AQ
kn4aq@arrl.net
QST Contributing Author

The Yaesu FT-7900R dual band FM mobile is an update of the FT-7800R reviewed back in April 2004.[1] That was a long time ago! What got updated? Not really that much — it didn't need much. It's a very capable radio with a really good receiver. So what I'm going to do is dig deeper and use this radio to discuss some things about FM and repeater operation that affect day-to-day operation.

The first thing I want to do is introduce two acronyms: OBAAT and TWOBAAT. They stand for *One Band At A Time*, and *Two Bands At A Time*. Since I invented the words, I get to decide how to pronounce them. The *O* in OBAAT is more like the *oo* in boot, so it rhymes with the *two* in TWOBAAT.

The FT-7900 is an OBAAT. It can transmit on 2 meters or 70 centimeters, but you can listen to just one frequency at a time. Hence the name. The receiver covers 108 MHz to 1 GHz, skipping only the television channels at 500 and 600 MHz and the usual cell phone stuff at 800 MHz. No loss — all that's gone digital, so you couldn't decode it anyway. This receiver coverage is good, but it's not exceptional. Some handhelds cover the shortwave and AM and FM broadcast bands. Shouldn't mobile radios do more than handhelds? *That* would be exceptional in a dual band mobile radio.

What *is* exceptional is the radio's immunity to *intermod* — the mixing of two strong off-channel signals creates a new signal that appears on a third frequency where you don't want it. You'll hear hams say that any receiver with a "barn door" front end (that is, wide enough to tune the business and public safety frequencies far outside the ham bands) will be prone to intermod. But Yaesu's FT-7900 (and '8800 and '8900) have broad

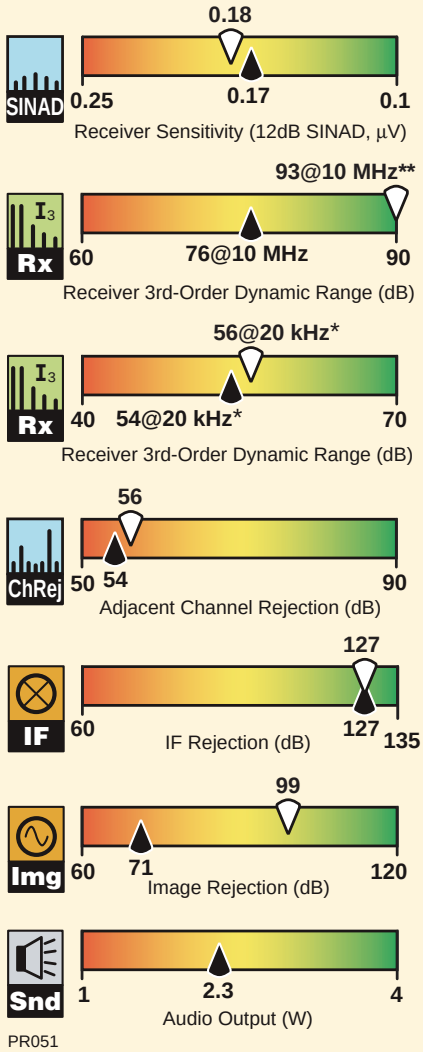
[1]J. Carcia, NJ1Q, "The Yaesu FT-7800R Dual Band FM Transceiver," Product Review, *QST*, Apr 2004, pp 78-81.

receivers with good intermod specs on VHF, so you can have your cake and tune it, too. On 2 meters, the ARRL Lab measured IMD dynamic range at 10 MHz spacing that's considerably better than the typical dual band mobile, and it's even slightly better than many 2 meter only radios we've reviewed in the past few years.

The FT-7900 transmits only FM, wide and narrow. *Wide and narrow*? Yes. For a decade at least, our FM radios have had the option of using the usual 5 kHz deviation (now called wide), or 2.5 kHz deviation, usually called narrow. The 2.5 kHz deviation permits putting channels closer together, squeezing more repeaters into a given amount of spectrum. Few if any ham repeaters are using narrow deviation, as it is somewhat incompatible with wide and there are still plenty of radios in use that only do wide. Narrow deviation will be useful in another few decades when those old legacy radios are toast. Our commercial cousins are required to switch to narrow now.

Transmit audio reports on the '7900 were good. I always wish for a little higher fidelity, but this radio is okay with my voice and some hams rave about it. Some transceivers now have at least a two step MIC GAIN control, but not this Yaesu line. I'm sure you've heard the wide range of transmit audio levels among stations on the repeaters. Crank up the volume to hear station A's near-whisper, and when station B picks it up his booming voice rattles your teeth. Put a MIC GAIN control and mild compression on my wish list. Opposing argument — users will misadjust these controls.

Key Measurements Summary



Bottom Line

Yaesu's FT-7900R dual band mobile radio includes excellent receiver performance, a wide range of features and relatively simple operation in a sturdy package.

OBAAT or TWOBAAT?

I prefer TWOBATTs over OBAATs. I've had the FT-7900's big (and older) brother, the FT-8900, TWOBAAT, for some time now. TWOBATTs give you most of the capability of two OBAATs for about 50% more money. They can listen to and display two frequencies at the same time.

When I recommend TWOBATTs (and I'm using the heck out of the terms to make it hard for the editor to snip out the concept, though I admit it's starting to look silly), hams often ask me how I can listen to two conversations at once. The fact that I can, by adjusting them to different volume levels, is not the point. Usually I'm listening to one repeater frequency that may or may not be busy on side A, while scanning or listening to another frequency on side B. I'll catch any traffic that pops up on side A while still entertaining myself with whatever activity I can monitor on side B.

This argument fails to persuade many hams. In the likely event you're among them, the '7900 is just right for you. By the way, the '7900 *does* hear our 222 MHz band but doesn't transmit there.

Music Box

All the front panel buttons except the POWER button are backlit and easy to read. Display characters are large and easy to read, too, but there are only six large characters available for the user programmed alphanumeric label for memory channels. The rest of the display is used for the little icons that indicate radio parameters. A nice touch — you can choose between frequency or alphanumeric label on a channel-by-channel basis.

The FT-7800 review noted that the display tended to fade when viewed from off axis. I don't see that with the '7900 except from *way* below, at which point it totally disappears. Side and high angle views are good almost until the body of the radio is in the way. Display brightness is adjustable. Good job!

Most of the mic buttons can be lit, but you can turn the light off with a switch on the side to save power if you're operating with limited battery power. The A , B , C and D mic buttons provide additional functions in receive mode.

The front panel buttons make low or high pitched beeps with a logical pattern if pushed. The number keys on the mic all have their own beep tones, pitched low to high corresponding to the numbers. This "music" helps hams with vision limitations a lot, of course. It also helps drivers who should be keeping their eyes on the road. You can turn the beeps off if they bother you.

The panel itself is removable and the body can be remote mounted. The YSK-7800 separation kit is listed as an option, but one came with the review radio as a promotion. It consists of a long cable with RJ-11 connectors at each end and a bracket to mount the control head. I like that the microphone plugs into the head, not the radio body, so you don't need a separate cable to extend the mic. The speaker is in the body, of course, so you'll have to use an external speaker if you tuck the body in the trunk or under a seat. The internal speaker is adequate if the radio is nearby, but it sounds better with an external speaker.

The VOLUME and SQUELCH knobs don't have much friction, so they're easy to misadjust in a bouncing car. I recently started appreciating the stiffer knobs on some other radios in my mobile. I think the roads are getting worse.

The back of the radio has the ANTENNA connector, a ⅛ inch mono SPEAKER jack, a six-pin mini-DIN for packet and programming, and a fan that activates during transmit and stays on for a while in receive. The fan is quieter than most.

Simple? It's Manual Time…

Yaesu's Web site says the radio "…is designed for simplicity of operation." Many hams who commented online agree, and they like it. My take: It's true that nothing in the '7900 is overly complex, but there are *dozens* of simple operations. Some are set and forget, but a few routine functions are buried deeper than I'd like. Many functions are clearly labeled on the buttons, but many more are not. The '7900 has 48 items in its SET menu, in alphabetical order if you can decode the sometimes cryptic labels. You'll probably never use some of the features controlled in those menus, and a truly simple

Table 2

Yaesu FT-7900R, serial number 9L000080

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: Receive, 108-520, 700-999.990 MHz (cellular blocked); transmit, 144-148 MHz, 430-450 MHz.	Receive, 108-136 (AM), 136-300, 300-336 (AM), 336-520, 700-824, 850-869, 894-914, 939-959, 984-1000 MHz; transmit, as specified.
Modes: FM, NFM, AM (108-136, 300-336 MHz).	As specified. AM is receive only.
Power requirements: 13.8 V dc ± 15%; receive: 500 mA (squelched); transmit, 8.5 A (144 MHz, 50 W), 9 A (430 MHz, 45 W).	Receive, 405 mA (max vol, max lights, no signal), 160 mA (standby, no lights). Transmit (high, mid 1, mid 2, low), 146 MHz, 7.8, 4.4, 3.3, 2.4 A; 440 MHz, 7.7, 4.6, 3.4, 2.6 A.
Receiver	***Receiver Dynamic Testing***
FM sensitivity: 12 dB SINAD, 0.2 µV (137-150 MHz), 0.25 µV (150-174 MHz), 0.3 µV (174-222 MHz), 0.25 µV (222-300 MHz and 336-420 MHz), 0.2 µV (420-520 MHz), 0.4 µV (800-900 MHz), 0.8 µV (900-1000 MHz).	For 12 dB SINAD, 0.18 µV (146 MHz), 0.2 µV (162 MHz), 0.28 µV (200 MHz), 0.22 µV (222 MHz), 0.25 µV (360 MHz), 0.17 µV (440 MHz), 0.3 µV (850 MHz), 0.73 µV (902 MHz).
AM sensitivity: 10 dB S+S/N, 0.8 µV (108-137), 0.8 µV (300-336 MHz).	For 10 dB S+S/N, 0.91 µV (120 MHz), 0.8 µV (320 MHz).
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 56 dB* (146 and 222 MHz), 54 dB* (440 MHz), 50 dB* (902 MHz). 10 MHz offset: 93 dB (146 MHz), 63 dB (222 MHz), 76 dB (440 MHz), 70 dB, (902 MHz).
FM two-tone, second-order IMD dynamic range: Not specified.	87 dB (146 MHz), 109 dB (440 MHz).
Adjacent-channel rejection: Not specified.	20 kHz offset: 56 dB (146 and 222 MHz), 54 dB (440 MHz), 50 dB (902 MHz).
Spurious response: Not specified.	IF rejection, 127 dB (146 and 440 MHz), 116 dB (222 MHz), 120 dB (902 MHz). Image rejection, 99 dB (146 MHz), 95 dB (222 MHz), 71 dB (440 MHz), –7 dB (902 MHz).
Squelch sensitivity: >0.16 µV.	At threshold, 0.05 µV (146 MHz); 0.07 µV (440 MHz).
S meter sensitivity: Not specified.	Full scale: 5.3 µV (146 MHz), 6.3 µV (440 MHz).
Audio output: 2 W at 10% THD into 8 Ω.	2.3 W at 3.2% THD into 8 Ω (max volume),THD at 1 V RMS, 1.5%.
Transmitter	***Transmitter Dynamic Testing***
Power output (high, mid 1, mid 2, low): 146 MHz, 50, 20, 10, 5 W; 440 MHz, 45, 20, 10, 5 W at 13.8 V dc ± 15%.	146 MHz: 44.8, 16.2, 8.0, 4.6 W; 440 MHz: 36.3, 16.3, 8.2, 3.8 W. At 11.4 V dc, 40.9 W (146 MHz), 36.1 W (440 MHz).
Spurious signal and harmonic suppression: >60 dB.	69 dB (146 MHz), 68 dB (440 MHz). Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, 144 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	122 ms (146 MHz), 96 ms (440 MHz).
Size (height, width, depth): 1.6 × 5.5 × 6.6 inches (w/o knobs); weight, 2.2 pounds.	
Price: FT-7900R, $290; ADMS-7900 *Windows* programming software and cable, $50; YSK-7800 separation kit, $50; CT-39 packet cable, $12.	

*Measurement was noise limited.

radio would do without them, but they don't get in the way. The '7900 is about as simple as a radio can be today.

The manual does a very good job of guiding you through the settings and options in its 78 pages. It includes a narrative description of what a function is for, in addition to the step-by-step instructions of how to set it. It's short and to the point, and most of the time it's clear if you have a basic understanding of FM and repeater operation. As I flipped through the manual, a sheet fell out. It was a full schematic and block diagram. You'll need a magnifying glass, but it's a nice touch.

Tone Deaf

CTCSS (continuous tone coded squelch system, which I'll shorten to *tone*) is a necessary evil. More than half the repeaters on the air require it, and the complaints about it have finally abated. Maybe the last radio that didn't have tone built in finally broke. But tone is still "traveler hostile." Without advance planning and programming, a ham on the road is effectively locked out of tone access repeaters.[2] Better design could help.

The '7900 is an example of a radio that could do a much better job with tone. You turn tone on and off with a convenient front-panel button, but you set the tone frequency by digging up a menu that can be multiple button pushes and knob twists away.

If you need this radio to hunt up a tone from a new repeater, you're going to have to work for it. *Tone scan* is a feature most radios have to help you find the tone for a repeater you've encountered. While the repeater is on the air, the radio scans through the list of about 50 possible tones and stops when it encounters the tone that the repeater is sending. A few radios make this easy, with a dedicated one push front panel button. The '7900 makes you dig through a couple of menus to start the scan, and then makes the radio go deaf until the tone is found. You do *not* want to do this while driving.

Banks for the Memories

The FT-7900 has about 1000 memory channels. How many memory channels do you use in your current radio? Less than 10, 0? I hear that a lot.

I admit I'm a power user. I like knowing what's going on with all the repeaters in the area, so I scan a lot. When I'm on the road, I scan the whole band. To do this, I program all the local repeaters into a group of memories. That takes about 70 in my area. Then I program all the 2 meter band plan channels into memory. That uses about 100 memory channels, and I'm a button push away from scanning everything. The memory channels hold the usual suspects — frequency, offset, tone — and one parameter other radio brands I've used don't — power.

You could use the '7900's *band limit scan*, with which you program in the low and high limit frequencies, then scan everything in between. That works okay on UHF, where all the repeater output frequencies are neatly lined up across about 5 MHz of spectrum (but a *different* 5 MHz in different regions of the country, and not in the Northeast, where input and output frequencies may be inverted). On 2 meters, our convoluted band plan doesn't lend itself to that kind of scan at all. Programming *all* the channels into memories makes scanning them more efficient. Even then we have *two*

[2]With the ARRL's *Travel Plus for Repeaters* and some programming software, you can plan ahead by loading the repeaters you'll pass on your trip into memory, tone and all.

basic band plans to consider. Most eastern states use 20 kHz channels below 146 MHz and 15 kHz channels above. Many western states (and Michigan and Alabama) use all 20 kHz channels. The FT-7900's 1000 memories make it possible to store two sets of band plan channels. You'll want to use the optional ADMS-7900 programming software and cable, not the buttons and dial on the front panel.

Using a radio loaded up with 1000 memory channels is wonderful — until you try to figure out where you are in those 1000 channels, and how to get to where you want to be. If you remember the memory number, you can use the mic to key it in directly (you can also enter frequencies directly in VFO mode). Dialing across 1000 memories takes a while. Speed it up by pressing the MHz button and tuning 10 channels per click.

That's still a lot of dialing, so I'm grateful for the bank system that lets you group memories together, effectively making a much smaller radio. The '7900 lets you place a given memory channel in one or more of 20 banks. If you're in a bank and spin the dial, you dial only the channels in the bank. Push scan, and you scan only the bank. So there's my local group, my airport group, my over-the-road group and my public service event group. Sweet.

A few repeaters use nonstandard offsets. The '7900 gives you a way to program a memory for a nonstandard split without changing the offset setting, using a few extra button pushes and a mic click. This function will also let you program different tones for transmit and receive. Not many repeaters need that, but if yours does, the feature is handy, and rare.

Programmable Buttons, and *Very* Programmable Buttons

One function that's buried deeper than it should be is the repeater offset *direction* — up, down or off (simplex). Fortunately, the '7900 has four programmable buttons on the microphone that can be set to select any of 17 parameters. I keep the offset direction on one of those buttons on my '8900. True, the radio has an automatic offset function, but band plans in many states offer offset options for some channels (especially 147.00 MHz). And the radio leaves the automatic offset *on* for the whole top 10 MHz of the UHF band, even though some of that spectrum is used for simplex. One of the front panel buttons is programmable, too, with a choice of six parameters.

Five front panel buttons *combine* the functions of programmable buttons and memories. These are the HYPER MEMORY buttons located to the left and right of the display. Press and *hold* one of these buttons and it takes a "snapshot" of every parameter and condition of the radio. Press it *briefly*, and it recalls what you set. So put the radio in MEMORY BANK 1, start it scanning, then press and hold HYPER MEMORY 5. Set up for something else, and later, when you press HYPER MEMORY 5, you're back in MEMORY BANK 1, scanning away. The HYPER MEMORY function goes deep into all the SET functions, so be careful what you select. I find these buttons incredibly useful.

The sixth button alongside the display can be used to lock the radio so you don't accidentally bump the dial or change other parameters. That button also activates the WIRES DTMF function. (WIRES is Yaesu's brand of Internet linking for repeaters — think IRLP and Echolink. It's more popular in Europe and Asia than in the US.) Activating it causes the radio to send a programmable series of DTMF tones at the start of each transmission (that's how WIRES works), meanwhile muting the microphone for a while. Turning it on accidentally can cause problems on repeaters that mute for several seconds if receiving DTMF tones — nobody will hear what you say! You'll hear the tone in your speaker, and a little icon appears on the display. I've had to talk many a Yaesu user through how to turn WIRES off when I noticed that the first several seconds of every transmission were muted.

Conclusion

Everybody's product line includes a dual band OBAAT, all priced within a narrow range. The FT-7900R distinguishes itself with a better than average receiver, some unique features you'll appreciate (and I didn't cover them all), and relative simplicity. It's a worthy contender if your needs, wants and budget are modest.

Manufacturer: Vertex Standard, 10900 Walker St, Cypress, CA 90630; tel 714-827-7600; **www.yaesu.com**.

Small Wonder Labs Retro-75 AM Transceiver Kit

Reviewed by Bruce Prior, N7RR
n7rr@hotmail.com
ARRL Technical Advisor

At last operators who live in a non CW world can have the fun of building a simple hand assembled kit transceiver and using it on the air. AM is no longer tied to boat anchors, modern big rigs and converted CBs for 10 meters. This rig can be thrown into a backpack and operated from a tent at night, just when the 75 meter band becomes active.

The Retro-75 is well named. It's not only a throwback by using AM mode; it's also retro in its basic design, which includes:

- A dual frequency Colpitts crystal oscillator for the transmitter,
- AM modulation of the carrier using a simple audio transformer,
- Yes, a manual transmit-receive switch, which works fine for relaxed AM contacts,
- Transmit audio circuitry designed for an inexpensive RadioShack dynamic microphone; and
- A straightforward superhet receiver using, inevitably, a varactor diode and a linear taper potentiometer rather than a more expensive air variable capacitor. This achieves about 50 kHz of tuning range. Also included is a three crystal 6 kHz wide IF filter plus a two stage tuned circuit front end.

Kit Building

The Retro-75 is a kit with through hole parts, making it a reasonable project for a kit building beginner. The manual includes a helpful tutorial for winding the five toroids. Construction is even easier since Chuck Adams, K7QO, has produced a pictorial tutorial about building the Retro-75. A copy of that work is included on the CD that accompanies the kit.

Perhaps to avoid clutter, some of the component identifiers are missing from the circuit board. The curved outline of Q9 isn't printed on the board. I put it in backward, luckily catching the error before soldering and trimming it. A diagram in the manual labels everything just fine, so it's quite possible to use that diagram to figure out which components go where, and how they should be oriented.

The circuit includes a whole section centered around U4, which is used only during alignment. Then U4 is unplugged from its socket for normal operation. No special test equipment is required. Table 3 shows results of testing in the ARRL Lab.

I actually constructed two Retro-75

Bottom Line

The Retro-75 is an economical and fun alternative for anyone looking to build a low power transceiver for a mode other than CW.

Table 3
Small Wonder Labs, Retro-75 AM Transceiver Kit

As Measured at the ARRL Lab

Frequency coverage:	Receiver, 3.859-3.912 MHz; transmitter, 3.870 and 3.885 MHz (crystal controlled, see text).
Power consumption (13.8 V dc):	Receive, 162 mA (maximum audio), 97 mA (max audio, no signal); transmit, 480 mA (carrier, no modulation), 590 mA (at 80% modulation).
Sensitivity:	10 dB S+N/N: 8 µV.
IF rejection:	74 dB.
IF and audio response:	75-1400 Hz (2650 Hz filter bandwidth).
Power output:	2.8 W carrier, 9.0 W PEP (at 80% modulation*).
Spurious/harmonic suppression:	50 dB, meets FCC requirements.
Size (HWD): 2.5 × 6 × 5 inches with optional enclosure; PC board 5.25 × 3.5 inches.	
Price: PC board kit, $69; enclosure kit, $40 (including shipping in US/Canada).	

*Transmit two-tone IMD testing indicated that modulation was cleanest at 80%.

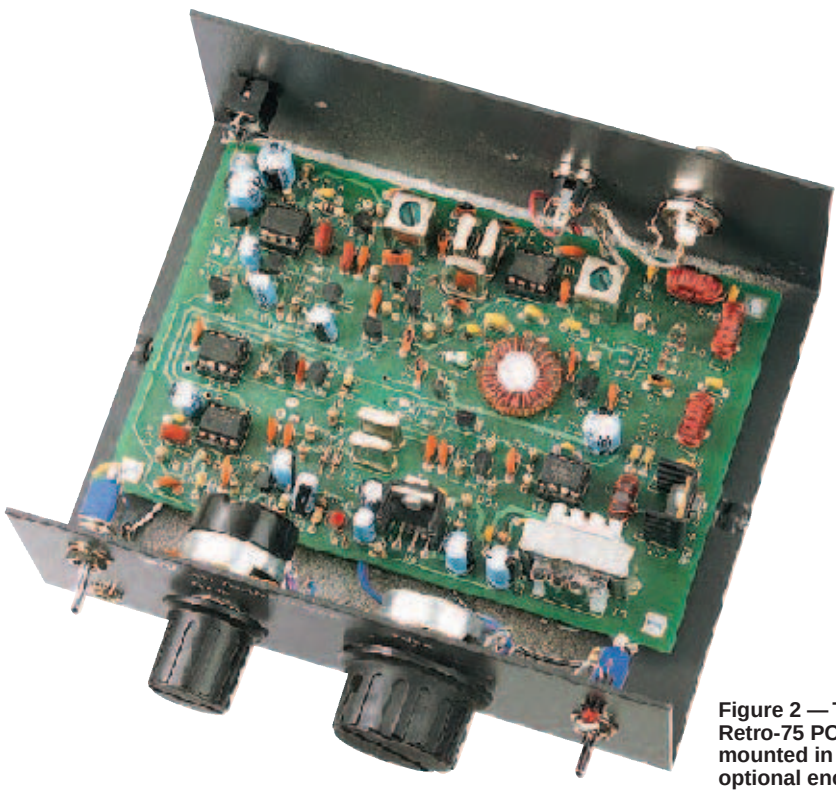


Figure 2 — The Retro-75 PC board mounted in the optional enclosure.

kits. The first time, I stuffed the board in component value order. I started with all of the resistors, then the capacitors, next the diodes, and finally the active components and the toroids. Using that method, most of my construction time consisted of searching the board and the diagram to figure out where components belonged. I had volunteered to build another Retro-75 for a local ham, so the second time around I decided to use the K7QO picture guide to assemble the parts on the desk while looking at the computer screen. I recommend the second method, even though a printed copy of the brief Small Wonder Labs instruction manual is quite sufficient to do the job without constant reference to a computer monitor.

If you have a well stocked junkbox, you can purchase just the PC board kit and supply your own enclosure, controls and connectors. Small Wonder Labs also offers an optional enclosure kit with everything needed to produce the attractive package shown in the photos. In either case, there is a lot of point-to-point wiring between the board and the panel mounted sockets and controls — a total of 19 wires with 28 soldered connections, if the optional switch for two transmit crystals is installed.

The original instructions for the review Retro-75 included a typographical error for the recommended RadioShack microphone. The correct 330-3019 Dynamic Recorder Microphone was available at a local RadioShack store and it works just fine.

You can download a copy of the manual from the Small Wonder Labs Web site to see what's involved in building the project. If you have questions or need assistance or just want to correspond with other Retro-75 enthusiasts, there's an active online support group at **groups.yahoo.com/group/SWLRetro75**.

On the Air

The review kit arrived with transmit crystals for 3880 and 3885 kHz supplied. 3885 kHz is the "national" calling frequency, which in practice is used mostly in the eastern US. I had to order a 3870 kHz crystal from **www.af4k.com** in order to find somebody to talk to in the Pacific Northwest. Another commonly used 75 meter AM frequency is 3875 kHz.

Its audio output is fine for driving an external speaker. The Retro-75 will not likely set any new records for DX operation, but it's economical and fun to build and operate. In one afternoon using a simple dipole antenna, I contacted four stations ranging from 113 miles to 249 miles away — not bad for a transmitter that puts out a carrier of 2.5 W and 8 W peak envelope power.

Manufacturer: Small Wonder Labs, PO Box 187, Newport, NH 03773; e-mail **k1swl@earthlink.net**; **www.smallwonderlabs.com**. QST

IN THE SEPTEMBER/OCTOBER 2010 ISSUE:

■ In "A Simple Path to Complex Impedance" Michael Bowman, KG2MG, describes an innovative method to measure complex impedances using a bidirectional coupler and an HP 35s pocket calculator.

■ Vincent Biancomano, WB2EZG, builds upon the classic W3DZZ multiband dipole antenna and creates a new design in "The WB2EZG Five-Band Trap Dipole." Vincent's approach results in an antenna with a broad 3:1 SWR response (at least 200 kHz at 80, 20 and 10 meters and 100 kHz on 40 and 15 meters) and a much simpler trap configuration.

■ Andrea Daretti, IZ2OUK, offers a "Simple and Effective RF Power Reference" that you can use to harmonize the readings of all the power meters in your ham shack.

■ Harold Kinley, WA4GIB, continues his discussion of how to go about solving several impedance matching problems by using Nathan Iyer's free Smith Chart computer program in "Using *QuickSmith* — Part 2."

■ In "A New Tune for the Loop," John Seager, GØUCP, describes an interesting approach to ferrite rod variable-inductance tuning for low power transmitting loops.

■ Trevor Bird, in "Definition and Misuse of Return Loss," discusses the correct definition of return loss, briefly outlining the history of the term and giving examples of current misuse.

■ In "Synthesizing an Audio AGC Circuit," Phil Anderson, WØXI, shows how he designed an effective automatic gain control (AGC) circuit for use in minimalist Amateur Radio receivers such as direct conversion QRP projects.

QEX is edited by Larry Wolfgang, WR1B, (**lwolfgang@arrl.org**) and is published bimonthly. The subscription rate (6 issues) for ARRL members in the US is $24. For First Class US delivery, it's $37; in Canada and internationally by airmail it's $31. Nonmembers add $12 to these rates. Subscribe to *QEX* today at **www.arrl.org/qex**.

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New Products

POWERWERX DESKTOP POWER SUPPLY

◊ The SS-30DV from Powerwerx is a switchmode power supply rated to deliver 13.8 V at 25 A continuously or 30 A maximum for up to five minutes. The supply has two sets of Anderson Powerpole connectors on the front panel and a pair of binding posts on the rear. This compact supply measures 2.5 × 6 × 5 inches (height, width, depth). Price: $119.99. For more information or to order, see **www.powerwerx.com**.

POWEREX IMEDION AA-SIZE RECHARGEABLE BATTERIES

◊ Powerex IMEDION AA-size rechargeable batteries from Maha Energy are rated for 2400 mAh and are said to be rechargeable up to 1000 times. Unlike some rechargeable batteries that lose their charge if stored for long periods, IMEDION batteries are said to retain up to 85% of their charge after one year of storage (at a room temperature of 20°C). The IMEDION batteries are compatible with all Powerex chargers. Price: $16.95 for a package of four AA cells. For more information, visit **www.mahaenergy.com**.

MICROHAM DIGIKEYER II DIGITAL MODE INTERFACE

◊ The DigiKeyer II from microHAM is a USB interface for digital mode operation. Modes supported include RTTY, PSK31, MFSK, Olivia, WSJT and others, as well as CW via a K1EL WinKey CW keyer. No computer sound card, serial port or parallel port are required, just one USB cable between computer and DigiKeyer II. Integrated transceiver control supports Elecraft, Kenwood, Icom, Ten-Tec and Yaesu transceivers. Dual channel receive is supported with compatible radios from these manufacturers as well, and independent, front panel level controls for each receiver are included. Price: $339, including a radio cable of your choice. For more information or to order, see **www.microham-usa.com**.

Strays

LOOK FOR "THE REST OF THE STORY" IN QST-IN-DEPTH

◊ Each month the editors of *QST* are faced with a dilemma: With a limited number of pages available in each issue, what do we include and what do we leave on the cutting room floor, as it were? Some *QST* articles would consume too many pages if we were to include every significant table, photo and drawing.

The solution we've devised is the QST-In-Depth Web page, **www.arrl.org/qst-in-depth**. Available to all ARRL members, the page contains files associated with articles that are listed by month of publication. For technical articles, the type of article typically included in QST-In-Depth, the files typically contain:

■ Operating firmware and other software,
■ PC board artwork,
■ Detailed fabrication drawings,
■ Detailed schematics and parts lists for complex projects, and
■ Design notes and other information helpful to builders.

Ideally we would be able to include the entire article in the pages of *QST*, and for many articles, we do precisely that. Moving some of the details out of a selected number of articles allows us to bring our readers a wider range of articles each month.

And There's More…

Other *QST* resources — the *QST/QEX/NCJ* Online Index and Archive, *QST* annual indexes, past Product Reviews, *QST* QuickStats and the *QST* cover plaque poll — and more — can be found at **www.arrl.org/qst**.

Check it out!

W1ZR

THE DOCTOR IS IN

Q Paul, N8XMS, asks: I have had a commercial HF vertical up since 1992 and it has given me very good service. It was taken down two or three years ago for cleaning and adjustment, but I have just discovered a new problem. We have had a lot of rain lately and I am now getting perfect 1.0:1 SWR readings on all bands, including bands on which the antenna is not even designed to work.

I assume that water is causing some significant losses and creating these phony SWR readings. At first I thought that it might be water in the traps, but wouldn't that cause worse SWR readings? Is contaminated coax more likely to cause a good SWR? The antenna is fed with 75 feet of direct burial RG-213, but it actually runs through a PVC conduit and is not directly buried. The connectors were cleaned and resealed back when I took the antenna down, but I know that water has a way of winning eventually. The screw heads on the R7's matching box are rusted so I have not yet been able to look inside for possible problems. (I will probably need to cut them off and then replace them.)

A Yes — losses can make SWR look really good! Did you try measuring the SWR of the cable with it disconnected at the antenna end? If the SWR looks good in that case, you have made your cable into a serious dummy load.

One problem with putting the coax in conduit is that it is almost guaranteed to be immersed in water. If the coax is buried directly in usual soil, the water will tend to drain away. If you do want to encase it in conduit to provide additional protection, set the pitch of the conduit so the water drains to open ends, and have some sand and gravel there to aid drainage. In my opinion, however, the best solution is to use the kind of drainage pipe with holes on the bottom along its length, laid in sand and gravel. This is the best way of keeping the coax from being immersed for long periods.

I am not a fan of RG-8X and think that direct burial RG-213 is a better choice, unless weight is a major consideration. Just make sure the jacket is not compromised, and keep it out of the water — direct burial doesn't mean submarine service.

Once you have the coax sorted out, I suggest you use an antenna analyzer to check the Z at the antenna base. If the bandwidth seems too wide, that is also a sign of losses within the antenna. If you can get to and isolate the connections, I'd try to check each individually with an ohmmeter — same for the matching network connections. I am always particularly suspicious of any riveted connections.

Especially with aluminum, the material tends to cold flow with the rivets becoming loose over time. Then corrosion gets between the surfaces. Sometimes they can be tightened for a time, or at least for a test, by repeening. I usually replace rivets with stainless machine screws, lock washers and nuts — the acorn style self-locking nuts are good at resisting vibration, but put star lock washers beneath to help cut through any oxides. A spray with clear varnish can aid longevity, but wait until you are sure you have everything adjusted.

Q Lou, W8LEW, asks: I have a discussion going with a ham buddy of mine. We know that if you feed a 15 meter signal to 40 meter dipole, or a 6 meter signal to a 17 meter dipole, the antennas should accept power and radiate reasonably well on the third harmonic. The debate is — if you are using an amplifier set for either 40 or 17 meters and feed it with a signal on the third harmonic, will the amplifier amplify? I don't think that things will work in this situation or am I wrong? What would happen if you tried it?

A It all depends on the amplifier design — particularly the type of filtering employed. All modern amplifiers should be designed to meet current FCC specifications on harmonic output. Thus they have filters designed to eliminate, or reduce by at least 53 dB, exactly the signal you are considering trying to push through them.

Vacuum tube amplifiers use sharply tuned resonant circuits at the output and if tuned to 7 MHz, will not work on 15 meters — or any other band. In fact, with the detuned plate circuit, the plate current will rise to unsafe levels and the tube(s) will likely melt or, if lucky, a fuse will blow.

Solid state linear amplifiers tend to be wideband active devices that don't require tuning. If it weren't for the need to eliminate spurious signals, the typical amplifier module would happily amplify any frequency in the HF range. In order to meet FCC specs for reduction of spurious outputs, however, the amplifier designers provide an output filter. Their biggest job is to eliminate undesired harmonic content, so they would be designed to not let the third, or even second harmonic pass. The full amplifier output would then be dissipated in the filter, or reflected back to the amplifier, likely leaving pieces all over the inside of the top cover.

In some cases, depending on filter design, operation of a solid state amp on adjacent but not harmonic bands, may be possible. For example, an amplifier designed for 10 meters might work on 12 meters — again, depending on the exact filter design.

Q Charles, KØAYS, wonders if adding parasitic elements to a near vertical incidence skywave antenna for 160 meters can improve performance. He has supports with a height of 54 feet and could make a full wave loop or, with about the same wire, use a dipole and add a reflector or lower the antenna and add a director above it. Will it make a difference, he asks?

A Charles, I did some modeling of the various possibilities and found that the square loop at the top of your supports is hard to beat. Its vertical pattern is shown in Figure 1, providing a maximum gain over typical earth of about 6.5 dBi. A dipole at the same height has a gain about 1 dB less forward gain. Putting a loop reflector below the loop at 10 to 20 feet above ground actually makes an improvement of about 0.15 dB, not worth the trouble in my opinion — the ground makes a pretty good reflector all by itself. A straight Yagi with a driven element at

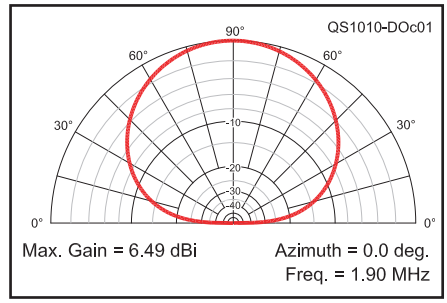


Figure 1 — Elevation pattern of a 160 meter full wave loop 54 feet above typical ground. This antenna makes a very good NVIS antenna. The azimuth pattern is within 3 dB of being omnidirectional.

Joel R. Hallas, W1ZR ♦ *QST* Technical Editor ♦ jhallas@arrl.org

54 feet and a reflector at 10 feet is almost the same. Because of the losses associated with driven elements very near the earth, as well as the problem of matching to the typically low impedances, director configurations with a driven element at 20 feet elevation are worse than anything else.

Q Steve, KC9MIR, asks: Do you know a way to check the calibration of my VHF SWR meter? I have the documentation that came with the meter but it doesn't indicate the accuracy or provide a calibration procedure.

A The easiest way to test the meter is to put it in series with another meter of known accuracy and compare the readings into a wide variety of loads. If they read the same, the meters are of comparable accuracy. Of course if you have one of known accuracy, you probably don't need to calibrate this one, but perhaps you could borrow one for the test.

In my experience, many SWR/Power meters are most accurate at a reflected power null. That is, if they show a good match, there's a good chance you have a good match. The way to verify that is to drive a high (or known) quality 50 Ω VHF dummy load and make sure that the meter shows a 1:1 SWR, or 0 W reflected power.

Other values take a bit of thought, with the main problem being to obtain a collection of loads with a known SWR and a high enough power rating to handle the radio's power. It is easier if your meter is sensitive enough to read properly with less than a watt. Then if you use a handheld transceiver and noninductive (preferably the old carbon composition) resistors you can make known resistive loads of any desired SWR. For example, both a 100 Ω and a 25 Ω resistor should show an SWR of 2:1 in a 50 Ω system. You can insert small resistors right inside a UHF coax plug (PL-259) so your leads have essentially zero length. This is important, because at VHF even very short leads may add enough inductance to change the SWR.

If you need to be able to measure at higher power, you can use two loads. First check each by itself to make sure that it is a good 50 Ω load at VHF. Then put a coax T connecter on the SWR meter and hook each load through matched 50 Ω coax to the T connector as shown in Figure 1 for the zero length case. Now you should have a 25 Ω load that should read an SWR of 2:1 SWR. To verify that 100 Ω also reads 2:1 put an electrical (consider velocity factor) ¼ wave of 50 Ω coax between the T and the meter — the impedance at the meter will then be 100 Ω.

If you only have a single 50 Ω load, and connect it to the meter through ¼ wave of 75 Ω coax, the impedance at the meter should be transformed to 112.5 Ω for an SWR of 2.25:1. If you use the same electrical ¼ wave of 75 Ω coax from the T connector with two loads, the impedance at the meter should be transformed to 225 Ω for an SWR of 4.5:1, which will be another handy calibration point. By using different lengths of 50 Ω coax between the end of the 75 Ω section and the meter, you can generate many different impedances that should all have a 4.5:1 SWR.

Table 1

Available Resistive Calibration Loads Using Coax Line Sections as Shown in Figure 2

Coax Z_0	*Length (WL)*	*R (Ω)*	*SWR*
N/A	0	25	2:1
50	¼	100	2:1
75	¼	225	4.5

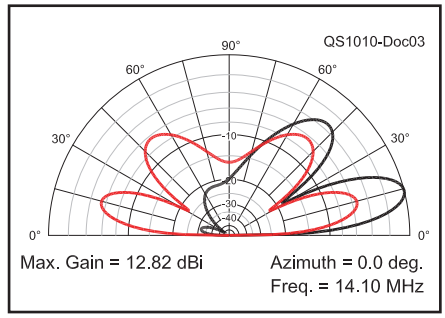


Figure 3 — Elevation pattern of a three element Yagi a wavelength above typical ground (black) compared to a dipole at the same height. Note the similar lobe shape and position on the right side of the pattern — determined largely by ground reflection.

Q Jim, WA6TFZ, notes that most Yagi antennas have horizontal booms and asks whether changing the elevation angle of the boom will change the elevation angle of the transmitted signal?

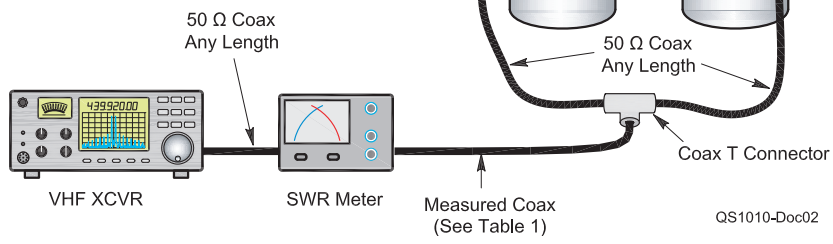
A It certainly would in free space. The free space signal elevation angle would exactly track the elevation angle of the boom. The elevation pattern of the usual near-ground HF Yagi is, however, much more an effect of the reflection from the ground at different elevation angles than of the boom angle. This becomes clear if we look at the elevation pattern of a dipole one wavelength above typical ground compared to the elevation pattern of a three element Yagi at the same height as shown in Figure 3.

Note that changing the HF Yagi's boom elevation angle down moves the reflector up and the director down — well, the dipole has essentially the same pattern (in the Yagi's favored direction) without the other two elements — so changing them will have limited effect until very high angles are reached. This does make more difference on VHF antennas, usually farther from ground effects, and is routinely used to peak up signals for high angle meteor or satellite work. For HF, changing the phase between multiple stacked Yagis can have more effect on elevation pattern, although it is still limited by ground reflections.

Tim, N3QE, dropped me a line regarding my answer to NØJSN's question in the July 2010 column about the burnt plate choke he encountered in a used amplifier. Tim agreed that while attempted operation on 11 meters could be the cause, in a tube amplifier built before we were assigned the 30, 17 and 12 meter bands (1980s), it could have been operation on those bands as well. Manufacturers were as likely to put the choke resonances there as on 11 meters, since they weren't ham bands at the time they designed the amplifier.

He also points out there the chokes could also burn with any event that resulted in excessive plate current, including some kinds of tube failures. Thus a purchaser should check these possibilities carefully rather than just replacing the choke and firing it up.

Figure 2 — Checking an SWR meter for accuracy at various SWR values. If a single load is used, and the line is ¼ wavelength of 75 Ω coax, the 50 Ω SWR should be 2.25:1, as described in the text.



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.

MFJ-929 Automatic Antenna Tuner

People sometimes use the term "Swiss Army Knife" to refer to a device that does more than its name might imply. Swiss Army Knife is actually a registered trademark of Wenger SA and Victorinox AG, long-time suppliers of knives to the Swiss Armed Forces. If you've ever seen one, you know that a true Swiss Army Knife is more than a simple blade; it is a multifunction pocket tool that even includes a pair of fold-out scissors.

So can an antenna tuner really be compared to a Swiss Army Knife? Not usually. Your basic antenna tuner merely acts as an inductive/capacitive network to match the impedance of an antenna system to 50 Ω for your transceiver. But in the MFJ-929 we find an antenna tuner that goes well beyond simple impedance matching.

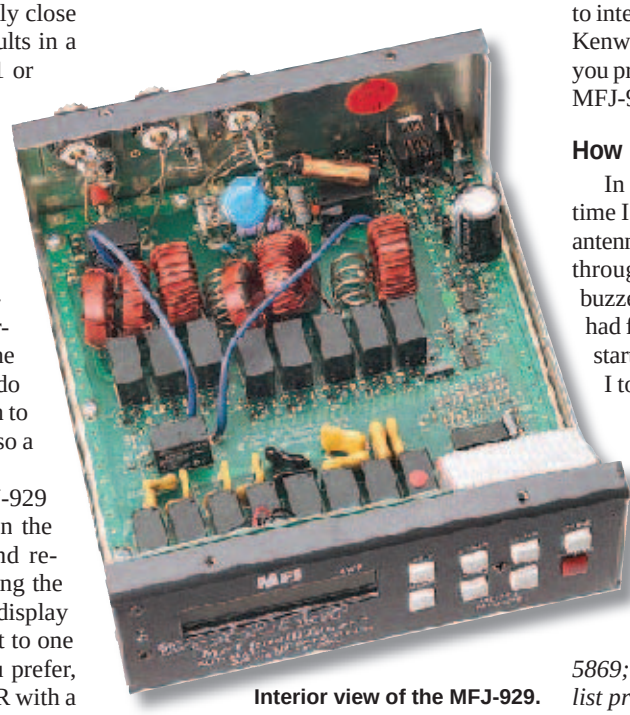
A Multifunction Tool

The MFJ-929 is an automatic antenna tuner, which is a way of describing how it operates. When you apply at least 2 W of RF, the 929 immediately begins switching inductors and capacitors in and out of its matching network until it finds a combination that offers an input impedance sufficiently close to 50 Ω — close enough that it results in a standing wave ratio (SWR) of 1.5:1 or less. There are four buttons on the front panel that allow you to increase or decrease the inductance or capacitance, but these are rarely used. The 929's auto-matching algorithm is so efficient, it usually doesn't require human assistance.

There are many automatic antenna tuners on the market that operate in this fashion. What makes the MFJ-929 stand out is its ability to do much more. For instance, in addition to being an antenna tuner, the 929 is also a frequency counter and wattmeter.

Whenever you transmit, the MFJ-929 displays your transmit frequency on the front panel along with forward and reflected power, and SWR. By pressing the MODE button, you can change the display from a purely alphanumeric readout to one that includes a bar graph. Or if you prefer, the MFJ-929 will indicate your SWR with a series of beeps: One beep means your SWR is less than 1.5:1; two beeps indicates an SWR between 1.6 and 2:1 and the beeps go up from there until you exceed 3:1. That's when the 929 sends SWR in Morse code. (Perhaps it should send SOS instead!) You can also enable a function that displays the tuner's chosen inductance and capacitance values.

Speaking of impedance matching, the MFJ-929 tuner can match impedance loads from 6-1600 Ω, and it can do this from 1.8 to 30 MHz at 2 W to 200 W. Whenever the 929 finds an acceptable match, it stores the values in one of its 20,000 VirtualAntenna Memories for instant recall.



Interior view of the MFJ-929.

The MFJ-929 isn't limited to coax-fed antennas. It also includes the ability to work with random wire antennas, or add an external balun to work with balanced loads. There are two coaxial connectors on the rear panel (Antennas 1 and 2) and a binding post and ground terminal for random wire antennas. By pressing the front panel ANT button, you can select between the antennas.

You can install the MFJ-929 right at your operating position. At only 6.5 × 2.75 × 7.5 inches, it fits easily in most stations. You can power the tuner from your dc supply or from the optional "wall wart" power supply. It is interesting to note that you can also power the 929 *through the coaxial cable* if you own a dc power injector such as an MFJ BiasTee. The 929 isn't weatherproof, but if you can protect the tuner from the elements with a sealed enclosure, there is no reason why you couldn't power the 929 through the coax and use it outdoors as a remote antenna tuner.

Finally, the MFJ engineers thoughtfully added a rear connector that allows the tuner to interface with a number of Alinco, ICOM, Kenwood and Yaesu transceivers. So, when you press that TUNE button on your radio, the MFJ-929 will respond appropriately.

How Does it Work?

In two words, extremely well. The first time I tried the MFJ-929 it was with a dipole antenna fed with 450 Ω windowed ladder line through a 4:1 balun. The MFJ-929 relays buzzed and within a couple of seconds it had found a match. (The buzz can be a little startling if you're not prepared for it!) Later I took the 929 outside with a battery for a little QRP fun. The tuner matched my random wire in no time and it was fascinating to see the results on the display, along with my 5 W output. The MFJ-929 is a multifunction tool indeed.

Manufacturer: MFJ Enterprises, 300 Industrial Park Rd, Starkville, MS 39759; tel 662-323-5869; **www.mfjenterprises.com**. *Suggested list price: $199.95.* QST

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

NØAX

HANDS-ON RADIO

Experiment 93 — An LED AM Modulator

A recent VHF-UHF Advisory Committee (VUAC) recommendation allows LED light sources as well as the traditional lasers to be used for VHF+ contest contacts. While this might be somewhat obscure to most hams, making contacts using light waves instead of the longer radio waves sounds like fun to me. High efficiency LEDs abound at all wavelengths from infrared to blue-violet and photodetectors are quite sensitive — so why not? After all, light at terahertz (THz) frequencies is to microwaves at GHz frequencies as microwaves are to 160 meter signals. All are a part of the ever increasing scope of ham radio!

This led me (so to speak) to the topic of this month's column — an AM modulator for an LED light source. Certainly, one could simply hook up an LED to an audio amplifier output, but where's the fun in that for an experimenter? Thus, we embark on a two-for-one experiment that not only demonstrates light wave AM, but also a method of pulse modulation.

Basics of Pulse Modulation

Pulse modulation occurs if some characteristic of a *pulse train* (a regular sequence of pulses) is changed so as to represent the information of an input or modulating signal. Three characteristics of the pulse train are commonly employed for pulse modulation: amplitude, position and width. The first varies the maximum value of the pulse while the second varies the position of each pulse with respect to the other pulses, moving the pulses back and forth in time. The third — *pulse-width modulation* or *PWM* — varies the duration or width of each pulse. All three types of pulse modulation are described in the Modulation chapter of *The ARRL Handbook*.[1]

Figure 1 shows the basic concept of PWM. As the voltage of the modulating signal increases, the pulse width increases and vice versa. (Inverting the relationship also inverts the modulated signal's envelope.) The amplitude of each pulse stays the same and the pulses occur at the same *repetition rate, PRR,* or *repetition frequency, PRF*. Assuming that each pulse is perfectly rectangular, the energy in joules (J) contained in each pulse, E_p, is equal to the *instantaneous power, P_i,* of each pulse times its duration, t_p, so — $E_p = P_i \times t_p$. (Instantaneous pulse power at any instant is the pulse voltage, V_p, times the pulse current, I_p.) The average energy, E_{avg}, during each pulse period is the energy in the pulse divided by the entire period allocated to one pulse — that is, the reciprocal of PRF — so that $E_{avg} = P_i\ t_p \times PRF$. Changing P_i creates *pulse amplitude modulation (PAM)* and changing PRF creates a form of *pulse position modulation (PPM)* similar to FM. PWM changes t_p.

By itself, one pulse doesn't convey much information but over many pulses, the average power of the pulse train follows the variations of the modulating signal. The usual method for recovering the modulating information from a PWM signal is to pass it through a low-pass filter, whose output power is approximately the average of the PWM signal's power.

The low-pass filter needn't be an electronic circuit. Any device that responds to the average power of an input signal will act as a low-pass filter, recovering the information from a PWM signal if the frequency of the modulation is not too high or too low. For example, a variable speed dc motor is often controlled by PWM of its drive power. This is a very common way of controlling motor speed in appliances, robotics, and heating and cooling systems. (The sharp pulse edges of PWM signals are rich in harmonics, making them potent sources of RFI if not filtered.)

Modulator Construction

As with analog amplitude modulators, creating PWM modulation requires two basic circuits: a carrier or *clock generator* and a modulator. The output of the clock generator is a regulator series of pulses all having uniform amplitude and width. These pulses serve as a trigger for a variable width pulse generator controlled by the modulating signal. In this experiment both the clock generator and the PWM modulator will be based on the 555 timer IC that was the subject of Hands-On Radio experiment #5. Reading that experiment will help you understand the rest of the experiment better.[2] (The dual timer 556 IC can also be used.)

Our PWM modulator is designed to pro-

[1]*The ARRL Handbook for Radio Communications,* 2010 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 1448 (Hardcover 1462). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop**; **pubsales@arrl.org**.

[2]All previous Hands-On Radio experiments are available to ARRL members as downloadable PDF files at **www.arrl.org/hands-on-radio**.

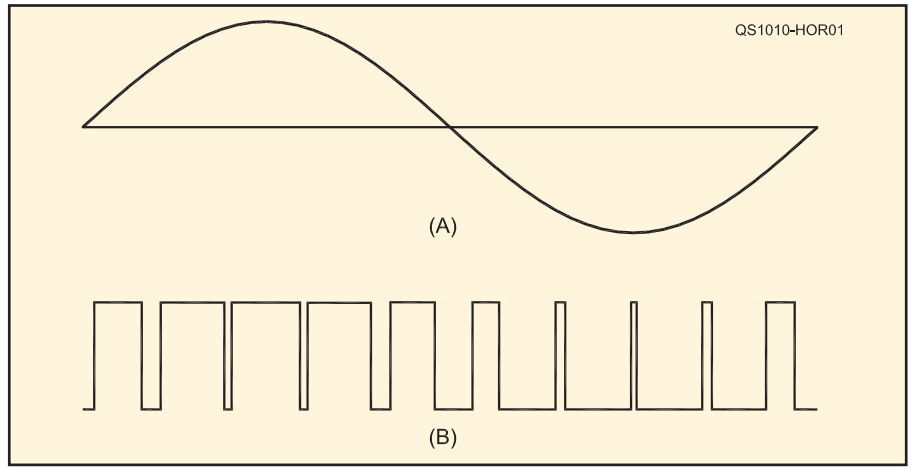


Figure 1 — PWM by a sine wave (top) results in the width of the pulses increasing with increasing sine wave amplitude and vice versa. The resulting variation in average power of the PWM signal creates an AM signal.

H. Ward Silver, NØAX ♦ 712 Jefferson St, St Charles, MO 63301 ♦ n0ax@arrl.org

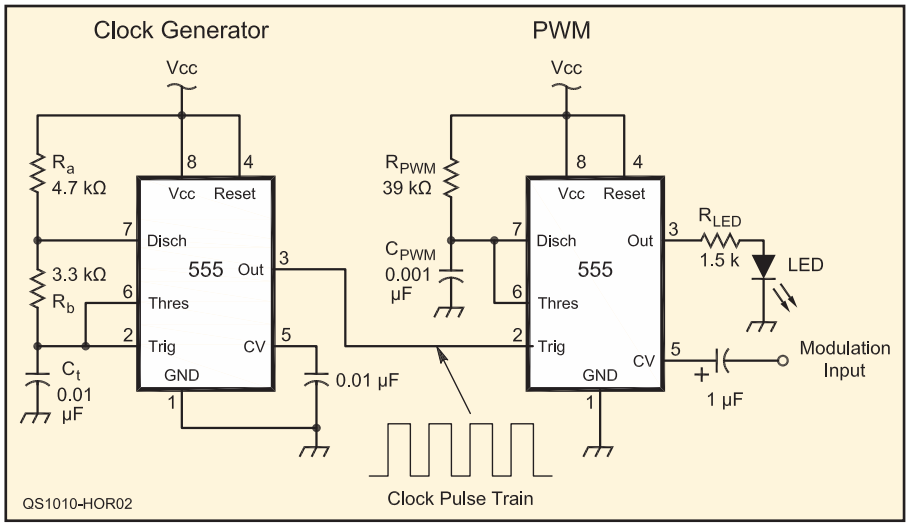


Figure 2 — At left a 555 timer in the astable mode generates clock pulses at 12.7 kHz. At right, a 555 timer in the monostable mode generates a variable-width output pulse at each negative-going edge of a clock pulse. An ac voltage applied to the CONTROL VOLTAGE input of the right-hand timer varies the switching threshold and thus the output pulse width, creating a PWM AM signal.

duce a PWM signal modulated by human speech with a maximum frequency of around 3 kHz. Since each pulse creates a sample of the modulating signal, the PRF of the clock generator must be at least twice the highest modulating frequency or 6 kHz. The selected values for the clock generator place the PRF well above that limit — about 12 kHz.

Clock Generator

The clock generator circuit, on the left in Figure 2, is a 555 timer configured in its astable or *free running* mode. The following two equations describe the output pulse train:

PRF (Hz) = $1.44 / [(R_a + 2R_b) \times C_t]$ = $1.44 / [(4.7\ k\Omega + 2 \times 3.3\ k\Omega) \times (0.01\ \mu F)]$ = 12.7 kHz

and

Output pulse width (s) = $0.693 \times (R_a + R_b) \times C_t$ = $0.693 \times (4.7\ k\Omega + 3.3\ k\Omega) \times 0.01\ \mu F$ = 55.4 µs

Build the clock generator circuit shown in Figure 2 and verify that a pulse train appears with about a 13 kHz PRF and 55 µs pulses.

Variable Width Pulse Generator

The circuit that does the actual modification is at the right in Figure 2. It's another 555 timer but this time configured in its *monostable* mode, with an output pulse triggered by the negative going edges of the input pulses from the clock generator. The output pulse length for this mode of operation is:

Output pulse width (s) = $1.1 \times R_{PWM} \times C_{PWM}$

The modulating signal is applied to the CV (Control Voltage) input. Increasing voltage raises the discharge threshold of ⅔ V_{CC} and lengthens the output pulse. Since the modulating signal (voice) will both increase and decrease about the zero signal value, for maximum range the output pulse with no signal applied should be approximately centered between the maximum (1/PRF) and zero pulse width. With a PRF of 12.7 kHz, ½ × 78 µs = 39 µs. The values shown in the schematic generate pulses of 1.1 × 39 kΩ × 0.001 µF = 43 µs with no signal applied to the CV pin.

The LED current limit resistor value depends on the LED used in your circuit. It's not necessary to use a high efficiency or high current LED. I used a generic red LED out of the junk box that gave plenty of output with 10 mA of forward current. The current-limit resistor value should be $R_{LED} = (V_{CC} - V_{LED}) / I_{LED}$. If V_{CC} = 12 V, a value of 1.5 kΩ will do for most LEDs.

Build the PWM portion of the circuit and verify that with no connection to the clock generator output, the LED stays dark. Connect the clock generator with no input modulation and verify that an approximately 43 µs pulse is output for every input pulse. The LED should be significantly less bright than when connected to V_{CC} directly through R_{LED}.

Now connect an audio source to the modulation input. You'll need about 1 V_{RMS} of audio, which translates to 2.8 V_{P-P}. I used the headphone output of my shop radio and monitored the signal level with a DVM set to measure ac voltage. I could immediately detect flickering in the LED brightness along with the audio — AM optical modulation!

Where is the low-pass filter? It's your eye! The LED can turn on and off very rapidly and reproduces each pulse of current as a pulse of photons. Your eye, however, can't distinguish between the individual pulses of light at that PRF, only the average power of the PWM signal, effectively demodulating it. The averaging response of your eye, plus the brightness versus current characteristics of your LED, are probably not optimized for the combination of pulse rate and width from the PWM modulator. Feel free to experiment with PRF and pulse width to see if you can increase the level of modulation of the LED. I found that substituting a 100 kΩ potentiometer for R_{PWM} allowed for adjustment that made the most difference in the LED modulation.

If you'd like to use a microphone to transmit your voice, the Transmitters chapter of *The 2010 ARRL Handbook* includes a microphone amplifier for dynamic or electret microphones.[3] It has an adjustable gain and will work with a single power supply voltage.

Is PWM actually used for AM communications? Yes, and in fact, it's widely used in the AM broadcast industry as an efficient and effective means of producing an AM signal. For more about generating an RF AM signal using PWM, review "Using two 555s as an AM Transmitter" at **williamson-labs.com/555-circuits.htm**.

Parts List

2 – 555 timer IC (or 1 556 dual-timer).
1.5 kΩ, 3.3 kΩ, 4.7 kΩ and 39 kΩ ¼ W resistors.
100 kΩ potentiometer.
LED.
0.01 µF and 0.001 µF ceramic or Mylar capacitors.
1 µF, 25 V electrolytic or tantalum capacitor.

For Further Reading

The 555 timer IC is described along with many useful circuits in Walter Jung's *IC Timer Cookbook*.[4] An excellent application note from Philips Semiconductor is also available online at **www.555-timer-circuits.com/datasheets.html**. If you're interested in trying to receive and demodulate your PWM light signal, begin with the material at **www.imagineeringezine.com/ttaoc/detector.html**. How long will it be before we hear (or see) "CQ 720 nanometers and standing by"?

[3]See Note 1.
[4]W. Jung, *IC Timer Cookbook*, Second Edition, SAMS Publishing, 1983.

AG1YK

HINTS & KINKS

ISOLATED IN-LINE RF TAP

◊A couple years ago the Mid-MO ARC (**mmccs.com/mmarc**) was the recipient of a surplus Cushman CE-5 Service Monitor to help maintain our 2 meter repeater. The Cushman has been pulled into service in support of the Missouri Emergency Packet Network (MEPN) and its series of both 2 meter (local) and 6 meter (packet backbone) stations.

As received, the CE-5 included a high-band preselector that provides a narrow receive passband and added sensitivity for the receiver when operating in the VHF high-band. Unfortunately, no such preselector was available for the VHF low-band (6 meters). As a result, the CE-5 was deaf to the off-air signal from our 6 meter packet backbone transmitter, even with a short whip installed and the monitor directly (about 150 feet) beneath the 6 meter antenna.

I was able to force-feed RF to the CE-5 by direct-connecting the transmit coax (through a T-connector), but the level of RF input to the CE-5 would have been well over the rated RF input level to the front end. I had to find a better way.

Then I remembered that about 30 years ago a good friend, Clarence "Coop" Cooper, KØLVR, used an "isolated RF tap" to feed RF from a signal generator *into* a device under test. If the RF tap that Coop used was suitable for getting RF *into* the signal line, it followed that it should be equally as good for getting RF *out* of the line as well.

To fabricate the isolated RF tap, I disassembled an Amphenol 83-1T T-connector into its five components (outer body, center thru-line, center T-pin and two clear center insulators).

Using my Dremel tool and a thin cutoff disk, I cut the center T-pin into two pieces as shown in Figure 1. Once I squared and deburred the cut ends of the T-pin, I cut a straight screwdriver slot in the threaded end of the T-pin to allow it to be firmly reattached when the T-connector was reassembled.

Using the cutoff disk in the Dremel tool allowed me to create a narrow (slightly less than 0.1 inch) air gap of removed metal between the two pieces of the T-pin when the T-connector was again reassembled and mated to the Amphenol 83-1J double female connec-

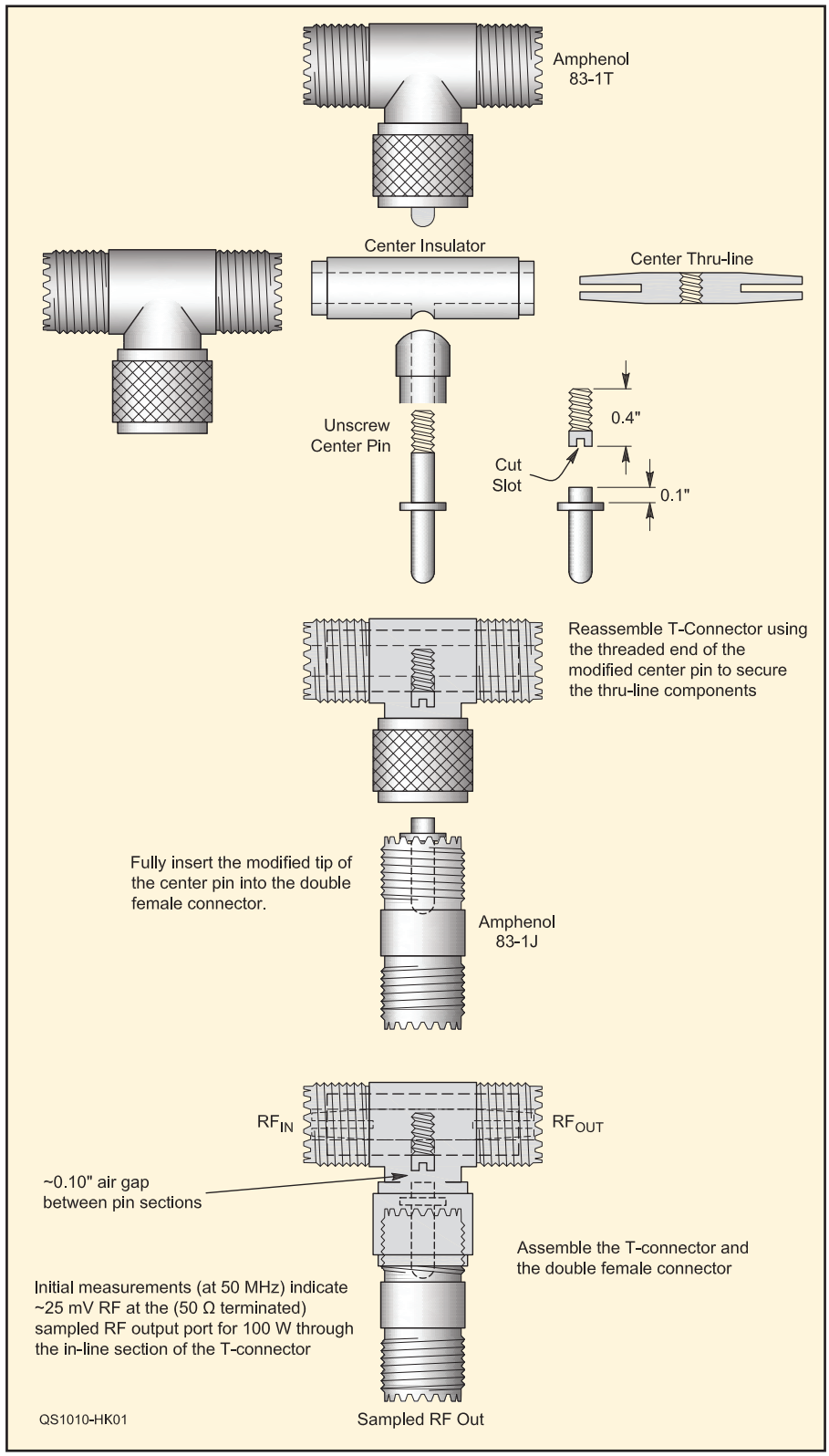


Figure 1 — Construction drawing for the in-line tap modification.

Steve Sant Andrea, AG1YK ♦ Assistant Editor ♦ h&k@arrl.org

tor. This air gap provides more than ample RF coupling for picking RF off the thru-line.

Once the T-pin was modified as described above, I reassembled the T-connector, using all of the original parts *except* for the non-threaded tip of the T-pin. I used the screwdriver slot in the threaded end of the T-pin to ensure that everything was well secured.

I then inserted (fully) the non-threaded tip end of the T-pin into one end of the double-female connector and screwed that end of the double female connector into the body of the T-connector, ensuring that both connectors were firmly seated together. The resulting air gap allowed the CE-5 to be able to hear 6 meter RF from the transmitter, even at power output levels of 5 W or less. There was still not nearly enough RF to risk damaging the front end of the monitor at the 100 W level.

The Isolated RF Tap may be left in-line when not in use. I was not able to measure a significant degradation in SWR on the transmit line (through 150 MHz) either with or without the tap installed. — *73, Tom Hammond, NØSS, 5417 Scruggs Station Rd, Lohman, MO 65053,* **n0ss@arrl.net**

STATIC AND LIGHTNING DANGERS

♢My spouse, Bonnie, KBØHTC, and I run a small Amateur Radio repair shop in a Denver suburb. I have had to change out some major components in a TS-480 and in two TS-2000s lately. Both had damage to the main circuit board, presumably from lightning or static surges. Both have multilayer boards; the missing signal or current paths just seemed to disappear into the board, not to reappear anywhere, making on-board repairs either too time consuming or not economical.

The repair bills for these rigs were extremely high due to the circuit board price and markup. Although the "commercial boys" would not even look twice at the bill, the average ham would have apoplexy. Even though you are getting a great many components replaced all at once, it's still hard to explain a $500 repair bill to an incredulous ham.

I would therefore offer this advice to any ham, especially someone running a newer (post 2000) radio, concerning the most destructive elements:

Static

Always touch the side of the radio before plugging, unplugging or operating any switches or controls. Out west, we get static sparks on 90° days just from getting in and out of the car. It is not necessary to find a shiny spot on the case such as a screw head or something similar to touch; if your body charge is sufficient to cause damage, it will go through the paint on the covers.

Lightning

The most commonly seen destructive path for lightning is through grounds and through data and audio lines. Antenna and dc lines are pretty heavy and can take a lot of surge current. The other signal lines in the new rigs are the width of a couple of human hairs and can only handle a few hundred milliamperes before they self-destruct. In addition, most of the traces are *in between* layers of the PC boards, not easily accessible; hence the need to change a whole board. So, we need an easy way to disconnect *all* data, audio and control lines from the back of the rig during electrical storms.

Power Supply Problems

Get rid of that surplus 100 pound boat anchor 12 V, gazillion ampere power supply. Get a good, current limited supply or better yet, a switch mode supply. Switchers usually fail "dark," that is, their output just goes away. Most are quite inexpensive and easy to replace. Also install a good ac line filter. I recommend the Isobar Ultra series of line filters; they come with a $50,000 equipment guarantee.

If your rig has a negative lead fuse, be sure to check it from time to time, especially if you are having problems. The negative lead fuse in most installations can open but leave the rig operating, as it obtains its dc return to the power supply by other means, such as an antenna ground. Receive may be noisy and data or control errors may be noted. On transmit, a variety of problems will be apparent.

Interfacing

A majority of problems in this area have to do with hams shorting the internal 8 V source during hook-up of audio or control accessories and cables to the rig. Extreme caution must be exercised if making your own cables. Your soldering skills must be above reproach; use pre-made or crimped connections wherever possible. Be very careful not to introduce "rogue" voltages or currents, even by way of ground loops to your rigs. Even very small fault currents can damage the radio or the accessory. Isolate wherever possible. When hooking gear together, always hook up the grounds first. — *73, Bill Leahy, KØZL (SK)*

QUICK BICYCLE MOBILE SETUP

♢I enjoyed WA3LKN's article about bicycle mobile ham radio.[1] David has certainly created a first-class setup, but there's a simpler way.

I commute via bicycle to my job and like David want to enjoy ham radio while I ride. Having radio equipment attached to my bike isn't an option since it is unattended while I am at work. While riding I wear a daypack, which contains work-related items. It occurred to me that the pack's shoulder straps were sturdy enough to support a handheld transceiver. I wrapped a length of #14 insulated wire around the left strap and soldered the two ends together, forming a flat loop with the strap passing through it. I then duct-taped the loop to the rear of the strap, to hold it in place. A handheld transceiver is attached with its belt clip to the loop on the front side of the strap, so the radio faces forward when the pack is worn (see Figure 2). The handheld transceiver is easily attached or detached from the pack in a few seconds.

JOE DICKINSON, WTØC

Figure 2 — William, KCØYQN, the author's son, demonstrates the use of the Quick Bicycle Mobile setup.

The loop is positioned on the strap so the top of the handheld transceiver is level with the top of my left shoulder when I wear the pack. This makes the handheld transceiver's controls easily reachable with either hand and puts the rubber duck antenna "in the clear" above my left shoulder.

I use a few variations of this basic arrangement. If I'm not feeling chatty and just want to read the mail on the local repeaters, the handheld transceiver alone fills the bill. Positioned about 6 inches below my left ear, I can easily hear it even in a noisy environment. No need for earphones or a headset, which could block other sounds and create a safety hazard.

If I want to talk, I add a speaker-microphone. I have to remove one hand from the handlebars to hold the speaker-microphone in front of my mouth and key the transmitter, but I do this only when I judge it is safe. When not transmitting, the speaker-microphone clips to the opposite (right) pack strap in a position where it is easy to hear with my right ear.

[1]D. Pennes, WA3LKN, "Bicycle Mobile Ham Radio," *QST*, May 2009, pp 69-70.

If I know I'll be doing a lot of transmitting, I use a small 12 V gel cell battery, which fits in the pack. I run a power cord from the battery out the top of the pack and over my left shoulder, where it plugs into the handheld transceiver's external dc jack. This provides much longer battery life and higher transmit power. By the way, the same setup works great for hiking or walking too. — *73, Joe Dickinson, WTØC, 8152 S Saint Paul Way, Centennial, CO 80122*, **wt0c@arrl.net**

IN-LINE FUSE FIX

♢While testing one of my mobile VHF/UHF transceivers on the bench, I found the power output was down 30% from normal and also varied very slightly. At first, I was concerned that either the power amplifier or driver was failing. As I continued testing, I noticed that one side of the in-line fuse in the power cord was noticeably warm, as was the connector at the far end.

I found the fuse holder used crimped connections. I soldered the wires taking care not to run any excess into the fuse connector. In addition, I took apart the power connector and also found crimped connections, which I also soldered. After reassembly, the power output returned to normal and was stable.

Most in-line fuse connectors are easy to disassemble. The typical T power connector takes a little more effort because the metal connectors have locking tabs. I found the tabs are easily compressed with a small, sharp tool and that the metal connector then slid out of its shell easily. The metal connector typically has ears and I recommend that you keep the solder from running past them.

I've had similar problems using cigarette lighter plugs with built-in fuses. Even when the current draw was less than half their rating, the plug body became quite warm. In those cases, I found that a compression spring at the plug tip was expected to apply enough pressure on the fuse to force a good mechanical connection at the top of the plug. It didn't. My solution was to solder the fuse into the circuit at the top of the plug. (I left as is the other end of the fuse where it slid into the tip with the spring.) After that, the cigarette lighter plugs were able to draw full rated current without noticeable warming or a material voltage drop. Cigarette lighter plugs are not the best solution to power equipment, but when you need to use them this fix should make them more reliable. — *73, Steve Glickstein, W4FMD, 3850 University Dr, Fairfax, VA 22030-2517*, **w4fmd@arrl.net**

ALARM SYSTEM RFI SOLVED

♢Most monitored systems have two keypads that are hard wired to the central alarm unit. The keypads are active, even when the system is in standby. I was experiencing 'beeping" from the keypads when transmitting on both the 160 and 80 meter bands. RFI was not a problem at higher frequencies, probably because the filtering built-in to the central alarm unit was adequate.

I tried several remedies including clamp-on toroids, bypass capacitors and single chokes, which failed to prevent the RFI. The RF chokes installed on the keypad terminals at the central alarm unit seemed to offer the most promise, but they only protected one band or the other. I did some impedance measurement on the chokes using the Autek RF-1 Analyst and found that using a large value choke in series with a smaller value choke exhibited a broadband high impedance range, sufficient to cover the frequencies of interest. This did solve the RFI problem.

The chokes I settled on were Fastron series 23 (**www.mouser.com/fastron**) with values of 680 µH in series with 47 µH. They are each about the size of a ½ W resistor.

A rule-of-thumb says an impedance of 1000 Ω or higher will usually provide good RFI suppression. The impedance of my chokes ranged from 2000 Ω at 1.5 MHz to 1250 Ω at 7.5 MHz.

Thus, high impedance is maintained over the frequencies of interest and overall resistance was increased by about 8 Ω, which did not affect the operation of the keypads. It is felt that combinations of chokes of different values in series can be an effective way of suppressing RFI in low current circuits where RFI is being experienced on several frequencies. — *73, John Holliman, K5SEE, 11919 Bourgeois Forest Dr, Houston, TX 77066-3209*, **k5seeham@aol.com**

COAX CABLE STANDOFF

♢After erecting my vertical antenna, I wanted to take the strain off the coax hanging on the PL-259 connector. The typical TV standoff doesn't work very well. I did not want to tape the coax to the aluminum mast. Not finding any standoffs advertised in the various ham radio catalogs, I decided to make my own.

Figure 3 shows a hardwood dowel, these are maple, 6 inches long and 1 inch in diameter with a right angle bracket mounted on one end and a plastic cable clamp mounted on the other end. Select a clamp to hold the coax firmly. A light coat of clear acrylic spray keeps the dowels from absorbing any water and the right angle brackets from rusting. Use hex head, self-tapping screws to secure the right angle bracket to the aluminum antenna support mast.

I built four of these standoffs and they did the job very nicely and look very professional. In addition to being inexpensive, mine have been up several years without any deterioration. — *73, Ernest Kampe, KBØLSX, 417 Cheyenne Ave, Eaton, CO 80615*, **memakampe@earthlink.net**

ERNEST KAMPE, KBØLSX

Figure 3 — The homebrewed standoff made from a wooden dowel, angle bracket and cable clamp.

MORE ON THE ELECTRET MICROPHONE

♢Time and technology wait for no hint. It seems the electret microphone element mentioned in the August column is no longer available.[2] The folks at Digi-Key tell me that the recommended replacement is the CUI company's model CMP-5247TF-K; Digi-Key part number 102-1729-ND.

MORE ON THE QUICK AND DIRTY ANTENNA SUPPORT

♢Randy, N2CUG, informs me he has received a number of e-mails asking about the attachment to the 408-R bracket shown in the June *QST* hint.[3] The 408R bracket is attached to a Style 4191-S Stand Off Extension also manufactured by Shakespeare. The extension bracket is 6 inches long and can be cut to shorten as necessary.

[2]J. Schultz, W4FA, "A Better Electret Element for Homebrew Microphones," *QST*, Aug 2010, p 60.

[3]R. Kulzer, N2CUG, "Quick and Dirty Antenna Support," *QST*, Jun 2010, p 57.

"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

Slow Boat to Tokelau

Bill Vanderheide, N7OU

The Pacific Ocean covers almost a third of the earth's surface. Even neighboring island groups can be separated by 1000 kilometers or more. In this vast area some DXers wonder why certain Pacific DXCC entities are so much rarer than others.

It's usually a matter of transportation. Getting to islands with international airports such as Tahiti, Rarotonga or Fiji is relatively easy. From these hubs you can use smaller air services to reach more remote places like the Marquesas, the North Cooks or Rotuma. These flights in small planes are expensive and often delayed by weather or other problems. Even harder to get to is a place like Tokelau, which has no airstrip at all.

A territory of New Zealand, Tokelau lies about 500 km north of Samoa and 8° south of the equator. Each of its three widely spaced atolls has about 500 people and consists of many narrow islets, or motus, that surround a large lagoon. Ever since seaplane service ended in 1983, Tokelauans have talked about building an airstrip, but many fear it would degrade their indigenous way of life.

Rough Ride

Visiting Tokelau, even now in the 21st century, means a rough two day voyage from Apia, Samoa — provided you can get a place on the boat. This explains why Tokelau rates as a semi-rare entity. It also explains why, in February/March 2010, Bob Norin, W7YAQ, and I spent a couple of weeks longer on our DXpedition to 5W and ZK3 than we expected.

In the last four years the two of us have teamed up for five lightweight, mostly CW DXpeditions to the South Pacific, and those experiences shaped our planning. We used the Web to arrange our accommodations and licenses in both Samoa and Tokelau. Visiting Tokelau requires a visa application to the Tokelau Apia Liaison Office (TALO), which also books you on a boat that makes the passage every couple of weeks.

Bob, W7YAQ, at the rig in Samoa for the 2010 ARRL DX Contest.

Very helpful was an e-mail from Willi Przygode, DJ7RJ, who operated on Tokelau's Nukunonu Atoll in 2008. He gave us advice on a good place to stay, the Te Mahina Guesthouse. We made a reservation with the house's owner, Zak Patelesio, who was also the island's General Manager. Willi's DXpedition partner, Ulli Krieg, DL2AH, sent us a CD full of photos that gave us a preview of the beautiful place ahead.

After our overnight flight from Los Angeles to Apia, Samoa, we were greeted with smiles when we picked up our licenses for 5WØYA and 5WØOU. Originally we had planned just a four day operation in Samoa.

When we went over to the TALO office to check on our boat to Tokelau, Tyson Wright, the young man in charge of bookings, explained that the day before one of their landing crafts capsized in heavy surf and three crewmen drowned. Because of the accident, all voyages had been postponed indefinitely.

The accommodations we had reserved in Apia didn't work out either. The room was too small and our antennas wouldn't fit in the garden. Just down the road we were lucky to find the Vaiala Beach Cottages, two-room units

built around a garden courtyard and just a few meters from the sea. The genial owner, Nigel Burr, said our antennas wouldn't be a problem.

On this trip we decided to simplify our antenna farm and brought two Butternut HF9Vs, each having a pre-assembled set of forty 9 m ground radials, and a Cushcraft MA160V for the Topband. We put one of the Butternuts right outside our cottage, within 15 m of the sea. The other one went about 15 m behind it, but its performance was about an S-unit poorer, so we soft-talked the neighbors next door into letting us put it in their front yard, in the clear and even closer to the sea, where it outperformed the first one. The 160 m antenna went smack in the middle of Nigel's garden.

Near our cottage was a tall coconut palm that leaned out toward the water. This was too good a support to pass up. After putting a line over the tree with our slingshot, we pulled up a wire vertical we twisted together for 15 m. Two elevated radials came down at 45° and helped guy it. This antenna was immediately nicknamed The Killer.

On the Air

Even though we ran our Elecraft K3 transceivers barefoot, we usually attracted a crowd of eager callers. Beginning an hour or so before our sunset 40 m and 30 m yielded predictable openings to Europe, and, as our evening progressed, similar openings would often appear on 20, 17 and even 15. Topbanders should thank Bob for staying up into the wee hours most nights. Shortly after our sunrise Europe often came through on 40-15 m. We had a lot of daytime action, too, unlike our other DXpeditions. Fifteen meters was lively most days, and we were careful to check 12 for openings to NA/SA/JA. Even 10 opened up once in a while.

We entered the 2010 ARRL DX CW Contest as a multi-single entry, signing 5WØOU. We operated the entire 48 hours, usually in 3 hour shifts, but allowing each of us 6 hours of sleep on one of the nights. Armed with The Killer, 15 m was our most productive band with 1100 QSOs. It made up for 20 m, which usually sounded empty and dead. We were happy with our total of 2400 QSOs and 1.7 million points.

After two weeks of waiting we got a new date to ship out to Tokelau, but this trip was canceled because of storms in the area. Several days later 25 passengers made the passage, but by now there was a backlog, and as mere tourists we didn't have the rightful priority given to people who lived and worked on Tokelau and needed to get home.

Of course there are worse places to wait around than Samoa. We got a scare of our own one morning when our host, Nigel Burr, pounded on our door at 4 AM and told us that a tsunami might be headed our way from the big Chilean earthquake. In the darkness, the wail of civil defense sirens gave a sense of impending doom. Our host packed all his guests into an SUV and we hurried up to the neighborhood's designated tsunami assembly area, on high ground near a cemetery.

When the news made it clear that there was no danger from a big wave, Bob and I walked down to the harbor to have a look. As we were talking with some locals there, the water suddenly rushed out about 100 meters, exposing a reef the locals had never seen before. Then the water surged back into shore. We think that was the tsunami, although it was only a foot or two high.

After three weeks on Samoa, Tyson called with the good news that we were booked to leave on the next boat. On Samoa, we made a total of 22,525 contacts, mostly on CW, but including — thanks entirely to Bob — 282 on SSB and 1648 on RTTY. Twenty meters had the most QSOs, but we made 3890 on 15 m and 2053 on 12, showing that the high bands are coming back. At 28%, Europe got a good share of the action.

Assembling the verticals on the porch of our guesthouse in Tokelau.

On to Tokelau

Our voyage to Tokelau was aboard the MV *Lady Naomi*, a round-bottomed freighter that sailed with a heavy roll. Neither of us got seasick; in fact we enjoyed the simple meals of chicken stew and rice, washed down with orange Kool-Aid.

Like the other atolls in Tokelau, Nukunonu doesn't have a harbor so getting ashore wasn't easy. You could see how an accident could happen. On arrival the *Lady Naomi* hovered about 500 m offshore and blew its horn. Soon an aluminum landing craft came out through the surf and pulled alongside. Stepping into the small boat, as it heaved up and down in the ocean swells, was all a matter of timing. After weeks of waiting and 32 hours at sea, it felt good to walk up the solid concrete wharf and finally reach our destination.

Nukunonu's inhabited islet is about 3 kilometers long and only 200 m at its widest point. Everyone lives in a single village with their massive Catholic church at its center. Nearby is the only store, a three story government building, and a satellite dish pointed almost straight up. Coconut palms, pandanus and saltbush thrive in the humid heat and thin soil, but not much else.

Our accommodations at the Te Mahina guesthouse turned out to be perfect.

The next morning we spaced our antennas along the beach. Zak said we could put them anywhere we wanted, but we carefully kept them out of the way of the fishing boats hauled up on shore.

Fresh Pileups

On the air as ZK3YA and ZK3OU we had fresh pileups to work down. Propagation followed the pattern we had gotten used to in Samoa. The hours close to sunrise and sunset were the best times for Europe. Toward the end of those openings we listened extra hard for our friends in the UK, whose signals have a difficult path to the central Pacific. During the day we usually could count on one or more of the high bands for working NA/SA/JA. South America, a clear shot across the lagoon, came pounding in. There were surprises too: late one night I worked SU9HP on 10 m. All of my contacts were CW, but off the key Bob also made 2201 on RTTY and 809 on SSB.

Later we received some good stories from the other end. N4LS/m worked us while waiting for a traffic light despite powerline noise. G3VPW reported listening patiently for two

Band Summary
5W and ZK3
Combined

160 m	750
80 m	1,706
40 m	6,669
30 m	8,170
20 m	10,543
17 m	8,531
15 m	8,896
12 m	4,418
10 m	1,635
Total	51,318

Bill making repairs with some young assistants.

On one of the outer islets, Bob is enjoying our shore lunch, provided by Harry Hope, a teacher from the school we visited. Harry spent two hours in search of our lunch and came out with a basketful of big coconut crabs. He fashioned a torch out of dry palm fronds and roasted the crabs for us.

weeks before hearing us late one morning on 20 m and nailing a new one. And from an Alpine village surrounded by mountains, HB9PL wrote that he used low power and a vertical antenna when he snagged us for number 298.

As in Samoa there were problems to overcome. For the first few nights Bob wasn't getting out on 160 m with our top-loaded vertical. We moved it away from some palm trees so it was in the clear and closer to the lagoon, and that did the trick. Bob proceeded to make 451 contacts on the Topband.

Bill at the rig as ZK3OU.

Murphy also struck one of our HF9V verticals. We had mounted it on the seawall in front of the house, but splashing waves detuned the antenna's coils, raising the SWR. The solution this time was moving the antenna a little back from the water. This activity attracted a swarm of neighborhood kids who eagerly offered their help — not all of it welcome!

A more vexing problem was the noise this antenna picked up, unlike its quiet twin down the beach. We thought the source must be somewhere in the house or possibly the WiFi antenna on the roof. Setting up The Killer helped a little, but like good teammates we took turns with the antennas on a daily basis and simply shared the annoyance.

Zak encouraged his guests to get involved with the community during their stay. Around the kitchen table he introduced us to the high school principal and the head of college extension classes. A few days later I stood in front of a junior high English class and answered questions about where and how I lived. They wanted to know about elevators, the look of American currency and my rare encounters with bears. The next day Bob took his gear to school and made a presentation on Amateur Radio, delighting the students by sending their names in Morse code.

Extra Time Pays Off

In our three week stay on Tokelau we made a total of 28,793 contacts. For many stations we were an all-time new one or at least a new band-country. We think operating a third week allowed many smaller stations to make it into our log. We also spent some time higher in the traditional bands and this gave General class operators a chance. Our 8310 QSOs on 15-10 m again showed improving conditions with the new solar cycle, as did the 34% share of QSOs that went to Europe.

Our boat back to Samoa was a much smaller vessel, the MV *Tokelau*. With its crowded deck and severe pitch and roll, most passengers kept to their beds and dozed or counted down the hours. It gave us plenty of time to reflect on our 50 day DXpedition and 51,000 contacts.

Photos by W7YAQ and N7OU.

Bill Vanderheide, N7OU, is a retired elementary school teacher. When he was 11, he received a crystal radio kit for Christmas and that began his lifelong fascination with wireless communication. He was first licensed as WV6FYW in 1959. His current ham radio interests are portable operation, DXpeditioning, CW and contesting. He lives in a high-rise building in a downtown area and all of his operating is away from home. He is a member of the ARRL and the Willamette Valley DX Club, and is a sorter for the 7th Area ARRL DX QSL Bureau. You can reach the author at 333 NW 9th Ave, Unit 913, Portland, OR 97209, **n7ou@arrl.net**.

Stranded on East Pen: SOS de VYØV!

Cezar Trifu, VE3LYC

My trip to East Pen Island in Hudson Bay, in late March and early April 2010, was prepared in great detail, months in advance, but real life threw me some random challenges that were impossible to predict. This uncertainty makes traveling to any remote location an adventure and not simply a commute.

East Pen is the only island in NA-231, the last group that remained to be activated in Canada out of 55 under the IOTA Program.[1] The story of VYØV is that of a dream, one that demanded a lot more determination and perseverance than I ever imagined. More than seven years in the making, with many ups and downs, it took me from hope to despair and back. But despite the arduous trials and disappointments, the dream overcame them all. I hope this story will live long after VYØV went QRT, through those whose lives were touched and inspired.

Under Way

After flying from Kingston to Toronto and on to Thunder Bay, I boarded a plane to Sioux Look-out, where I picked up my guide, Tommy Miles, who was visiting his family. After a short stop in Big Trout Lake, we landed in Fort Severn on March 26, surrounded by snow and the cold of winter: −29°C early that morning! I thought Tommy had already prepared everything, but I was wrong. That evening he worked past midnight to build the sled.

Preparations continued next morning and by 1 PM, dressed head to toe in winter gear, I hopped in the sled, sitting comfortably in a folding chair, surrounded by the tent and other camp materials, the food, a wood stove, gas, batteries, a generator, radio equipment and our personal effects. The weather was good, −17°C with mostly blue sky and almost no wind. As Tommy's snowmobile pulled the sled away, speeding through forests of spruce trees, riverbeds, fields of tamarack trees — deep marshes in the summer, it felt like −25°C with the wind chill.

After driving 22 of the 120 km to the island, the engine began overheating, as the coolant was boiling! It was then that Tommy told me he had been having this problem with the snow machine, suspecting that the thermostat had become stuck. Stopping frequently to cool off the engine, it took us five hours to drive the next 22 km, after which we were forced to return to the village, hungry, thirsty, completely exhausted, and feeling stiff and numb.

Attempts to repair it the next day were unsuccessful. Without a solution and with time running out, Tommy threw in a bottle of Ballantine's to convince his brother Timothy to trade him his smaller, but air cooled, snow machine. We left the village at 5:15 PM, prepared for a night ride. Crossing the frozen landscape, Tommy followed a track only his eyes could identify. He lost it a couple of times, but recovered, later driving closer to the Bay, following the tree line from afar.

The First CQ

We reached East Pen after a gruelling nine hour ride, which included a frantic search around the GPS coordinates of its southern tip. The island was completely covered by ice and snow, making identification at night very difficult. After savouring in the moment, we unloaded everything and left for the tree line, 11 km from the camp, to bring wood poles for the tent, and firewood. We returned three hours later, and it took two more to set up the camp. By the time I raised the mast with the vertical wire antenna taped to it, we were in full snowstorm. The first CQ was shortly after 8 AM (1200 UTC) on 30 m CW, driving back a huge North American pile-up. I later moved to 20 m SSB, taking advantage of the opening propagation to Europe, as the storm grew in intensity. Around 1900 UTC, while I was running the 8 call area in Europe, disaster struck: The mast broke in three places! While the wind continued to pound fiercely at 90-100 km/h, I felt tired and decided to take a nap, waiting for it to calm down.

Within an hour, a dream that I should put the antenna on the tent right away woke me up. The wind relented a little, and it began to rain — freezing rain! I hooked up the antenna to the top of the tent, with the radials 10-15 cm from the ground, since I didn't have higher support. By 2130 UTC I was back in business, although with a significantly weaker signal. Minutes

How could I have imagined that just over half a year after nearly sinking off Gilmour Island I would also be stranded at the southwest edge of Hudson Bay?

[1]Islands on the Air, **www.rsgbiota.org**

With sled and snow machine as a backdrop, I heat water for a hot cup of tea.

later, to my complete amazement, several JA stations made the log! Encouraged, I kept working the pileup from 20 to 30 m, and then 40 m, until the propagation conditions forced me to shut down for the night.

It was long before sunrise that I began to work with Tommy on a plan to fix the mast. We used six to eight planks for each of the three broken sections, every piece about half a meter long and 2 cm wide, and tied them up with steel wire and rope. Tommy used the chainsaw to cut the splinters from a particle board panel while I prepared the mast by scraping off a 3 mm ice sheet. We did a great job, but the mast was much heavier and far less flexible now. As I raised the antenna in the morning sunshine, I decided to keep a close eye on it to prevent another break, as there were no materials left.

At 1400 UTC I was back into Europe on 20 m CW when, shortly after, Tommy let me know that he was leaving! While I couldn't believe what I heard and looked stunned, he mentioned that Andrew, his replacement, had already left the village and should arrive in a few hours, so I had nothing to worry about. He left me a rifle and 10 rounds…in case a polar bear might show up!

Inspecting the area adjacent to the camp, I felt pretty good to find a half full can of anti-bear spray. It had the safety clip on, so I took this valuable asset inside the tent. A little later, after taking care of some…physical necessities, a burning sensation in the groin made me realize that the can was leaking! I had a bit of water left from heating the rations upon arrival, which I planned to use for drinking. The pain was so strong that thirst was the least of my worries, however, so I used the water to wash myself thoroughly!

Running Low

I kept working the EU pileup on 20 m until around 2100 UTC, when the propagation with Far East Asia opened, and for about an hour I was able to log JA and UAØ stations. As the wind got stronger, I took the mast down and positioned it adjacent to the back of the tent, tying it to its frame for increased strength. By then, the wind was at storm level and the rain was pouring in curtains. I couldn't take the mast down to switch the band and risk breaking it in the process. Frank, VE7DP, who kept in regular contact with me over the radio, phoned Tommy and announced that Andrew's snow machine broke and he had to return to Fort Severn. However, he would leave as soon as possible. I didn't have much gas left and without a good feeling about Andrew's arrival, I decided to save power for better propagation conditions the next morning.

The rain was so intense that the tent leaked in two places, close to my sleeping corner. I moved away, ate a couple of bars, put the rifle next to me, and fell asleep. A couple of hours later I woke up as the tent shook violently into the west blowing wind. As the rain had stopped, I was glad to hear that the generator was still working. Whether the mast remained in one piece or not after this new storm, VYØV would be back on the air the next morning!

Luckily, I found the generator still chugging along, but it stopped running early that morning. After some power calculations, I came up with an operating plan and time schedule to maximize the number of stations logged, while giving all regions a chance. The power drop forced me to switch the rig off at 0119 UTC on April 1.

After the intense rainstorm overnight, I was shocked when I stepped out of the tent in the morning: I was surrounded by...land! I could clearly see how the island, 5 km long and almost 1.5 km wide at the SE edge, was curving and narrowing farther to the northwest, with the camp at its southern tip. Behind the high ice line the waters of Hudson Bay were glazing. It continued to warm up throughout the day, but as the evening fell it got cloudy and cold. It was well past sunset and I was still without aid on East Pen! Keeping VYØV on the air helped me get through the day, but with the battery almost dead, that purpose vanished.

At this point I am without gas, power, water and fire.

Working to fix the badly broken mast.

Back in business after the snowstorm.

Left to right: Jason, Andrew, Timothy, Gordie, Cezar and Tommy.

SOS de VYØV

At 0210 UTC on April 1, after spending 36 hours alone, without gas, power, water and fire, I felt that I needed help. With just a few watts, I started to send the emergency QRRR code on 10.1075 MHz. A little later, doubting that this would work, I sent my first SOS message. W3HQ replied right away and I asked him to phone my wife, Lucia, tell her to call VE7DP for an update, and let her know that *I need search & rescue now!* Since it was April Fool's Day, I decided to send the same message to two more hams who replied to my calls, N9NS and VE7WEB.

VE7DP and VE7XF came over to 30 m to monitor the situation. Low on battery, I would transmit for only a few moments every 15-20 minutes, with W5GAI and later VE7MR providing relays on 30 m CW and 40 m SSB. The message from Fort Severn was that Andrew had departed and should arrive by early morning. I had no reason to trust this information more than any of the earlier ones that didn't materialize, but I imagined that heavy thawing could hamper a land mission. Made for ice, the sled sinks in snow and doesn't advance easily in wet conditions either. The wood it is made of absorbs water, becoming heavier, increasing the sled's friction with the melting ice. Overnight, the wooden poles began to sink in the ice, shaking the tent, while the wind blowing into small crevasses around it made growling, bear-like noises. Adrenaline rushes kept me awake most of that night!

At 1145 UTC, looking for an update, I tried to contact the stations dotting the frequencies between 14.260 and 14.270 MHz with local networks, those operating down to 14.200, as well as Canadian stations under 14.150. It was all in vain, as I was brushed away when I indicated that I had an emergency. I was sent to other frequencies or deliberately ignored! With only 5 W, it took more than half an hour to get a reply to my distress calls. Finally, K1BG brought in VE3XF and VE7DP, who kept monitoring 14.260 MHz, while my transmissions were limited to "yes" or "no" to cleverly posed questions, every 15 to 60 minutes. Meanwhile, many hams and non-hams kept talking repeatedly with the Ontario Provincial Police (OPP) as they assessed the situation through their officer in Fort Severn. By early afternoon they had a plane on standby, in case the land team didn't arrive. They later announced that it would be dispatched regardless.

Land Team Arrives

A couple of snow birds were entertaining me with their joyful chirping when, around 5 PM, I heard the buzzing of a small engine and I saw one, then two very tiny dots — the land team. With stops and slaloms, it took them an hour and a half to drive across. *They are here*, I transmitted, relieved! In no time I started to pack the radio gear, while the guys worked on the tent and camp. Before long, we heard an airplane, saw it circling and landing just west of the island. Of the three guys on board, the first to reach us was...Tommy, followed by Timothy and Gordie — the pilot!

Loading everything on the plane, at 7:55 PM we took off as the sun was disappearing quickly behind the horizon. As we crossed the Mintiagan River, I could see the thin contour of East Pen, with the open water of Hudson Bay just a few kilometers behind it. The sun was reflecting its orange light on the thin layer of water covering a vast region underneath. Small and large rivers were meandering through marshes and woods. Looking from the sky at the canvas below, the difficulties of the two trips to East Pen, and the harrowing effort of the land team were evident. The colors began to fade out at dusk when, half an hour later, we landed in Fort Severn.

Results

The log includes almost 2700 contacts with over 2100 stations in 63 DXCC entities on all continents:

Cont	QSO	%	Stn	%	Dupe
AF	5	<1	4	<1	0
AS	180	7	140	7	8
EU	1032	39	846	40	44
NA	1415	53	1116	52	39
OC	7	<1	6	<1	0
SA	33	1	17	<1	3
TOT	2672		2129		94

Two-thirds of the contacts were on CW, 1748 QSO or 65%, compared with 924 or 35% on SSB (almost all on 20 m). A total of 1658 QSOs or 62% were logged on 20 m, while 733 (27%) were on 30 m, and 281 (11%) were on 40 m. Top ten DXCC by the number of contacts:

#	DXCC	QSO	Stn	Dupe
1	K	1249	985	39
2	I	185	151	8
3	JA	160	124	7
4	VE	155	121	1
5	DL	142	127	4
6	F	73	57	2
7	EA	65	53	3
8	G	60	44	3
9	ON	54	38	1
10	UA	53	46	1

Acknowledgments

I am grateful to my wife, Lucia, for her love and forceful pursuit to have me extracted from East Pen, and to my son Tiberius who kept track of all expedition finances. Tommy's enthusiasm and skills were critical to the project. My thanks to VE7DP, W3HQ, N9NS, VE7XF, K1BG, Debbie, Justin and all those who handled my distress calls, maintained a communication channel or worked tirelessly to get me off the island.

Financial support received from the International Radio Expedition Foundation, German DX Foundation, ICOM–Canada, Swiss DX Foundation, Clipperton DX Club and Truro Amateur Radio Club is gratefully acknowledged. I would like to thank W5BXX, JM1PXG and W5IZ for their encouragement and strong support. Top individual donors included DK8UH, G4VMX, I2YDX, KO1U, N3QQ, N6PYN, ON4ATW and PA3EXX, and major support was received from DF6EX, DL1BDD, EA8AKN, F6CKH, G3KMA, G3ZAY, G4SOZ, I1SNW, IK8DDN, JA1BPA, JA1QXY, JE1DXC, JE2QYZ, JF4VZT, JA8MS, KD1CT, W5BOS, N6AWD, K8NA, OE3SGA, OE3WWB, ON4IZ, PT7WA, VE7DP and VE7QCR. My thanks to everyone who supported this project.

Photos by the author.

The author is a Seismologist and an expert in the use of seismic technology in the monitoring of man-induced seismicity associated with mining, petroleum and geotechnical applications. He is an avid DXer with 336 DXCC, 9BDXCC, 2350 DXCC Challenge and 5BWAZ. Particularly interested in island chasing, Cezar confirmed over 980 IOTA and during the last couple of years activated six rare and new IOTA groups in the Canadian Arctic. Born and raised in Romania, where he is known as YO3YC (his father Septimius was YR5TI and YO3TU), he lives in Kingston, Ontario, with his wife, Lucia, who is a Professor of French. His son Tiberius is a Mechanical Engineer. You can reach the author at **ve3lyc@hotmail.com**.

A Backpack Grid DXpediton to CM79

Rare DX isn't confined to far-flung reefs and exotic corners of the globe. In the VHF world, rare DX can be found in a California wildlife preserve.

Russell Dwarshuis, KB8U

CREATED BY RUSSELL DWARSHUIS, KB8U

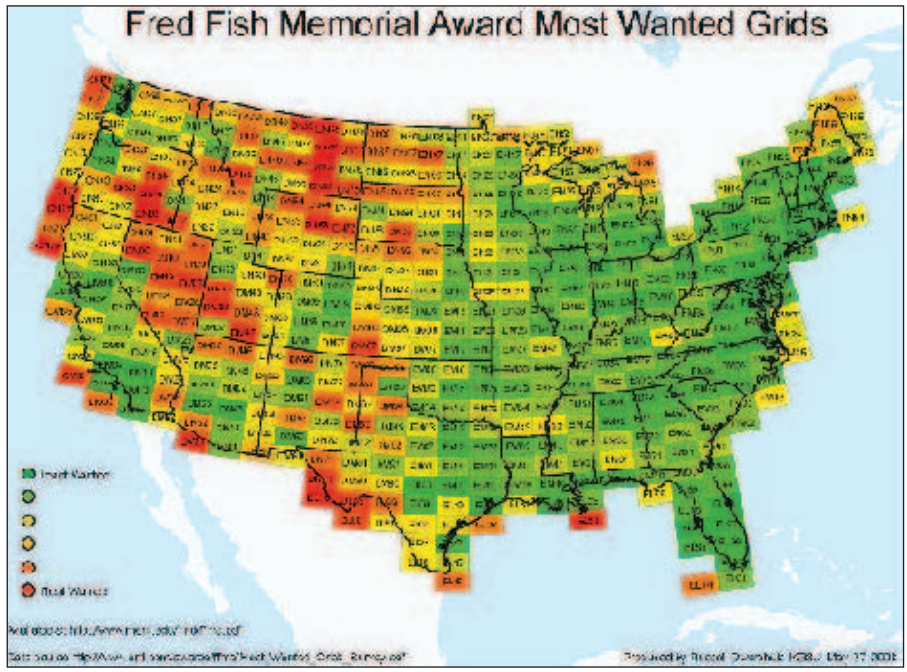


Figure 1 — The 488 grids required on 6 meters for the ARRL Fred Fish Memorial Award. All grids are color coded from dark green (most worked) to dark red (most needed) based on a 2007 survey of active 6 meter operators.

The ARRL VUCC award is for confirming contacts with stations on 50 MHz and above in 2° longitude by 1° latitude "grid squares." The pinnacle of VHF achievement is the ARRL Fred Fish Memorial Award (FFMA) for working all 488 grid squares in the 48 contiguous United States on 6 meters. This is a very difficult award to obtain, since there are grid squares with little or no ham population, and others with no population at all. The only way to make a contact with those grids is if someone makes an expedition to activate them.

As of July 2010, only the namesake of the award had all 488 of the grids confirmed, and FFMA #1 was awarded to Fred posthumously. A tight race to earn FFMA #2 was ongoing between a handful of top North American 6 meter operators, and their standings were updated regularly on the ARRL FFMA page, **www.arrl.org/ffma**. As a result, high-profile portable operations from rare grids had increased since the FFMA award was introduced in 2008 and those operations were given a lot of press in the VHF community.

Inspiration

In July 2008 I activated the most-wanted grid, DN67, and five other rare grids in western Montana and South Dakota. I was also inspired by the effort of the K5N team in 2009 that activated EL58 to do something similar to what they had done. EL58 is at the end of the Mississippi River and is almost entirely in the Gulf of Mexico. The road to EL58 stops in Venice, Louisiana, so the K5N group took boats down to the mouth of the Mississippi to activate the grid for a few days. CM79 is another grid that is extremely difficult to reach, so I decided to try to activate it.

CM79 is almost entirely in the Pacific Ocean. There is approximately ½ square mile of land, but all the land is in the King Range National Conservation Area. There are no roads in the grid square. In 2006 the land was designated a Federal Wilderness Area so even more restrictive laws now apply: No mechanical conveyances (cars, ATV, bicycles, etc) are allowed off-road and any powered mechanical devices, including generators, are not allowed outside of developed camping areas. Special recreational permits are required for groups. Fortunately, portable radios are allowed, but any operation needs to be battery powered and all equipment must be backpacked or carried in on pack animals.

The easiest way to reach CM79 is via a beach trail that is sometimes impassable at high tide. The terrain is so rugged that beach hikers who have not been mindful of rising tides have been known to drown, unable to scale the areas that have cliffs. The terrain rises rapidly from the beach to a height of over 2000 feet, so most useful radio paths for 50 MHz and above are blocked by Chemise Mountain and the King Range, making operation from the beach difficult.

On the Corner

Discussions on the FFMA e-mail list revealed another possibility: activation from the grid corner at 124°W longitude, 40°N latitude. That point is about 70 feet down from a ridge where a hiking trail passes. It is about two miles from there to a campground (where motor vehicles are permitted). The VUCC rules were consulted, and Rule 4(e) specified that operations from a grid line or intersection of four grids must have a portion of the operating station physically present in all grids to qualify. This meant a transceiver and batteries could be located at the grid corner and the antenna could be up on the ridge so the hillside won't block the signal.

As a bonus, all contacts would also count for VUCC credit for the other three grids (CN70, CM89 and CN80). CN70 is also a fairly rare grid since there are no amateurs living there who are active on 50 MHz and the grid is only accessible by rugged mountain roads. I had a plan!

My Gear

Equipment used on my expedition to CM79 included an ICOM IC-706, polymer lithium-ion batteries and a Moxon rectangle antenna. The main body of the '706 and batteries were located at the grid intersection, which was located with a GPS receiver,

US DEPARTMENT OF THE INTERIOR MAP

Figure 2 — Topographic map of California's Lost Coast Area and the trail used to access the confluence of CM79, CM89, CN70 and CN80 at 124°W longitude, 42°N latitude. The blue dot shows the approximate operating location.

RUSSELL DWARSHUIS, KB8U

KB8U at the "operating desk." Russ made over 270 QSOs on 6 meters by backpacking 30 pounds of gear in and out of the operating area for a week in June 2010.

according to VUCC rules. The front panel and antenna were located on the ridge, about 70 feet up the slope. An extension cable was made for the front panel and 100 feet of LMR400 coax was used.

The Moxon rectangle was made with fiberglass driveway markers for spreaders and short pieces of tubing attached to the corners of the wires so the antenna could be quickly assembled in the field. It is similar to the Moxon antenna described recently in *QST*.[1] To avoid expensive airline baggage fees, most equipment was shipped ahead "hold for pickup" via UPS. The antenna was hung from tree branches at the peak of the ridge with the help of a 12 foot painter's extension pole. The batteries were two 21 Ah, 14.8 V lithium-ion packs that were recharged back at the campground each night with a small generator (the campground has no ac power).

I arrived on Wednesday, June 16 and spent the day gathering the gear from the UPS shipping center, buying groceries, renting a car, driving to the campground and getting settled in at the campground. Thursday morning I set out for the operating site.

The two mile hike from the campground to the grid corner has 800 feet elevation gain. The trail is in good shape but there are sections that are fairly steep, and 30 pounds of radio gear made it slow going. It took me about an hour and half to hike there and set up the radio.

W5OZI Hears Me!

For about the first hour, I only heard stations out to a few grids away. Then KB6NAN alerted me to an opening to Texas and the fact that W5OZI was on. I knew that CM79 was the very last grid W5OZI needed to complete the FFMA award, so I asked KB6NAN to let Pat know that I would be calling him immediately on a clearer frequency. W5OZI was not strong, Q4 to Q5 copy, but I knew that he would be running more power than I was. I suspected I would be difficult copy for him so I sent calls and my grid repeatedly until he got it. I learned later that the 50 MHz propagation logger Web sites erupted with a torrent of congratulations to Pat! He was the first E skip contact on the Grid DXpediton, and it was fitting that he would be my first QSO out of the local area. Being able to give Pat his last grid for the FFMA award was an absolute thrill, and made the entire Grid DXpedition worth all the effort.

About half an hour later the band opened up nicely to Arizona and Colorado before shifting to southern California. In 3.5 hours, 48 stations were logged. The batteries had not been fully charged or I would have worked more. The second and third days had excellent propagation with strong double hop to W8, W9, W1, W2 and W3 call areas along with a smattering of W4s and, of course, single hop stations from the Great Plains states westward.

Tuesday and Wednesday were completely absent of E skip, unfortunately. The last day I made some meteor scatter contacts using *WSJT* software but, as expected, that quickly drained the batteries so only six contacts were made using the FSK441 mode.

Results

I made a total of 272 contacts in 101 grids on 6 meters. I hiked roughly 25 miles with 4800 feet of climbing. There was no rain but during all but the last day the temperature was below average and there was a steady wind at the peak of the ridge. The last day had no wind, but then the mosquitoes came out in force. Other than some mosquito bites, a scratch on my hand and sore muscles I was no worse for wear.

If you're looking for some ham radio adventure, I heartily recommend trying a 6 meter grid-expedition. A small radio and simple directional antenna can yield big-time fun during the summer sporadic-E season. The FFMA e-mail group on Yahoo (**groups.yahoo.com/group/FFMA/**) has over 200 members and a lot of helpful people with great suggestions and enthusiasm. Many of the rare FFMA grids are in especially scenic areas so it's a great way to add ham radio to a summer vacation. No hiking is required for most of them! Maybe you could give that last grid to an operator striving for their FFMA!

[*Editor's note:* Since this article was written, Rick Roderick, K5UR, has qualified for FFMA #3. Six other stations have over 450 FFMA grids validated by the ARRL Awards Branch.]

ARRL member Russell Dwarshuis, KB8U, was first licensed in 1976 as a Conditional class license and has held the calls WBØWCQ, WD8NWM and KB8ME. His primary Amateur Radio interest is in weak signal operation on the VHF+ bands and he has earned VUCC on 9 bands. He enters VHF/UHF contests in the low power category. He placed first in two events and has numerous other top 5 finishes. You can reach the author at 427 Barber, Ann Arbor, MI 48103, **kb8u_6m@yahoo.com**.

[1]A. Baker, KG4JJH, "A 10 Meter Moxon Beam," *QST*, Aug 2009, pp 33-36.

ARISS Scores an A+ at Midvalley Elementary

A dedicated principal and an enthusiastic teacher spark a fire of interest in ham radio.

Rosalie White, K1STO

Jacee and Nikole enjoyed hands-on classroom activities related to ARISS. Teacher Dave Bettinson, KE7LMH, says that students continue to be excited about ARISS and technology they used to take for granted.

Carla Burningham, principal of Midvalley Elementary School in Midvale, Utah, is known in ham circles as KC7HON. Her school serves about 540 students from kindergarten through sixth grade. She had thought about ARISS (Amateur Radio on the International Space Station) learning activities for her students, explaining, "Having ARISS education in my school was important to me because it would bring real-life science into the students' daily lives. It would be an opportunity to inspire young minds to study hard, especially in the subject areas of science and math."

When Carla was Assistant Principal at Midvale (not Midvalley) Elementary she tried to get the sixth grade teachers interested in ARISS. They were, but backed out because of other curriculum projects. Carla was transferred to Midvalley as principal in June of 2005. In 2007 David Bettinson, KE7LMH, entered the picture as one of Carla's teachers. She recalls asking Dave, "How hard would I have to twist your arm to try to get ARISS at Midvalley?" His response: "Not hard at all."

Lighting the Fire

At about that time, the ARISS team thought it would be great to whet the interest of schools in states that had not yet applied for an ARISS learning event. ARRL section managers in those states got phone calls, one being Mel Parkes, NM7P, of Utah. Mel spoke to Carla about the Utah Amateur Radio Club's (**www.xmission.com/~uarc**) interest in helping a school support an ARISS contact. That just added fuel to Carla's fire.

Next came a meeting with Mel, Carla and Dave. The latter had begun reviewing Education & Technology Program materials on the ARRL Web pages (**www.arrl.org/education-technology-program**). As Carla and Dave finalized their ARISS school application in March 2008, Mel mentioned the ARRL Teachers Institute professional development workshop (**www.arrl.org/teachers-institute-on-wireless-technology**) and Dave decided to apply. He was selected and attended that summer, and after returning home, added some of the activities to his sixth grade curriculum.

ARISS Education

Carla explained: "Dave spearheaded the educational part of ARISS at Midvalley." That fall, he focused on the radio wave portion of the electromagnetic spectrum with each of the sixth grade science classes.

David reports: "That piece of the curriculum gave me the opportunity to address with students the science of radio and radio wave propagation. We reviewed some of the basic electricity concepts the students learned in fifth grade. Then we moved through the broader concepts of wireless communication. I used some lesson plans derived from my experience at Teachers Institute plus other educational resources from ARRL and AMSAT."

On December 2, 2009, the Midvalley Elementary School ARISS contact was an exciting success. The contact was between NA1SS and W7SP (the UARC's club call) and began at 1613 UTC, lasting for approximately 9 minutes and 30 seconds. Students interviewed Astronaut Jeffrey Williams, KD5TVQ. Here is a small sampling of the questions students asked:

- How do you decide which experiments to take into space and which is the most important one onboard ISS?
- What do you do to get ready for a spacewalk and how long does it take?
- How do you get cold, warm or hot water up there to take showers?
- What does your spacesuit do for you and what would happen without it?

Dave reports, "We focused on, and feel we achieved, the fulfillment of the following

Anna, Nikole and Jacee were keen on earning about wireless control and robots.

Jaycee and Shayla learned "fun serious stuff" — the electromagnetic spectrum, radio waves and propagation were folded into their science curriculum.

objectives in the Utah State Core Curriculum:

"1) Manifest Scientific Attitudes and Interests

"2) Understand Science Concepts and Principles

"3) Demonstrate Awareness of Social and Historical Aspects of Science

"4) Understand the Nature of Science

"For years I have enriched my space-related curriculum with NASA materials and resources pulled from their workshops. I shared those materials with other teachers in the school as well. As part of our ARISS contact, I emphasized the technology and history related to the International Space Station, as well as the subjects of microgravity and physiology in space. I will use these as a springboard for additional in-depth exploration throughout the rest of the school year."

And the Winner Is…

Carla reported: "Student interest in science and Amateur Radio has accelerated." Dave explained further: "The students continue to be excited about the ARISS events and continue to show increased interest and motivation in science and the technology topics they generally take for granted. I field questions on almost a daily basis about Amateur Radio and look forward to moving ahead with our plans to make it not only a regular addition to the sixth grade curriculum, but providing an enrichment experience for other interested students.

"The students who participated in this event recognize the significance of what we did, and it has piqued their interest in our science curriculum, especially as it relates to space. Our challenge will be to keep those fires burning and to ignite others. I intend to use this experience and the recorded experiences of other schools to keep the interest up."

Beyond Midvalley

Other schools watched Midvalley Elementary School's ARISS experience. The Canyons School District Technology Department Webcast the event throughout the entire school district. Carla provided neighboring school districts with the information they needed to connect their students to the Webcast. Some of these schools have started expressing interest in ARISS. Dave reported that UStream (**www.ustream.tv/recorded/2693694**) and YouTube videos of the event are available. [The ARISS contact can be seen at **www.youtube.com/watch?v=0wE2EAirEX4** and an interview with Dave Bettinson, KE7LMH, can be seen at **www.youtube.com/watch?v=0kZNPM-vdrw&feature=related** — *Ed.*]

Local hams put together the Amateur Radio station for the ARISS contact. Carla thanked Randy Kohlwey, WI7P, as the key to success with the ARISS contact due to his expertise in satellite communications. She said, "Randy was definitely the brain behind us. He pulled in Steve Olsen, AE7AC, an engineer who provided us with our assembly and testing facility. They put together a successful ham station." Dave said, "We learned a great deal under Randy's tutelage, and Steve was an immense help."

Carla noted that the whole community showed great interest: "The school district superintendent spent the day of the ARISS contact at Midvalley along with other school board members and district directors. The two major Salt Lake City newspapers, the *Salt Lake Tribune* and the *Deseret Morning News* reported stories, as did ABC, Fox and the community newspaper."

> ***"This has been a fantastic event that will reap rewards in science interest for years to come."***

Midvalley Elementary School Principal Carla Burningham, KC7HON, brought ARISS to her school to inspire students to study science and math. These sixth graders were anxious to implement what they learned.

Julian, Landon and Preston experiment with modeling. Teacher Dave Bettinson, KE7LMH, used lesson material from NASA, ARRL and AMSAT in his classes during the school year.

Lexi's and Maddie's interest in technology resulted from Principal Burningham's dream. She and teacher Dave Bettinson intend to make Amateur Radio and technology not only a regular part of the sixth grade curriculum, but also an enrichment class with a ham station.

What's Up Next

Dave and Carla have discussed establishing a class as an extension/enrichment activity in the school. Dave wrote: "With Carla's background in Amateur Radio, and my relatively recent entry into Amateur Radio, we have the ability to set up a class with the support of the Utah Amateur Radio Club. We have begun to assemble some of the equipment necessary to set up a station at school. The experts who assisted us with equipment for the ARISS activities have expressed their willingness to assist. This was one of our desires from when our interest first began in ARISS."

Carla's sentiments are as follows: "The ARISS activities brought us a most exciting time and experience! During the contact people in the audience were crying tears of joy. This was the highlight of my 29 year career in education. It inspired many students. We appreciated ARRL's encouragement to Mel, his to us and to dozens of area hams."

Dave added: "We certainly appreciate your assistance and that of the entire ARISS organization. This has been a fantastic event that will reap rewards in science interest for years to come."

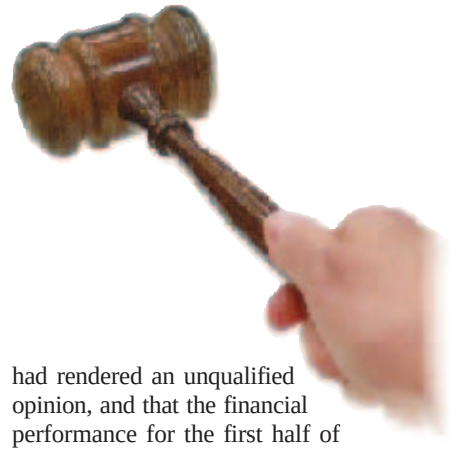
In July 2010 Dave participated in ARRL's TI-2 on "Space in the Classroom" where he received the equipment and the training to make Amateur Radio contacts with satellites from the classroom. More exciting learning opportunities will be coming for Midvalley students!

Photos by David Bettinson, KE7LMH.

Rosalie White, K1STO, an ARRL Life member, was Field and Educational Services Manager at ARRL headquarters for 24 years before leaving in 2005 for her native Indiana where she was first licensed in 1970 as WN9FJT. Currently, she is ARISS-International Secretary-Treasurer and one of two ARISS US Delegates. She consults for ARRL as its ARISS Program Manager and shepherds authors through electronic self-publishing at Author Solutions Inc, in Bloomington, Indiana. She enjoys contesting and can be reached at **rwhite@arrl.org**.

Organizational Issues Top Board's Agenda for 2010 Second Meeting

With a new President at the helm, the July meeting of the ARRL Board of Directors recognized an anniversary, made a contest change, conveyed some awards and even had a little fun.



S. Khrystyne Keane, K1SFA
ARRL News Editor

Kay Craigie, N3KN, led her first meeting of the ARRL Board of Directors as ARRL President for its 2010 Second Meeting, held July 16-17 in Windsor, Connecticut. Directors, Vice Directors and ARRL Board Officers, including three newly appointed Vice Directors — Rod Blocksome, KØDAS, of the Midwest Division, Kent Olson, KAØLDG, of the Dakota Division and Grant Hopper, KB7WSD, of the Northwestern Division — were in attendance. The Board also welcomed Rod Stafford, W6ROD, in his new capacity as IARU Secretary, and Radio Amateurs of Canada President Geoff Bawden, VE4BAW. Craigie, who was elected President in January 2010, replaced Joel Harrison, W5ZN, who retired after 27 years as an elected ARRL volunteer. At the meeting, the Board considered and acted on a number of organizational, regulatory and operating issues.

IARU Secretary Rod Stafford, W6ROD, represented the International Amateur Radio Union at the Board meeting. Stafford was appointed IARU Secretary in October 2009.

Organizational Issues

As 2010 marks the 75th year of the Amateur Radio Emergency Service® (ARES®), the Programs and Services Committee — at the urging of the ARRL Public Relations Committee — recommended to the Board that 2010 be officially designated as the 75th anniversary of ARES®. This motion passed without opposition and material supporting this milestone will be released shortly.

The Board adopted an amendment to the Bylaws to allow those candidates seeking election to Director and Vice Director positions to submit their petitions via fax or e-mail attachment, provided that upon request by the Secretary the original documents are received within seven days of the request. This provision is in effect for the current round of Director and Vice Director elections that will take place in November. The Board considered, but ultimately declined to adopt, a proposal from the Executive Committee to amend the procedures for appealing decisions of the Ethics and Elections Committee.

The Board directed that any publication printing contracts valued at or in excess of $20,000, or any other contracts or agreements valued at or excess of $10,000 be reviewed from a legal standpoint by the ARRL General Counsel.

The Board also agreed to support the admission of the Montenegrin Amateur Radio Pool (MARP) to IARU membership.

The Board formally accepted the financial statements, including the annual audit, for the year ending December 31, 2009. Chief Financial Officer Barry Shelley, N1VXY, reported that the independent accounting firm retained by the League had rendered an unqualified opinion, and that the financial performance for the first half of 2010 was on track with the budget plan, which calls for a positive change in net assets for the year. Treasurer Jim McCobb, K1LU, noted that the ARRL saw a good recovery to its portfolio, and that most of the losses from the recent stock market decline have been recouped.

President Craigie brings the meeting to order with a new gavel and a vintage bell. This bell has been used for many years at Board meetings.

Regulatory Issues

General Counsel Chris Imlay, W3KD, reported to the Board that the recently released *National Broadband Plan* by the FCC could be a concern to Amateur Radio operators, especially the amateur spectrum near 2.3 GHz. Saying that "nothing is sacred," Imlay said that even spectrum

Kay Craigie, N3KN, led her first Board meeting as ARRL President. She was elected President in January.

Summary of Board Actions

The *Minutes* of the 2010 Second Meeting of the Board are published on the ARRLWeb at **www.arrl.org/board-meetings**. Members without Internet access may request a written copy of the *Minutes* by writing: ARRL Secretary, 225 Main St, Newington, CT 06111.

Minute	*Purpose*	*Action*
Organizational		
21	Appeals of Election Committee Decisions *Would have amended procedures for appeals of decisions of the Ethics and Elections Committee under certain circumstances.*	Defeated
22	Electronic Submission of Candidate Materials *Candidates for Director and Vice Director may now submit via e-mail or fax those documents pertaining to their candidacy, as long as original documents can be supplied, if requested by the Secretary.*	Approved
23	Auditors' Statements *Formally accepted the financial statements, including the auditors' opinion letter, for the year ending December 31, 2009.*	Accepted
24	ARES® 75th Anniversary *Designated 2010 as the 75th anniversary of the Amateur Radio Emergency Service®.*	Approved
32	IARU Admission *Instructed Secretary to vote to admit the Montenegrin Amateur Radio Pool (MARP) to IARU membership.*	To Secretary
33	ARRL HQ Staff Recognition *The Board recognized and expressed its warmest appreciation to those ARRL HQ staffers and others who also serve as Volunteer Examiners (VEs).*	Approved
Operating		
25	Modification to Rule 1.12 of General Rules for ARRL Contests *Clarified the VHF rules to allow monochromatic sources (such as laser or LED) to count for contest credit, as long as the laser power is less than 5 mW.*	Approved
Award and Recognitions		
26	*2009 Hiram Percy Maxim Award* to Emily Bishop, WE4MB	Conveyed
27	*Joe Knight Distinguished Service Award* to James E. "Jim" Cross III	Conveyed
28	*2010 ARRL Technical Service Award* to Richard Knadle, K2RIW	Conveyed
29	*2010 Technical Innovation Award* to Sumner "Skip" Hansen, WB6YMH	Conveyed
30	*2010 Herb S. Brier Instructor of the Year Award* to Delvin Bunton, N7QMT, and Phillip Peterson, AC7NB	Conveyed
31	*2010 Philip J. McGan Memorial Silver Antenna Award* to Norm Lauterette, WA4HYJ	Conveyed
By mail vote	*2009 Doug DeMaw, W1FB, Technical Excellence Award* to Rudy Severns, N6LF	Conveyed

Summary prepared by S. Khrystyne Keane, K1SFA

ARRL President Kay Craigie, N3KN — flanked by First Vice President Rick Roderick, K5UR (left), and Secretary and Chief Executive Officer David Sumner, K1ZZ — prepares to open the 2010 Second Meeting of the ARRL Board of Directors.

Dakota Division Director Greg Widin, KØGW (second from right), prepares to make a motion. From left to right: International Affairs Vice President Jay Bellows, KØQB; RAC President Geoff Bawden, VE4BAW; Chief Technology Officer Brennan Price, N4QX; Atlantic Division Director Bill Edgar, N3LLR; Widin, and Delta Division Director Mickey Cox, K5MC.

From the left: Three Vice Directors — Tom Abernethy, W3TOM (Atlantic), Kermit Carlson, W9XA (Central), and Kent Olson, KAØLDG (Dakota) — intently follow happenings at the Board meeting. This was Olson's first Board meeting; he was appointed in January 2010 after then-Vice Director Greg Widin, KØGW, moved up to Director.

During the Friday morning portion of the Board meeting, ARRL Chief Executive Officer and Board Secretary David Sumner, K1ZZ, received a surprise plaque from the Amateur Radio Research and Development Corporation (AMRAD). Titled "BPL Spoils," the plaque featured a discarded Broadband over Powerline (BPL) modem that was rescued from surplus equipment belonging to a prominent manufacturer that had decided to exit the BPL business. ARRL Chief Technology Officer Brennan Price, N4QX, presented the plaque to Sumner in recognition of his and ARRL staff's tireless work against radio interference generated by BPL systems.

Photos by Steve Ford, WB8IMY

occupied by the Department of Defense is being challenged.

ARRL Legislative Consultant John Chwat of Chwat & Company reported that his office has received more than 2400 letters from amateurs supporting HR 2160 and S 1755. He noted that there are only a few more weeks left in the 111th Congress and that the ARRL must continue efforts its efforts to have the House consider these bills. He also reported on the progress of legislation concerning the tax deduction for personal vehicle mileage on behalf of charitable organizations and the ARRL's efforts to avoid impact on mobile operating in distracted-driving legislation.

Operating Issues

The Board amended Rule 1.12 of the General Rules for ARRL Contests above 50 MHz. Amateurs operating above 300 GHz can have QSOs that use monochromatic signal sources (such as laser or LED) *and* that employ at least one stage of electronic detection on receive, as long as the laser power is less than 5 mW contacts count for contest credit; laser usage is restricted to ANSI Z136 Class I, II, IIa and IIIa.

The complete minutes of the 2010 Second Meeting of the ARRL Board of Directors are available at **www.arrl.org/board-meetings**. Committee reports are also available online at **www.arrl.org/committee-reports**. The next meeting of the ARRL Board of Directors is scheduled for January 21-22, 2011.

S. Khrystyne Keane, K1SFA, is the ARRL News Editor and can be reached at **k1sfa@arrl.org**.

ARRL Board Names Award Recipients for 2009-2010

The ARRL Board of Directors named eight hams recipients of seven awards at its July 2010 meeting in Windsor, Connecticut: The 2009 Hiram Percy Maxim Award; the ARRL Joe Knight Distinguished Service Award; the 2009 Doug DeMaw, W1FB, Technical Excellence Award; the 2010 ARRL Technical Service Award; the 2010 ARRL Technical Innovation Award; the 2010 Herb S. Brier Instructor of the Year Award, and the 2010 Philip J. McGan Memorial Silver Antenna Award.

Hiram Percy Maxim Award

The recipient of the 2009 Hiram Percy Maxim Award is Emily Bishop, WE4MB, 15. She was first licensed at the age of 8; when she was 9, she passed her Morse code test and one year later, she passed the General and Extra license exams during the same sitting, and enjoys PSK31 and other sound card modes, as well as 6 and 2 meter SSB. In July 2006, Emily was appointed ARRL Tennessee Assistant Section Manager-Youth by then-Tennessee Section Manager Larry Marshall, WB4NCW. In January 2008, then-Delta Division Director Henry Leggette, WD4Q, appointed Emily as Assistant Director-Youth for the division, a position she still holds today.

COURTESY BISHOP FAMILY

Emily Bishop, WE4MB

As an auxiliary member of Tennessee ARMY MARS, she has helped to provide communication support during Hurricanes Katrina and Rita. Emily is sysop of the Tennessee Army MARS Winlink VHF Packet and HF PACTOR RMS station AAB4TN. A member and Director of the Young Ladies Radio League (YLRL), she also writes a youth-oriented column for their bi-monthly magazine. Emily is also a proud member of the ARRL and the Cleveland (Tennessee) Amateur Radio Club.

The Hiram Percy Maxim Memorial Award is given annually to a licensed radio amateur under the age of 21. The nominee must be a current ARRL member. The nominee's accomplishments and contributions to both the community of Amateur Radio and the local community should be of the most exemplary nature.

ARRL Joe Knight Distinguished Service Award

ARRL Maryland-DC Section Manager Jim Cross, WI3N, is the recipient of the ARRL Joe Knight Distinguished Service Award. He was first licensed as a Novice in 1963 when he was in 10th grade; a year later, he upgraded to General. Graduating in 1971 from the University of Maryland, Cross went on to serve on the Laurel City Council and the Maryland Municipal League Legislative Action Committee. Cross served

JIM CROSS, WI3N

Jim Cross, WI3N

as the president of the Laurel Amateur Radio Club and in 2000, was appointed as an Emergency Coordinator in the Maryland-DC Section, going on to serve as Assistant Section Manager and Section Emergency Coordinator; he is in his fifth year as Section Manager.

The Knight Distinguished Service Award is awarded to an ARRL Section Manager who has distinguished himself or herself in accordance with exceptionably notable contributions over an extended period of time within his or her Section and beyond, efforts that have contributed to the health and vitality of the ARRL and its Field Organization and actions that are in the spirit of the unselfish contributions of ARRL New Mexico Section Manager Joe T. Knight, W5PDY (SK).

Doug DeMaw, W1FB, Technical Excellence Award

The 2009 Doug DeMaw, W1FB, Technical Excellence Award was awarded to Rudy Severns, N6LF, former *QEX* Editor and a retired electrical engineer (UCLA '66). First licensed in 1954 as WN7WAG, he holds an Amateur Extra class license. Severns is Life Member of the ARRL and a Fellow of the IEEE. His current Amateur Radio interests are antennas — particularly HF vertical arrays and interactions between towers and arrays, as well as 600 meter operation as part of the WD2XSH experimental group. In earlier days, Severns served in the US Navy Reserve as a Radioman and in the US Army as a Radio Operator on a Special Forces A-team (10th Group). Some of his publications on antennas are posted at **www.antennasbyn6lf.com**.

RUDY SEVERNS, N6LF

Rudy Severns, N6LF

The Doug DeMaw, W1FB, Technical Excellence Award recognizes the author whose article in an ARRL periodical was judged by the ARRL Editorial Staff to have the highest degree of technical merit.

ARRL Technical Service Award

Dick Knadle, K2RIW, was named the recipient of the 2010 ARRL Technical Service Award. He has been the moderator of The Technical Net on 146.85 MHz, the LIMARC Repeater in New York City, for 20 years. Dick operates 2 meter and 432 MHz SSB. Knadle has had many articles published in *QST*, including: "A Strip-Line Kilowatt Amplifier for 432 MHz," a two-part article published in the April and May 1972; "A 12 Foot Stressed Parabolic Dish Antenna" in the August 1972 issue; "UHF Antenna Ratiometry" in February 1976, and "Houston, this is Apollo..." in June 1972. Presently, Knadle is developing a 10 GHz articulated periscope antenna system that uses beam wave guide as the low loss transmission line.

JAY PAUL WHITE, KA2UGZ

Dick Knadle, K2RIW

The Technical Service Award is given annually to a licensed radio amateur or to individuals who are licensed radio amateurs whose service to the amateur community and/or society at large is of the most exemplary nature within the framework of Amateur Radio technical activities.

ARRL Technical Innovation Award

The recipient of the 2010 ARRL Technical Innovation Award is Sumner "Skip" Hansen, WB6YMH, author of *theBridge* conference server software that allows EchoLink, IRLP and other Voice over Internet Protocol (VoIP) users to simultaneously connect multiple users around the world. Hansen's software development has dramatically changed Amateur Radio VoIP activities from simple two station connections into having the ability of connecting hundreds of stations together via EchoLink "conferences" and IRLP "reflectors." His software has increased Amateur Radio's emergency communications capabilities during disasters, such as Hurricane Katrina, the Space Shuttle *Columbia* disaster and many other events.

REBECCA DAVIS

Skip Hansen, WB6YMH

The ARRL Technical Innovation Award is granted annually to the licensed radio amateur or to individuals who are licensed radio amateurs whose accomplishments and contributions are of the most exemplary nature within the framework of technical research, development and application of new ideas and future systems in the context of Amateur Radio activities.

Herb S. Brier Instructor of the Year Award

Delvin Bunton, N7QMT, and Phillip Peterson, AC7NB, are the co-recipients of the Herb S. Brier Instructor of the Year Award. Together, these two ARRL Registered Instructors team-teach two or three Technician exam courses and one General exam course each year.

Bunton is very proactive in encouraging hams, new and old alike, to be actively involved in the EmComm mission of Amateur Radio. He actively pursues creative solutions to the complex geographical and varied organizational EmComm challenges in his local area.

Over many years, Peterson's personal passion for Amateur Radio has resulted in instructing a very large number of interested folks who successfully became hams. His wife Kolleen, KC7IWC, as well as his five children, are amateurs, and most of their spouses also have their licenses. The Peterson family uses their radios mostly when they are traveling as a family or in the woods while hiking and camping.

TODD KESTNER, WE7WEI

Delvin Bunton, N7QMT

PHIL PETERSON, AC7NB

Phil Peterson, AC7NB

Herb S. Brier, W9AD, long-time *CQ* Novice Editor, represented the spirit of effective, caring Amateur Radio instruction. The ARRL sponsors this award, in conjunction with the Lake County Indiana Amateur Radio Club, in his memory to recognize the very best in Amateur Radio instruction and recruitment.

Philip J. McGan Memorial Silver Antenna Award

Norm Lauterette, WA4HYJ, first became licensed in 1975 and Amateur Radio became his traveling companion as he traveled across the Mid-Atlantic and Southeastern United States for work. He became interested in public relations while on the road, becoming hooked on Amateur Radio public relations after joining his local radio club — Lake Monroe Amateur Radio Society (LMARS) — and ARES®. Lauterette credits ARRL Northern Florida Section Public Information Coordinator Mike Welch, W1MNW, as his "PR Elmer," who helped him become PIO for LMARS and the ARRL. The two became a team, working with the media and local government to find various ways to promote Amateur Radio. Using the Mac *iMovie* program, Lauterette produced two 45 minute narrated historical documentaries — one on LMARS and another on QCWA, Chapter #45 — that were burned to DVD. Close to nine months of research, interviews and scanning went into each. His current focus is on a special project developed by LMARS President Andy Gausz, KG4QCD, called *Neighborhood HamWatch*. Lauterette wrote an introductory piece about this program that appeared in the Public Service section of the June 2010 issue of *QST*. LMARS is currently implementing this program locally and in the Northern FL section, with an eye to going national with it.

NORM LAUTERETTE, WA4HYJ

Norm Lauterette, WA4HYJ

The award's namesake, journalist Philip J. McGan, WA2MBQ (SK), served as the first chairman of the ARRL's Public Relations Committee, helping to reinvigorate the League's commitment to public relations. The ARRL, along with the New Hampshire Amateur Radio Association, offer this award to that ham who has demonstrated success in Amateur Radio public relations and best exemplifies the volunteer spirit of Phil McGan. QST

HAPPENINGS

Midwest City (OK) Agrees with ARRL: RFI Ordinance Does Not Apply to Hams

Acting on behalf of an ARRL member in Midwest City, Oklahoma — who had been sent a notice by the city asserting that he was in violation of a city ordinance regarding radio frequency interference (RFI) — the ARRL notified Midwest City officials in late July that only the FCC is empowered to regulate such matters. Two weeks after ARRL General Counsel Chris Imlay, W3KD, sent the letter to city officials, Midwest City Assistant City Attorney Randal D. Homburg sent an e-mail to the ham to let him know "the previously delivered notice is hereby rescinded. There will be no citations issued and thus, the issue is moot." Midwest City is in the Oklahoma City metropolitan area.

Calling the ordinance "null and void," Imlay's letter said the notice stated the ham "was in violation of the ordinance as the result of radio frequency interference appearing in a neighbor/complainant's home electronic equipment. The licensed radio amateur was ordered to remedy the problem in one day, under penalty of a sanction assessed against the real property of the radio amateur." Imlay pointed out that Midwest City "in fact has absolutely no jurisdiction whatsoever over radio frequency interference. Such regulation is exclusively within the jurisdiction of the Federal Communications Commission and *all regulation of radio transmission and interference phenomena is preempted by Federal law*."

The ordinance in question — Midwest City Ordinance 27-3(9) — reads: "In addition to other public nuisances declared by other sections of this Code or law, the following [is] hereby declared to be [a] public nuisance: Operating or using any electrical apparatus or machine which materially and unduly interferes with radio or television reception by others." Section 27-2 of the nuisance ordinance states the penalty for non-compliance: "It shall be unlawful for any person to create or maintain a public nuisance within the or [sic] to permit a public nuisance to remain on premises under his control within the city" and that "the punishment for a violation of this chapter shall be a minimum of one hundred dollars ($100.00) or fifteen (15) days imprisonment or both such fine and imprisonment and shall not exceed two hundred dollars ($200.00) or thirty (30) days imprisonment or both such fine and imprisonment. Each day a violation shall continue shall constitute a separate offense."

Imlay explained to Midwest City officials that all radio stations operate, and all telecommunications are regulated pursuant to the *Communications Act of 1934, As Amended*. The FCC has exclusive jurisdiction over RFI matters and all technical matters associated with radio communications. Imlay presented almost 20 legal cases defining the Commission's role and its sole authority over these matters.

The Communications Amendments Act of 1982 clearly demonstrated that Congress intended to completely preempt the regulation of RFI: "The Conference Substitute is further intended to clarify the reservation over matters involving RFI. Such matters will not be regulated by local or state law, nor shall radio transmitting apparatus be subject to local or state regulation as part of any effort to resolve an RFI complaint. The Conferees believe that radio transmitter operators should not be subject to fines, forfeitures, or other liability imposed by any local or state authority as a result of interference appearing in home electronic equipment or systems. Rather, the Conferees intend that regulation of RFI phenomena shall be imposed only by the [Federal Communications] Commission." The Conference also clarified that "the exclusive jurisdiction over RFI incidents (including preemption of state and local regulation of such phenomena) lies with the FCC."

Homburg's letter read: "As previously indicated, it is the city's position that the ordinance cited in the notice, MCO 27-3(a)(9), does not apply to RF transmission devices licensed by the FCC as to their operation and use pursuant to the license. In the event there are future complaints from any citizen about a neighbor's use of these licensed devices, the city will direct the complaining party to file their complaints with the FCC."

Homburg went on to claim that there is no issue with the language of the ordinance: "This council adopted the ordinance over eleven years ago, pursuant to the procedures for adopting such ordinances, provided for under the city's charter. Your issue with the ordinance has been with the application of the cited section to the use of your licensed transmitting device. That is no longer an issue. This e-mail is the official position of the city. There should be no need for further inquiry from any other city official."

K2BSA TAKES TO THE AIR DURING BSA'S NATIONAL JAMBOREE

The 2010 National Scout Jamboree — celebrating the 100th anniversary of the Boy Scouts of America — was held July 26-August 4 at Fort AP Hill in Virginia. According to ARRL Rocky Mountain Division Director and K2BSA Station Coordinator/Manager Brian Mileshosky, N5ZGT, ham radio was a big part of the event that attracted more than 43,000 participants from across the nation and around the world.

K2BSA has been a fixture at the BSA National Jamboree since the 1970s. This year, it had three elements: a demonstration station, licensing classes and VE exams, and radio merit badge instruction. The station was on the air on both VHF and HF — 70 cm, 2, 6, 10, 15, 20, 40 and 80 meters — utilizing at least 10 transceivers and as many monoband Yagis or dipoles atop 60 foot tall telephone poles, to make contacts using phone, CW, PSK31, meteor scatter, IRLP, D-STAR, APRS and satellite. "K2BSA made thou-

SAM GRAY, KG4WRM

K2BSA staff prepare for a satellite QSO.

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

SAM GRAY, KG4WRM

Almost 50 men and women helped construct K2BSA and put it on the air during the BSA National Jamboree, held July 26-August 4 at Fort AP Hill in Virginia.

SAM GRAY, KG4WRM

Fort AP Hill Commander Lt Col John Haefner, KJ4WRN, got his ticket at the National Jamboree. Lt Col Haefner took both his Technician and General exam at the same sitting.

sands of QSOs," Mileshosky said. "We put a dual-band repeater on the air for a nightly net for Jamboree participants who brought their handheld transceivers to the Jamboree."

Mileshosky said that nearly 6000 youth scouts — 13 percent of the total Jamboree attendance — received thorough exposure to ham radio, touring the K2BSA station and getting on the airwaves. Six lucky scouts conducted a memorable contact with astronaut Doug Wheelock, KF5BOC, aboard the International Space Station (ISS) before a crowd of Jamboree participants.

"We held Technician license classes and two VE exam sessions daily, resulting in 147 new Technicians, 33 Generals and 8 Amateur Extras," Mileshosky said. "210 scouts earned their Radio merit badges, too."

Calling K2BSA's operation at the 2010 National Scout Jamboree "a resounding success," Mileshosky thanked everyone who worked K2BSA while it was on the air, with special thanks to all scouts and Scouters who attended the Jamboree. "All eyes are on 2013 when the next National Jamboree will be held at its new permanent location: the Summit Bechtel Family National Scouting Reserve, located adjacent to the New River Gorge National River Park in West Virginia," he said. "We look forward to K2BSA to once again carry on its tradition of introducing thousands of youth to the extraordinary hobby and service of Amateur Radio."

ARRL ASKS FCC TO DENY APPLICATIONS TO USE RECON SCOUT

On August 4, 2010, the ARRL filed a *Petition to Deny Applications* with the FCC to deny 68 pending Public Safety Pool license applications associated with the Recon Robotics Video and Audio Surveillance System. Each license application is accompanied by a waiver request to permit operation of the devices in the 433-445 MHz band. The applications were coordinated by APCO International Inc Licensing Services — the frequency coordinator for the public safety land mobile radio services — and would allow the use of the Recon Scout product currently being marketed by ReconRobotics pursuant to an FCC waiver.

"While several issues factor into the ARRL's *Petition to Deny* these applications, most notable is that the Commission has not acted on the ARRL's *Petition for Reconsideration* in WP Docket 08-63, which has been pending since March of this year," said ARRL Regulatory Information Manager Dan Henderson, N1ND. "That petition raises issues that should be addressed prior to any action on the individual applications. Granting applications based on the Docket 08-63 waiver, which is not final, would be premature. There is the potential for significant interference from these devices to licensed operations in the amateur 70 cm band. We urge the FCC to take thoughtful and expedient action on our *Petition for Reconsideration*."

The *Petition to Deny* also noted incorrect technical parameters and frequency ranges in each filed application, stemming from errors in the grant of equipment authorization for the ReconRobotics device, as well as inconsistencies between the applications and the FCC waiver grant for the device in Docket 08-63.

JOHN ROBERT STRATTON, N5AUS, APPOINTED WEST GULF DIVISION VICE DIRECTOR

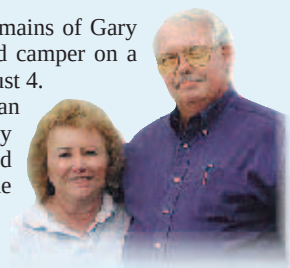
In July, after review of eligibility by the ARRL Ethics and Elections Committee, President Kay Craigie, N3KN, appointed John Robert Stratton, N5AUS, of Austin, Texas, to serve as Vice Director of the ARRL West Gulf Division for the remainder of the current term that expires January 1, 2011. Stratton, an attorney, fills the vacancy created when John Thomason, WB5SYT, resigned the position in July.

QUICKSTATS DEBUTS ON WEB AND *QST*

Member polls have returned to the ARRL Web, but with a twist. Rather than a single weekly poll, the new QuickStats page at **www.arrl.org/quickstats** offers several polls at once with new questions every 30 days. The results will be published in *QST* beginning with this issue (see page 130). Be sure to bookmark the QuickStats page in your browser! Watch for poll results in the special *QST* QuickStats page in the rear advertising section of the magazine. Along with monthly poll results, *QST* QuickStats offers colorful charts and graphs that highlight interesting Amateur Radio statistics.

In Brief

- **Amateur and Wife Believed Murdered**: The skeletal remains of Gary Haas, N5VGH, and his wife Linda were found in a charred camper on a remote ranch in eastern New Mexico on the morning of August 4. Authorities believe they were killed by convicts, along with an accomplice, who had escaped from an Arizona prison on July 30. Authorities said that the Haas' bodies and camper were found by a rancher on his property, not far from Santa Rosa, one of the New Mexico cities that the couple frequented; their truck was found in Albuquerque, 100 miles away.



COURTESY OF HAAS FAMILY

- **ARRL on Facebook**: With more than 11,000 fans on Facebook — and still counting! — the ARRL page is the number one spot for hams on the Internet's most popular social networking site. Not only is the ARRL page the most popular Amateur Radio page on Facebook, it is attracting young — and not-so-young — hams to share their opinions and ham radio-related news with other hams. According to Facebook demographics, more than 100 people between the ages of 13-17 are fans of the ARRL's page, with 80 percent below the age of 55. The ARRL page also averages about 400 users each week. Users are those who post their own comments, comment on others' posts or "like" a comment. Along with this, the ARRL Facebook page generates more than 3000 page views each week, with the majority of stories generating more than 80,000 "click-thrus." Find the ARRL Facebook page at **www.facebook.ARRL.org**.

ASTEROID *(31531) ARRL* NAMED IN HONOR OF LEAGUE

John, Paul, George and Ringo are on the list. Mozart, Bach, Beethoven and Brahms — even Frank Zappa and Elvis (but not Madonna). Of course Asimov and Sagan made the cut, Mr Spock, too, but not Captain Kirk. And now ARRL — more precisely, (31531) ARRL — joins this prestigious company as one of more than 16,000 named minor planets in our solar system. A minor planet — such as an asteroid — is an astronomical object in direct orbit around the Sun that is neither a dominant planet — such as Mercury, Saturn and Neptune — nor a comet. The first minor planet — named Ceres — was discovered in 1801. Since then, more than 200,000 minor planets have been discovered, most of them lying in the asteroid belt. But as of July 27, 2010, only 16,005 had been named.

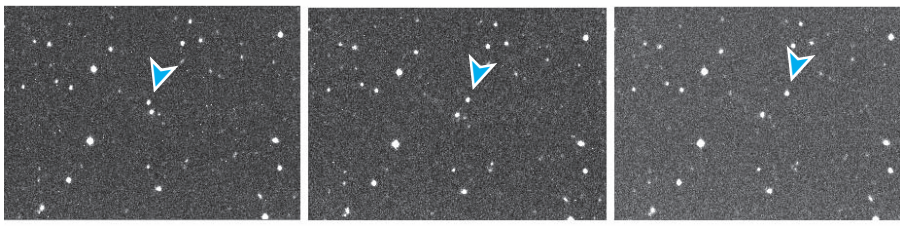
Approximately 2.5-4 miles (3-7 km) long, (31531) ARRL orbits the Sun at a distance of 2.7 Astronomical Units (AU) (1 AU is the distance from the Earth to the Sun, about 93 million miles, or almost 150 million km). It is currently located near the boundary of the constellations Scorpio and Libra and is about 2.1 AU distant from the Earth. It takes (31531) ARRL almost five years to orbit the Sun.

At a magnitude of brightness of 19.5, (31531) ARRL is extremely faint. This is almost 15 magnitudes fainter than the human eye can see from most cities and towns; 5 magnitudes is a factor of 100 in brightness, so this object (at its time of discovery) was about 100 × 100 × 100, or 1 million times fainter than the naked eye can see. The asteroid remains about 19th magnitude most of the time and does not brighten considerably, so (31531) ARRL will never be seen with the naked eye (unless via spacecraft). Even though it is faint, it is probably within the range of a moderate to large amateur telescope equipped with a CCD

Joe Montani, W7DXW — an ARRL member and a senior research specialist with the Spacewatch Near-Earth Asteroid Project Lunar and Planetary Lab at the University of Arizona — told the ARRL that the Spacewatch program had discovered (31531) ARRL in its work of discovering and observing Near-Earth Asteroids. He said he had received confirmation that the asteroid had been officially named as of July 27; it can take 10 years or more for the smaller objects — such as asteroids, dwarf planets and comets — to receive names. (31531) ARRL was discovered in 1999.

"The naming was proposed to the International Astronomical Union's Committee on Small Bodies Nomenclature (CSBN), and was accepted by the CSBN and published to the world on July 27, 2010 at about 1900 UTC," Montani said. "The full name of the object is (31531) ARRL. The number in parenthesis is the so-called 'permanent number' that an asteroid receives after its orbit is sufficiently accurately determined so that it can never become 'lost.' 'ARRL, is, of course, the American Radio Relay League."

Prior to the object receiving its permanent number, Montani said that (31531) ARRL was known by its permanent designation of 1999 CQ137. "I selected this object for naming from among the many thousands discovered by Spacewatch," he told the ARRL. "It seemed fitting to me that 'CQ' should be in the designation. In addition, the number 137 is also significant to physicists and engineers and perhaps to radio amateurs: It is the reciprocal of the 'fine-structure constant' that depends on the square of the charge on the electron, the speed of light, Planck's constant and the permittivity of free space. This object seemed to have it all for us!"



These three images were made on February 9, 1999 with the Spacewatch .9 meter telescope on Kitt Peak (about 45 miles southwest of Tucson, at 6850 feet altitude). This main-belt asteroid was discovered by software and confirmed in the images by the observer on duty on that date, Jeffrey Larsen, PhD. The asteroid is moving across the field of stars near the center, from lower left to upper right. The images were taken every 30 minutes in order to see how fast and in what direction the asteroid was moving. Time proceeds from left to right. [Observations of Minor Planet (31531) ARRL by Prof Jeffrey A. Larsen for the Spacewatch Project of the Lunar and Planetary Laboratory, University of Arizona, funded in 1999 by the National Aeronautics and Space Administration, the US Air Force Office of Scientific Research, the Steven and Michele Kirsch Foundation and the David and Lucile Packard Foundation. © 1999 by the Arizona Board of Regents. Used by permission.]

SECTION MANAGER NOMINATION NOTICE

To all ARRL members in the Arizona, Arkansas, Iowa, Kentucky, Mississippi, Montana, North Texas, Orange and Wyoming sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 16 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms FSD-129 are available on request from ARRL Headquarters but are not required. A sample nomination form is available on the ARRL Web site at **www.arrl.org/section-terms-nomination-information**.

We suggest the following format:

(Place and Date)

Membership and Volunteer Programs
Manager, ARRL
225 Main St
Newington, CT 06111

We, the undersigned full members of the _____ ARRL Section of the _____ Division, hereby nominate _____ as candidate for Section Manager of this section for the next two-year term of office.

(Signature___ Call Sign____ City___ ZIP__)

Any candidate for the office of Section Manager must be a resident of the Section, an Amateur Radio licensee of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a nominating petition. Petitions must be received at Headquarters by 4 PM Eastern Time on December 10, 2010. If more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before January 3, 2011, to full members of record as of December 10, 2010, which is the closing date for nominations. Returns will be counted February 22, 2011. Section Managers elected as a result of the above procedure will take office April 1, 2011.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 2011. If no petitions are received from a section by the specified closing date, such section will be resolicited in the April 2011 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Membership and Volunteer Programs Manager. — *David Patton, NN1N, Membership and Volunteer Programs Manager*

Amateur Radio Supports Oklahoma City Memorial Marathon

Thomas Webb, WA9AFM/5
tmwebb@cox.net

We come here to remember those who were killed, those who survived and those changed forever. May all who leave here know the impact of violence. May this memorial offer comfort, strength, peace, hope and serenity. — Mission statement of the Oklahoma City National Memorial (**www.oklahomacitynationalmemorial.org)**, used by permission.

Over 75 Amateur Radio operators volunteered their services to the Tenth Annual Oklahoma City Memorial Marathon on Sunday, April 25, 2010. The Oklahoma City Memorial Marathon was founded in 2000 to honor "those who were killed, those who survived and those who were changed forever" by the Murrah Federal building bombing on April 19, 1995. Amateur Radio support has been an integral part of the Marathon since it began in April, 2000. The Marathon is a living memorial to the 168 lives lost on that day and it has gained the title "A Run To Remember."

MARK WATKINS, NM5W

Myrna Cobb, KE5IAD, and Dan Burchett, KD5JPR, give their handheld transceivers a quick check out before assuming their duties at the final relay exchange point located at Mile Marker 20.

The run is a 26.2 mile course winding its way from downtown, through the Bricktown entertainment area, past the Oklahoma State Capitol, through several of Oklahoma City's residential neighborhoods to Lake Hefner and back to downtown Oklahoma City. Clear and accurate communication among the various public safety agencies, medical staff and event officials is vital.

Thus, the Amateur Radio community's primary mission for the Marathon is public safety and welfare communications to make sure the runners, volunteers and spectators have a safe and enjoyable day.

A Marathon to Remember

The first Marathon in 2000 had 5000 runners. For the 2010 Marathon, just short of 23,000 runners crossed the starting line in the clear, cool Oklahoma morning. The Oklahoma City Memorial Marathon has grown in stature in the running community. *Runner's Magazine* has listed it as one of the "twelve must-run" marathons. Many significant members of the

FRANK TASSONE, KE5KQL

Snatch and Grab vehicles were dispatched to pick up runners who had withdrawn from the Marathon. "SAG Control" was staffed by Brian Teters, AE5MT (foreground), Andrew Wolfe, KE5YBC (center) and Richard Sharp, KE5NCR (background). The event timing contract personnel were collocated with SAG Control.

MIKE CURTIS, KE5BIX

In the Oklahoma City Regional Emergency Operations Center, Oklahoma City Fire Department (OCFD) Battalion Chief Brian Stanaland (left) monitored the status of fire calls. Major Chuck Foley, OCPD (center) dispatched all OCPD resources assigned to the Marathon. Lucien Jones, KD5LPV (right) coordinated planning and public safety communications operations in the REOC.

running community participate in the Memorial Marathon including Olympians, winners of the New York and Boston marathons, and thousands of running enthusiasts and folks who simply want to be there the morning of race day.

The Memorial Marathon has special meaning to the Oklahoma Amateur Radio community. Within minutes after the explosion at the Murrah Federal Building, the Oklahoma County Amateur Radio Emergency Service (ARES®) net was up and running, providing emergency communication support to rescue and support units. The net operated on a 24-hour-a-day basis for over 2 weeks, more than 360 hours of continuous operation.

Until Hurricane Floyd struck in 1999, the emergency net supporting the Murrah disaster was the longest running Amateur Radio emergency net in US history. Over 330 Amateur Radio operators from Oklahoma, Texas, Kansas and Arkansas volunteered their services.

APRS is Essential

To enhance the command and control capability, over a dozen units in the field are equipped with APRS. This provides police, fire and emergency medical services with a display of where the runners are along the course, through the position of the lead vehicles, for the Full and Half Marathons. It also displays the locations of "Snatch and Grab" (SAG) vehicles and "sweep" vehicles patrolling the Marathon course. In the event emergency equipment is dispatched and would cross the Marathon route, appropriate locations and traffic control agencies could be advised.

The communications function operates under a comprehensive communications plan, which is constantly updated based on experiences from previous Marathons (contact the author for an e-mail copy).

The communications plan includes three levels of communications: a public service net handling support for general communications and medical support; the SAG net, which dispatched vehicles on the racecourse to pick up runners who had withdrawn from the race, and spotters at the four relay exchange points announcing the approach of individual relay runners.

The plan calls for the use of tactical call signs keeping the Incident Command System standard; that is, the tactical call sign is descriptive of the unit's location. For example, medical stations are identified by their street location (main and cross, if any). This expedites the dispatch of SAG mobile medical units.

Operator Assignments

Radio operators were assigned to support a variety of posts. Hams provided communications for the primary medical aid station at the finish line, race officials, relay exchange points, course support vehicles and with medical units along the course. The net control station for the Marathon Public Safety Network operates from the Salvation Army Emergency Operations Center in southeast Oklahoma City. The SAG vehicles, essentially taxis to pick up runners who have withdrawn from the Marathon, are dispatched by "SAG Control" located at Firefighters Union Hall located in downtown Oklahoma City. SAG Control is collocated with event timing contractor. This allows both activities to coordinate the recording of runners withdrawing and, when requested by race officials, locating runners on the course.

Radio operators are also assigned to the Oklahoma City Regional Emergency Operations Center (REOC) located in north Oklahoma City to coordinate between the public service net and the various police, fire and ambulance services. The REOC also manages the "emergency conference bridge," which provides a discrete communications link between race officials and police, fire and medical agencies.

"These volunteers play a vital role in assuring the safety of all participants in the marathon and relays…"

Amateur Radio operators are stationed along the Marathon route to report the progress of runners and alert medical units in the event a runner, spectator or volunteer requires attention. Operators at the four relay exchange points alert members of the relay teams of approaching teammates and report the progress of each segment of the race. These volunteers play a vital role in assuring the safety of all participants in the marathon and relays, as well as a smooth flow of foot traffic and vehicular traffic on and near the course.

"The radio operators are another great story of the success of the Marathon," said Chet Collier, Director and Co-Founder of the Oklahoma City Memorial Marathon. "These individuals love what they do and they love Oklahoma City," he continued. "We literally could not run a successful event without their work."

One of the many assignments for the Marathon was "shadow" for various race officials to keep them "in the loop" on the status of the Marathon. "I've been Chet Collier's 'shadow' for several years," Webb said. "He's very 'hands on' with the Marathon and keeping up with him is a real challenge. However, it is a critical assignment as he needs to be aware of all aspects of the Marathon from 'starting gun' to the last runner across the line."

Almost a fourth of the radio operators volunteering in 2010 provided communications support in all 10 Marathons. As with the volunteers in all areas of the Marathon, many "claim" an assignment as their own as an expression of dedication to the event and return to the same duty location year after year.

Webb noted the radio operators begin meeting, preparing equipment and planning over 4 months prior to the Marathon to be ready for the next "Run To Remember."

NOMINATIONS OPEN FOR GEORGE HART DISTINGUISHED SERVICE AWARD

The George Hart Distinguished Service Award may be presented by the Board of Directors to the ARRL member whose service to the ARRL Field Organization is of the most exemplary nature. The Distinguished Service Award is named in honor of George Hart, W1NJM, long-time Communications Manager at ARRL Headquarters and chief developer of the National Traffic System.

Selection criteria include:

- Operating record with the National Traffic System; or participation within the Amateur Radio Emergency Service; or
- Station appointments and/or leadership positions held within the Field Organization.

Nominating Procedure:

- Nominations shall be accepted from anyone.
- Nominations shall be submitted to the Membership and Volunteer Programs Manager at ARRL Headquarters by November 1.
- Nominations should document as thoroughly as possible the nominee's lifetime activities and achievements within the Field Organization. It is expected that nominated candidates will have 15 or more years of distinguished service.

The Programs and Services Committee will serve as the Review Committee. The Board of Directors shall make the final determination at its Annual Meeting in January.

The award shall consist of an engraved plaque, a cover letter and coverage in *QST*.

Nominations for the 2011 George Hart Distinguished Service Award and any related supporting material and letters of recommendation may be sent to ARRL Headquarters to the attention of Dave Patton, NN1N, ARRL Membership and Volunteer Programs Manager (**nn1n@arrl.org**) or to Steve Ewald, WV1X (**wv1x@arrl.org**). The nomination period continues until November 1, 2010.

This Month in Contesting

Sean Kutzko, KX9X
ARRL Contest Branch Manager, kx9x@arrl.org

POTPOURRI: NEW CATEGORIES, AND A QTH QUESTION

Things have been rumbling here at ARRL HQ the past month. The ARRL Programs and Services Committee, the committee that votes on rules changes in ARRL contests (among other things), met on July 15 and voted on several proposals. These affect both HF and VHF operators.

New Categories for Some ARRL HF Contests

For HF operators, there have been numerous requests for new operating categories based on power. After recommendations from the Contest Advisory Committee, the Programs and Services Committee voted to approve the splitting of the Single Operator Assisted category into High Power and Low Power. This will apply to the November Sweepstakes and International DX Contests.

The P&SC also approved splitting the Multioperator, Single Transmitter category to High Power and Low Power. This applies to the ARRL International DX Contests, the November Sweepstakes, The ARRL 160 Meter and the 10 Meter Contests.

These changes will take effect on January 1, 2011. The first contest that will have the new categories will be the 2011 ARRL DX Contests.

Lasers in VHF Contests

VHF+ contesters that operate on the uppermost edge of the spectrum have long asked for a clarification on the use of lasers in contests. The P&SC, at the recommendation of the VHF/UHF Advisory Committee, reworded the rule concerning QSOs made above 300 GHz for contest credit between licensed amateurs. The new rule reads:

Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using monochromatic signal sources (for example, laser and LED) and employing at least one stage of electronic detection on receive. Laser usage is restricted to ANSI Z136 Class I, II, IIa, and IIIa (that is, output power is less than 5 mW).

This should open the door to a little more experimentation in that portion of the spectrum during VHF+ contests. Remember, those QSOs are worth 8 points each and the extra multiplier or two really adds to your score in the long run.

Mailbag: A Question of QTHs

Every few months, I like to dip into the mailbag and answer a question. This subjecy has shown up in my Inbox a few times this year:

"I'm a new ham and don't do much contesting. I noticed the Sweepstakes is coming up in November and want to participate. I live in Ohio, but I will be visiting my in-laws in New Hampshire that weekend. Do I give my location as Ohio (where my license was issued) or New Hampshire, where I will be operating?"

If you're in a contest that requires geographic information as part of the exchange, you always give the location of where your station is physically located. In the November Sweepstakes example above, the contest exchange includes your ARRL Section. Our newly licensed ham would give New Hampshire as his location, because that is from where he is operating the contest. This applies to contests that use states or provinces, CQ zones, grid squares or any other geographic entity. Always base your sent exchange on where your station is located.

October's poplars are flaming torches lighting the way to winter. ~ Nova Bair

With the world's largest Amateur Radio contest — CQ World Wide DX Phone — occurring the last weekend of October, the 2010-2011 contest season begins! There will be numerous major competitions taking place in rapid-fire succession from the end of October until the end of March. If you haven't made any adjustments or modifications to your station to improve your performance during the upcoming season, now is the time! Many a ham can tell you from first-hand experience that climbing a tower or getting on your roof to upgrade an antenna or replace a bad feed line in the middle of winter isn't anybody's idea of a good time. If you have jobs that need to be done, make the time to do them. You will be rewarded with fewer technical problems during the contest itself. What's that old saying about an ounce of prevention?

Good luck to everybody this season.

Sean's Picks

- **State QSO Parties this month:** Arizona, California, Illinois, Iowa, New York, Pennsylvania.
- **Oceania DX Contest (Phone = October 2-3, CW = October 9-10):** Everybody works everybody in this event, designed to focus attention on all countries within the continent of Oceania. Exchange is a signal report and sequential serial number.
- **ARRL International EME Competition, 50-1296 MHz (Round 1 = October 2-3, Round 2 = October 30-31):** Once viewed as the nearly impossible communications path, "moonbounce" is now relatively easy, thanks to the *WSJT* software by K1JT; visit **www.vhfdx.net/jt65bintro.html** to learn more and work this contest.
- **North American RTTY Sprint (October 10):** 4 hours of RTTY frenzy! Exchange is both calls, your name, sequential serial number and your state or province. Don't forget about the mandatory QSY rule, too!
- **QRP ARCI Fall QSO Party (October 16-17):** One of the finest QRP events on the calendar. Exchange is a signal report, state or province, and either your QRP ARCI member number or your power. Turn down the power on your rig and you'll be surprised by what you can work with 5 watts.
- **W/VE Islands QSO Party (October 23-24):** A contest to promote activating islands within the US and Canada. Portable operation from qualified islands is strongly encouraged! Visit **www.usislands.org** for information on the program and the contest.
- **CQ World Wide DX Contest, Phone (October 30-31):** The biggest Amateur Radio contest on the planet. Tens of thousands of stations will be on the air from all corners of the globe to participate in this amazing event. This is definitely not one to miss!

OCTOBER 2010 W1AW QUALIFYING RUNS

W1AW Qualifying Runs are 10 PM EDT Monday, October 4 (0200Z October 5) and 4 PM (2000Z) Wednesday, October 20. The West Coast Qualifying Run will be transmitted by station K9JM on 3590 and 7047.5 kHz at 9 PM PDT Wednesday, October 13 (0400Z October 14) (40-10 WPM). Unless indicated otherwise, speeds are from 10-35 WPM.

CONTEST CORRAL

in association with the *National Contest Journal*

OCTOBER 2010

Start and Finish	HF	VHF+	Contest Title	Phone	CW	Digital	Exchange	Sponsor's Web Site or Contact
Oct 2, 0000Z - Oct 2, 2400Z	1.8-28	50	PSK Rumble - The Fall Classic			✘	Name and call area (see Web site)	www.n2ty.org
Oct 2, 0400Z - Oct 3, 0359Z	1.8-28		EPC Russia DX Contest			✘	EPC member nr or serial and grid square	www.epc-ru.ru
Oct 2, 0800Z - Oct 3, 0800Z	1.8-28		Oceania DX Phone Contest	✘			RS and serial	www.oceaniadxcontest.com
Oct 2, 1600Z - Oct 2, 1959Z	3.5-14		EU Autumn Sprint	✘			Both call signs, serial, name	www.eusprint.com
Oct 2, 1600Z - Oct 3, 2200Z	1.8-28	50,144	California QSO Party	✘	✘		Serial and state/prov/"DX" or CA county	www.cqp.org
Oct 3, 0700Z - Oct 3, 1900Z	21,28		RSGB 21/28 MHz Contest	✘	✘		Serial and UK district	www.rsgbcc.org/hf/rules/2009/r2128.shtml
Oct 5, 0200Z - Oct 5, 0400Z	3.5-28		ARS Spartan Sprint		✘		RST, S/P/C, and power	www.arsqrp.blogspot.com
Oct 6, 7 PM - Oct 6, 11 PM		432	Fall VHF Sprints	✘	✘	✘	6-char grid locator	www.svhfs.org
Oct 8, 0230Z - Oct 8, 0300Z	1.8-14		NS Weekly Sprint		✘		Serial, name, and S/P/C	www.ncccsprint.com/rules.html
Oct 8, 1400Z - Oct 10, 0200Z	1.8-28		DX/NA YLRL Anniversary Party		✘		Serial, RST, and section/province/country	www.ylrl.org
Oct 9, 0000Z - Oct 10, 2359Z		**50-1296**	**ARRL EME Contest – 1st Weekend**	✘	✘	✘	**Both call signs, signal report**	www.arrl.org/contests
Oct 9, 0000Z - Oct 10, 1600Z	3.5-28		Makrothen RTTY Contest			✘	4-char grid square	home.arcor.de/waldemar.kebsch
Oct 9, 0800Z - Oct 10, 0800Z	1.8-28		Oceania DX CW Contest		✘		RST and serial	www.oceaniadxcontest.com
Oct 9, 1200Z - Oct 10, 1200Z	3.5-28		Scandinavian Activity Contest	✘			RS and serial	www.sk3bg.se/contest/sacnsc.htm
Oct 9, 1200Z - Oct 10, 1200Z	14-28		Worked All Britain HF Contest	✘			RS, serial, DXCC entity or WAB area	www.worked-all-britain.co.uk
Oct 9, 1600Z - Oct 9, 2000Z	3.5-14		EU Autumn Sprint		✘		Both call signs, serial, name	www.eusprint.com
Oct 9, 1600Z - Oct 11 2200Z	1.8-28	50,144	Pennsylvania QSO Party	✘	✘	✘	Serial and ARRL/RAC section	www.nittany-arc.net/paqso.html
Oct 9, 1600Z - Oct 10 2359Z	3.5-28	50,144	Arizona QSO Party	✘	✘	✘	RS(T) and AZ county or S/P/C	www.azqsoparty.org
Oct 9, 1700Z - Oct 9, 2100Z	3.5-28		FISTS Fall Sprint		✘		RST, S/P/C, name, FISTS number or pwr	www.fists.org
Oct 10, 0000Z - Oct 10, 2359Z	1.8-28	50	Straight Key Weekend Sprint		✘		RST, QTH, name, member number	www.skccgroup.com/sprint/wes
Oct 10, 0000Z - Oct 10, 0400Z	**3.5-14**		**North American RTTY Sprint**			✘	**Both call signs, serial, QTH, name**	www.ncjweb.com
Oct 10, 0001Z - Oct 10, 2359Z	28		10-10 Sprint	✘	✘	✘	Call, name, 10-10 number, S/P/C	www.ten-ten.org
Oct 13, 1100Z - Oct 14, 0400Z	3.5-14		CWops Mini-CWT Test		✘		Name and member number or S/P/C	www.cwops.org/onair.html
Oct 16, 6 AM - Oct 16, 12 PM		902+	Fall VHF Sprints	✘	✘	✘	6-char grid locator	www.svhfs.org
Oct 16, 8 PM - Oct 17, 2 AM	1.8		Great Pumpkin Sprint			✘	RST and S/P/C	www.podxs070.com
Oct 16, 0000Z - Oct 17, 1600Z		50,144	Arucaria VHF Contest	✘	✘		RS(T) and 4-char grid square	www.avhfc.com
Oct 16, 0000Z - Oct 17, 2400Z	3.5-28		JARTS WW RTTY Contest			✘	RST and age (YL may send '00')	jarts.web.fc2.com
Oct 16, 1200Z - Oct 17, 2400Z	1.8-28		QRP ARCI Fall QSO Party		✘		RS(T), S/P/C, QRP ARCI number or pwr	www.qrparci.org
Oct 16, 1400Z - Oct 16, 2300Z	1.8-28	50+	Iowa QSO Party	✘	✘	✘	RS(T) and IA county, state/prov, or "DX"	www.wa0dx.org
Oct 16, 1400Z - Oct 17, 0200Z	1.8-28	50+	New York QSO Party	✘	✘	✘	RS(T), NY county, state/prov, or "DX"	www.nyqp.org
Oct 16, 1500Z - Oct 17, 1500Z	1.8		Stew Perry Warmup Contest		✘		4-char grid square	web.jzap.com/k7rat/stew.rules.txt
Oct 16, 1500Z - Oct 17, 1459Z	3.5-28		Worked All Germany	✘	✘		RS(T) and serial or DOK code	www.darc.de/referate/dx/contest/wag
Oct 16, 2000Z - Oct 16, 2200Z	3.5-7,21-28		Spooky Feld-Hell Sprint			✘	RST, Feld-Hell nr, S/P/C, and 10-10 nr	www.feldhellclub.org
Oct 17, 0000Z - Oct 17, 0200Z	14-21		Asia-Pacific Sprint		✘		RST and serial	jsfc.org/apsprint/aprule.txt
Oct 17, 1700Z - Oct 18, 0100Z	1.8-28	50,144	Illinois QSO Party	✘	✘		RS(T) and IL county or S/P/C	www.w9awe.org
Oct 18, 0200Z - Oct 18, 0400Z	1.8-28		Run For the Bacon		✘		RST, S/P/C, Flying Pig nr or power	www.fpqrp.com/fpqrprun.php
Oct 18, 1300Z - Oct 22, 2400Z	**1.8-28**	**50+**	**School Club Roundup**	✘	✘	✘	**RST, class and S/P/C**	www.arrl.org/school-club-roundup-scr
Oct 23, 0000Z - Oct 23, 2359Z	1.8-28	50,144	FOC QSO Party		✘		RST, name, and FOC number if member	www.g4foc.org
Oct 23, 0001Z - Oct 24, 2359Z	28		10-10 Fall CW QSO Party		✘		Call, name, 10-10 number, S/P/C	www.ten-ten.org
Oct 23, 1600Z - Oct 24, 2359Z	1.8-28	50	W/VE Islands QSO Party	✘	✘	✘	RS(T) and S/P/C or island designator	www.usislands.org
Oct 27, 0000Z - Oct 27, 0200Z	1.8-28		SKCC Straight Key Sprint		✘		RST, S/P/C, SKCC nr or power	www.skccgroup.com/sprint/sks
Oct 30, 0000Z - Oct 31, 2359Z	1.8-28		CQ WW SSB Contest	✘			RS and CQ zone	www.cqww.com
Oct 30, 0000Z - Oct 31, 2359Z		**50-1296**	**ARRL EME Contest – 2nd Weekend**	✘	✘	✘	**Both call signs, signal report**	www.arrl.org/contests
Oct 30, 0001Z - Oct 31, 2359Z	28		10-10 Fall Digital QSO Party			✘	Call, name, 10-10 number, S/P/C	www.ten-ten.org
Oct 30, 2300Z - Oct 31, 0300Z		50	Fall VHF Sprints	✘	✘	✘	4-char grid square	www.svhfs.org

All dates refer to UTC and may be different from calendar date in North America. Times given as AM or PM are local times and dates.
Refer to the contest Web sites for full rules, scoring information, operating periods or time limits and log submission information.
No contest activity occurs on 60, 30, 17, 12 meters. Serial = Sequential number of the contact. S/P/C = State, Province, DXCC Entity.
Publication deadline for Contest Corral listings is the first day of the second month prior to publication.

Check for updates and a downloadable PDF version online at www.arrl.org/contests

The 2010 ARRL November Sweepstakes

JIM JOHNSON, KC4HW

CW: 2100Z Saturday, November 6 – 0300Z Monday, November 8

Phone: 2100Z Saturday, November 20 – 0300Z Monday, November 22

- Amateur Radio's longest-running domestic contest enters its 77th year, and the thrill of the chase is still as exciting as it was back in the Days of Yore.
- Can you work all 80 ARRL Sections in a single weekend? Over 600 entrants qualified for a Clean Sweep coffee mug last year!
- New for 2010: Alumni may operate as part of the School Club category from their school's club station. Could we see some school rivalries spill onto the amateur bands?
- Domestic Amateur Radio contesting doesn't get any more fun than SS. We will see you on the bands in November!
- All logs must be submitted no later than *15 days* after the contest ends. CW logs are due by 0300 UTC Tuesday, November 23. Phone logs are due by 0300 UTC Tuesday, December 7. *Cabrillo-formatted electronic logs are preferred.* E-mail Cabrillo logs to **sscw@arrl.org** or **ssphone@arrl.org**.

Complete rules can be found at www.arrl.org/contests

VHF/UHF Century Club Awards

Compiled by Sharon Taratula
Administrative Manager

The ARRL VUCC numbered certificate is earned by amateurs who submit written confirmation for contacts with the minimum number of Maidenhead grid locators (indicated in italics) for each band listing. The numbers preceding call signs indicate total grid locators claimed. The numbers following the call signs indicate claimed endorsement levels. The totals shown are for credits given from June 1, 2010 to July 31, 2010.

The VUCC application form, field sheets and complete list of VHF Awards Managers can be found on the VUCC Web site at **www.arrl.org/vucc**. An SASE to ARRL is required if you cannot download these forms. Send questions relating to VUCC to **vucc@arrl.org**.

50 MHz

100

1714	W9ILY
1715	KØSIX
1716	AAØMZ
1717	NA5Z
1718	AC5K
1719	WA3TLT
1720	KF6A
1721	W8FN
1722	N3KN
1723	W9HT
1724	N5ZMP
1725	AE7V
1726	N5ZBI
N3KN	125
NE1B	125
W4EJ	125
NA5Z	150
WA7AJ	150
AB4GG	175
AA4ZZ	200
KØSIX	200
KG4JSZ	200
AAØMZ	225
VA3XJ	225
WD4JHD	225
NA2R	250
K8VFV	350
WBØULX	425
KF8UN	475
W7BA	475
KØIP	500
K6GXO	525
KAØJGH	700
W4WRL	700
K5UR	1175

144 MHz

100

700	WD4JHD
WD4JHD	125
AA4ZZ	150
WA3BZT	275
K7MAC	400

222 MHz

50

144	K7MAC
145	KØVXM
AA4ZZ	100

432 MHz

50

333	WBØULX
AA4ZZ	100

1296 MHz

25

161	W3HMS
162	NQ8A
163	W9OBG

Satellite

100

198	SV1EEK
199	WC7V
W8KHP	175
WC7V	250
WA8SME	300
WA5KBH	350

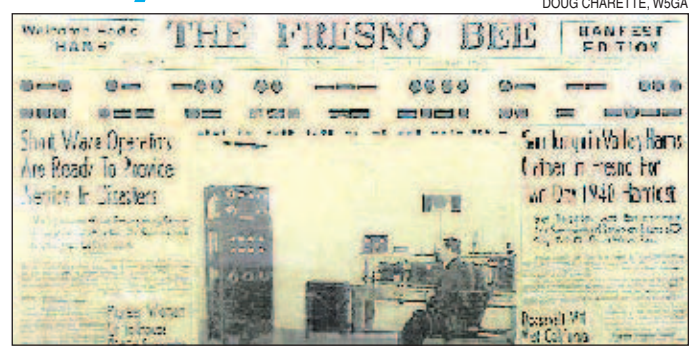
In the September/October "Contesting 101"

"How to start and grow a contest club from the ground up." The column will feature TCG charter members KØEJ and WO4O, who were instrumental in forming the Tennessee Contest Group.

Contesting 101 can be found in the National Contest Journal, published six times per year. For subscription information, visit **www.arrl.org/ncj**.

Strays

DOUG CHARETTE, W5GA



Sounds like fun…sorry we missed it: **Doug Charette, W5GA, of Afton, Oklahoma, ran across this framed wall decoration, from a 1940 issue of *The Fresno (CA) Bee*, in a restaurant called Humphry's Station in the foothills above Fresno.**

W3UR

HOW'S DX?

Disbanding the Netherlands Antilles May Create Four New Caribbean DXCC Entities

In mid-July of this year the Dutch Senate (*Eerste Kamer der Staten-Generaal*) agreed to disband the Netherlands Antilles.[1] The effective date is October 10, 2010 (10-10-10). The breakup will give the Dutch Caribbean islands of Curaçao and Sint Maarten independent country status within the Kingdom of the Netherlands, much like it did with Aruba back in 1986. The split up will continue to keep the BES islands (Bonaire, St Eustatius and Saba) as special municipalities (*bijzondere gemeenten*) of the Netherlands.

NETHERLAND ANTILLES DXCC HISTORY

During the creation of the ARRL's first postwar (WWII) DXCC Countries List the Netherlands West Indies (PJ) was one DXCC entity, which included the islands of Aruba, Bonaire, Curaçao, Saba, St Eustatius and Sint Maarten. During the late '40s and early '50s radio communications between these island's amateur stations and amateur stations of other countries were forbidden. The ban was lifted on March 11, 1952.

In 1954 the Netherlands advanced the Netherlands West Indies from a colonial territory to a domestic autonomy within the Kingdom of the Netherlands, which was the beginning of the Netherlands Antilles. The May 1955 issue of *QST* announced the recognition of two DXCC entities within the Netherlands Antilles, which was effective July 1, 1955, but with a starting date back dated to November 15, 1945 for DXCC credit purposes.[2]

During this time period there was not a set distance rule but rather a "does it have adequate geographical separation from a parent nation?" rule. So then there were two DXCC entities. One in South America, which at the time included Aruba, Bonaire and Curaçao and a second in North America including Saba, St Eustatius and Sint Maarten. [At the time it may have been a good idea to have called them Southern Netherlands Antilles and Northern Netherlands Antilles, instead of the two current names, Netherlands Antilles and Saba, St Eustatius and Sint Maarten. Too late now. — *Ed.*]

On January 1, 1986 Aruba was constitutionally separated from the Netherlands Antilles, shortly afterward receiving the P4 prefix directly from the Netherlands and not the ITU.

What Can We Expect?

So with the date (10-10-10) now official as to the termination of The Netherlands Antilles, DXers and DXpeditioners are no doubt asking how all of this will affect the DXCC program. Let me first state that from this point on these comments are the thoughts and opinions as seen by your editor as things stand as of today (August 1). Obviously by the second week in October we will have a much clearer picture of what to expect.

The Deletion of Two

Once The Netherlands Antilles are disbanded, both of the current DXCC entities (PJ2, 4, 9 Bonaire and Curaçao; and PJ5-8 Sint Maarten, Saba, St Eustatius) should then be deleted per DXCC Rules. The Netherlands Antilles were put on the DXCC Countries list prior to many of the modern day rules, including the separation of the two and any measurable distance rule.

The Addition of Four

From that point it is clear that Curaçao (PJ2) and Sint Maarten (PJ7) would become two new DXCC Entities. This would leave the BES islands (Bonaire, PJ4; St Eustatius, PJ5, and Saba PJ6). The distance from the homeland, the Netherlands (PA), to the first island is more than 350 km thereby giving a third DXCC Entity of St Eustatius and Saba. These two islands are too close to each other and must be one DXCC Entity. Bonaire is just barely over the 800 km distance from PJ5 and PJ6 so it would then be a fourth new DXCC Entity.

How and When Will This Happen?

Now the questions and the answers get a little tricky as to when these new DXCC countries will come online because the ARRL DXCC Rules are clear on what and how "Political Entities" are added to the list.

These Rules Affect the Addition of Curaçao and Sint Maarten

DXCC Rule 1a asks if the potential new one is a member state of the United Nations. Neither one is and neither is expected to be. This is just like Aruba. Rule 1b is not likely to apply, in the near future and most likely not by 10-10-10. It is doubtful that the ITU will assign a new prefix in time for the expected date. You can watch the ITU Web site at **www.itu.int/online/mms/glad/cga_callsign.sh?lng=E**. There is a chance, but not a high probability, that the Netherlands will give up one of their current prefixes. Most likely Rule 1c is the one that will get these two fledgling DXCC Entities on the DXCC list. The US Department of State's "Dependencies and Areas of Special Sovereignty" list will most likely be updated around the birth date of these two new DXCC countries. Watch the State Department's Web page, **www.state.gov/s/inr/rls/10543.htm**.

What About the BES Islands?

The BES islands should immediately be added to the DXCC list on 10-10-10 (exact time of day is yet to be determined) as they will clearly meet the DXCC criteria per the "Geographic Separation Entity" rule. Since the first set of islands (Saba and St Eustatius) are 350 km or more away from the parent country (Rule 2bii) and a second island (Bonaire) being 350 km from the parent country and just over 800 km from "any other island attached to that Parent" (Rule 2biii).

Again I want to emphasize the last six paragraphs are the opinions of your editor and not the official word of the ARRL or the DXCC Desk. The new DXCC Entities should be:

- Curaçao (PJ2)
- Bonaire (PJ4)
- St Eustatius (PJ5) and Saba (PJ6)
- Sint Maarten (PJ7)

So there you have it. You will definitely want to pay specific attention to the DX

[1]B. McClenny, W3UR, "How's DX?," *QST*, Nov 2009, pp 88-89.
[2]R. Newkirk, W9BRD, "How's DX?," *QST*, May 1955, p 152.

Bernie McClenny, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

news sources and more importantly to the ARRL DXCC Desk come the second week of October.

ACTIVITY FROM THE NEW ONES

The talk of new countries coming from the Netherlands Antilles has been going on for several years now and would-be DXpeditioners have been eyeing these islands for several years. So over the next few months, starting in October, we should see plenty of activity from all of the islands.

PJ2 — Curaçao

Of the four island groups Curaçao will no doubt be the easiest one to work as there are multiple nationals living on the island, some of whom are somewhat active. Also, the PJ2T Caribbean Contest Consortium (CCC) is located at the famous Signal Point (**www.pj2t.org**). Continuing in the celebration of his 50th year in Amateur Radio, Seppo, OH1VR, will be participating in the GAREC-2010 conference, taking place on October 11-12 and plans to be QRV in his spare time, when not at the conference. Jeff, K8ND, one of the PJ2T ops, announced earlier this year that he would be QRV from Curaçao as PJ2/K8ND from October 8-18. QSL via K8ND.

Don't be surprised to see other members of the CCC show up on the island before the CQ WW SSB DX Contest. A four man team announced their plans to be QRV from a few weeks after the projected 10-10-10 date. Starting November 4 through November 11 Bill, K2TQC; Brian, N2MF; Tony, K2NV, and Ken, W1NG, plan a full week of serious non-contest operation from the CCC (PJ2T) station. For you 6 meter ops and those who are serious about the ARRL DXCC Challenge, don't worry about 50 MHz as PJ2LS and PJ2BVU are serious 6 meter men. So don't rule this one out between now and the end of this year as we could get an opening!

PJ4 — Bonaire

This island has several locals, several of whom are QRV (PJ4LS and PJ4NX) as well as at least one contest (rental) station, which will most likely be active. Peter, PJ4NX, is very active on 50 MHz for the 6 meter crowd.

The team of W7XU, NØQJM, WØSD, WØOE and ON4IQ plan to be here for their annual summer 6 meter sporadic-E DXpedition. The timeframe is mid-June to July 5, 2011.

Just as we were going to press a multinational team announced their plans for a DXpedition to Bonaire. This team from The Netherlands, Germany and the US will team up with several PJ4 islanders for a 10 day operation starting October 10. Complete details can be found on their Web page at **www.bonaire2010.com**.

PJ5/6 — St Eustatius and Saba

The hardest of the four new ones to work will probably be St Eustatius/Saba (PJ5/6), as there is only one local (PJ5KBF) who is somewhat currently active and there is at least one contest station among the two islands. Bob, K4UEE, announced earlier this year he had a team that would be operating from Saba

during the big event. This will include members of the Southeastern DX Club and the K5 Desecheo team. In March several of his team members (W6IZT, N4GRN) went down to secure a location. Don't be surprised if Jim, K1NA, shows up on the air from his PJ5NA station on St Eustatius. Dick, K5AND, and George, K5TR, plan to go to Saba next June and July. In addition to 6 meters, they will also have along a 2 meter EME setup. The boys plan to rent a villa, which they believe will eliminate the possibility of issues with antennas.

PJ7 — Sint Maarten

Sint Maarten (PJ7) has a least one active op (PJ7MF) and at least one contest station so this one should be somewhat active. In addition, two multiop groups have announced their plans to be here for the initial anticipated activities. In May of this year Paul, K1XM, announced his plans, along with others, to be on the air on or before October 10. They will be operating from the PJ7UQ location on 1.8 through 28 MHz on SSB, CW and RTTY. No call sign was mentioned. QSL via KQ1F.

A second multiop team will also be on starting October 10 led by W8GEX and K9CT. The 12 man team will be QRV for 10 days. They have a Web site at **www.stmaarten2010.com**. Jimmy Treybig, W6JKV, and Mike Stall, K6MYC, plan to be here with a concentration on 6 and 2 meters sometime between June 20 and July 4, 2011. Details are still being worked out. EME is likely too. Jimmy wants to make it clear he and Mike do not intend to compete with those putting these new ones on HF; they just want to concentrate on VHF.

Wrap Up

Okay, so there you have it for this month's column. October promises to be very exciting with these new DXCC Entities. This will be the first new ones added to the ARRL DXCC list since December 2007 and very likely the first deletes to the DXCC list since the DXCC 2000 rules went into effect back in April of 1998. Until next month, see you in the pileups! — *Bernie, W3UR*

W3ZZ

THE WORLD ABOVE 50 MHz

Three Days in June

Last month we had some of the best North American E-skip (E_s) openings ever recorded and discussed conditions on 6 meters that would have already put June 2010 in the category of one of the best summer E_s months in the history of the Magic Band. This month we will describe the events of June 19-21 when the have-nots who had already had a decent summer experienced some of their best conditions to Europe and the Middle East in 6 meter history. We will then talk a little about DXpeditions and domestic 6 meter expeditions that enlivened the chase for rare VUCC grids.

Prologue

Under normal conditions a single E_s hop covers a maximum of ~2200 km. Most transregion DX, for example, Region II (Americas) to Region I (Europe), is likely to be multiple hop E_s where each hop is reflected from the Earth's surface. Some 4 years ago Han Higasa, JE1BMJ, and then others (JA1ELY and TZ6JA) suggested that the long distances needed to support contacts between Japan and locations east of the Mississippi, at >8000 km, were probably not possible with the 4 E_s hops required. They thought that such contacts involved some kind of ductal or chordal propagation over the Polar Regions where the ray does not return to Earth over distances equivalent to a number of hops. Han calls this Short-Path Summer Solstice Propagation (SSSP) because it appears to peak around the summer solstice (June 21).

The question is how much chordal propagation actually occurs. Based on the geometry of the openings and the distribution of the contacts Joe Kraft, CT1HZE, argued last year in this column and in *DUBUS* that the large majority of the long distance propagation between Europe and the western US was ordinary multiple hop E_s with touchdowns at each hop. More recently Jim Kennedy, KH6/K6MIO, presented a paper at the July 2010 Central States VHF Society meeting in St Louis. He made a strong case that significant amounts of chordal propagation exist not only for the polar paths but for other unusual contacts such as transequatorial paths between OA4TT to ZL and K6QXY to VK/ZL as well as the 4 hop path between KH6 and the eastern US. I have been collecting data for the 2010 season and I hope to have Jim present this data in a future column as an extension of his Central States paper.

DX SHERLOCK

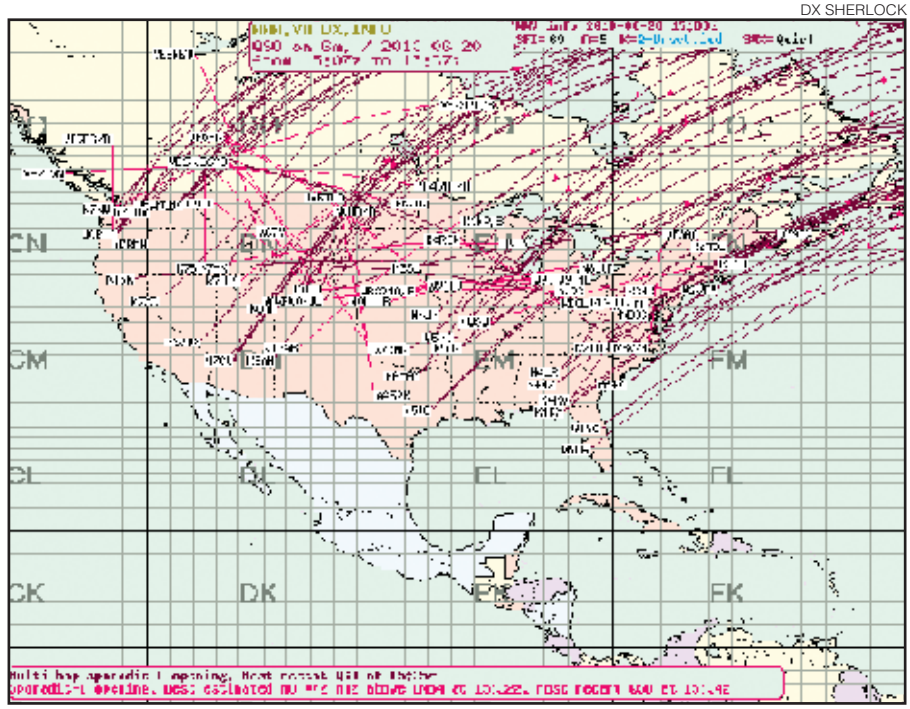


Figure 1 — DX Sherlock map (www.vhfdx.info) of last contacts from North America June 20 1507-1537Z. Notice the bands of propagation to the East Coast, central US, Rockies and Pacific Northwest, and the lack of propagation elsewhere. Used with permission from EA6VQ.

So now let us look at least qualitatively at the events of June 19-21 and the amazing conditions that many will remember for a lifetime. I am indebted to the propagation reflectors at DX Sherlock (**www.vhfdx.net**), OH8X (**www.dxsummit.fi**) and **dxworld.com** as well as my many correspondents including KI4FW, KD7WPJ and WA9M, not otherwise mentioned.

This Month

*October 2-3	ARRL EME Contest second weekend
*October 3	Very good EME conditions
October 6	432 MHz Fall Sprint
October 16	Microwave Fall Sprint
October 22-23	50 MHz Fall Sprint
October 30-31	ARRL EME Contest third weekend
*October 31	Excellent EME conditions

*Moon data from W5LUU

Japan

Most of the North American fireworks were toward Region I but that does not mean there weren't splendid conditions toward Japan. The major openings started with unusually good conditions between the far Midwest and Japan. Bill, KØHA, EN10 generated a pileup of over 100 JAs, which you can hear at **k0ha.com/6m/6m.html**, that extended from QN13 to PM42/43. Many were probably small stations running 50 W or less to small Yagis. Tim, NWØW, EM37 worked 14 JAs on the 19th; many more very weak ones were not worked. Steve, W5KI, EM36 says it was his best JA opening ever, working 35 JAs in JA1, 2, 7, 9, Ø but no JA8 in the north or JA3, 4, 5, 6 in the south. SSSP reached Steve, NN4X, EL98 on the 19th with JE1BMJ. On June 20

Gene Zimmerman, W3ZZ ♦ 33 Brighton Dr, Gaithersburg, MD 20877 ♦ w3zz@arrl.org; (301-948-2594)

Jay, KØGU, DN70 and Al, K7CA, DM37 both worked 32 JAs, Jerry, KØDU, DM58pk worked 23 JAs and Arliss, W7XU/Ø, EN13 had a brief opening for two contacts. Bob, ZL4AAA, notes that the ODX for Japan was probably TI5XP EK70nm to JE1BMJ QM05br (13,052 km).

Europe and Asia

The openings these 3 days strongly favored stations nowhere near the East Coast (see Figure 1). Though eastern stations made some contacts on June 20 the best DX and the strongest signals appeared in the Southwest, the Rockies and particularly the Pacific Northwest (PNW). Much of the central Midwest (for example, Bill, WØWOI, EN22 Iowa called the summer very poor) and southern CA had only marginal openings.

My column predecessor Emil, W3EP, has defined a donut hole — a space between hops — that suffered poor propagation. Perhaps something analogous occurs via ductal propagation. The best description came from Ned Stearns, AA7A, who uses an extensive set of MUF tracking tools to spot openings (his 144/222 MHz tools were described in these pages in June 2004).[1] For 6 meters he uses an RF Space SDR/IQ receiver monitoring the beacon bands and following spots on DX Sherlock. He says "Multi-hop E_s openings from AZ/DM43 to EU are rare. Over a 35-year period, I have managed to catch only six such openings." He emphasizes the spotty nature of the propagation — on these pages we have called it "spotlighting" where the openings are very narrow and jump around frequently.

In contrast both days he found the band open to more than one place at a time. On the 19th he was hearing two skip zones at the same time, one favoring Western Europe (G, ON) and a second favoring Central/Southern Europe (I, S5, LZ, SV, UT) and alternating between them. The Western EU opening was shorter (1605-1620Z) compared to the farther zone (1550-1730Z). The former signals peaked higher and had rapid fading. The latter signals were weaker but much steadier.

On the 20th there were again openings to two areas: central EU (HA, S5, 9A, E7, I) and Northern Europe (OH, SM, LA). The paths for those two locations are substantially different in AZ. The opening lasted only a single hour; central EU signals were copiable only for extremely short periods of time (seconds to minutes) whereas Northern EU stations were copiable a little longer (tens of minutes). Johan, ON4IQ, reports the band open to NM, AZ, TX, WY and CO on June 19.

[1]N. Stearns, AA7A, "Early Detection of E_s on 144 MHz and Above," *QST*, Jun 2004, pp 80-81.

Colorado and WØ

KØGU says "my best E_s opening ever to Europe by a factor of two." On the 19th Jay worked 42 Europeans in 2 hours with 12 DXCC entities, 4 new — LA, HA, SV, LA. On the 20th he worked 35 Qs, four new — OM, E7, ES, LY. Conversely, Phil, NØKE, DM69 worked six Europeans on the 19th and 67 in a 3 hour opening on the 20th and Larry, KØCL, DM69 had 54 Europeans in 18 DXCC entities, all new with ODX 5B4FL and UY1HY. Farther southwest Jerry, KØDU, DM58 worked 58 Europeans. Arliss, W7XU, had small openings to OH and SM. For many this was the best European opening ever.

Deep Southwest and W6

Pete, WA7JTM, DM33xo worked ON, 9H, UT on the 19th and S5, HA, OE, I, 9A, E7, LA on the 20th, nine new DXCC in 2 days. June 20 Al, K7CA, DM37 worked 15 Europeans in eight DXCC as far east as UR. Mark, K5AM, DM54 worked 10 European countries mostly in Eastern Europe and Scandinavia. Tim, K7XC, DM09nm worked 14 Qs in E7, SV, PA, EA6 and I, all new DXCC after working ON on the 19th. Bob, K6QXY, CM88 worked LA and SM on the 20th. Jon, NØJK, EM28 worked into SM.

Pacific Northwest

For decades it was common knowledge that the PNW could not work into Europe on E_s until N6TR operating as K7RAT did it during the June 2001 ARRL VHF contest along with several other PNW stations. Since then a handful of other European openings have been worked but nothing like June 19-20. Let Dave, K7RWT, CN85 explain it: "I have been a six meter operator in Oregon for 47 years and have never experienced an opening as unprecedented as this year's Fathers Day openings." After working I on the 19th, Dave worked five new DXCC on the 20th: S5, E7, OE, HA, 9A. The ODX kings were Jeremy, W7EME, CN77xx to SU1SK KM50pc (11,508 km) on CW June 19 and W7MEM DN17nt to IK5YJY JN53pg (8688 km) on SSB June 20.

The Kiesels — Paul, K7CW, CN87lj and Johnny, KE7V, CN88ic — both excellent operators with first-rate stations, demonstrate that a small geographic difference means a lot. Paul worked three DXCC on the 19th (with ODX SV1DH 9963 km) but had a run of almost 100 Europeans in 1 hour 10 minutes June 20. Johnny had four DXCC on June 19 but only 20 Qs in 11 DXCC June 20.

Jim, W7FI, CN87 notes that the magnetic field was slightly disturbed during these openings but not much. Jim worked three DXCC on June 19 and then seven DXCC on the 20th making it eight new entities this summer. John, W7KNT, DN26xm worked 10 European DXCC, a rare day for MT indeed. Clay, W7CE, CN87oa worked four DXCC as far as SV1DH on the 19th and seven DXCC as far east as LY on June 20. Steve, K7AWB, DN17es had eight Qs in seven DXCC as far east as SP. Steve, K6UM, CN85 worked E77DX for WAC after 47 years of 6 meter operation.

Elsewhere

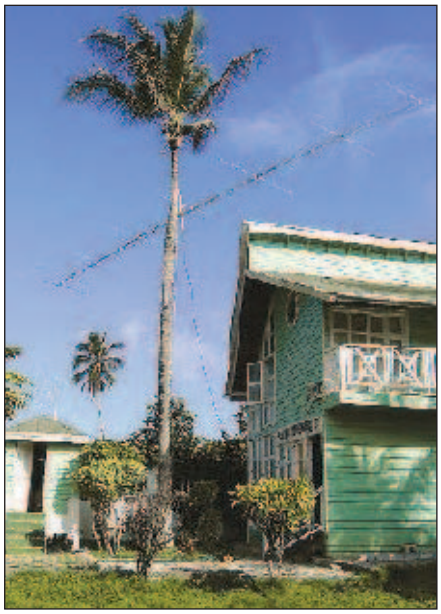
Pat, W5OZI, EM00 says, "In 25 years of 6 meter DXing I have never seen such an explosion of Europeans E_s DX to NA." Pat had three new DXCC, E7, S5 and UT on the 19th. Bill, K3XA, FM18 found HA loud on June 20. Your conductor found signals generally not up to W7 standards but did add HA, E7, S5, 9A. Mike, K4PI, EM73 fared better with 45 Qs deep into Eastern Europe. Mike, NC4W, worked into OH. Steve, W5KI, EM36 had 33 Europeans in 12 entities. Steve also worked KL7/KB7Q BP40 for state #50 and KB8U/6 at the rare CM79 grid corner. Russ, K4QI, portable in EM85 had nine DXCC on the 20th. Ray, W9VHF, EN71 enjoyed such worthies as HA, MUØ and EA6.

Double hop transcontinental contacts

JAMES TREYBIG, W6JKV

The view toward Europe from FS/W6JKV in St Martin.

JAMES TREYBIG, W6JKV



Colombian antenna engineering. No tower? No problem. Dennis, K7BV, mounts his 6M8GJ Yagi in a palm tree at 5JØBV. Rotation and elevation for EME by rope.

abounded throughout the weekend. Dave, N7DB, reports numerous contacts along the northern tier to W1, 2, 3 with strong backscatter to the Rockies. Roman, N4SC, EN72 worked W3FF/bicycle mobile in CN70.

Expeditions

C56E. The team of Arliss, W7XU; Holly, NØQJM; Ed, WØSD, and Edith, NØOE, activated Gambia C56E (IK13ql) from June 29-July 5. They worked 802 unique stations, 734 from Europe, 57 from North America and 10 from Africa. Propagation to NA and the Caribbean was poor and very spotty with hot spots simultaneously often 1000 miles or more apart. ODX was the ninth district. All QSLs are via W7XU.

FS/W6JKV. Jimmy, W6JKV, activated St Martin FS/W6JKV (FK88) from June 26 to July 4. Located on a cliff 50 meters above the ocean with an all water path to Europe and North America (see photo) he worked 1303 Qs in 56 countries with 393 stations in Europe, Africa and Asia, and the remainder in the Americas. Jimmy also observed very long distance propagation to Europe and the US with West Coast openings 6 out of 9 days totaling over 100 W6, 7, VE6, the best E_s he can remember in over 30 years of trips to the Caribbean. Just as interesting was the long skip to Europe with ~75% of Europeans at >7000 km and ⅓ of those >8000 km. This was illustrated by working 22 HAs, 15 UT, 17 YU, 73 I, 6 HB9 and 20 S5. The difference was the lack of Western Europeans, Gs, Fs, EAs, etc.

5JØBV. Dennis, K7BV, went to San Andres as 5JØBV June 11-23. Dennis brought an FT-450 driving an ACOM 1000 1 kW to a 6M8GJ M^2 Yagi at 40 feet (see photo). He worked 33 entities and 1000 Qs, 81 in Europe where 5JØ was a new DXCC for many. Still there were 5 days with <10 Qs/day. June 12 was the best day for Europe with weaker openings on the 17th and 18th.

ON THE BANDS

6 meters. Bob Cooper, ZL4AAA, reminds us that when a summer E_s season starts early it usually ends early. That is indeed what was observed this July. After the first week of July, conditions went downhill steadily and in spite of a few decent openings during the CQWW VHF contest July 17-18 the last half of the month was very poor. Overall this has been an outstanding summer particularly for those located long distances from Europe. Joe, W5HNK, EL29 says it is the best E_s in his 47 years on 6 meters with 54 DXCC, 19 in Europe. Bill, KØHA, EN10 recorded 40 Qs in Europe and 198 JA contacts.

July 3 John, W5UWB, EL17ax worked 11 European DXCC via JT6M including C37. July 4 Frank, W3LPL, FM19 worked 4 new DXCC, 5B, GJ, SV9 and T7. Dan, K3ZXL, EL87 was among many that worked OX3LX that day. Paul, K7CW, worked into the Caribbean and Rob, KØRU, EM28 worked CN8 and 3 western Europeans. Jay, KØGU, DN70 worked eight Western and Central European DXCC including T7. To Japan July 4 W5UWB worked his all-time JA ODX to JR6EXN PM53gh 11,516 km. KØHA worked nine Qs in northern JA on the 17th and a few more to southern JA on the 19th. Domestic double hop was in evidence the first week of July. K3ZXL worked to the Pacific Northwest July 2-3; Gil, WA1LAD, FN41 worked AZ, CO and UT on the 3rd. Dave, N7DB, reports excellent double hop across the northern border to W1 July 5 and Paul, K7CW, worked VO1MP GN37.

Fred, K3ZO, reports that Thailand allowed 6 meter operation for the first time during the CQWW VHF contest. The experiment was a resounding success as HSØAC operated by HS2JFW worked 177 Qs in 35 grids running only low power.

2 meter E_s. 2 meter E_s continued into July with significant openings on 2 days and E_s propagation logged on 6 other days. July 2 was widespread but with little activity. Sam, K5SW, EM25 and Steve, W5KI, EM36 worked into EN37. Jay, KØGU, DN70 worked EM75. DX Sherlock showed openings between DN13/17 and EN10, EM29, 26, 17 as well as DM79 to EN44, 53, 54. July 5 Emil, W3EP, notes a strong opening between New England and nearby Canada into the Upper Midwest and DX Sherlock shows short openings over the Rockies.

Specifically, Ellis, WA1RKS, FN32 worked EN36, 37. From the other direction Gary, WØGHZ, EN34 worked FN31, 32, 33, 34, 42; Bill, KØAWU, EN37 worked FN12, 30, 31, 32; and Edd, N8LIQ, EN56 worked FN31, 32, 41. Jay, KØGU, worked into CN87/88 and Tim, K7XC, DM09 heard the NTØV beacon in EN08. Otherwise on July 3 small reflecting centers supported E_s between EL95 and FN14/EN81/EM69 to the north and EM00 to the west. Steve, AG4V, EM55 worked into DN47 midday. July 4 midday EL95/87 worked into DM52 to the west. July 6 featured propagation across the Rockies: DM98/EM17 to DN13/17 and DN70, EM79, 65 to the Pacific Northwest. Jay, KØGU, had nine Qs with CN87/88. July 13 a single contact between EL95 and DM52 was reported. July 28 there was E_s between EL95 and EM00/DM65 and July 29 between EL95 and EM78/FN31. Overall this was one of the best summers ever for 2 meter E_s and certainly among the most widespread in extent.

Tropospheric ducting. Tropoducting was evident but not particularly good in July. Jon, NØJK, EM28 worked EM66 on July 1. Steve, N1JFU, FN42 worked coastal tropo to FN73 on the 7th. Bob, ZL4AAA, warned of good tropo July 30 from TN to the northwest, based on FMDX reports. Sure enough Todd, N4QWZ, EM66 worked stations in EN12, 22, 31, 33, 35, 51 up through 70 cm but nothing on 902 and above.

HERE AND THERE

2010 ARRL International EME Competition. The second full 48 hour period covers 50 through 1296 MHz from 0000Z to 2359Z October 2-3. The third period covers the same frequencies from 0000Z October 30 to 2359Z October 31. Both analog and digital modes are allowed. Remember that neither single operator nor multi-operator entries are allowed to use any form of active or passive assistance in this contest on these frequencies. The full set of rules is at **www.arrl.org/eme-contest**.

Fall Sprints. The second round of Sprints continues from last month. The 432 MHz Sprint is held October 6, 7-11 PM local time; the Microwave Sprint is October 16 from 6 AM to 12 noon local time; and the 50 MHz Sprint starts 2300Z October 22 and ends 0300Z October 23. See **www.svhfs.org/sprints.html** for complete information.

EME DXpedition to 3D2. Lance, W7GJ, expects to activate Fiji 3D2 from September 27 through October 7 UTC. This time period spans the optimum days of the month for 6 meter EME. More information is now available at **www.bigskyspaces.com/w7gj/Fiji2010.htm**.

LoTW and VUCC. Updating the new ARRL Web site has resulted in many complex problems. As of this writing there is still no date when Logbook of the World will be linked to VUCC. When this finally happens Jay, KØGU, reminds us that we need to be certain that we have entered our grid square in TQSL or no one will get VUCC credit. Go to your TQSL, click STATION >>EDIT LOCATION and check to see that your grid square is entered.

EX1SIX/B. The EX1SIX beacon is operational on 50.026 MHz from MN82sd running 60 W to a vertical antenna. The location is near Tamga on the southern coast of Lake Issyk Kul (Kyrgyzstan). The beacon is one of many provided by Dave, N3DB, of the Six Meter Beacon Project Inc. More information is available at **www.6meterbeaconproject.org**.

K4ZOO SK. One of the Midatlantic region's stalwart VHFers, Ray Veldran, K4ZOO, (ex-N4KWX) passed away July 22. Ray was one of the most active operators in FM08. We will miss his cheerful presence. Farewell old friend!

New World 10 GHz Record. A group of Swiss amateurs, part of the Hyperatlantica 2010 DXpedition, operating from Cape Verde (D44) HK86nu set a new world 10 GHz record by working a group in Portugal IM57or (2696 km) on July 10, 2010 at 1046Z on SSB. This contact was preceded the same day by a record breaking contact to CN2CT IM52jh at 2200 km at 0855Z. The existing record was 2070 km between DL3AM and DJ3KM. The path between D4 and Africa/Iberia is one known to support excellent tropoducting. The team in D44 was running 20 W to a 90 cm dish. Congratulations to all! QST

SPECIAL EVENTS

Contact these stations and help commemorate history. Many provide a special QSL card or certificate!

Sep 6-Sep 20, 1000Z-0000Z, W3FT, Baltimore, MD. Baltimore Amateur Radio Club. Reisterstown Festival. 14.285 7.190. QSL. Baltimore Amateur Radio Club, PO Box 120, Reisterstown, MD 21136. **www.baltarc.com**

Sep 9-Sep 12, 1600Z-2300Z, WA3COM, West Alexander, PA. Washington Amateur Communications Amateur Radio Club. West Alexander Fair. 14.227 7.240 7.245 3.810. QSL. Ed Oelschlager, 60 Carl Ave B2, Eighty Four, PA 15330. *Help us show Amateur Radio is alive and well*. **www.wacomarc.org**

Sep 11-Sep 12, 0000Z-2359Z, K8H, Delaware, OH. Delaware Amateur Radio Association. Delaware All-Horse Parade — Celebrating its 25th year. 21.340 21.040 14.340 14.040 7.240 7.040 3.840 3.540. Certificate. Gary Mackey, 44 Providence Ln, Delaware, OH 43015. **www.k8es.org**

Sep 11-Sep 12, 1400Z-2000Z, W5C, Lubbock, TX. Ransom Canyon Amateur Radio Club. The 22nd National Cowboy Symposium & Celebration and National Chuckwagon Championship Cook-Off. 18.130 14.260 7.260 3.850. QSL. Robert C. Boyd, 98 S Lakeshore Dr, Ransom Canyon, TX 79366. **www.cowboy.org**

Sep 11-Sep 12, 1500Z-1500Z, N1Y, Delaware County, NY. Symbol Technologies Amateur Radio Club. 9-11 Always Remember. HF/CW/SSB/PSK31/SSTV 2m/6m SSB. QSL. Via bureau or direct to Symbol Technologies ARC, Attn: James Fuccello M/S-B13, 1 Symbol Plz, Holtsville, NY 11742. **www.jsconsulting.com/starc**

Sep 18-Oct 18, 0000Z-2359Z, VC3M, Mississauga, ON. Mississauga Amateur Radio Club. 14.265 25th Anniversary Mississauga Amateur Radio Club. All HF bands; no WARC bands. Certificate & QSL. Michael Brickell, 2801 Bucklepost Cres, Mississauga, ON L5N 1X6 Canada. **www.marc.on.ca**

Sep 18-Sep 19, 1300Z-2200Z, K4EG, Burlington, NC. Alamance County Amateur Radio Club. 23rd Annual Burlington Carousel Festival. 14.250 14.050. QSL. Carousel Festival, PO Box 391, Elon, NC 27244. *Celebrating 100 years of the hand carved Dentzel Carousel*.

Sep 18-Oct 1, 0000Z-2359Z, N6R, Various, CA. Northern California Contest Club. 40th Anniversary All bands/modes. Certificate. NCCC, 904 Sawyer Way, Brentwood, CA 94513. Make 40 member QSOs during event and log on to **www.nccc.cc/40thaward.html** for special certificate! Submit by October 31, 2010. **nccc.cc/40th.html**

Sep 24-Sep 26, 2200Z-1700Z, WØB/WØS/WØA, Kansas City, KS. Boy Scouts of America. Boy Scouts of America - Heart of America Council - Centennial Celebration. 146.940 14.290 7.190 3.940. Certificate. Doug Roberts, NEØA, 4415 NW Normandy, Kansas City, MO 64116. **hoac-bsa.org**

Sep 24-Oct 4, 2359Z-2359Z, N1ME, Bangor, ME. Pine State Amateur Radio Club. Pine State Amateur Radio Club 35th Anniversary Special Event. 28.405 14.255 7.188 3.937. QSL. Jeff Collins, W1JFF, 294 Maple St, Bangor, ME 04401. **www.n1me.org**

Sep 25, 1600Z-2100Z, W2FHA, Mohawk, NY. Fort Herkimer Amateur Radio Association Inc. Fort Herkimer Living History Weekend Special Event Station. 14.280 7.280. Certificate. Christopher Bouck, 28 W State St, Dolgeville, NY 13329. **www.fhara.net**

Oct 1-Oct 3, 2000Z-1300Z, K1BSA, Bangor, ME. Post 211, Katahdin Area Council, Boy Scouts of America Centennial. 21.360 14.290 7.190 3.940 phone and digital. QSL. Daniel Albert, 504 Wing Rd, Bangor, ME 04402. *Custom QSL cards being printed; allow extra time for receipt*. **katahdinareabsa.org**

Oct 1-Oct 4, 0000Z-1200Z, KB3IGH, Glen Rock, PA. Jon Abbott, Boy Scout Jamboree On-the-Air. 14.250 7.250 3.850 . QSL. Jon Abbott, 26 High St, Glen Rock, PA 17327.

Oct 2, 1600Z-2100Z, KBØTUC, Canon City, CO. Royal Gorge Amateur Radio Club. Octoberfest at the Royal Gorge. 14.250. Certificate. Charles Ward, 1011 Harrison Ave, Canon City, CO 81212. *Operating from the world's highest suspension bridge that can handle vehicle traffic, over 1000 feet above the Arkansas River.*

Oct 2, 1200Z-2000Z, W4O, Augusta, GA. Columbia County Amateur Radio Club. Oliver Hardy Festival Special Event. 28.360 21.260 14.260 7.260. QSL. W4O Special Event, PO Box 800, Evans, GA 30809. **ccarc.hamradioman.com**

Oct 2, 1300Z-2100Z, N2CMC, Wildwood, NJ. Cape May County Amateur Radio Club. Cape May County Amateur Radio Club 35th Anniversary. SSB 21.260 14.260 7.260 CW 21.040 14.040 7.030. QSL. CMARC, 8 Fox Run Rd, Cape May Court House, NJ 08210. *From the Former USCG Loran Unit, Wildwood, NJ.* **capemaycountyamateurradioclub.org**

Oct 2, 1400Z-2000Z, W9JOZ, Radioville, IN. Starke County Amateur Radio Club. Radioville, IN — The Town that Never Was. 21.350 14.250 7.250 3.905. QSL. W9JOZ, 7495 South 500 West, North Judson, IN 46366. **www.w9joz.org**

Oct 2, 1400Z-2300Z, W3G, Nazareth, PA. Delaware-Lehigh Amateur Radio Club, Inc. Easton Garlic Festival. 28.350 21.350 14.235 7.235 PSK 14.070 7.035. Certificate & QSL. DLARC, 14 Gracedale Ave, Nazareth, PA 18064. *Motto: Eat Drink and Stink. Contact W3G and tell us how bad our signal stinks!* **www.dlarc.org**

Oct 2, 1500Z-1900Z, KJ4SZD, Brandon, FL. Computer Acquisition and Placement Program Inc. Family Abilities Information Rally. 14.325 146.52. Certificate. CAPP, Inc, 201 Paka Ct, Brandon, FL 33510. **cappinc.org**

Oct 2, 1700Z-2000Z, WA5VA, El Paso, TX. Veterans Amateur Radio Club. Welcome Home for Veterans of Conflicts of All Eras. 21.300 14.287 7.245. QSL. EPHCS 137S, 5001 N Piedras St, El Paso, TX 79930-4210.

Oct 2-Oct 3, 1200Z-1200Z, NØR, Albert Lea, MN. Promotion of Education at Fur Trader Reenactment. 28.350 14.270 7.270 146.880. QSL. Special Event BIR, Tom Lehto, KCØMTW, 701 Marshall St, Albert Lea, MN 56007. **www.bigislandfestivalandbbq.org**

Oct 2-Oct 3, 1400Z-1700Z, K4HH, Lexington, KY. Jessamine Amateur Wireless Society. The 2010 Alltech FEI World Equestrian Games. 28.365 18.130 14.255 7.255. QSL. K4HH/Jaws, PO Box 273, Nicholasville, KY 40356. **www.k4hh.org**

Oct 2-Oct 10, 1400Z-2300Z, W5B, Albuquerque, NM. High Desert Amateur Radio Club. Albuquerque International Balloon Fiesta, QSL. Bill Firth, KE5TOB, 4609 Cactus Ave NW, Albuquerque, NM 87114. Albuquerque, NM 87114. *Operating times will vary, 8 to 12 and 12 to 5 local time depending on Fiesta schedule and weather.* **nm5hd.com**

Oct 3, 1200Z-2000Z, N1D, Auburn, ME. Androscoggin Amateur Radio Club. Dempsey Challenge. 28.400 14.240 7.195. QSL. Androscoggin ARC,W1NPP, PO Box 1, Auburn, ME 04212. *Dempsey Challenge Bicycle Race, for Hope, Healing and Awareness against cancer.* **www.w1npp.org**

Oct 9, 1200Z-2200Z, K4L, Lagrange, GA. LaGrange Amateur Radio Club and Georgia 3-Rivers Red Cross. Operating Demonstration of the Emergency Communications Response Vehicle. 14.230 7.178 3.975. QSL. E. A. Kazmarek, 1190 Byrnwyck Rd, Atlanta, GA 30319. **k4eak@arrl.net**

Oct 9, 1300Z-2000Z, N4J, Forest, VA. Lynchburg Amateur Radio Club. Archaeology Open House at Thomas Jefferson's Poplar Forest. 14.263 7.260 PSK 14.070. QSL. Dick Hiner, W4HMK, 3977 Waugh Switch Rd, Big Island, VA 24526. *Jefferson's retreat home and farm in Bedford County, VA; uncovering evidence of life and work on the plantation 200 years ago*. **k4cq.n4kss.net**

Oct 9, 1400Z-1800Z, W9LJ, Akron, OH. Lake County Amateur Radio Club. Dillinger Days. 14.235 7.205. Certificate. Lake County ARC, PO Box 90, Crown Point, IN 46308. **www.lakenetnwi.net/member/lcarc/index.html**

Oct 9, 1600Z-2359Z, NI6IW, San Diego, CA. USS *Midway* (CV41) Museum Radio Operations Room. Birthday United States Navy 1775. SSB 14.320 7.250 D-STAR 012C 2 m/70 cm SOCAL rptrs. QSL. USS *Midway* Museum Radio Room, 910 N Harbor Dr, San Diego, CA 92101. **kk6fz@arrl.net**

Oct 9-Oct 10, 1000Z-1600Z, W1W, New Milford, CT. Northville Amateur Radio Association. 49th Annual Warren Fall Festival. 14.225. Certificate. Mike Walters, W8ZY, 32 Chapin Rd, New Milford, CT 06776. **www.na1ra.com**

Oct 9-Oct 10, 1322Z-1322Z, W4UCJ, Thomasville, GA. Thomasville Amateur Radio Club. 43rd Annual Thomasville Fly-In. 28.400 21.300 14.250 7.250. QSL. Mike Brown, 927 Enon Rd, Coolidge, GA 31738. **thomasvilleamateurradioclub.com**

Oct 9-Oct 10, 1400Z-0200Z, K7LHC, Lake Havasu City, AZ. London Bridge Amateur Radio Association. Lighthouse Replicas Built on Lake Havasu for Navigation. 14.253 7.253 3.953. Certificate & QSL. LBARA, PO Box 984, Lake Havasu City, AZ 86405. **www.lbara.net**

Oct 9-Oct 10, 1300Z-0100Z, W9FEZ, Fort Wayne, IN. Mizpah Shrine Radio Unit. Mizpah Shrine 100th Anniversary Special Event Station. 28.400 21.350 7.200. Certificate. Mizpah Shrine, Attn: Radio Unit, 407 West Barry St, Fort Wayne, IN 46802.

Oct 9, 1400Z-2200Z, WØCGM, Newport, MN. South East Metro Amateur Radio Club. Milwaukee Road Railroad. 14.250 7.250. Certificate. Steve Howard, ABØXE, 1432-5th Ave S, South Saint Paul, MN 55075. *Operating from restored 104 year old Milwaukee Railroad Dispatch Tower*. **www.semarc.org**

Maty Weinberg, KB1EIB ♦ Special Events ♦ events@arrl.org

Oct 9-Oct 10, 1300Z-2300Z, KD5C, Midland, TX. Midland Amateur Radio Club. Commemorative Air Force Airshow. 21.300 21.031 14.250 14.031. Certificate. John Wilder, 4405 Lennox Dr, Midland, TX 797097. Online Certificate. Oct 9 1300 to 2359 UTC; Oct 10 1300 to 2300 UTC. *Commemorating FIFI's return to the air after major overhaul. Check Web site for details.* **www.w5qgg.org**

Oct 9-Oct 17, 1500Z-2000Z, K1W, Newburyport, MA. Pentucket Radio Association. National Wildlife Refuge Week. 18.125 14.265 7.240 3.880. QSL. Pentucket Radio Association, 25 Elm Park, Groveland, MA 01834.

Oct 10-Oct 16, 1500Z-2300Z, N6W, Delano, CA. Area amateurs. National Wildlife Refuge Week. 28.400 14.240. QSL. Terry Godley, 2701 Fordham St, Bakersfield, CA 93306. *Operating from Kern County National Wildlife Refuge in Delano, CA,* **www.nwrweek-radio.info**. *SAE only, will QSL thru Bureau or direct, no postage needed.* **www.n6aj.com**

Oct 15-Oct 17, 1600Z-2400Z, KL1YY, Homer, AK. Alaska Hams & Friends Of Alaska National Wildlife Refuges. Alaska Maritime National Wildlife Refuge 2010 Wildlife Refuge Week. 21.310 14.265 7.240 3.910. Certificate & QSL. Marvin Baur, 4275 Kachemak Way, Homer, AK 99603. *Operating from Refuge Headquarters & Visitor Center at Homer, AK*. **kl1yy@yahoo.com**

Oct 16, 1300Z-1900Z, WV8BD, Beaver, WV. Black Diamond Amateur Radio Club. 31st Annual West Virginia Bridge Day Celebration. 14.170 7.145. Certificate & QSL. John Hymes, W8HY, PO Box 607, Beaver, WV 25813. **jdhymes@suddenlink.net**

Oct 16, 1500Z-2300Z, K9P, Trempealeau, WI. Riverland Amateur Radio Club & Winona Amateur Radio Club. National Wildlife Refuge Week — Trempealeau NWR. 14.265 7.225. Certificate. Bob Seaquist, 202 Zephyr Cir, La Crosse, WI 54601. *National Wildlife Refuge Week radio operation.* **www.nwrweek-radio.info**, **bobseaquist@rocketmail.com**

Oct 16-Oct 17, 1200Z-1200Z, K2BSA/2, Brookhaven, NY. Great South Bay Amateur Radio Club. Boy Scouts America, Suffolk County Council Camporee, 100 Years of Scouting. 14.255 14.070 7.180 3.925 SSB CW PSK. QSL. Carl Soranno, 27 Gamecock Ln, Babylon, NY 11702. *Also participating in JOTA*. **www.gsbarc.org**

Oct 16-Oct 17, 1400Z-1900Z, WC5C, Fort Worth, TX. Tri-County Amateur Radio Club. Activation of Goat (Monster) Island TX060L. 28.350 21.350 14.250 7.250. QSL. David Johnson, KB5YLG, 820 Wood Ln, Azle, TX 76020. **wc5c@arrl.net** *or* **www.wc5c.org**

Oct 17, 1600Z-2000Z, ND8GA, Gates Mills, OH. Gilmour Academy Amateur Radio Club. Gilmour Academy celebrates today's canonization of Br Andre Bessette, CSC, as the first Saint in the Congregation of Holy Cross. 146.55/S 21.327 14.227 7.227. Certificate. Br Ken Kane, CSC, KG8DN, Gilmour Academy, 34001 Cedar Rd, Gates Mills, OH 44040. *We may move around among these four listed frequencies during the event.* **kanek@gilmour.org**

Oct 18-Oct 23, 1600Z-2200Z, WØA, St Louis, MO. St Louis & Suburban Radio Club. 45th Anniversary of the St Louis Gateway Arch. 14.245 14.045 7.245 7.045. Certificate & QSL. Mark Biernacki, 31 Kenton Dr, Saint Louis, MO 63132. **www.slsrc.org**

Oct 21-Oct 23, 1800Z-2200Z, W4Z, Virginia Beach, VA. Coast Guard Auxiliary. Coast Guard Auxiliary 71st Anniversary. 21.340 14.265 7.240. QSL. Robert Dunnington, KI4VCT, 1110 Atlantic Ave, Virginia Beach, VA 23451. **QE@flotilla51.net**

Oct 23, 0000Z-2300Z, W4D, Virginia Beach, VA. US Coast Guard Auxiliary D5-SR. US Coast Guard Auxiliary 71st Anniversary. 14.070 7.035. QSL. Richard D. Dunnington, W4RDD, 1200 Atlantic Ave, Virginia Beach, VA 23451. *All contacts including DX receive Special Event QSL card postage paid.* **www.qrz.com/db/W4RDD**

Oct 23, 0000Z-2359Z, K2R, Bellmore, NY. US Coast Guard Station Jones Beach. United States Coast Guard Auxiliary 71st Anniversary. 14.225 7.185 14.030 7.030. QSL. Ronald A. Tomo, KE2UK, 1049 Barbara Ct, Bellmore, NY 11710. **rtomo@optonline.net**

Oct 23, 0300Z-2000Z, N1P, Turners Falls, MA. Area amateurs. Franklin County Pumpkinfest 2010. 20 40 m. QSL. Franklin County Pumpkinfest — N1P, c/o Richard H. Wheeler, N1KXR, PO Box 482, Northampton, MA 01061. *Check Web site for secondary frequencies*. **n1kxr.webs.com/pumpkinfest_2010.htm**

Oct 23, 1200Z-2000Z, W1Q, Fall River, MA. USCG Auxiliary. USCG Auxiliary Radio Day. 2010.14.230 21.350. QSL. Larry Beavers, 297 Clarkson St, Fall River, MA 02724.

Oct 23, 1200Z-2300Z, KG4FXV, Smyrna, GA. US Coast Guard Auxiliary Flotilla 2-2 District 7. Commemorating US Coast Guard Auxiliary 71st Anniversary. 28.449 21.339 14.259 7.239. QSL. Jim Farley, KG4FXV, PO Box 641, Smyrna, GA 30081. **jimfarley@att.net**

Oct 23, 1300Z-2100Z, K3K, Essex, MD. US Coast Guard Auxiliary. Commemorating 71st Anniversary of USCG Auxiliary. 28.355 21.380 14.290 7.265. QSL. Stanley J. Krol, 614 George Ave, Essex, MD 21221. **sjkrol@verizon.net**

Oct 23, 1400Z-2200Z, K3G, Media, PA. US Coast Guard Auxiliary. US Coast Guard Auxiliary 71st Anniversary. 28.330 21.375 14.270 7.270. QSL. Dan Amoroso, 196 Dam View Dr, Media, PA 19063.

Oct 23, 1400Z-2300Z, K2G, Babylon, NY. USCG AUX District 1sr HF TEAM. US Coast Guard Auxiliary 71st Anniversary. 28.360 21.375 14.278 7.258. Certificate & QSL. KA2HHO, PO Box 92, Babylon, NY 11702.

Oct 23, 1400Z-2300Z, N4U, Buchanan, TN. US Coast Guard Auxiliary. US Coast Guard Auxiliary Special Event Radio Day. 28.385 21.340 14.268 7.278 PSK 20 m. QSL. William Husfield, 4156 Barge Island Rd, Benton, KY 42025. Operating from USCG operations center at Buchanan,TN on the Tennessee River. Cutter base for CGC Cimarron & CGC Chippawa. **cdpd01@mchsi.com**

Oct 23, 1400Z-2300Z, W8E, Milford, OH. US Coast Guard Auxiliary Division 5 8ER. US Coast Guard Auxiliary 71st Anniversary. 28.405 21.405 14.345 7.240. Certificate. David Stroup, 6095 Drum Hill Ln, Milford, OH 45150.

Oct 23, 1400Z-2300Z, KB9QMH, Milwaukee, WI. United States Coast Guard Auxiliary. 71st Anniversary of the Coast Guard Auxiliary. 28.837 21.303 14.355 7.226. Certificate. Mike Wiedel, 646 N 47th St, Milwaukee, WI 53223.

Oct 23, 1400Z-2300Z, N3G, New Castle, DE. US Coast Guard Auxiliary. U.S. Coast Guard Auxiliary 71st Anniversary. 14.070 7.035. QSL. William G Begley, 3 Pancoast Ave, Aston, PA 19014.

Oct 23, 1700Z-2359Z, K7A, Juneau, AK. Juneau Auxiliary Flotilla. Coast Guard Auxiliary Anniversary. 14.280 14.070 PSK-31. QSL. Juneau Auxiliary Flotilla, PO Box 210574, Auke Bay, AK 99821.

Oct 24, 1313Z-1717Z, KAØKWU, Salina, KS. Kansas Wesleyan University. Kansas Wesleyan University's 125th Anniversary and KAØKWU's 50th Anniversary. 14.250 14.240 7.110 7.090. QSL. Tanner Colvin, KDØIRW, 2634 Robin Rd, Salina, KS 67401. **geekoc.com**

Oct 24, 1600Z-2000Z, K2A, Sandy Hook, NJ. Roseland Amateur Radio Club. Fort Hancock Establishment Day. 14.270 7.270. QSL. Roseland ARC, 300 Eagle Rock Ave, Roseland, NJ 07068. *Operating from Sandy Hook Lighthouse, USA-731.*

Oct 23, 0800Z-2000Z, W8R, Greenwood, IN. US Coast Guard Auxiliary. Coast Guard Auxiliary Radio Day, 71st Anniversary. 28.305 21.362 14.265 7.257. QSL. Wm J. Reisa, 35 Hazy Ct, Greenwood, IN 46142. *Find out what the Coast Guard Auxiliary is all about and how you could become a part of this great organization.* **w4cga@msn.com**

Oct 23-Oct 24, 1400Z-2100Z, NB9QV, Manitowoc, WI. USS Cobia Amateur Radio Club. Commemorating 28 subs built during WWII in Manitowoc, WI. 14.250 7.250. Certificate & QSL. Fred Neuenfeldt, W6BSF, 4932 S 10th St, Manitowoc, WI 54220. **www.qrz.com/NB9QV**

Oct 29-Oct 30, 2200Z-1700Z, W9BSP, Olathe, KS. Johnson County Radio Amateurs Club. Ensor Museum Special Event. 14.259 7.259 3.959. QSL. Brian Short, 12170 S Prairie Creek Pkwy, Olathe, KS 66061. **www.w0erh.org**

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, use the ARRL Special Events Listing Form, at **www.arrl.org/special-events**. A plain text version of the form is also available at that site. You can also request a copy by e-mail or send a self-addressed, stamped envelope (SASE) (Special Requests, ARRL, 225 Main St, Newington, CT 06111; write "Special Events Form" in the lower left-hand corner.) Off-line completed forms can be mailed, faxed (Attn: Special Events) or e-mailed.

Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; a special event listing for **Dec** *QST* would have to be received by **Oct 1**. In addition to being listed in *QST*, your event will be listed on the *ARRLWeb* Special Events page. Note: All received events are acknowledged. If you do not receive an acknowledgment within a few days, please contact us.

Special Events listed in this issue include events received through Aug 10. You can view all received Special Events at **www.arrl.org/special-events**. QST

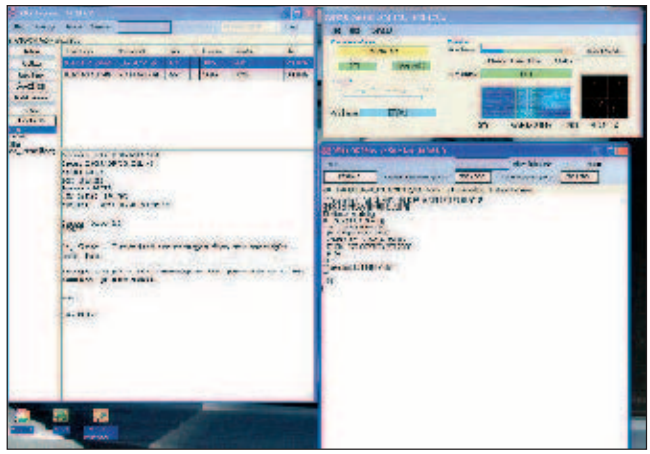
WB8IMY

ECLECTIC TECHNOLOGY

WINMOR at Last: No Hardware Needed

If you frequent the ARRL Web site, or read *The ARRL Letter*, you may have seen the story about the debut of the *WINMOR* software TNC as part of the latest Winlink 2000 *RMS Express* software suite. As one who participated in *WINMOR* beta testing, I can honestly say that its public release marks a milestone in Amateur Radio HF digital communications.

When the idea was introduced in 2008 at the ARRL/TAPR Digital Communications Conference, the response was understandably skeptical. For years hams had been pursuing the goal of creating a *Windows* sound card application that could compete with PACTOR in terms of efficiency and ease of use. Some believed this was next to impossible because of timing issues within *Windows*. In contrast, PACTOR is implemented in dedicated hardware modems, so it isn't encumbered by relatively sluggish operating systems.



Making a *WINMOR* connection to KN6KB on 40 meters during beta testing last fall.

It took a couple of years, but Rick Muething, KN6KB, and Vic Poor, W5SMM, finally made it happen. What they've created is a clever piece of software on par with almost anything you'll encounter in the commercial world. For instance, *WINMOR* is able to grab the latest propagation data and calculate which Winlink 2000 Radio Message Server is most likely to hear your signal. If your radio features computer control capability, a single mouse click will instantly tune your rig to the desired frequency. There is a built-in "busy detector" to keep your radio from transmitting if another conversation is already taking place on the frequency.

While on vacation this summer, I set up a mobile whip antenna on my hotel balcony and coupled it to my HF SSB transceiver. I was only running about 50 W PEP, yet I was able to use *WINMOR* and my laptop computer to access Rick's 40 meter Winlink server. It was fascinating to watch *WINMOR* "talking" to KN6KB's station, shifting modulation schemes automatically as conditions varied. Within a few minutes I had sent a couple of e-mails and downloaded several others. I accomplished all this *without* a $1000+ PACTOR box.

I have nothing against PACTOR modems, by the way. The quality of these devices is top notch, which is part of the reason they are so expensive. But if you want to tap into the Winlink 2000 network on HF, *RMS Express* with *WINMOR*, at a suggested donation of $39, is difficult to beat.

You'll find *RMS Express* on the Winlink 2000 Web site at **www.winlink.org**. It is worth noting that the *WINMOR* TNC helper application is also available separately to third party developers who wish to add the *WINMOR* protocol to their products, so we may be seeing it in other software packages as well. Maiko, VE4KLM, is already working on interfacing the *WINMOR* TNC code into *JNOS 2.0*. See his Web site at **www.langelaar.net/projects/jnos2/**.

How about a *WINMOR* app for the iPod and iPad? Hmm. . .

Tracking Bees at 378 MHz

How small can a transmitter "be"? How about small enough to be carried by a bee?

In Central America scientists are studying the pollination activities of orchid bees (*exaerete frontalis*) by equipping them with ultra-miniature 378 MHz beacon transmitters. The transmitter/battery combos weigh 300 milligrams, which doesn't pose too much of a flight challenge for these particular bees.

According to Martin Wikelski, director of the Max Planck Institute for Ornithology, "By following the radio signals, we discovered that male orchid bees spent most of their time in small core areas, but could take off and visit areas farther away. One male even crossed over the shipping lanes in the Panama Canal, flew at least 5 kilometers, and returned a few days later."

The team used handheld Yagi antennas and sensitive receivers, conducting what hams would easily recognize as a UHF *foxhunt*. Tracking a tiny moving "fox" in a jungle environment, however, is certainly impressive.

Upgrading GPS

Like the Internet, the Global Positioning System began as a tool for the military. And like the Internet, GPS has since exploded into an extremely popular technology for consumer use. GPS receivers are standard equipment in automobiles these days; even my pizza delivery guy navigates the streets of our town with GPS. Of course, GPS is also at the core of the Automatic Packet Reporting System (APRS) that thousands of hams use every day.

GPS uses a constellation of 24 satellites orbiting approximately 11,000 miles above the surface of the Earth, and the orbits are arranged so that at any time there are always at least a half dozen or so satellites above the horizon. GPS receivers pinpoint their locations by working out exactly how far they are away from at least three or four of these satellites based on an analysis of extremely accurate time information supplied by atomic clocks within the satellites.

But the United States GPS satellite fleet is aging. So, as part of the $8 billion upgrade, the satellites will be replaced individually over the next few years. Boeing Space and Intelligence Systems and Lockheed Martin are constructing 30 new satellites between them, which will allow for six spare satellites to be available if needed. The new satellites will eventually triple the available signals. The equipment on the satellites will include even more accurate atomic clocks able to keep time to a fraction of a billionth of a second.

The upgraded system will significantly increase position accuracy. It will also make the system faster, and there will be provisions to prevent disruptions such as accidental jamming. QST

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

K2TQN

VINTAGE RADIO

100 Years Ago this Month — Jack Irwin and the Airship *America*

This month I am continuing the story of Jack Irwin's adventure on the Airship *America*. Last month I discussed the airship itself and how it came to be. This month we will lift off from New Jersey for the transatlantic crossing attempt.

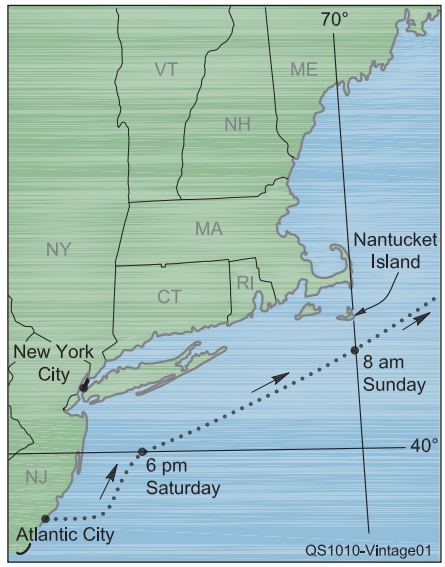
Continuing from Jack's report: "On the morning of October 15, 1910, I was awakened about 4 o'clock and told to go aboard. There was not a breath of wind. A dense fog dripped down over everything. The crew of the ship consisted of Messrs. Walter Wellman, commanding; Melvin Vaniman, chief engineer; Louis Loud and Fred Aubert, assistant engineers; Murray Simon, navigator; and the writer. With the help of a few hundred police and firemen we proceeded to launch the largest non-rigid airship ever constructed. At 8 AM all was in readiness and the crew climbed aboard. The last to embark was our mascot, a pretty foundling kitten that had been a pet around the hangar. The crew had jokingly told visitors that the kitten was going along with us and just as the word to "let go" was passed, somebody in the crowd threw the kitten into the lifeboat where I had taken my station. Up we went and the cat was one of us! Kitty, at first, appeared scared and raised an awful 'holler,' but he (yes, it was a Tom!) soon settled down. In the long days and longer nights that followed, I will admit I was grateful for that kitten's affectionate company. It was always to be found cuddled up to me in the wireless corner of the boat.

"We did not start our motors immediately, but preferred to be towed out through the narrow entrance called 'The Inlet' at Atlantic City. Reaching the open water our tug cast off our line and we started our engines. We were flying at an altitude of only 200 feet, with a portion of the equilibrator trailing on the surface of the ocean. This low altitude was due to the heavy cargo we carried and the fact that the morning was cold and wet. The moisture of the fog contracted the hydrogen with a consequent loss of lifting capacity."

Not everyone was happy having the cat aboard. His name was Kiddo. He was at first caught and placed into a sack with a rope attached and was lowered down toward the tug's deck. But by then the wind was pushing the airship out to sea faster than the tug could go and it wasn't able to keep up. So rather than drop him into the water, he was pulled back up to become a member of the crew.

HARPERS MAGAZINE 1910

This is an artist's conception of the launch of the *America*. Police and firemen help pull the *America* out of the hangar.

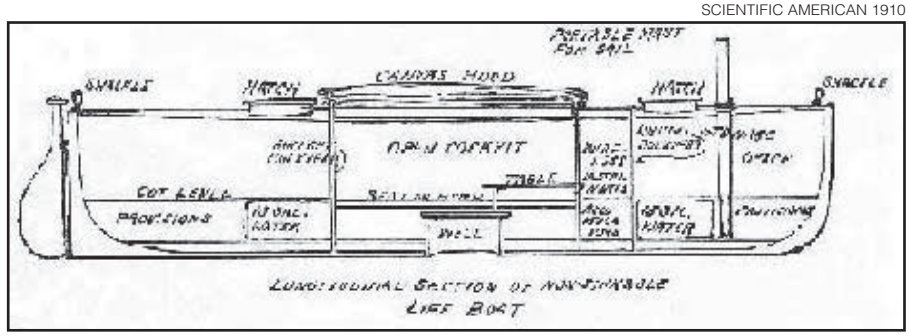


This is a map of the flight of the *America* during its first day in the air.

LIBRARY OF CONGRESS

Engineer Melvin Vaniman and Kiddo, the adopted stray cat.

SCIENTIFIC AMERICAN 1910



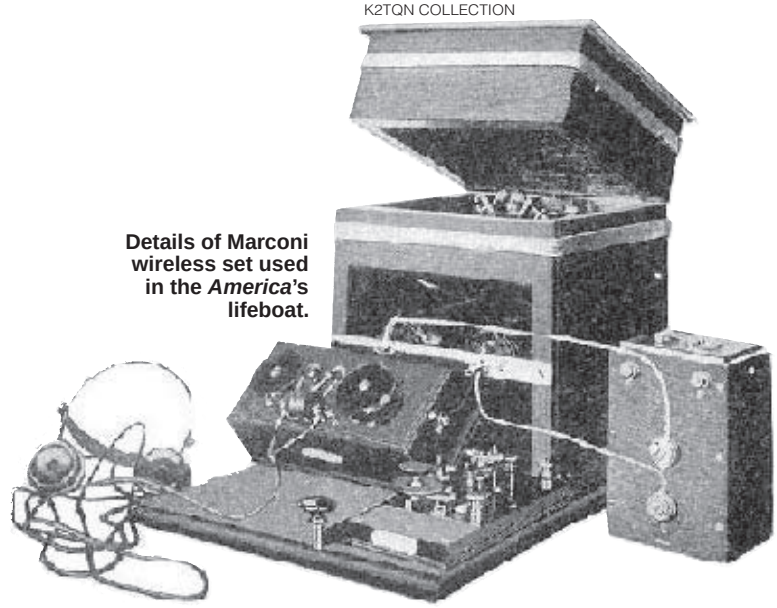
Schematic drawing of the lifeboat.

John Dilks, K2TQN ♦ 125 Wharf Rd, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

SCIENTIFIC AMERICAN 1910

An artist's conception of airship *America* under way.

K2TQN COLLECTION



Details of Marconi wireless set used in the *America*'s lifeboat.

Irwin continues: "During the first hour of the flight I was busy making various adjustments. Listening in, I could hear 'Bobby' Miller, at the old United Wireless station 'AX,' on Young's Pier at Atlantic City calling 'W,' the call letter assigned to the *America*. The signals dissipated any doubts I may have had regarding the receiver.

"For months we had discussed the possibility of sparking in the rigging and the risk of burning a hole in the fabric of the balloon, so when the moment came to 'sit' on the key of the transmitter, I think I can be pardoned for my nervousness. I am sure I experienced the moment that a suicide passes through when he is about to pull the trigger. Stationing the crew in different parts of the ship to report any sparking, I threw in the sending switch and answered Miller's repeated calls. I shall never forget my expansive satisfaction when he came back and told me my signals were clear and strong. I had opened the coupling of the transmitter for a minimum radiation; therefore, with only a few miles separating us from the nearest station, I had established radio communication for the first time between a ship of the air and the earth. I had plenty of power in reserve and knew that we had reliable communication within certain limitations. Mr. Wellman, during the time I had been engaged in these preliminary tests, had been sitting at my elbow, anxiously waiting the result. But as he afterwards wrote in his book describing the trip, he could tell by the pleased grin on my face that we had succeeded in establishing communication.

"By reference to my log, I find that communication was established with AX at 10:30 AM and that at 11:05 AM I had sent eight messages to Miller; At 12:30 PM I made an entry of receiving two messages from AX, while at 1:30 PM, there was this notation in the log, 'Received one message and sent two to Atlantic City. Everything going fine, sensation very fine, all happy.' Thus was the first airship traffic conducted, and it had soon developed into the ordinary routine. I had been very busy, these hours, without time to reflect upon my strange surroundings or give thought to the unusual experience of flying. I have spent hundreds of hours in the air since and been asked innumerable times what my first sensations were, but I can truthfully say I cannot recall them, if I had any. My only anxiety was regarding the success of the installation of wireless; once that was assured I felt nothing but elation. While I was busy at the radio key, successfully maintaining constant touch with Atlantic City, things were not going so smoothly with the engineering department of the ship.

"After several hours in the air the dense fog in which we started condensed upon the huge surface of the dirigible, adding a great weight to an already overloaded ship. Instead of steadily rising, as the heat of the sun increased and expanded the gas, we slowly descended and lost altitude. We were compelled to jettison some of the cargo. Due, also, to the lack of trial flights, the engines required tuning and we proceeded very slowly during the morning of the first day. Several times during that morning either one or the other of the engines had to be stopped, caused by sand in the bearings. Our hangar at Atlantic City was in a most exposed spot where every wind that blew brought clouds of sand. However we continued to make progress.

"At 3:30 PM on that first day, I received my last message direct from Atlantic City. At that time I find that a notation in the log states that I was no longer able to hear him, because his signals were weak. The motors made a fearful noise. The only means I had of deadening the sound of those big engines was the slight protection provided by the cotton battens, I had fashioned. From then until 8 PM, with the exception of intermittent motor trouble, the voyage was uneventful. At that time, still in a dense fog, we almost ran into a large sailing ship. So close did we pass that we could see the crew running round the decks. Later we passed very close to a large steamer, which we eventually learned was the *COAMO*. From time to time I tried to get into communication with various shore stations, without success. It is quite possible that some of them answered me, but the engines killed anything but the very strongest signals."

An Engine Gone Bad

"During the night, our best engine had to be stopped, permanently out of commission. It appears that the bearings of the propellers had broken, causing one of them to wobble alarmingly. Up to this time there had been no wind at all, but now it began to freshen up a bit which drove us eastward, but in a northerly leeway. The fog still persisted and we were compelled to jettison some fuel to prevent descending into the sea. Another danger which became apparent when night fell was the stream of sparks from the exhaust. We were afraid that they would cause an explosion and Wellman wanted to stop the remaining engine. Vaniman, however, talked him out of this, explaining that we had been running all day and that, if we stopped the engine we would undoubtedly drift over Long Island. Furthermore, the balloon by this time was so saturated with water from the condensed fog that we ran little risk of fire. So, through all that night we preceded under one engine. The engine that had gone bad on us was the one to which the dynamo was belted and that meant that we would be unable to charge our battery. With this in mind, I began to hoard the battery juice and used the wireless only when positive that there was something to use it for: As subsequent events proved, it was well I did."

The *America*'s story will be continued next month. More photos are posted at **www.k2tqn.com**. — *K2TQN*

W1GHZ

MICROWAVELENGTHS

Combining Microwave Amplifiers

At microwave frequencies, it is hard to generate high power on an amateur's budget. It's not necessary for most contacts, but some things, like EME, need a big signal — either high power or a really big antenna.

At lower frequencies, we can use a big tube — Russian tubes have become available at reasonable prices. But big tubes require serious high voltage, to which I've developed a bit of an allergy. With solid-state devices, and sometimes with tubes, it is much more economical to combine smaller devices than to find a big one.

One obvious way to do this is to just put devices in parallel. With tubes at lower frequencies, this works quite well — if the output impedance of a tube is perhaps 4000 Ω, two in parallel will be 2000 Ω, which is closer to 50 Ω and thus easier to match. The capacitance will be twice as high, but this is manageable at lower frequencies, even as high as 1296 MHz.

On the other hand, transistors operate at low voltages and high currents, which equals low impedance, perhaps a few ohms. Paralleling them directly makes the impedance twice as low and twice as hard to match to 50 Ω (which we must to get the power out of the transistors).

At VHF and UHF frequencies, transistors are sometimes paralleled in a push-pull amplifier, using ferrite or air transmission-line balun transformers to operate the transistors 180° out of phase. Done properly, the transformer can effectively put the impedance of the two transistors in series, doubling the total impedance. Transformers often use the Guanella or Ruthroff configurations. Figure 1 shows a 144 MHz amplifier from IØJXX with a matched pair of MOSFETs, which uses a ferrite transformer at the input and air-core transmission-line transformers at the output.

A Better Way

At microwave frequencies, these transformers are hard to realize. A more effective technique is to combine two identical amplifiers. A major advantage is the opportunity to get each amplifier working individually first, then concentrate on just the combining.

There are three types of splitters and combiners commonly used: balun, Wilkinson and quadrature hybrid combiners. A splitter and a combiner are the same device, used in pairs. As a splitter, it splits a signal into two equal, half-power signals to drive two amplifiers. Turned around, it combines the output from the two amplifiers to double the total power. Frequently, the splitter and combiner are identical, but not necessarily, since the splitter may be handling much less power.

A balun is a transmission-line transformer that converts a single-ended, or "unbalanced," transmission line signal (coax, for example) into a "balanced" signal — two equal signals 180° out of phase — the same balun used in antennas. A balun can be designed to also provide impedance transformation, but the version we discuss here is 50 Ω at all ports. Then, two identical amplifiers connected between a pair of baluns form a push-pull amplifier, like Figure 1. One disadvantage is that the balun provides no isolation between the two amplifiers; another is that it is difficult to make a planar balun, so there are few printed-circuit baluns.

The Wilkinson combiner, shown in Figure 2, converts the single-ended signal into two equal signals in phase and adds an isolation resistor between the two signals. This resistor absorbs any difference in power between the two signals. Two identical amplifiers connected between a pair of Wilkinson combiners are effectively in parallel but with isolation. The drawing shows the input divider — just reverse it to

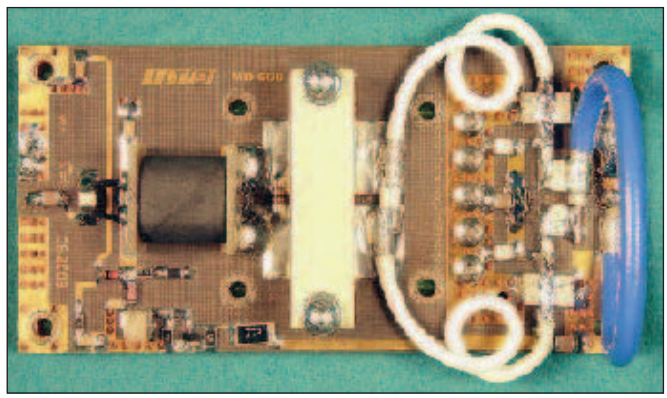


Figure 1 — A VHF amplifier that combines two MOSFET transistors.

Figure 2 — Sketch of a Wilkinson combiner or divider.

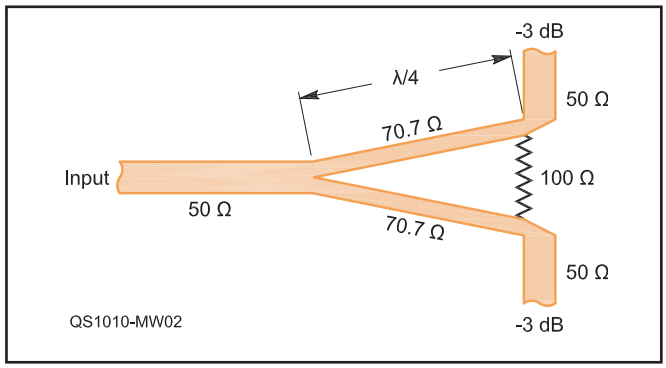
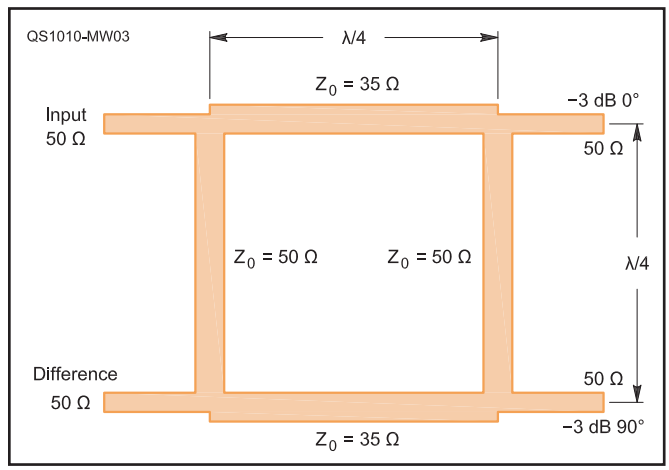


Figure 3 — Sketch of a branch-line quadrature hybrid combiner or divider.



Paul Wade, W1GHZ ♦ 161 Center Rd, Shirley, MA 01464 ♦ w1ghz@arrl.org

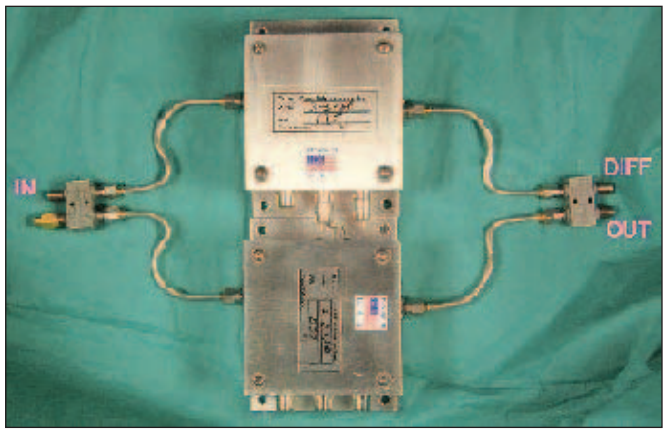


Figure 4 — Two 10 GHz power amplifiers combined with quadrature hybrids.

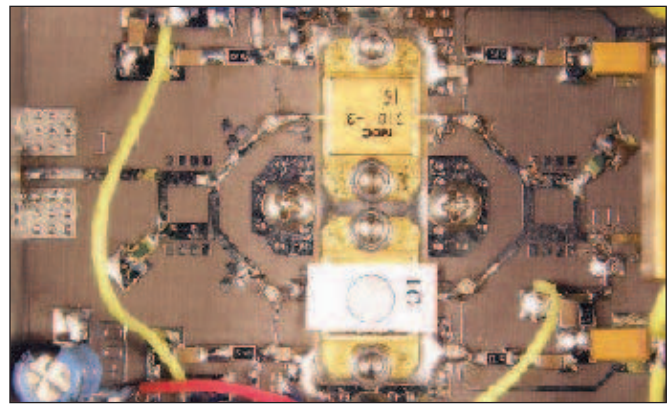


Figure 5 — Each 10 GHz amplifier combines two transistors with branch-line quadrature hybrids.

make an output combiner. Any slight difference between the amplifiers will result in drive power lost in the resistor on the input side or output power wasted in the resistor on the output side. The disadvantage of the Wilkinson combiner is that it requires a floating 100 Ω microwave resistor capable of handling the full power of one amplifier — if an amplifier fails, the resistor must absorb the full output power of the other amplifier.

The quadrature hybrid has four ports: a combined port, two ports that are each ½ power (−3 dB) but 90° out of phase (quadrature) and a difference port. As a divider, power into the combined port is split into two equal signals 90° out of phase, but any reflected power at these ports is rejected to the difference port. A popular version is the branch-line quadrature hybrid, shown in Figure 3; other versions are also used. As a combiner for the outputs, the hybrid is reversed: the power into the two −3 dB ports adds together at the combined port if the powers are equal and 90° out of phase and any difference in power or phase error results in power at the difference port.

So a quadrature hybrid acting as an input divider for two identical amplifiers provides the phase difference needed for the quadrature hybrid acting as an output combiner. If the amplifiers have an imperfect input VSWR, the reflected power goes to a 50 Ω load at the input difference port and does not affect the driver stage. Any difference in output power or phase appears at the output difference port and goes to another 50 Ω load.

Two amplifiers being combined must be equal in both gain and phase. Equal phase is difficult with multistage amplifiers and very difficult with tube amplifiers — tuning adjustments can cause a large change in phase. Phase is much more difficult to measure than power or gain. The best choice is a single-stage transistor or FET amplifier with identical devices and similar matching circuits.

With the quadrature hybrid, we can compensate for small differences between the two amplifiers even if we can only measure power and we don't have to make accurate measurements. Figure 4 shows two 10 GHz power amplifiers from Down East Microwave (**www.downeastmicrowave.com**) combined with surplus quadrature hybrids rated for 7 to 12 GHz. Note that the input and output connections are at the opposite corners of the quadrature hybrids, to make the 90° phase differences add up correctly.

The amplifiers and hybrids all have SMA connectors, so everything is hooked up with short semirigid coax cables — the two input lengths and the two output lengths should be equal. To test for balance, we apply 10 GHz power and note the power at the two difference ports. If there is power appearing at the output difference port, the two amplifiers are not identical. Then we replace one input coax with one that is slightly longer or shorter than the other and power up again. If the output difference power decreases, we are going in the right direction; otherwise, switch the input coax cables. What we are doing is changing the relative phase of the two amplifiers slightly, looking for improvement. If we find that the output difference power decreases, indicating better overall phasing, but the input difference power increases, indicating worse input phasing, then we should be adjusting output cables instead.

The difference in cable length for each trial should be 10 or 15 electrical degrees — about 1/32 inch at 10 GHz, proportionally longer at lower frequencies. We can make semirigid cables of the needed lengths as described in the last Microwavelengths and bend them to fit.[1]

Does it Work?

Is this a good way to get more power or just blow up some expensive transistors? Last summer, I decided to try for increased power for the 10 GHz contest. I had two power amplifiers from Down East Microwave and found a couple of surplus quadrature hybrids on eBay at a reasonable price. For an initial test, I selected four semirigid cables of equal length, mounted the amplifiers on a heat sink and wired them up as shown in Figure 4. A complete packaged configuration might use shorter cables.

I had tested the amplifiers individually first. Each delivered about 8 W output with 2 W of drive and drew about 2.1 A at 13 V. I also tested the quadrature hybrids and found them to have low loss, about 0.3 dB. With cable loss, I could hope for perhaps 14 W from the combined amplifiers.

When I tested the pair, the output was only about 10 or 11 W. The difference power from the outputs was about 0.15 W — not perfect, but pretty close. The input reflected power was also small. The problem was not enough drive from the transverter — about 4.5 W would be needed for full output and the transverter output is less than 3 W.

So the combined amplifier works, but the system doesn't yet. I'm confident that it would provide good power with more drive and I may do it someday if I try EME on 10 GHz. For portable operation, the extra output power is not worth the additional dc power — 10 W is only 1 dB more than 8 W, but twice as much dc power is required from the battery. This is a really poor tradeoff for portable operation. I chose to use only a single amplifier, so my power output is now about 7 W at the antenna, 4 dB better than the transverter alone.

Summary

My 10 GHz example suggests that combining amplifiers with low gain provides limited benefit — the drive power needed may require a third amplifier. Devices with higher gain can provide much better results — VHF and UHF amplifiers with 20+ dB of gain are often combined to provide several hundred watts with only a few watts of drive; the amplifier in Figure 1 can produce 500 W with only 3 W of drive. High power devices have high catalog prices but so do large tubes. So be on the lookout for a good deal or a surplus amplifier containing usable devices.

All photos by Paul Wade, W1GHZ. QST

[1] P. Wade, "Microwavelengths," *QST*, Apr 2010, pp 96-97.

OP-ED

The Radio Amateur is *Considerate...*

David Coursey, N5FDL

So begins *The Amateur's Code*, originally written in 1928 by Paul M. Segal, W9EEA. Its other elements include "Loyal," "Progressive," "Friendly," "Balanced" and "Patriotic."

I first read the *Code* long before I actually became a licensed amateur, back when my uncle, Russ Van Kirk, K5OSH, introduced me to his Swan 500 transceiver and the wonders of talking all around the world.

I was about 12 at the time, making it about 1971, and *The Amateur's Code* turned up in an ARRL book I purchased at Radio Shack. How things have changed.

You don't see it referenced so often these days, but while some things have changed, *The Amateur's Code* hasn't. The values it stresses are timeless, but what do they mean today?

Considerate — There have always been and always will be inconsiderate operators. Much of it is unintentional or the result of frustration, but some of it is intentional and malicious. Hopefully, FCC enforcement will remain strong and the worst offenders will be taken off the air. Meanwhile, the rest of us just need to turn the dial when inconsiderate operators appear.

It is up to each of us to encourage considerate operation and practice it ourselves. People really are listening to our frequencies. Let's all be good examples and make the bad apples really stand out. Don't let our bands become "run down" by a lack of good manners.

Loyal — What have you done for Amateur Radio lately? How many club meetings have you attended? Have you joined the ARRL Diamond Club this year? If every League member was active in their local club(s), we'd all have a lot more fun and Amateur Radio would be tremendously more powerful. What is keeping you at home?

Progressive — Most people think new modes, anything digital and the cusp of technology when they read this. As an emergency guy, I read it as a mandate to keep my training up-to-date and accept the new challenges our served agencies throw at us. That requires both progressive technology and progressive thought as to how it is used.

Friendly — Hams are a friendly bunch, but we are also a little cliquish. Not everybody will get along and some folks just need to be kept separate. Still, try reaching out to people you don't normally speak to. Make the first effort to become friends. Don't let yourself be the reason that "they" will not become friends. Reach across the lines.

Balanced — This is the part of the *Code* that I and many other amateurs break by doing "radio stuff" when we should be doing something else. Fortunately, most hams have very forgiving spouses — some licensed — and a few have understanding bosses. Still, unless there's an emergency, this is a hobby and should be accounted for as such when planning our time.

Patriotic — Ham radio operators love their country. We may disagree on the details, but hams of all political bents are patriotic in a time when patriotism has gone out of fashion. Hams serve their communities and their country in many ways. We do it because we want to, but also because it fulfills the bargain we made with our fellow Americans for use of so many wonderful frequencies. Is this a great country or what?

The Amateur's Code is as valid today as it was when it was written, more than 80 years ago. Most hams follow it because of the good examples previous generations set. But the *Code* needs to live within all amateurs, and if this little commentary has encouraged you to think about it, that's just what I hoped it would do.

ARRL life member David Coursey, N5FDL, is Emergency Coordinator of San Joaquin County (CA) ARES. He hosts the popular **N5FDL.com** *blog about Amateur Radio and Emergency Communications. He can be reached at* **n5fdl@arrl.net**.

Op-Ed Policy

The purpose of Op-Ed is to air member viewpoints that may or may not be consistent with current ARRL policy.

1) Contributions may be up to 900 words in length.

2) No payment will be made to contributors.

3) Any factual assertions must be supported by references, which do not necessarily have to be included in the body of the article to be published.

4) Articles containing statements that could be construed as libel or slander will not be accepted.

5) The subject matter chosen must be of general interest to radio amateurs, and must be discussed in a way that will be understandable to a significant portion of the membership.

6) With the exception that the article need not be consistent with League policy, the article will be subject to the usual editorial review prior to acceptance.

7) No guarantee can be made that an accepted article will be published by a certain date, or indeed, that it will be published at all; however, only articles that we intend to publish will be accepted, and any article we have decided against publishing will be returned promptly.

8) Send your contributions to ARRL Op-Ed, 225 Main St, Newington, CT 06111 or via e-mail to **qst@arrl.org** (subject line Op-Ed). QST

Strays

CRAIG KLIMCZAK, K4LSU

At ScoutQuest 100, St Louis, Missouri: **Craig Hirsh, KØCMH, shows a scout how to send CW. Held every 10 years, the event, which took place this past June, brings together over 25,000 Cub Scouts, Boy Scouts, Venturers, guests and alumni for the second largest gathering of scouts in North America. As in previous decades, K2BSA/Ø gave scouts an opportunity get on the air and hams across the country a chance to work a very special event station. A host of volunteers helped make it happen.**
— Craig Klimczak, K4LSU

CONVENTION AND HAMFEST CALENDAR

Abbreviations
Spr = Sponsor
TI = Talk-in frequency
Adm = Admission

Alabama (Helena) — Oct 16 D F H R T V
8 AM-1 PM. *Spr:* Shelby County ARC. Helena Amphitheater, 4151 Helena Rd. Outdoor event. *TI:* 146.98. *Adm:* Free. Tables: Bring your own. Jim Niven, KI4BRE, Box 572, Columbiana, AL 35051; 205-260-6477; **jwniven@aol.com**; **W4SHL.com**.

Arizona (Tucson) — Oct 16 D F H R V
7 AM-noon. *Spr:* Old Pueblo RC. Kino Community Center, 2805 E Ajo Way. ARCA meeting. *TI:* 147.3 (110.9 Hz). *Adm:* Free. Tables: $5 per vendor space. Ronald Kalish, N7SPW, 5402 E 8th St, Tucson, AZ 85711; 520-207-3852; **n7spw@arrl.net**; **www.oprc.org**.

PACIFIC DIVISION CONVENTION

October 15-17, San Ramon, California
D F H R S V

The Pacific Division Convention (Pacificon 2010), sponsored by the Mount Diablo ARC, will be held at the San Ramon Marriott Hotel, 2600 Bishop Dr. Doors are open Friday 7 AM-5 PM, Saturday 6 AM-7 PM, Sunday 6 AM-noon. Features include outstanding technical forums; large exhibit hall filled with exciting products and the latest ham radio equipment; Antenna and Legal Seminars (Friday, $10); opening breakfast with keynote speaker Gordon West, WB6NOA ($14); series of Amateur Television demonstrations; Saturday evening banquet with special speaker ($39); VE sessions (Saturday and Sunday 9 AM-noon, $15); one day Technician class (Saturday, 8 AM-4 PM); great QRP and HFpack activities; great Sunday morning swapmeet in hotel parking lot ($20 for a double-car slot); the Boy Scout Jamboree-On-The-Air; "The Sounds of Amateur Radio;" fun and informative T-hunts; Wouff Hong ceremony; handicapped accessible. Talk-in on 147.06 (100 Hz). Admission is $15 in advance, $20 at the door (good all 3 days). Exhibit tables are $300. Contact Marty Heyman, W6MDH, c/o PACIFICON 2010, Box 5514, Concord, CA 94524-0514; 510-290-6484 or 925-288-1730; fax 818-757-7319; **pacificoninfo@k6ori.com** or **mheyman@symas.com**; **www.pacificon.org**.

Florida (Delray Beach) — Nov 6 D F H S V
7 AM-1 PM. *Spr:* Boca Raton ARA. South County Civic Center, 16700 Jog Rd. *TI:* 145.29 (110.9 Hz). *Adm:* $2. Tables: $10. Walt Dreyfus, W4WCD, 21512 Woodchuck Ln, Boca Raton, FL 33428; 954-481-5327; **wdreyfus@bellsouth.net**; **southfloridahamfest.org**.

Florida (Leesburg) — Nov 6 T V
8 AM-noon. *Spr:* Lake ARA. Lake ARA Clubhouse, 11146 Springdale Ave. *TI:* 147.255 (103.5 Hz). *Adm:* Free. Doug Rehman, K4AC, 18950 US Hwy 441, #201, Mount Dora, FL 32757; 352-357-7222; **doug@k4ac.com**; **www.k4fc.org**.

GEORGIA STATE CONVENTION

November 6-7, Lawrenceville
D F H R S T V

The Georgia State Convention (Stone Mountain Hamfest and Computer Expo), sponsored by the Alford Memorial RC, will be held at the Gwinnett County Fairgrounds, 2405 Sugarloaf Parkway. Doors are open Saturday 8 AM-4 PM, Sunday 8 AM-2 PM. Features include indoor flea market, huge boneyard ($8 per space for both days, plus admission), commercial tailgating ($25 per space with electric connections for the weekend), major manufacturers and commercial vendors, forums, youth lounge, contests, VE sessions (both days; registration 8:30 AM, testing at 9 AM sharp; $15 cash test fee), on-site camping ($15 per night), refreshments. Talk-in on 146.76 (107.2 Hz), 145.45. Admission is $6 in advance, $8 at the door (good both days); 16 and under are free. Tables are $20 ($25 with electrical hookup; includes admission). Contact Randy Bassett, KR4NQ, Box 1282, Stone Mountain, GA 30086; 770-978-9181; **hamfest@stonemountainhamfest.com**; **www.stonemountainhamfest.com**.

Georgia (Rome) — Oct 16 D F H R T V
8 AM-2 PM. *Spr:* Northwest Georgia ARC. National Guard Armory, 340 Wilshire Rd NE. Al Brock Memorial Hamfest and Tailgate. *TI:* 146.94 (88.5 Hz). *Adm:* Free. Tables: Bring your own. Grover Keith, KA5QFI, 13 Fallow Dr NW, Rome, GA 30165; 706-766-1118; **gfkeith@comcast.net**; **www.w4vo.org**.

Coming ARRL Conventions

September 17-19
Southwestern Division, San Diego, CA*

September 18
EmComm East, Rochester, NY*
MicroHAMS Digital, Redmond, WA*

September 24-25
SEDCO W4DXCC, Pigeon Forge, TN*

September 24-26
ARRL/TAPR Digital Communications, Portland, OR*

September 25
Mid-Atlantic States VHF, Montgomeryville, PA*
Washington State, Spokane Valley*

October 1-2
Pacific Northwest VHF, Seattle, WA

October 2-3
Iowa State, West Liberty*

October 8-9
Amateur Radio Lighthouse Society Kill Devil Hills, NC

October 8-10
AMSAT Symposium, Elk Grove Village, IL*

October 9-10
Florida State, Melbourne*

October 10
Connecticut State, Wallingford*

October 15-17
Pacific Division, San Ramon, CA

October 16
Ohio Section and ARES Conference, Columbus

November 6-7
Georgia State, Lawrenceville

November 13
Alabama Section, Montgomery

November 13-14
Indiana State, Fort Wayne

December 4-5
West Central Florida Section, Palmetto

*See September *QST* for details.

Hawaii (Honolulu) — Oct 16 D F H V
8 AM-noon. *Spr:* Emergency ARC. Fleet Reserve Assn Branch 46, 891 Valkenburgh St. *TI:* 146.88. *Adm:* Free. Tables: $5 donation. Chris Colquhoun, NH7QH, Box 30315, Honolulu, HI 96820; 866-620-0127; **nh7qh@nh7qh.com**; **earchi.org/event_listing.html**.

Hawaii (Kamuela/Waimea) — Oct 23 F R V
10 AM-3 PM. *Spr:* Big Island ARC. Waimea Community Center, 65-1260 Kawaihae Rd (Hwy 19). *TI:* 147.16 (100 Hz). *Adm:* Free. Tables: Free. John Buck, KH7T, Box 489; Kamuela, HI 96743; 808-885-9718; **kh7t@arrl.net**; **www.biarc.net**.

Iowa (Davenport) — Nov 7 D F H R
8 AM-2 PM. *Spr:* Davenport RAC. Clarion Hotel (formerly the Davenport Holiday Inn), 5202 N Brady St. 39th Annual Hamfest/Computer Show. *TI:* 146.88 (192.8 Hz); 146.94. *Adm:* advance $6, door $7. Tables: $12. John Hoenshell, NØBFJ, 2331 N Linwood Ave, Davenport, IA 52804; 563-326-4985; **n0bfj@arrl.net**; **www.arcsupport.com/drac/hamfest.html**.

Kansas (Olathe) — Oct 29-30 F R S T V
Friday 5 PM-Saturday 4 PM. *Spr:* Johnson County RAC. Ensor Museum and Farmstead, 18995 W 183rd St. Auction. *TI:* 147.24 (151.4 Hz). *Adm:* Free. Tables: Bring your own. Brian Short, KCØBS, 12170 S Prairie Creek Pkwy, Olathe, KS 66061; 913-638-7373; **kc0bs@arrl.net**; **www.w0erh.org**.

Kentucky (Hazard) — Oct 30 D F H R S V
8 AM-1 PM. *Spr:* Kentucky Mountains ARC. National Guard Armory, 782 Dawahare Dr. *TI:* 146.67 (103.5 Hz). *Adm:* $5. Tables: $5. John Farler, K4AVX, 1264 Hall Mountain Rd, Viper, KY 41774; 606-476-9662; **k4avx@arrl.net**; **k4avx.net/hf**.

Maryland (Westminster) — Oct 24
D F H R S T
8 AM-1 PM. *Spr:* Carroll County ARC. Carroll County Agricultural Center, 700 Agriculture Center Dr. 20th Annual Mason-Dixon Hamfest. *TI:* 145.41 (114.8 Hz). *Adm:* $5. Tables: $16. Steve Beckman, N3SB, 2145 Bethel Rd, Finksburg, MD 21048; 410-583-4321; fax 410-583-4149; **n3sb@qis.net**; **www.qis.net/~k3pzn**.

Massachusetts (Cambridge) — Oct 17. Nick Altenbernd, KA1MQX, 617-253-3776; **w1gsl@mit.edu**; **www.swapfest.us**.

Michigan (Holland) — Oct 16 D H R V
8 AM-noon. *Spr:* Holland ARC. West Ottawa High School South Campus, 3600 152nd Ave. 9th Annual Great Lakeshore Super Swap. *TI:* 147.06 (94.8 Hz). *Adm:* advance $5, door $6. Tables: $10. Jeff Ver Hage, KB8QAP, Box 2104, Holland, MI 49422; 616-724-7720; **HollandArcSwap@gmail.com**; **hollandarc.org**.

Michigan (Kalamazoo) — Oct 17
D F H Q R S T V
8 AM-noon. *Sprs:* Kalamazoo ARC and Southwest Michigan AR Team. Kalamazoo

D = DEALERS / VENDORS
F = FLEA MARKET
H = HANDICAP ACCESS
Q = FIELD CHECKING OF QSL CARDS
R = REFRESHMENTS
S = SEMINARS / PRESENTATIONS
T = TAILGATING
V = VE SESSIONS

Gail Iannone ♦ Convention and Hamfest Program Manager ♦ giannone@arrl.org

County Fairgrounds, 2900 Lake St. *Tl:* 147.04 (94.8 Hz). *Adm:* $5. Tables: $12 (8-ft, without electricity); $22 (with electricity). Ruth Bates-Hill, WB8VEV, 9176 Shade Tree Cir, Galesburg, MI 49053; 269-665-7149 (home), 269-833-3351 (work), 269-207-9955 (cell); **Ruth.M.Bates-Hill@Pfizer.com**; **www.KalamazooHamFest.com**.

Mississippi (University) — Oct 16 R T
8 AM-2 PM. *Sprs:* ARRL Mississippi Section and University of Mississippi ARC. University of Mississippi, 1 University Cir. Annual "ARRL Day in the Park." *Tl:* 147.33 (107.2 Hz), 145.47. *Adm:* Free. Malcolm Keown, W5XX, 64 Lake Circle Dr, Vicksburg, MS 39180; 601-636-0827; **w5xx@arrl.org**; **www.arrlmiss.org**.

Missouri (Belton) — Oct 16 D F H R S V
Set up 6 AM; public 8 AM-1 PM. *Spr:* South-Side ARC. South Haven Baptist Church, 16800 Bel Ray Blvd. Octoberfest 2010. *Tl:* 147.12 (151.4 Hz). *Adm:* advance 4 for $5; door 3 for $5 or $4 each. Tables: $15 (includes 1 admission). Donna Quick, KBØYJN, Box 1670, Lee's Summit, MO 64063; 816-537-7464; **kb0yjn@juno.com**; **www.qsl.net/southsidearc**.

Missouri (Kirkwood/St Louis) — Oct 30
D F H R V
7:30 AM-1 PM. *Spr:* St Louis ARC. Kirkwood Community Center, 111 S Geyer Rd. 19th Annual Halloween Hamfest. *Tl:* 147.15 (141.3 Hz). *Adm:* advance $3, door $5. Tables: $15. Bob Sluder, NØIS, 7511 Local Hillsboro Rd, Cedar Hill, MO 63016; 636-285-7605; fax 314-569-3567; **bcsluder@msn.com**; **www.halloweenhamfest.org**.

New Hampshire (Londonderry) — Nov 6
D F H R T
8 AM sharp-noon. *Spr:* Interstate Repeater Society. Londonderry Lions Hall, 256 Mammoth Rd. *Tl:* 146.85 (85.4 Hz). *Adm:* $4. Tables: $15. George Moranian, N1NAZ, 114 West Rd, Londonderry, NH 03053; 603-421-0940; **n1naz@arrl.net**; **www.irs.nhradio.org**.

New Jersey (Township of Washington) — Oct 9 D F H Q R T V
8 AM-2 PM. *Spr:* Bergen ARA. Westwood Regional High School, 701 Ridgewood Rd. *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; fax 201-265-1366; **k2zo@arrl.net**; **www.bara.org**.

New Mexico (Socorro) — Oct 30
D F H R S T V
8 AM-2 PM. *Sprs:* Socorro ARA, Tech ARA, and the City of Socorro. NM Firefighters Academy, 600 Aspen Rd. Tour of VLA. *Tl:* 146.68 (100 Hz). *Adm:* Free. Tables: $10. Al Braun, AC5BX, 722 California St, Socorro, NM 87801; 575-835-3370; **ac5bx@juno.com**; **www.socorroara.org**.

New York (Hicksville) — Oct 31
D F H Q R V
7:30 AM-1 PM. *Spr:* Long Island Mobile ARC. Levittown Hall, 201 Levittown Parkway. *Tl:* 146.85 (136.5 Hz). *Adm:* $6. Tables: $20. Richard Cetron, K2KNB, 198 Haypath Rd, Old Bethpage, NY 11804; 516-694-4937; fax 631-574-4851; **k2knb@limarc.org**; **www.limarc.org**.

AMATEUR RADIO LIGHTHOUSE SOCIETY CONVENTION

October 8-9, Kill Devil Hills, North Carolina
D H R S

The Amateur Radio Lighthouse Society Convention, sponsored by the Amateur Radio Lighthouse Society, will be held at the Comfort Inn on the Ocean (formerly known as the Clarion Inn), 1601 South Virginia Dare Trail. Doors are open Friday 1-5 PM, Saturday 9 AM-noon. Features include Saturday morning meeting featuring first rate lighthouse-related presentations and a business session, opportunity to activate some or all of the lighthouses, dinner as a group at Basnight's Lone Cedar Restaurant (Friday, 6 PM), dinner as a group at Owen's Restaurant (Saturday, 6 PM). Talk-in on 145.11 (131.8 Hz). Registration is $35 in advance (before Sep 30), $40 at the door (or after Sep 30). Tables are $10. Contact James Buffington, K5JIM, Box 52, 402 S Matubba St, Aberdeen, MS 39730; 662-369-4985; fax 662-369-3440; **jim@jimbuffington.com**; **www.arlhsconvention.com**.

OHIO SECTION and ARES CONFERENCE

October 16, Columbus
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The Ohio Section and ARES Conference, sponsored by the ARRL Ohio Section, will be held at the Educational Service Center of Central Ohio, 2080 Citygate Dr. Doors are open 8:45 AM-4:45 PM. Features include social time, special guest program, Great Lakes Division Director and Section Manager time, lunch, annual newsletter awards, AB8P award, ARES. Talk-in on 147.06 (94.8 Hz). Admission is free. Contact Scott Yonally, N8SY, 258 Valley Hi Dr, Lexington, OH 44904; 419-884-5105; **n8sy@arrl.net**; **www.arrlohio.org**.

Ohio (Georgetown) — Nov 6 D F H R S V
8 AM-2 PM. *Spr:* Grant ARC. ABCEOI Building, 406 W Plum St. *Tl:* 146.73. *Adm:* $2. Tables: Free. Rodney Crawford, WD8CTX, 2585 SR 138, Sardinia, OH 45171; 937-446-2338; **wd8ctx@juno.com**; **www.garcohio.net**.

Ohio (Massillon) — Oct 31 D F H R V
8 AM-2 PM. *Spr:* Massillon ARC. Massillon Boys and Girls Club, 730 Duncan St SW. 50th Annual Hamfest. *Tl:* 147.18 (110.9 Hz). *Adm:* $5. Tables: $12. Terry Russ, N8ATZ, 3420 Briardale Dr NW, Massillon, OH 44646; 330-837-3091; **truss@sssnet.com**; **www.marcradio.org**.

Oklahoma (Ardmore) — Oct 22-23
D F H S V
Friday 5-8 PM; Saturday 8 AM-1 PM. *Spr:* Texoma Hamarama Assn. Ardmore Convention Center, 2401 N Rockford Rd. *Tl:* 146.97. *Adm:* advance $7, door $8. Tables: $10. Henry Allen, W5TYD, 2802 County Rd 2226, Caddo Mills, TX 75135; 214-673-7942; **w5tyd@arrl.net**; **www.texomahamarama.org**.

Oregon (Rickreall) — Oct 23 D F H R
9 AM-3 PM. *Spr:* Mid-Valley ARES. Polk County Fairgrounds, 520 S Pacific Hwy. *Tl:* 146.86 (186.2 Hz). *Adm:* advance $7, door $8. Tables: $22. Donald Brusch, K7UN, Box 5130, Salem, OR 97304; 503-371-8070; **k7un@arrl.net**; **swaptoberfest.net**.

Pennsylvania (Newtown) — Oct 3
D F H R T
6 AM-2 PM. *Spr:* Mt. Airy VHF Club. Middletown Grange #684, Penns Park Rd. 39th Annual Hamarama. *Tl:* 146.52. *Adm:* $5. Tables: $15. George Altemus, KA3WXV, 1561 Tennis Cir, Lansdale, PA 19446; 484-300-8070; **ka3wxv@gmail.com**; **www.packratvhf.com/latest.htm#Hamarama**.

Pennsylvania (Sellersville) — Oct 17
D F H R T V
Set up 6 AM; public 7 AM-1 PM. *Spr:* RF Hill ARC. Sellersville Firehouse, 50 N Main St. *Tl:* 145.31 (131.8 Hz). *Adm:* $6, nonham spouses and children free. Tables: $12 (indoor); $8 (outdoor, bring your own table), plus admission. Jim Soete, WA3YLQ, c/o RF Hill ARC, Box 336, Perkasie, PA 18944; 215-723-7294; fax 215-257-0724; **wa3ylq@arrl.net**; **www.rfhill.ampr.org**.

Pennsylvania (Washington) — Nov 7
D H Q R S T V
8 AM-2 PM. *Spr:* Washington Amateur Communications. Washington County Fairgrounds, 2151 N Main St. *Tl:* 145.49. *Adm:* $5. Tables: $12 (discount for more than 5 tables). Bud Plants, N3TIR, 236 Chambers Ridge Rd, West Alexander, PA 15376; 724-484-0207 or cell 724-350-6745; fax 724-484-0998; **n3tir@arrl.net**; **www.wacomarc.org**.

South Carolina (Sumter) — Oct 23 D F R T
8 AM-4 PM. *Spr:* Sumter ARA. Sumter Jaycee Hut, 314 Pine St. Sumter "Open-Air" Hamfest. *Tl:* 147.015 (156.7 Hz). *Adm:* $5. Tables: $5. Carl Ecabert, AA1MD, 6105 Dubose Siding Rd, Sumter, SC 29153; 803-469-0013; **aa1md@ftc-i.net**; **webspace.webring.com/people/pk/kt4jk_jim/sara.htm**.

Tennessee (Chattanooga) — Oct 23
D F H R T V
8 AM-2 PM. *Spr:* Chattanooga ARC. East Ridge Community Center, 1517 Tombras Ave. *Tl:* 146.79. *Adm:* $5. Tables: $5. Jim Bowman, W4DFS, Box 3681, Chattanooga, TN 37404; 423-394-7373; **w4dfs@arrl.net**; **w4am.org**.

Tennessee (Johnson City) — Oct 16
D F H Q R S T V
8 AM-4 PM. *Spr:* GrayHamfest Assn. Appalachian Fairgrounds, 100 Lakeview St. *Tl:* 145.29 (103.5 Hz). *Adm:* $6. Tables: $10; tailgating $3. Charlie Stuchell, K4CWA, 222 River Rd, Bluff City, TN 37618; 423-538-3868; **k4cwa@arrl.net**; **grayhamfesttn.com**.

Texas (Belton) — Oct 2 D F H R T V
7 AM-3 PM. *Spr:* Temple ARC. Bell County Expo Center, 301 Loop 121 W. *Tl:* 146.82 (123 Hz). *Adm:* $5. Tables: $25. Mike LeFan, WA5EQQ, 1802 S 13th St, Temple, TX 76504; 254-773-3590; fax 254-231-4128; **expo@tarc.org**; **www.beltonhamexpo.org**.

Texas (Lufkin) — Oct 16 D H R S T V
Set up Friday 3-9 PM, Saturday 7 AM; public 8 AM-noon. *Sprs:* Deep East Texas and Nacogdoches ARCs. Lufkin First Church of the Nazarene, 1604 S Medford Dr. *Tl:* 146.94 (141.3 Hz). *Adm:* Free. Tables: Free. Jerry Wilson, K5JLW, 144 Donna St, Huntington, TX 75949; 936-632-9310; **ac5zj@cs.com**; **www.lufkinhamfest.com**.

PACIFIC NORTHWEST VHF CONFERENCE

October 1-2, Seattle, WA
D S T

The Pacific Northwest VHF Conference (17th Annual Conference), sponsored by the Pacific Northwest VHF Society, will be held at the Embassy Suites Seattle-Tacoma International Airport, 15920 W Valley Hwy. Doors are open Friday 6-9 PM, Saturday 8 AM-4 PM. Features include Friday eve dinner, tailgate swapmeet in parking lot, technical presentations, great programs, top-notch speakers and interesting round-table discussions, PNWVHFS Annual Meeting, free buffet lunch (Saturday), annual awards presentation, Saturday evening dinner (6-8 PM), Sunday morning "Farewell Breakfast" (Oct 3, 8-10 AM). Talk-in on 146.58. Admission is $40 in advance, $50 at the door (includes lunch). Contact Scott Honaker, N7SS, 14014 89th Ave SE, Snohomish, WA 98296; 425-330-5439; **n7ss@arrl.net**; **www.pnwvhfs.org**.

Wisconsin (Colby) — Sep 25 D R
8 AM-noon. *Spr:* Black River ARA. Colby Lions Pavilion, SW corner of the intersection of S 13th and Adams Sts. *Tl:* 147.15 (114.8 Hz). *Adm:* advance free with advance table purchase, door $3. Tables: $5. Tater Schuld, KC9ESF, W6679 Stetson Ave, Apt T, Medford, WI 54451; 715-560-8000; **tater1337@yahoo.com**.

75, 50 AND 25 YEARS AGO

October 1935

- The cover photo shows a nice-looking all-metal tower reaching toward the sky.
- The editorial looks at the new A.R.R.L. Southwestern Division, made up of Arizona and southern California. It points out that there are over 5000 licensed amateurs in California — more than any other state in the union!
- "On Top of the U.S.," by Don Wallace, W6AM, tells of a group of hams taking a 56 Mc. station to the top of Mount Whitney, California.
- Meanwhile, John Diecks, W2HPV, tells how "W2MO, Portable, Sets the Pace" atop 550-foot-high Garret Mountain in Paterson, New Jersey.
- "The Equipment on the *Morrissey*," by Bob Moe, W2UN, tells about W1ØXFP, whose 'phone signals were heard by many hams while the *Morrissey* was in Arctic waters this summer.
- In "What's in a Circuit?", George Grammer, W1DF, discusses possible problems you might encounter in building a simple oscillator-amplifier transmitter.
- C. F. Hadlock, W1CTW, takes a look at "Reducing QRM on 56 Mc." in the Boston area.
- At the 1933 A.R.R.L. Board meeting, the technical staff of *QST* was tasked with investigating the feasibility of single-side-band 'phone. In "Background for Single-Side-Band 'Phone," James Lamb, W1CEI, provides a simplified explanation of this possible new mode.

October 1960

- The cover photo shows a ham working out some tuned-circuit calculations using his trusty slide rule.
- The editorial discusses how the recent expansion of the 20-meter 'phone band temporarily upset the informal gentlemen's agreement to use part of the band for S.S.B. and part of it for A.M.
- George Hanchett, W2YM, describes an easy-to-build V.F.O. that has a cathode-follower output, in "Stability with Simplicity."
- John Howard, K8MME, comes up with "A Dummy Load off the Mind" — a low-power dummy load made up of carbon resistors in parallel mounted on the back of a PL-259 UHF connector. The dummy load was built into a metal 35 mm film can. Looks good, works great!
- Lew McCoy, W1ICP, presents "A Limited-Space Antenna," a 30 foot vertical element with one radial, fed via an antenna coupler and open-wire line — another simple but effective idea!
- In "Two-Band Mobile Station," S. B. Leslie, W5DQV, describes his small transceiver for 75 and 40 meter AM 'phone.
- D. J. Healey, W3HEC, tells us how we can design "High-Frequency Crystal Filters for S.S.B" that provide excellent performance.

October 1985

- The cover photo shows a slick homebrew converter and preamplifier for the new 902 MHz band.
- The editorial discusses "The Facts about RF Hazards."
- "Up Front in *QST*" notes that hams helped following the recent crash of Delta Flight 191, just before touching down on the Dallas/Fort Worth airport's runway.
- "Better Ears for the MAVTI-40 Transceiver," by Paul Kranz, W1CFI, tells about a worthwhile rebuild of that popular club-project QRP transceiver.
- Donald Hilliard, WØPW, describes "A 902- to 144-MHz Receive Converter" (the cover article).
- Doug DeMaw, W1FB, presents Part 2 of "The Principles and Building of SSB Gear."
- Paul Newland, AD7I, gives us "A User's Guide to AMTOR."
- "Build a UHF Wattmeter," by Bruce Williams, WA6IVC, tells us about a nice one-evening construction project.
- Paul Courson, WA3VJB, brings us the latest space shuttle-ham news, in "WØORE/Challenger: Picture Perfect from Space."
- The "Happenings" column provides details of the "New Band at 902-928 MHz."
- In the "How's DX?" column, Ellen White, W1YL reports on "St. Vincent '85," the J87J DXpedition manned by K4UEE, K9GL, WB9TIY, K9VV, and KA9CJG.

Al Brogdon, W1AB ♦ Contributing Editor

Field Organization Reports

JULY 2010

Public Service Honor Roll

This listing recognizes radio amateurs whose public service performance during the month indicated 70 or more points in six categories. Details on the program are at this Web page: **www.arrl.org/public-service-honor-roll**.

570 W7TVA
480 KØIBS
372 KB2ETO
357 W4CAC
350 KA2ZNZ
335 K2HAT
325 N2LTC WB9YBI
296 WB8RCR
295 KB2RTZ
285 KT2D
281 KI4KWR
265 KD1LE
256 NC4VA
253 KK1X
250 W5DY
245 K2DYB
235 AK2Z
230 WB9FHP
229 K8OLY
225 N7CM
215 K7EAJ KB8GT
205 WB9JSR
199 N4HUB
196 WD8BCS
195 W5KAV
190 K9LGU
186 WA2BSS
180 AG9G
170 KC2SFU
165 K2HJ WE2G K8RDN
163 K2ABX
162 N4EJF
160 KGØGG AA3SB KK3F
155 WD9FLJ NA9L AC6C
150 K7MQF N1UMJ K7OAH
148 KE5HYW K7BC KF7GC
145 WØLAW KK7DEB K8DD
144 W7ELI
143 K9EOH
142 KA8ZGY
140 K7BFL W2DWR K2TV
139 KK5NU
138 WB6OTS
135 KB1NMO W3YVQ W4LHQ
134 W7JSW
131 N5NVP
130 NX9K N9VC K6JT WB2FTX K4IWW W4DNA N2JBA WM2C
125 NN7H N2GJ WB2KNS N7IE W2EAG
120 KCØM KA4FZI NØMEA WB8HHZ W8UL N2GSS N3RB W1GMF KW1U N1LKJ W4OTN KB2BAA
115 N9VT WB8WKQ
112 N2DW KØLQB
110 K5KV WC5M W7QM W7GB KE4CB WI2G KC5OZT K3RC N8IO WB4GHU KK5GY N1IQI K1YCQ N7XG N7YSS K1HEJ K4GK WA4UJC W2SFD N8NMA
105 KI6RUW N8OD N1QLN
104 KJ7NO
103 N2VC
102 K4DND
100 KB5SDU N7EIE K4SCL WØCLS WAØVKC N5OUJ K2AN KA8IAF N9AUG
WB8SIQ WG8Z WD8Q N9MN W1SGC N1JX KA3OCS K4BF N3SW W3TWV WB6UZX W4TTO
99 K2GW
98 W1PLW
97 NA7G
96 K4BEH
95 K5MC N2YJZ W8CPG
94 W5ESE W9LW
93 W2CC
91 K6HTN W5GKH
90 NIØI KB9KEG N8DD KC8WH W8DJG W3GQJ KA1EHR W8IM K1JPG NU8K W9MBT KI4JQB K4MSG KB3LNM K3IN N3ZOC N3KB W4WNE WB4BIK WA2CUW NS7K W2DSX NX8A
89 KS3Z
87 AD4BL
86 KC2UVQ
85 KD7OED
84 K5GLS W5CU W1PLK
83 KE5YTA W4AVD
81 WDØGUF KK7TN W3CB KC4PZA
80 AC5CW KCØZDA KF5CRX WA3EZN N4ELI KJ4HGH W9WXN KC2UMX K8KV KD8CYK KD8LZB K8VFZ
79 KD4KFR KJ8O
78 K6RAU KT5SR KC5MMH
77 WD8DHC
76 KB1KRS
75 N2VQA
73 AL7N KB5PGY W5XX
71 N9DVL
70 KØDEU NØDLK NØDUW NØDUX NUØF KAØFUI KBØJKO NØMHJ N3NTV NØPTK KØOR KØRXC NØUKO KD7ZUP KC8UR

The following stations qualified for PSHR in previous months, but were not properly recognized in this column: (June) KA2ZNZ 350, N2LTC 325, KB2FED 290, KB2ETO 252, K2DYB 250, AK2Z 210, KC2SFU 200, K2ABX 154, WI2G 120, N2RDB 107, K1YCQ 110, K2AN 100, W2KFV 98, WB2WAK 95, WF2T 85, K2BRG 78, W2LIE 75, KA2EJD 73, WB2HBI 71.

Section Traffic Manager Reports

The following Section Traffic Managers reported: AK, AL, AZ, CO, EB, EMA, ENY, EPA, EWA, CT, GA, IL, IN, LA, LAX, MDC, ME, MI, MN, MS, NC, NFL, NLI, NNJ, NTX, OH, OK, OR, ORG, SFL, SNJ, STX, SJV, TN, UT, VA, WCF, WI, WNY, WPA, WV, WY.

Section Emergency Coordinator Reports

The following ARRL Section Emergency Coordinators reported: AZ, EWA, GA, ID, IA, IN, KS, ME, MI, MN, MO, MT, NC, NLI, NNY, NTX, OH, SD, SV, SFL, STX, TN, VA, WMA, WTX, WV.

Brass Pounders League

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 or more points or a sum of 100 or more origination and delivery points for any calendar month. Messages must be handled on amateur radio frequencies within 48 hours of receipt in standard ARRL radiogram format. Call signs of qualifiers and their monthly BPL total points follow. N1IQI 1613, KA9EKG 1439, W1GMF 1240, WB5NKD 1180, KW1U 1101, W8UL 960, KK3F 820, WB5NKC 740, WB8WKQ 674, WB9JSR 621, N8IXF 600, KZ8Q 596, K7IFG 580, WB8FHP 553, W4WNE 551, N1LKJ 532.
Stations earning BPL by Originations plus Deliveries: K8LJG 109, NM1K 106.

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

WB1GFM **Braley**, Alice A., North Swanzey, NH
K1GLR **Kuchinsky**, Louis E., North Grafton, MA
♦ KA1GWE **Godrie**, Anna, Fairfield, CT
AB1K **Varzhabedian**, Diran, Stamford, CT
W1NHJ **Herrick**, Shailer A. Jr, Bayonet Point, FL
WA1QCZ **Melia**, Paul F., Marshfield, MA
N1WD **Denton**, William A., Palmdale, CA
♦ WA1YXS **Kelly**, George F., Fredonia, NY
W2BAK **Kern**, Eugene O. "Gene," Tenafly, NJ
K2CON **Grossman**, Mark J., Jamaica, NY
N2FFA **Knosky**, Jeffrey J., Titusville, NJ
AF2HD **Wilder**, Robert H., Theodore, AL
WA2JFS **Scott**, Walter J. "Buddy," Amsterdam, NY
W2VX **Neukomm**, Robert E., Bloomington, IN
W3BEB **Dolas**, Nicholas T., Pottstown, PA
WA3BIX **Lenz**, John H., Johnstown, PA
W3BJQ **Lambert**, J. Lester, Johnstown, PA
W3DFJ **Sichel**, Archie T., Oreland, PA
W3GSW **Myers**, Robert A., Bala Cynwyd, PA
WB3JYR **Evans**, Horace A. "Duke," Douglassville, PA
W3LSE **Klenk**, Kenneth D., Johnstown, PA
W3ZHU **Good**, Clarence Jr, Johnstown, PA
W3ZKO **Adams**, Spurgeon W. "Bud," Johnstown, PA
WA3ZMM **Stewart**, Richard E., Tamarac, FL
♦ AC4A **Draughon**, James R. "Jim Bob," Shepherdsville, KY
K4BK **Jaquez**, Luis A., Boynton Beach, FL
ex-K4BW **Sprague**, William, Parksley, VA
W4COD **Cuddy**, John W., Defuniak Springs, FL
K4CVF **Mewbourne**, Lloyd R., Columbus, GA
♦ W4DPH **Homan**, James M. Jr, Clearwater, FL
KC4EFN **Bain**, Lloyd Nathan, Rossville, GA
KJ4EYU **Walls**, Roland H., Fort Payne, AL
KC4IBG **Estill**, Wallace F., Knoxville, TN
W4MJH **Hillman**, Eugene L., Coeburn, VA
W4MTD **Kernen**, Robert H., Fort Walton Beach, FL
W4OBY **Sipprell**, Raymond F., Stuart, FL
♦ W4OUK **Brown**, William B. "Dr Bill" MD, Gloucester, VA
♦ W4PED **Wright**, Charles N., North Augusta, SC
W4ROX **Scott**, Robert W., Signal Mountain, TN
W4SGH **Thomas**, James W., Glencoe, AL
KF4UCU **Carden**, Edward L., Northport, AL
N4UIF **Johnson**, Volney L., Dawson Springs, KY
N4UPB **Harrod**, Carroll D., Vero Beach, FL
W4VAN **Guill**, George M. Jr, Roanoke, VA
WB4WZF **Bunch**, Charles E. Jr, Albertville, AL
KI4XF **Aucremann**, Robert C., Saint Petersburg, FL
K4ZOO **Veldran**, Raymond R., Orange, VA
KG5AJ **Dennis**, Frederick W., Amarillo, TX
KF5CLE **Ivy**, Jerry L., Corrigan, TX
W5EV **Edwards**, Jan R., Folsom, LA
WB5NRQ **Hayes**, Don H., Altus, OK
W5QPT **Thatcher**, Ellis C., Lee's Summit, MO
W5ROQ **Babin**, Ben R., Duplessis, LA
KA5RQU **Duchan**, Rose D., Patterson, LA
N5XWC **Thatcher**, Marilyn J., Lee's Summit, MO
WW5Y **Cartwright**, Owen C. "O.C.," Amarillo, TX
KH6AJ **Soares**, Joseph A., Kalaheo, HI
KA6ATJ **Ashby**, Gary L., Carson City, NV
K6CTQ **King**, Charles L. III, Mendocino, CA
KH6CXP **Baker**, Franklin, Waimanalo, HI
KG6DAK **Keith**, Marlene E., Madera, CA
N6EKE **Wisniewski**, Susan R., Maricopa, CA
W6FZA **Margot**, Alan T., Palm Desert, CA
W6GTX **O'Connell**, James L., Los Alamitos, CA
K6HIH **Beck**, Clifton T., Vacaville, CA
NH6HT **Breen**, Edward H., Keaau, HI
W6HVR **Koenig**, Eugene R. "Gene," Florence, OR
W6KJW **Worthen**, Kent J., Santa Cruz, CA
KF6LVE **Marino**, Lawrence A. Jr, Banning, CA
AB6OH **Spradley**, John F., Northridge, CA
AA6OJ **Woodrow**, Jack L., Camp Nelson, CA
W6SIJ **Gin**, Fong, Oakland, CA
KB6USX **Haines**, Geraldine V., La Mirada, CA
♦ K6VSB **Midyett**, Gene H., Torrance, CA
KA6WBY **Hotchkiss**, Glenn, Turlock, CA
KC6WOY **Gillison**, James D., Cambria, CA
W7DMV **Jackley**, Thomas W. "Billy" Jr, Holladay, UT
♦ K7ER **Klein**, Elliott K., Paradise Valley, AZ
WB7ESQ **Zambrano**, Elio, Tucson, AZ
KB7FCI **Ingram**, Gary V. Sr, Grants Pass, OR
KC7FQI **Wade**, Julie D., Phoenix, AZ
KB7JEU **Cooper**, Albert L., Wilsonville, OR
KE7LKX **Shryock**, William K. "Rocky," Grants Pass, OR
WA7LXC **Johnson**, Kenneth A., Las Cruces, NM
KC7OMK **Holman**, Raymond A., Salem, OR
W7PLA **Atkinson**, Ceryl Eddie, Chelan, WA
WB7TQT **Lauerman**, John M., Issaquah, WA
K7ULT **Whatley**, El Duane, Dallesport, WA
KB7UTA **Bekolay**, Paul W., Kingman, AZ
KB7YY **Yake**, Walter R., Oak Harbor, WA
W8FXB **Selkow**, Charles F. Jr, Winter Haven, FL
W8IZS **Sorrick**, Thomas M., Pellston, MI
ex-WB8LBJ **Riedel**, Robert E., Ithaca, MI
K8LBZ **Edel**, John T., Massillon, OH
K8MBY **Buckholdt**, Phillip A. Sr, Wadsworth, OH
N8MPC **Henderson**, James Jr, Oberlin, OH
W8OO **McDowell**, William R. "Bud," Piedmont, WV
K8PBA **Banta**, Robert W., Pinckney, MI
W8SPX **Schaafsma**, Leonard, Grand Rapids, MI
KA8WBY **Sollars**, William M. "Bill," Washington Court House, OH
W8YNL **Amstutz**, Paul L., Alameda, CA
N9ABA **Oakes**, George E., Prattville, AL
WB9BNX **Mize**, Stanley E., Beechgrove, IN
KC9BSA **Glaser**, George R., Warsaw, IN
N9BUU **Raitt**, John W., Arlington Heights, IL
K9COJ **Esler**, Donald C. Sr, Matteson, IL
KE9CR **Blanchard**, Brooks K., Waukesha, WI
WD9CXW **Hansen**, Robert L., Prophetstown, IL
KC9EPA **Schlaugat**, Sandra K., New Berlin, WI
K9EWF **Fron**, Edwin W., Washington, IL
W9GNK **Willette**, Richard C., Rhinelander, WI
W9HJ **Lindh**, Howard V., Prospect Heights, IL
K9IHU **Sage**, William A., Vincennes, IN
W9JPI **Young**, James S. Jr, Whitewater, WI
W9LCB **Fowler**, Robert C. "Bob," Prairie Du Sac, WI
N9NJK **Norrell**, Craig W., Warsaw, IN
W9NZM **Bauman**, Robert H., Itasca, IL
KA9OOH **Wendt**, David A., Indianapolis, IN
KB9QAY **Brinkman**, John G., Racine, WI
WB9RLE **Alderfer**, Myron E., Rochester, IN
KD9RM **Bell**, David C., Bloomingdale, IL
W9SMQ **Brown**, Lewis W., Columbia City, IN
KA9UPI **Dunham**, Robert A., Beaver Dam, WI
W9WSS **Kleefisch**, Arthur J., Baraboo, WI
WØBBO **Eklund**, Alfred G., Lindsborg, KS
WBØFKS **Booe**, Robert J., Wellington, KS
KØHAO **Watts**, Elmer F., Newton, KS
AAØI **Ranson**, Barbara B., Sebeka, MN
KAØJLB **Londroche**, Art, Saint Paul, MN
KØRDK **Kline**, Raymond D. II, Sunrise Beach, MO
KØSZ **Johnson**, Harry Dayle, Lincoln, NE
NØYNP **Weber**, Jeanne E., Mitchell, NE
♦ WBØYNX **Brosamle**, Thomas E. "Tom," Sioux City, IA
WØZXH **Blando**, Emanuel L. "Manny," Kansas City, MO
VE6SY **Merryweather**, Howard J., Edmonton, AB, Canada
G3NOH **Eddowes**, George, London, Great Britain
HB9TL **Laib**, Jack C., Amriswil, Switzerland
UAØAZ **Belyaev**, Alexey G., Krasnoyarsk, Russian Federation
VK2ARJ **Johns**, Ronald L., New South Wales, Australia

♦ 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

Gail Iannone ♦ Silent Keys Administrator ♦ sk@arrl.org

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 1.8025, 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 also transmitted monthly. See "This Month in Contesting" in this issue for further details on the Qualifying Runs. 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. The initial certificate is available for a $10 fee. Subsequent endorsement stickers are available for a $7.50 fee.

♦ **Digital transmissions:** Frequencies are 3.5975, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent using 45.45-baud Baudot, PSK31 in BPSK mode and MFSK16 on a daily revolving schedule.

Keplerian elements for many amateur satellites will be sent on the regular digital frequencies on Tuesdays and Fridays at 6:30 PM Eastern Time using Baudot and PSK31.

♦ **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.

W1AW code practice and CW/digital bulletin transmission audio is also available real-time via the *EchoLink Conference Server* **W1AWBDCT**. The conference server runs concurrently with the regularly scheduled station transmissions.

During 2010, Headquarters and W1AW are closed on New Year's Day (January 1), Presidents' Day (February 15), Good Friday (April 2), Memorial Day (May 31), Independence Day (observed July 5), Labor Day (September 6), Thanksgiving and the following day (November 25 and 26) and Christmas (observed December 24).

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				

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/ham-radio-glossary**.

The Doctor is IN

Antenna analyzer — Test instrument designed to measure the impedance and standing wave ratio (SWR) of an antenna or an antenna and feed line combination as a function of frequency. See **www.arrl.org/reviews-listed-by-issue**, look for May 2005.

Boom — Structural portion of many antennas used to support the active elements and maintain their relative spacing.

Dummy load — Sometimes called dummy antenna. Device designed to accept and dissipate the power from a transmitter without radiating it. Generally used for transmitter testing to avoid interfering with other spectrum users.

NVIS — Near vertical incidence skywave. A mode of communication in which HF signals are launched at vertical, or near vertical, elevation angles to return from the ionosphere and provide short and medium range (typically to 1000 miles) communication.

Parasitic element — Antenna element in a multielement array. The parasitic elements do not connect to the transmission line, but rather receive radiated energy from the *driven* element and reradiate to contribute to the antenna's directional pattern.

RG-213 — Coaxial cable type with 50 Ω characteristic impedance. Replacement military designator for an improved version of the more common RG-8 coax, with the same dimensions.

SWR — Standing wave ratio. Measure of the match between a transmission line and its load. A ratio of 1, expressed as 1:1, reflects a perfect match.

T connector — Circuit bridging device that connects one circuit to two others, all in parallel. T connectors are often found configured as coaxial cable or power connectors.

UHF (PL-259/SO-239) connector — Coaxial cable connector family developed before WWII for the "ultrahigh frequencies" then starting at 30 megacycles (now MHz). On right in photo.

VHF (very high frequency) — Radio frequencies from 30 to 300 MHz.

Yagi antenna— Multielement directive antenna array in which one or more elements are driven by connection to a transmission line and the others are parasitically coupled. Yagis are generally characterized by high gain for their size accompanied by narrow operating frequency range.

[1]*The ARRL Handbook for Radio Communications,* 2010 Edition. Available from your ARRL dealer or the ARRL Bookstore, ARRL order no. 1448 (Hardcover 1462). Telephone 860-594-0355, or toll-free in the US 888-277-5289; **www.arrl.org/shop/**; **pubsales@arrl.org**.

A Multiband 50 W Linear Amplifier

ARRL Homebrew Challenge — Competitive equipment construction exercise sponsored by the ARRL. The first was announced in *QST* for August 2006.

Bias circuitry — Circuitry that provides the dc current applied between the base and emitter of a transistor in order to set the desired collector current for intended circuit operating conditions. In a similar manner, such supplies may be used to set the gate or grid voltage of an FET or vacuum tube respectively to obtain the no signal or *quiescent* current of the device.

Class A or Class AB mode — The *class* of an amplifier defines the operating conditions in terms of voltages and currents that result in certain operating characteristics. A Class A amplifier draws current throughout the input waveform, providing the most linear, but least efficient, operation. A Class AB amplifier is biased to draw current during only part, but more than half, of the input waveform, providing fairly linear, but more efficient operation than Class A.

Linear amplifier — An amplifier that provides a constant multiple of the input signal resulting in a larger copy of all original input signals, and no additional signals, at the output. This is the ideal case for many types of amplifiers. All real amplifiers exhibit some distortion products, generally increasing with larger input signals.

MOSFET — A field-effect transistor that forms its electric field through an insulating metal oxide layer.

Push-pull — Amplifier configuration in which two active devices are used. They are arranged so that during one half of the input cycle one device amplifies, while the other amplifies during the other half cycle. The outputs are combined in a common output transformer or coupling arrangement.

An Orthogonally Steered Antenna that Reduces Interference

Ground wave signal — Radio signal that propagates along the surface of the ground. This is typically encountered in the medium frequency (MF) and lower HF portions of the spectrum. Ground losses, depending on soil characteristics, generally limit the useful range to well under 100 miles.

MF (medium frequency) — Radio frequencies from 300 to 3000 kHz.

NVIS — Near vertical incidence skywave. A mode of communication in which HF signals are launched at vertical, or near vertical, elevation angles to return from the ionosphere and provide short and medium range (typically to 1000 miles) communication.

U bolt — Kind of machine bolt in the shape of the letter U with threads on both ends. Often used to secure a round object, such as pipe or antenna mast, to a flat object.

A Signal Generator for the VHF Operator

QRP — Strictly speaking, an operating shorthand for "I am sending with low power." In common use it refers to low power, typically under 5 W output, operation many amateurs view as a special challenge.

RCA connector — Inexpensive coaxial connector type often encountered in home audio equipment. It sometimes is pressed into service as a low power RF connector.

Return loss bridge — Device that measures the ratio between the forward and reflected power on a transmission line. The ratio is usually expressed in decibels. A high return loss means that little power is reflected, indicating a closely matched condition equivalent to a low SWR.

Three terminal voltage regulator — Circuit that provides a fixed output voltage from an input voltage that varies.

Is Your Tower Still Safe?

Anode — The element of an electrical device that accepts electrons.

Digital multimeter — Basic test instrument that can be switched to measure the electrical voltage, resistance or current in different ranges. Originally an analog instrument, now more commonly available with a digital display.

EHS steel wire — Steel wire designated as *extra high strength*.

Electrolyte — Solution generally of acid or salt that acts like a conductive medium in batteries or for electroplating purposes. The conduction is via free ions within the solution. For more information, see **en.wikipedia.org/wiki/Electrolyte**.

Galvanic corrosion —An electrochemical process resulting in metals in contact with each other, or immersed in the same electrolyte, corroding at an accelerated rate.

Galvanizing — Coating of iron or steel with a zinc compound to improve corrosion resistance.

Guyed towers — A vertical antenna support structure secured in an upright configuration through the balanced stress of attached guy wires.

Guy wire — A set of wires used to hold a tower or other structure in position.

Hydroxide ion — A negatively charged ion consisting of a single oxygen atom and a single hydrogen atom (HO). If combined with a second hydrogen atom, a neutral water molecule (HO_2) will be formed.

THHN insulated wire — Wire designed for ac power distribution in buildings. THHN stands for thermoplastic high heat-resistant nylon coated, describing the composition of the insulating material.

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- DSP built in
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- 100W HF, 6M, 2M • 50W 70CM
- 10W 1.2 GHz w/opt UT-20 module
- Built-in TNC, DX packet cluster
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- High RF output (50w) • Multiple Scan
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- EchoLink® memory (auto dialer)
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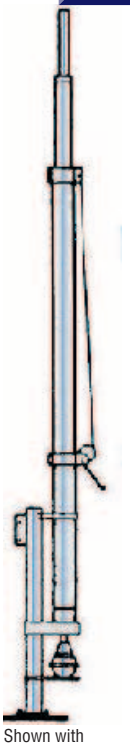

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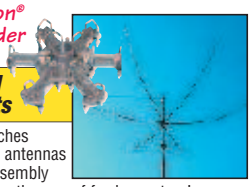

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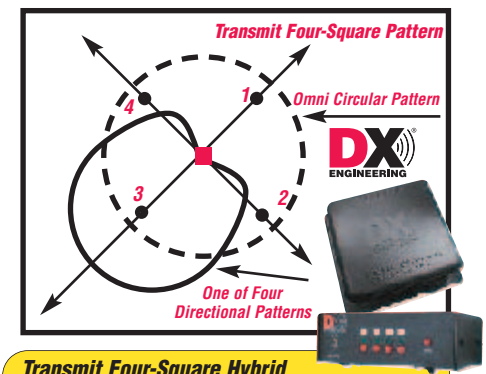

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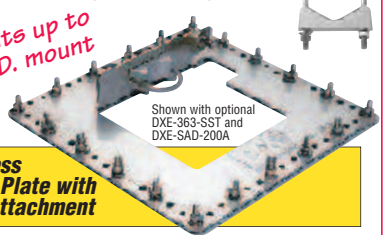

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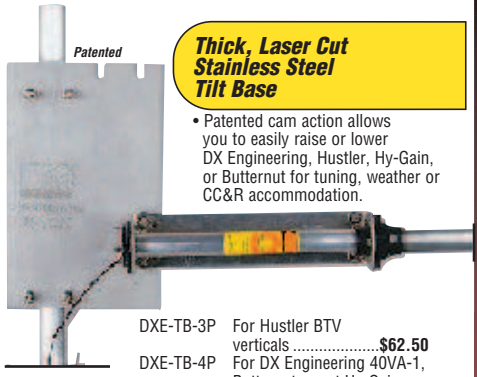

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Z-11ProII

Meet the Z-11ProII, 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. The Z-11ProII 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. With an optional LDG balun, it will also match longwires or antennas fed with ladder-line. Includes Icom interface cable, DC power cable and coax jumper.
Suggested Price $179.99

radio not included

Z-817

The ultimate autotuner for QRP radios including the Yaesu FT-817(D). Tuning is simple; one button push on the tuner is all that is needed - the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters. The Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. Powered by four AA internal Alkaline batteries (not included), so there are no additional cables required. A coax jumper cable is also induced for fast hook up.
Suggested Price $129.99.

radio not included

AT-897Plus for the Yaesu FT-897

If you own a Yaesu FT-897 and want a broad range automatic antenna tuner, look no further! The AT-897Plus Autotuner mounts on the side of your FT-897 just like the original equipment and takes power directly from the CAT port of the FT-897 and provides a second CAT port on the back of the tuner so hooking up another CAT device couldn't be easier. ***Suggested Price$199.99***

- ***RF Sensing***
- ***Tunes Automatically***
- ***No Interface Cables Needed***

AT-100ProII

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 with LEDs, allowing you to switch instantly between two antennas. The AT-100ProII requires just 1 watt for operation, but will handle up to 125 watts. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $229.99***

Z-100Plus

Small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. Includes Icom interface cable, DC power cable and coax jumper.
Suggested Price $159.99

LDG Electronics, Inc. 1445 Parran Road, St. Leonard, MD 20685 ***Phone 410-586-2177 • Fax 410-586-8475***

AT-1000Pro

The AT-1000Pro has an Automode that automatically starts a tuning cycle when the SWR exceeds a limit you set. Operates at any power level between 5 and 1,000 watts peak. RF Relay protection software prevents tuning at greater than 125 watts. Tunes from 1.8 to 54.0 MHz (inc. 6 meters), with tuning time usually under 4 seconds, transmitting near a frequency with stored tuning parameters, under 0.2 seconds. 2000 memories. 2 Antenna connections. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $599***

NEW! AT-600Pro

The LDG AT-600Pro will handle up to 600 watts SSB and CW, 300 on RTTY (1.8 – 30 MHz), and 250 watts on 54 MHz. It will match virtually any kind of coax-fed antenna and will typically match a 10:1 SWR down to 1.5:1 in just a few seconds. You can also use the AT-600Pro with longwires, random wires and antennas fed with ladder line just by adding a balun. It has two antenna ports with a front-panel indicator, and separate memory banks for each antenna. Easy to read LED bar-graph meters showing RF power, SWR and tuner status, tactile feedback control buttons and an LED bypass indicator. Operates from 11 – 16 volts DC at 750 mA. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $359.99***

- ***RF Sensing***
- ***Tunes Automatically***
- ***No Interface Cables Needed***

AT-200Pro

The AT-200Pro 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 MHz (including 6 meters). Rugged and easy-to-read LED bar graphs show power and SWR, and a function key on the front panel allows you to access data such as mode and status. Includes Icom interface cable, DC power cable and coax jumper. ***Suggested Price $249***

IT-100

Matched in size to the IC-7000 and IC-706, the new IT-100 sports a front panel push-button for either manual or automatic tunes, and status LEDs so you'll know what's going on inside. You can control the IT-100 and its 2000 memories from either its own button or the Tune button on your IC-7000 or other Icom rigs. It's the perfect complement to your Icom radio that is AH3 or AH-4 compatible.
Suggested Price $179.99

KT-100

LDG's first dedicated autotuner for Kenwood Amateur transceivers. Easy to use - just right for an AT-300 compatible Kenwood transceiver (except TS-480HX). The KT-100 actually allows you to use the Tune button on the radio. The LEDs on the front panel indicate tuning status, and will show a match in seconds, or even less of you've tuned on or near that frequency before. Has 2,000 memories for instant recall of the tuning parameters for your favorite bands and frequencies. If you have an AT-300 compatible Kenwood radio, you can simply plug the KT-100 into your transceiver with the provided cable; the interface powers the tuner, and the Tune button on the radio begins a tuning cycle. The supplied interface cable makes the KT-100 a dedicated tuner for most modern Kenwood transceivers.
Suggested Price $199.99

YT-100

An autotuner for several popular Yaesu Radios. An included cable interfaces with your FT-857, FT-897 and FT-100 (and all D models) making it an integrated tuner, powered by the interface. Just press the tune button on the tuner, and everything else happens automatically: mode and power are set, a tune cycle runs, and the radio is returned to its original settings. It's the perfect complement to your Yaesu radio.
Suggested Price $199.99

Meters!

FT Meter 2.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Still Only $49***

FTL Meter For Yaesu FT-857(D) and FT-897(D). 4.5" face with calibrated scales for signal strength, discriminator reading on receive, and power output, SWR, modulation, ALC action and supply voltage on transmit, all selectable from the radio's menu. ***Suggested Price $79.99***

NEW! M-7600 For IC-7600. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together.
Suggested Price $79.99

M-7700 For IC-7700. It will display S-meter on receive, or power out, SWR, ALC level or supply voltages, all selectable from the radio's menu. What's more, the M-7700 and the virtual meter on your radio can work together.
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- Power: 60/25W • Memories: 200

TM-V71A Dualband FM Mobile
- TX: 144-148, 430-450 MHz
- RX: 118-524, 800-1300 MHz (cell blkd)
- Power: 50/10/5W • Dual receive (V+V) (U+U)
- Cross-band repeat • EchoLink® ready

TM-D710A
Dualband FM Mobile w/TNC
- TX: 144-148, 430-450 MHz
- RX: 118-524, 800-1300 MHz (cell blkd)
- Power: 50/10/5W • Dual receive (V+V) (U+U)
- Built-in TNC for APRS (needs GPS)
- Cross-band repeat • AvMap G5 & EchoLink® ready

TH-K2AT

TH-F6A

TH-K2AT 2M FM HT
- TX: 144-148 • RX: 136-174
- Power: 5/1.5/0.5W • Memories: 100

TH-F6A Triband FM HT
- TX: 144-148, 222-225, 438-450 MHz
- RX: 0.1-1300 MHz (cell blkd) • Dual band RX
- FM Wide/Narrow, AM, SSB and CW receive modes
- Power: 5/0.5/0.05W • Memories: 435

TS-480HX
200W HF/6M Mobile Transceiver
- TX: HF/6M • RX: 0.5-60 MHz
- Power: 10-200W (with two optional 22A PS's)
- Memories: 99
- IF/stage DSP on main band, AF/stage DSP on sub-band

TS-480SAT
100W version with built-in auto antenna tuner.

GPS Units for TM-D710A

GPS-710

G5

Green Light Labs GPS-710
- Plug-and-play adds GPS for TM-D710A & RC-D710
- Acquires GPS lock from cold start in under 60 seconds
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AvMap G5 APRS GPS Navigator
- Bright non-glare 5 inch color touchscreen
- Preloaded Tele Atlas street maps of N. America
- Import extra POI's with no extra costs

TS-2000 100W HF/VHF/UHF Transceiver
- TX: HF/6M/2M/440 MHz • RX: 0.03-60, 142-152, 420-450 MHz • Power: 10-100W (10-50W on 440 MHz)
- Memories: 99 • HF/6M Auto Antenna Tuner
- IF/stage DSP on main band, AF/stage DSP on sub-band

TS-B2000
Same as the TS-2000 but without front panel controls. Includes PC control software.

TS-2000X
The TS-2000 with 1.2 GHz @ 10W.

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100W HF/6M Compact Transceiver
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- Memories: 500 • IF DSP Technology
- Includes Auto Antenna Tuner

FT-2000 100W HF/6M Transceiver
- TX: HF/6M • RX: 0.03-60 MHz • Power: 10-100W
- Memories: 99 • Auto Antenna Tuner • 32-bit Floating Point DSP • Dual In-Band Receive • Internal Power Supply
- Optional MTU tune units for 160M, 80/40M and 30/20M bands allowing you to pull through weak signals

FT-2000D 200W HF/6M Transceiver
- 200W RF output and power supply is external

FT-817ND
HF/VHF/UHF All Mode Backpack QRP
- TX: HF/VHF/UHF • RX: 0.1-56, 76-154, 420-470 MHz
- Power: 0.7-5W (AM 1.5W) • Memories: 200
- Field operation with AA batteries or Ni-MH pack

FTDX-5000 Series
– Covers HF and 6M; Three configurations all running 10-200W on CW, SSB, FM, RTTY & PKT and 5-50W on AM • RX: 0.03-60 MHz • Memories: 99 • The "D" and "MP" come with SM-5000 Station Monitor with an excellent bandscope

FTDX-5000 Basic Model & ±0.5ppm TCXO
FTDX-5000D With Station Monitor & ±0.5ppm TCXO
FTDX-5000MP With Station Monitor, ±0.05ppm OCXO & 300 Hz Roofing Filter

FT-857D 100W HF/VHF/UHF Mobile
- TX: HF/VHF/UHF • RX: 0.1-56, 76-108, 118-164, 420-470 MHz • Power: 5-100W (HF/6M), 5-50W (2M), 5-20W (440 MHz) • Memories: 200 • YSK-857 included!

FTDX-9000 Series
– Covers HF and 6M; Three configurations including 200W and 400W versions. Class-A operation at 100W (400W version or 75W with the 200W version). The 200W versions feature a built-in power supply. There is an included external power supply for the 400W version. All models also feature analog meters.

FTDX-9000Contest 200W, Configurable, No TFT
FTDX-9000D 200W, 6.5" TFT Display
FTDX-9000MP 400W, Ext. AC PS, No TFT

FT-897D 100W HF/VHF/UHF Portable
- Similar to the FT-857D but can also operate using optional FNB-78 13.2V @ 4.5 Ah NiMH battery packs

FT-950 100W HF/6M Transceiver
- TX: HF/6M • RX: 0.03-56 MHz • Power: 10-100W
- Memories: 100 • Auto Antenna Tuner
- 32-bit Floating Point DSP • Built-in high stability TCXO
- Optional MTU tune units for 160M, 80/40M and 30/20M bands allowing you to pull through weak signals

Quadra System VL-1000
HF/6M 1KW Linear Amplifier
- TX: 160-15M/6M • Power: 1000W on 160-15M & 500W on 6M (220 VAC), 500W (110 VAC)
- Automatic band change & antenna tuner
- Two input & Four output connectors
- Easily connects to any current Yaesu HF transceiver

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• TX: HF/6M • RX: 0.03-60 MHz • Power: 10W @ 13.8VDC, 5W @ 9.6VDC • Memories: 105 • Built in HF automatic antenna tuner • Quantities are limited!

IC-7600 *Multimode HF/6M Transceiver*
• TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
• Memories: 101 • 5.8 inch color screen
• High-resolution real time spectrum scope using a dedicated DSP unit • Automatic antenna tuner
• Dual DSP units • 3, 6 & 15 kHz 1st (roofing) filters

IC-706 MK II-G *Multimode Mobile*
• TX: HF/6M/2M/440 MHz • RX: 0.03-199, 400-470 MHz
• Power: 100W (HF/6M), 50W (2M), 20W (440 MHz)
• Memories: 107 • AF-DSP • IF Shift • Preamp/attenuator
• RMK-706 included • Quantities are limited!

IC-7700 *Multimode HF/6M Transceiver*
• TX: HF/6M • RX: 0.03-60 MHz • Power: 5-200W
• Memories: 101 • 7 inch color screen
• Two 32-bit floating DSPs • Power supply built-in
• Three roofing filters • External VGA connector
• Automatic antenna tuner • USB memory drive socket

IC-7000 *Multimode HF/VHF/UHF XCVR*
• TX: HF/6M/2M/440 MHz • RX: 0.03-199, 400-470 MHz
• Power: 100W (HF/6M), 50W (2M), 35W (440 MHz)
• Memories: 503 • 41 band-widths with sharp or soft filter shape • RMK-7000 included!

IC-7800 *Multimode HF/6M Transceiver*
• TX: HF/6M • RX: 0.03-60 MHz • Power: 5-200W
• Memories: 101 • 7 inch color screen • Two receivers
• Four 32-bit floating DSPs • Power supply built-in
• Three roofing filters • External VGA connector
• Automatic antenna tuner

IC-718 *Multimode HF Transceiver*
• TX: HF (except 60M) • RX: 0.03-30 MHz
• Power: 5-100W • Memories: 101 • DSP built-in
• SSB, CW, RTTY and AM (2-40W)

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IC-7200 *HF/6M Portable Transceiver*
• TX: HF/6M • RX: 0.03-60 MHz • Power: 2-100W
• Memories: 201 • Rugged design for outdoor use
• 32-bit IF-DSPs + 24-bit AD/DA Converters
• USB Port for CI-V Format PC Control and Audio In/Out

PW-1 *HF/6M 1KW Linear Amplifier*
• TX: 160-15M/6M • Power: 1000W (180-264 VAC), 500W (90-132 VAC) • Automatic band change & antenna tuner • Two input & Four output connectors
• Easily connects to any current Icom HF transceiver

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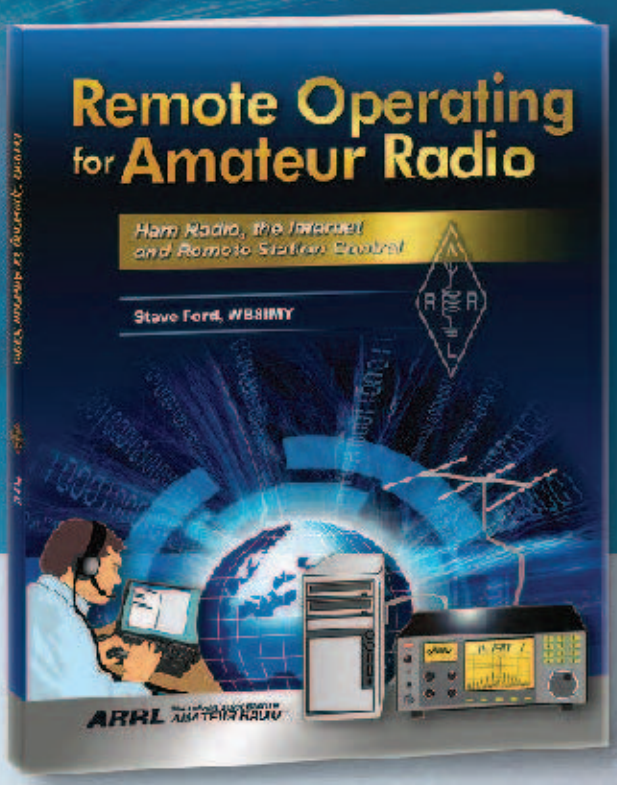
Ham Radio, the Internet and Remote Station Control

By Steve Ford, WB8IMY



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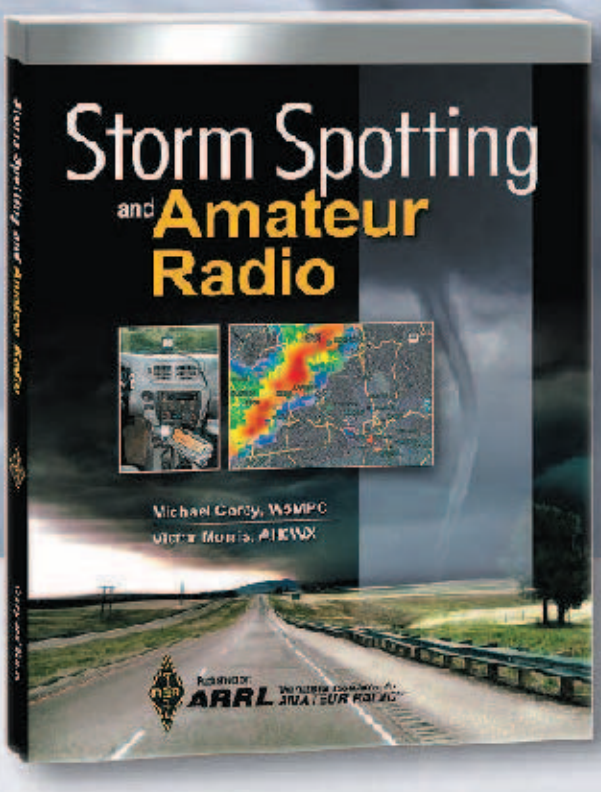
By Michael Corey, W5MPC and Victor Morris, AH6WX



Storm Spotting and Amateur Radio is a resource for the Amateur Radio operator who volunteers as a trained storm spotter. This handy guide includes information on resources, training, equipment, safety, storm spotter activation procedures, reportable weather criteria, developing a local storm spotter manual, and the experiences of storm spotters from around the country. It also provides some meteorological information about severe weather such as hurricanes, tornadoes, hail, floods, damaging wind, and winter weather.

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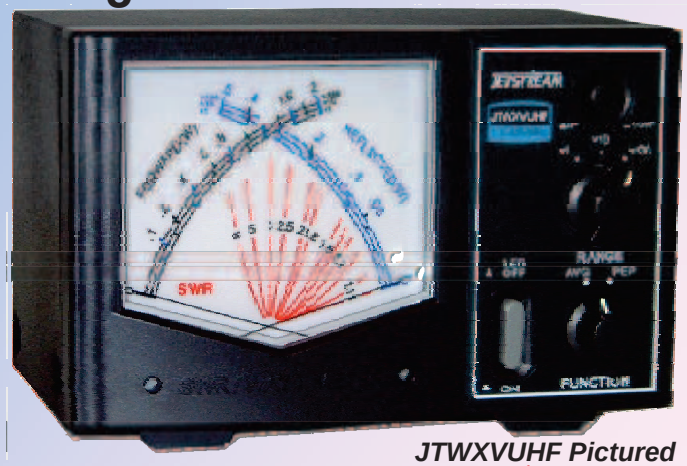

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JT1010J2
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FBA39	Alkaline Battery Tray	27.95
FGPS2	GPS Unit	74.95
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ADMS1J	Software/Cable	39.95
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EDC6	DC Cable	8.95
FBA25A	AA Battery Case	21.95
FNB83	7.2V 1400mAh Ni-MH	39.95
MH34B4B	Speaker Mic	35.95
VAC370B	Rapid Charger	62.95

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ADMSVX3	Software/Cable	39.95
CSC92	Soft Case	15.95
EDC21	DC Cable w/Noise Filter	38.95
FBA37	AA Battery Case	18.95
FNB82LI	7.2V 1400mAh Ni-MH	36.95
MH34B4B	Speaker Mic	35.95

FT8800R

If you're ready for the best in a Dual-Band FM Mobile Transceiver, the FT-8800R is ready for you! With easy operation, outstanding receiver performance, and cross-band repeat capability, the FT-8800R is the new standard of comparison!!

ADMS2I	Software and cable	39.95
JTPS14M	Jetstream Power Supply	49.95
MLS100	External Speaker	46.95
MMB60	Quick Release Mobile Bracket	32.95
YSK8900	Separation Kit	41.95

FT7900R

Yaesu's economically priced One-Touch Operation FT-7900R Dual band FM mobile. Back-lit push button controls ensure extraordinarily easy and safe operation while driving at night. The exceptionally wide receiver coverage provides all sorts of additional uses!

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JTPS14M	Jetstream Power Supply	49.95
MLS100	External Speaker	46.95
MMB60	Quick Release Mobile Bracket	32.95
YSK7800	Separation Kit	29.95

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FT-950
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VL-1000
High performance linear amplifier covers 160 to 15 and the 6 meter amateur bands

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NEW!

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2M/440 50W
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state of the art IF DSP technology, world class performance, easy to use

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1.5W 2M, 1.0W 440MHz
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HF/6/2/440 all mode

FT-8800R
2M/440MHz

FT-8900R
10M/6M/2M/440MHz

FT-2900R
2 meter transceiver

FT-7900R
Dual bander

VX-8 Series

NEW!

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Full 5 watts 144/440MHz GPS unit and Antenna

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50/144/440MHz GPS unit and Antenna Optional, Lithium Ion battery
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— FTDX Series —

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FTDX-9000D
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FTDX-9000C
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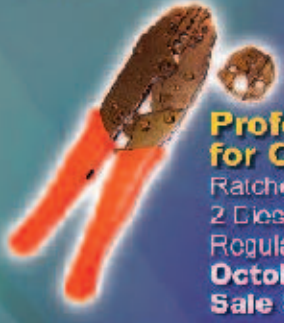

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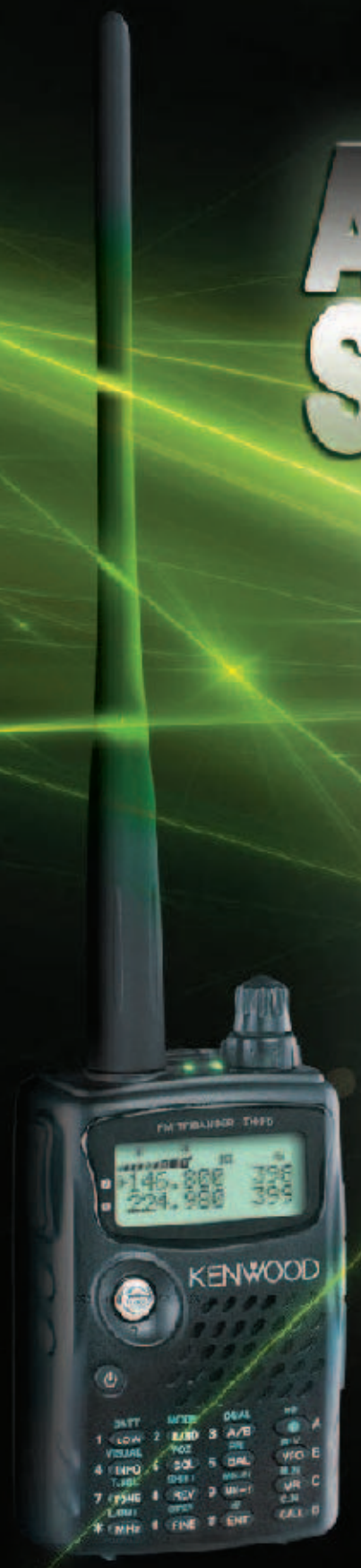
[1]Note that certain frequencies are unavailable. [2]5W output



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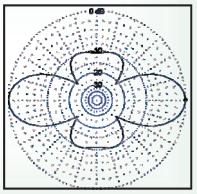
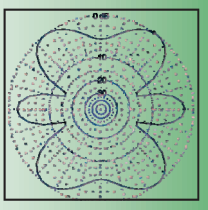
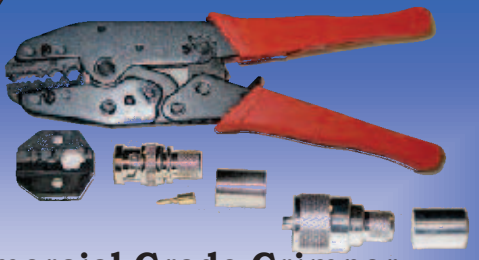


EZNEC Rocket 88™ Antenna plot at 35 feet over typical ground on 20 Meters. 10.43 dBi gain (4.98 dBi free space).



EZNEC G5RV Antenna plot at 35 feet over typical ground on 20 Meters. 7.33 dBi gain. That's more than 3 dB *below* the Rocket 88™!



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QST QuickStats

sta·tis·tics (st-tstks) n.
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2. (used with a pl. verb) Numerical data.

www.arrl.org/Quickstats

Online QuickStats Poll Results for July 10 through August 10

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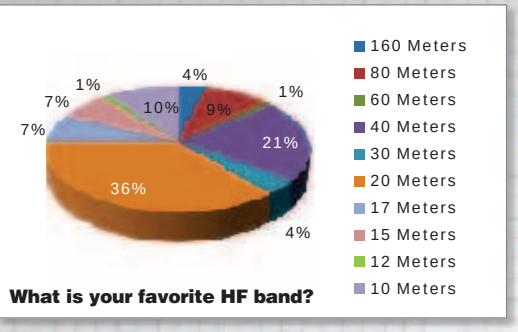
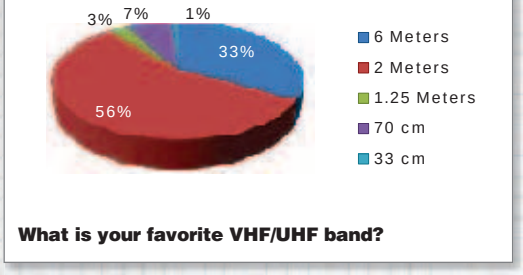
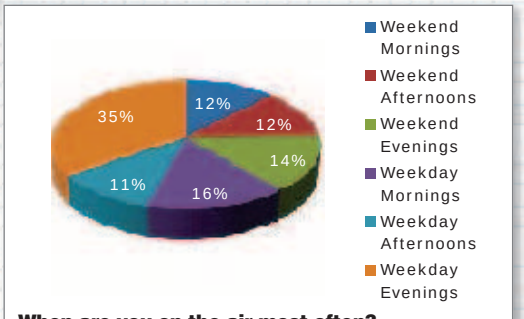


What is your favorite HF band?



What is your favorite VHF/UHF band?



When are you on the air most often?

ARRL Affiliated Club Activites

(Based on a total of 2180 Affiliated Clubs. If your club isn't affiliated, go to **www.arrl.org/affiliated-club-resources**).

1428	Offer entry level license classes.
1114	Offer General and/or Amateur Extra license classes.
1831	Are involved in emergency communications and public service.
1156	Have a mentor program for new hams.
1148	List DXing as an activity.
918	List contesting as an activity.
647	Sponsor a hamfest.

Top 20 Most Commonly Confirmed DXCC Entities

(Based on total number QSO credits submitted to the DX Century Club, via either Logbook of The World or paper QSLs. See **www.arrl.org/dxcc-top-338-totals**.)

Rank	DXCC Entity	Submitted QSOs
1	Italy	28009
2	France	27888
3	Canada	27861
4	Spain	27735
5	England	27733
6	Brazil	27709
7	Japan	27676
8	Sweden	27663
9	Belgium	27614
10	Finland	27477
11	Netherlands	27446
12	Germany	27371
13	Poland	27369
14	Australia	27145
15	Argentina	27139
16	Austria	27049
17	Switzerland	27002
18	Hungary	26995
19	Denmark	26866
20	USA	26819

Top 20 Least-Confirmed DXCC Entities

(Based on total QSO credits submitted to the DX Century Club, via either Logbook of The World or paper QSLs. See **www.arrl.org/dxcc-top-338-totals**.)

Rank	DXCC Entity	Submitted QSOs
1	Saint Barthelemy	4655
2	DPRK (North Korea)	5112
3	Swains Island	6031
4	Scarborough Reef	6470
5	Montenegro	7012
6	Yemen	7853
7	Chesterfield Island	8316
8	Glorioso Island	8968
9	Ducie Island	9225
10	Palestine	9247
11	Marquesas Islands	9357
12	Timor - Leste	9406
13	Andaman & Nicobar Islands	9546
14	Pratas Island	9701
15	Austral Island	9766
16	Bouvet Island	9990
17	Temotu Province	10015
18	South Sandwich Islands	10276
19	Prince Edward & Marion	10456
20	Heard Island	10707

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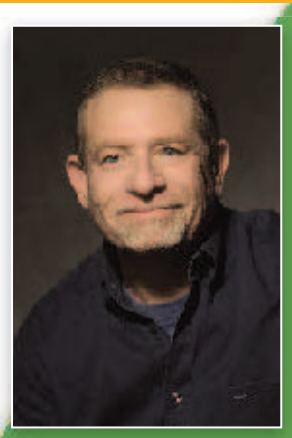
Former owner of a coax cable, assemblies, and connector company returning to the business



Marc Abramson, KC9VW

Hello everybody,

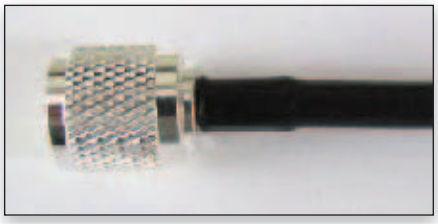
Took the personal time to be with my new grandchildren, harmonize my relationship, and yes, enrolled in acting classes; did some TV and stage acting too. Nevertheless, after careful consideration, I am confident it is now the right time to return to this wonderful market called Amateur Radio.

Our new company is located in Houston, Texas (family is here), which is geographically desirable for fast transit time nationwide, to again service the market with superb-knowledgeable customer service, first-rate quality products, and a great value.

Our production staff benefits you with over 35 years of manufacturing experience. In our new facility we build each assembly with state-of-the-art manufacturing equipment, ensuring that you receive a quality finished product each and every time. That is our guarantee.

So it is with enthusiasm, that I look forward to the opportunity to do business in this fine market again.

73's Marc Abramson, KC9VW



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Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz). 7.25x8.75x3.6 inches. 3.4 pounds.

SWR/Power Meters

PM-30
$89.95
PM-30UV
$99.95

PM-30, $89.95, for 1.8 to 60 MHz.
Displays forward/reflected power, SWR simultaneously on Cross-Needle meter. True shielded directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction, scratch-proof case, durable paint, Lexan front panel. Lamp switch. SO-239 connectors. 5.3x5.75x3.5 in.

144/220/440 MHz, 30/300 SWR/Wattmeters
PM-30UV, $99.95, SO-239 connectors.
PM-30UVN, $99.95, N connectors.
PM-30UVB, $99.95, BNC connectors.

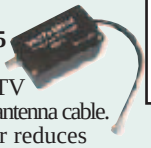
1.5 kW *dry* Dummy Load

DL-650M, $79.95 100 Watts continuous 1500 W/10 seconds to 650 MHz. *Ceramic* resistor. SWR less than 1.3. SO-239s. **DL-650MN, $84.95** has N connectors.

Low Pass TVI Filter

LP-30, $89.95 Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1.5 kW.

High Pass TVI Filter



HPF-2, $34.95 Installs between VCR/TV and cable TV/antenna cable. Eliminates or reduces interference caused by nearby HF transmitters.

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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 in.

B-5018-G
$329

B-1018-G, $409. MIRAGE's most popular *dual purpose* HT/mobile/base amp. 160 Watts out/10W in. For 0.25-10W rigs.

B-2518-G, $329. Like B-5018-G but for 10-25 Watt mobile/base. 160W out/25W in.

RC-2, $49. Remote Control. On/Off, preamp On/Off, selects SSB/FM. 25 ft. 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

FCC Type Accepted

6 Meter Amplifier

A-1015-G, $389, *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 Watts out/10W in. For 1-15 W transceivers. 20 dB GaAsFET preamp.

300 Watts on 2-Meters, $739

3 models: 300 Watts out for 10, 25, or 50 Watts in. FM/SSB/CW. 15/20 dB gain, *GaAsFET* preamp.

Repeater Amps

11 models: *continuous* duty FM/SSB/CW *Repeater* Amps for 6, 2, 1¼ Meters, 70 cm, 450 MHz, ATV.

Commercial Amps, $159 to $429

Commercial Amps for 150-174, 450-470 MHz, VHF marine bands, 70-130 Watts out.

70 cm Amplifiers (420-450 MHz)

D-3010-N, $389 -- 100 W out/30W in. For 5-45 Watt *mobile/base*. **D-1010-N, $419**, 100W out/10W in. *Dual purpose* -- for handhelds or mobile/ base. **D-26-N, $299**, 60W out/2W in, for *handhelds*.

Low Noise GaAsFET preamps

High gain ultra low noise *GaAsFET* preamps for receiving weak signals. Selectable 15-22 dB gain prevents intermod. < 0.8 dB noise figure, auto RF switching to 160W.

In-shack or Mast-Mount models.

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Read SWR directly and Forward/ Reflected, Peak/Average power. Remote coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

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Industry standard ATV amps: **D-1010-ATVN, $439**, 82 W PEP out/10W in. **D-100-ATVN, $449**, 82W PEP out/2W in. (without sync compression).

Frequency, MHz	*In Shack, $149.95*	*MastMount, $199.95*
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50-54	**KP-1/6M**	**KP-2/6M**
144-148	**KP-1/2M**	**KP-2/2M**
220-225	**KP-1/220**	**KP-2/220**
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1¼ Meter Amps (223-225 MHz)

10 models -- 20-220 Watts out for 2-50W in, $169-$739.

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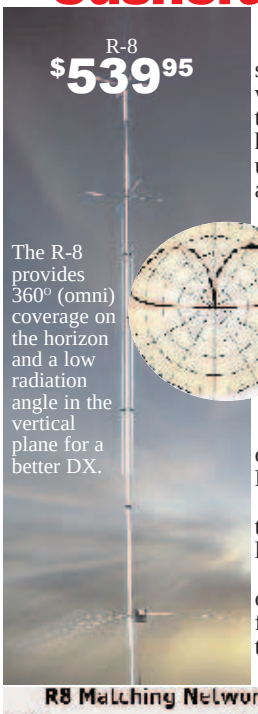
Cushcraft R8 *8-Band Vertical*



Covers 6, 10, 12, 15, 17, 20, 30, and 40 Meters!

The Cushcraft R8 is recognized as the industry gold standard for multi-band verticals, with thousands in use worldwide. Efficient, rugged, and built to withstand the test of time, the R8's unique ground-independent design has a well-earned reputation for delivering top DX results under tough conditions. Best of all, the R8 is easy to assemble, installs just about anywhere, and blends inconspicuously with urban and country settings alike.

Automatic Band Switching: The R8's famous "black box" matching network combines with traps and parallel resonators to cover 8 bands. You QSY instantly, without a tuner!

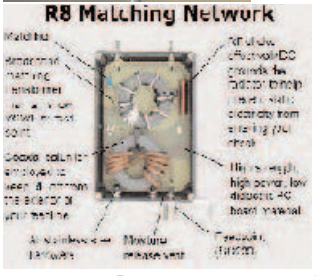
Rugged Construction: Thick fiberglass insulators, all-stainless hardware, and 6063 aircraft-aluminum tubing that is double or triple walled at key stress points handle anything Mother Nature can dish out.

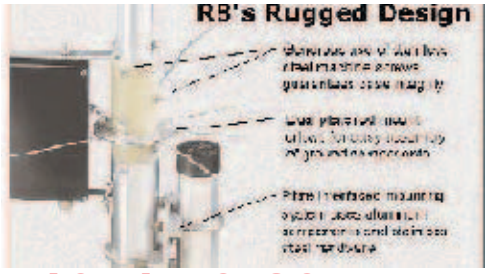
Compact Footprint: Installs in an area about the size of a child's sandbox -- no ground radials to bury and all RF-energized surfaces safely out of reach.

Legal-Limit Power: Heavy-duty components are contest-proven to handle all the power your amplifier can legally deliver and radiating it as RF rather than heat.

The sunspot count is climbing and long-awaited band openings are finally becoming a reality. Now is the perfect time to discover why Cushcraft's R8 multi-band vertical is the premier choice of DX-wise hams everywhere!

R-8GK, $56.95. R-8 three-point guy kit for high winds.





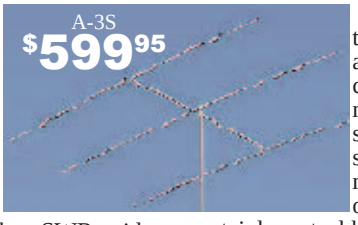
MA-5B *5-Band* Beam

Small Footprint -- Big Signal

The MA-5B is one of Cushcraft's most popular HF antennas, delivering solid *signal-boosting directivity* in a bantam-weight package. Mounts on roof using standard TV hardware. Perfect for exploring exciting DX without the high cost and heavy lifting of installing a large tower and full-sized array. Its 7 foot 3-inch boom has less than 9 feet of turning radius. Contest tough -- handles 1500 Watts.

The unique MA-5B gives you 5-bands, automatic band switching and easy installation in a compact 26-pound package. On 10, 15 and 20 Meters the end elements become a two-element Yagi that delivers solid power-multiplying gain over a dipole on all three bands. On 12 and 17 Meters, the middle element is a highly efficient trap dipole. When working DX, what really matters are the interfering signals and noise you *don't hear*. That's where the MA-5B's impressive side rejection and front-to-back ratio really shines. *See* ***cushcraftamateur.com*** *for gain figures.*

Cushcraft 10, 15 & 20 Meter Tribander Beams



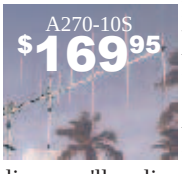
Only the best tri-band antennas become DX classics, which is why the Cushcraft World-Ranger A4S, A3S, and A3WS go to the head of the class. For more than 30 years, these pace-setting performers have taken on the world's most demanding operating conditions and proven themselves every time. The key to success comes from attention to basics. For example, element length and spacing has been carefully refined over time, and high-power traps are still hand-made and individually tuned using laboratory-grade instruments. All this attention to detail means low SWR, wide bandwidth, optimum directivity, and high efficiency -- important performance characteristics you rely on to maintain regular schedules, rack up impressive contest scores, and grow your collection of rare QSLs!

It goes without saying that the World-Ranger lineup is also famous for its rugged construction. In fact, the majority of these antennas sold years ago are still in service today! Conservative mechanical design, rugged over-sized components, stainless-steel hardware, and aircraft-grade 6063 make all the difference.

The 3-element A3S/A3WS and 4-element A4S are world-famous for powerhouse gain and super performance. **A-3WS, $499.95,** 12/17 M. **30/40 Meter** *add-on kits* available.

Cushcraft Dual Band Yagis

One Yagi for Dual-Band FM Radios



Dual-bander VHF rigs are the norm these days, so why not compliment your FM base station with a dual-band Yagi? Not only will you eliminate a costly feed line, you'll realize extra gain for digital modes like high-speed packet and D-Star! Cushcraft's A270-6S provides three elements per band and the A270-10S provides five for solid point-to-point performance. They're both pre-tuned and assembly is a snap using the fully illustrated manual.

Cushcraft Famous *Ringo* Compact FM Verticals

W1BX's famous *Ringo* antenna has been around for a long time and remains unbeaten for solid reliability. The Ringo is broad-banded, lighting protected, extremely rugged, economical, electrically bullet-proof, low-angle, and more -- but mainly, it just plain works! To discover why hams and commercial two-way installers around the world still love this antenna, order yours now!

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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.***

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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!

Call your favorite dealer for your best price!

MFJ-259B
$289.95

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.

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, $269.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $159.95. 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. 7½x2½ x2¼ 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-731, $99.95. *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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MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

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1.8-170 MHz *plus* 415-470 MHz SWR Analyzer

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
$389.95

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More hams use MFJ SWR Analyzers™ than any others in the world!

MFJ *IntelliTuner*™ Automatic Tuners

More hams use MFJ tuners than all other tuners in the world!

World's most advanced Automatic Antenna Tuners feature world renowned MFJ AdaptiveSearch™ and AutomaticRecall™ algorithms -- world's fastest ultra-wide range tuning. Nine World Class models! Choose your features: Digital/Analog/Audio SWR-Wattmeter, Antenna Switch, Balun, Radio Interface, Digital frequency readout, Remoteable, Coax/Balanced Lines/Wire Tuning, Field Upgradeable . . .

MFJ-998 1500 Watt *Legal Limit IntelliTuner*™

Only the MFJ-998 gives you fully automatic antenna tuning for your legal limit full 1500 Watts SSB/CW linear amplifier!

MFJ-998 $699.95

Ultra-fast Automatic Tuning

Instantly match impedances from 12-1600 ohms using MFJ's exclusive *IntelliTune*™, *Adaptive Search*™ and *InstantRecall*™ algorithms with over 20,000 *VirtualAntenna*™ Memories.

Safe auto tuning protects amp

MFJ's exclusive *Amplifier Bypass Control*™ makes tuning safe and "stupid-proof"!

Digital/Analog Meters

A *backlit* LCD meter displays SWR, forward/reflected power, frequency, antenna selected, an auto-ranging bargraph power indication, and much more.

Has quick-glance auto-ranging Cross-Needle SWR/Wattmeter.

MFJ VirtualAntenna™ Memory

MFJ new *VirtualAntenna*™ Memory system gives you 4 antenna memory banks for *each* of 2 switchable antenna coax connectors. Select up to 4 antennas on each antenna connector. Each antenna has 2500 memories, 20,000 total. Has binding post for end-fed long wire antennas.

Download & Upgrade Remotely

Download from internet and upgrade your MFJ-998 firmware as new features are introduced.

Plus Much More!

Built-in radio interface controls most transceivers.

Automatically bypasses with excessive tuning power.

Use balanced line antennas with external **MFJ-912, $59.95**, 1.5 kW 4:1 balun.

Small 13Wx4Hx15D inches easily fits into your ham station. 8 pounds. Requires 12-15VDC at 1.4 amps maximum or 110 VAC with **MFJ-1316, $21.95**.

for 600 Watt amps

AL-811/ALS-600/ALS-500

For 600 Watt amps like Ameritron AL-811/ALS-600/ALS-500M. Matches 12-800 Ohms. 10,000 *Virtual Antenna*™ memories. Cross-Needle SWR/Wattmeter. 10Wx2¾Hx9D inches.

MFJ-994B $359.95

***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.

300 Watt...Best Seller

Digital Meter, Ant Switch, Balun

The *world's best selling* automatic antenna tuner is *highly acclaimed the world over* for its ultra high-speed, wide matching range, reliability, ease-of-use! Matches virtually *any* antenna.

MFJ-993B $259.95

300 Watt...*Extra* Wide Range

SWR/Wattmeter, 10000 VA Memories

***Extra** wide matching range at less cost.* Exclusive dual power level: 300 Watts/6-1600 Ohms; 150W/6-3200 Ohms. Cross-Needle SWR/Wattmeter.

MFJ-991B $219.95

200 Watt ...Compact

Digital Meter, Ant Switch, Wide Range

World's fastest compact auto tuner uses MFJ *Adaptive Search*™ and *InstantRecall*™ algorithms. 132,072 tuning solutions instantly match virtually any antenna with near perfect SWR.

MFJ-929 $219.95

200 Watt ...Econo

Small, Ant Switch, 20K VA Memories

High-speed, wide matching range and compactness at low cost! Leave in-line and forget it -- your antenna is *always* automatically tuned! 2-position antenna switch.

MFJ-928 $199.95

200 Watt *MightyMite*™

Matches IC-706, FT-857D, TS-50S

***No** extra space needed!* Just set your IC-706/7000, FT-857D, TS-50S on top of this matching low-profile automatic tuner -- it's all you need for a completely automated station using *any* antenna! Just tune and talk!

MFJ-925 $179.95

G5RV Antenna

Covers all bands, 160-10 Meters with antenna tuner. 102 ft. long. Can use as inverted vee or sloper. Use on 160 Meters as Marconi.1500 Watts. Super-strong fiberglass center/feedpoint insulators. *Glazed ceramic* end insulators. All hand-soldered connections. Add coax, some rope and you're *on the air!*

MFJ-1778M, $39.95. G5RV Junior. Half-size, 52 ft. 40-10M with tuner, 1500 Watts.

MFJ-1778 $44.95

200W...Weather-sealed

for Remote/Outdoor/Marine

***Fully** weather-sealed for remote Outdoor/Marine use*! Tough, durable, built-to-last the elements for years.

MFJ-926B $399.95

200 Watt...Remote

Coax/Wire Ant, No pwr cable needed

Weather protected fully automatic *remote* auto tuner for wire ***and*** *coax* antennas -- an MFJ exclusive. Powers through coax -- No separate power cable needed.

MFJ-927 $259.95

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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 $389.95

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 $349.95

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 $299.95

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 $219.95

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 $179.95

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 $139.95

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 $129.95

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 $119.95

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 $99.95

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 $99.95

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, $149.95. 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 $69.95

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 $99.95

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $69.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 ***VHF/UHF*** Tuners

MFJ-921/924 $89.95

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 $109.95

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, $209.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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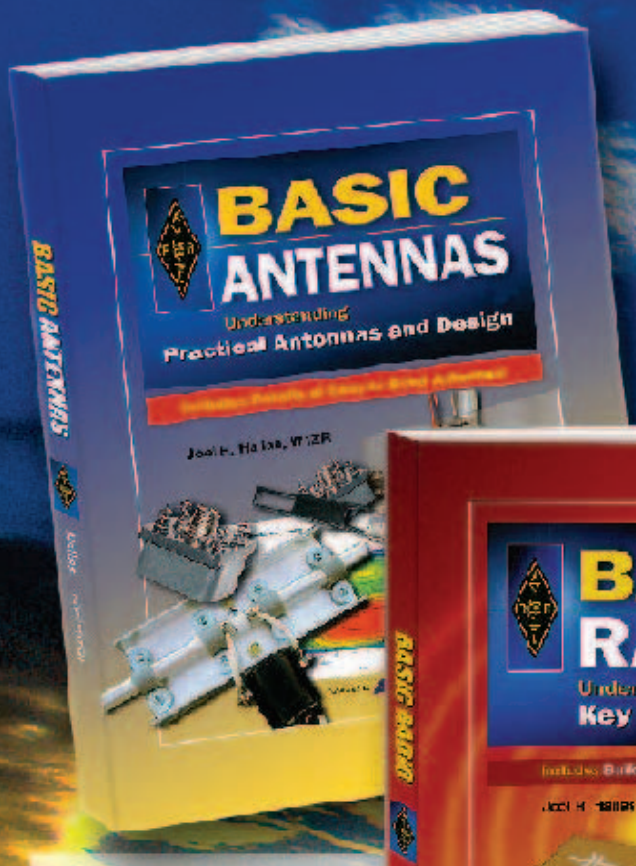

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For something that is often so simple to make, an antenna is remarkably difficult for many people to understand. That's unfortunate, because for many radio systems the antenna is one of the most important elements, one that can make the difference between a successful and an unsuccessful system.

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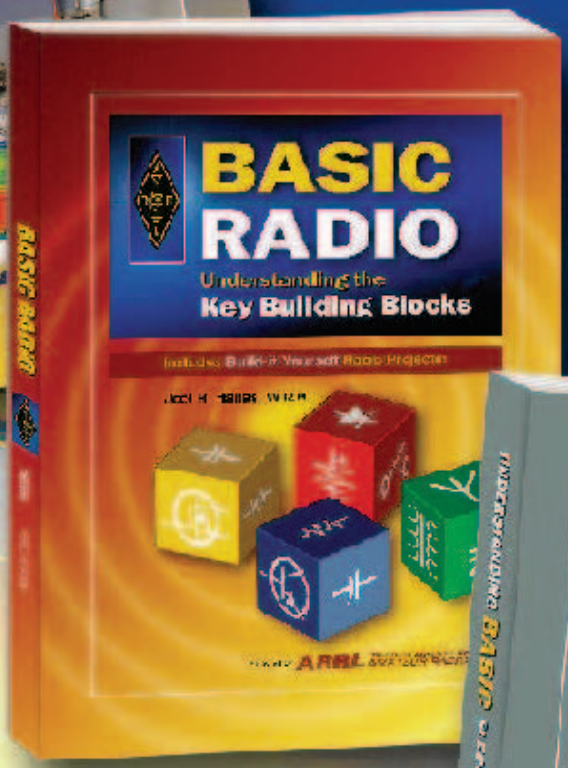

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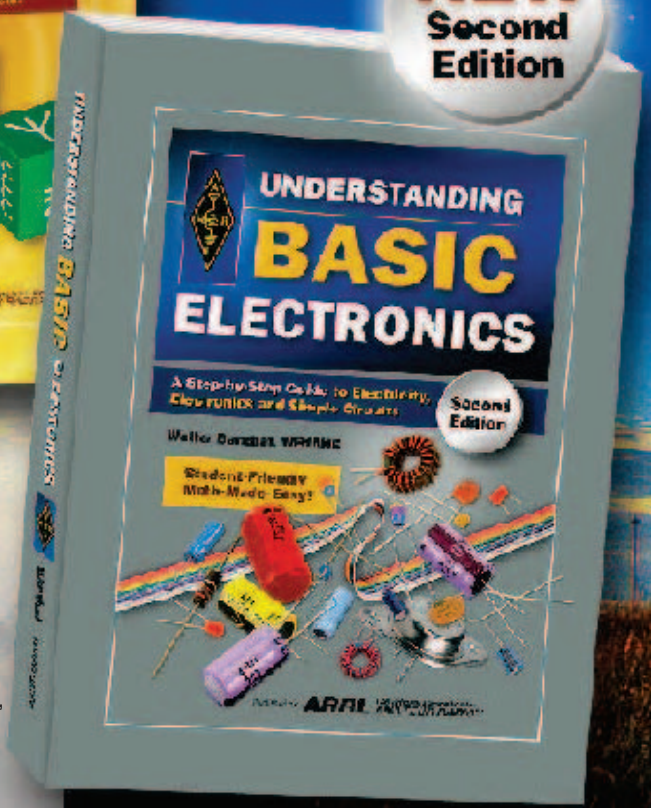

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QS6/ 2010

MFJ *Balanced Line* Antenna Tuner

Superb balance . . . Very wide matching range . . . Covers 1.8-54 MHz . . . Cross-Needle SWR Wattmeter . . . Handles 300 Watts . . . Compact size . . .

The MFJ-974HB is a* fully balanced true *balanced line antenna tuner. It gives you superb current balance.

Johnson Matchbox

For decades, the Johnson Matchbox has been the standard of comparison for balanced line antenna tuners. But, it had a severely limited matching range and covered only 80, 40, 20, 15 and 10 Meters.

***The** MFJ-974HB is its successor*. It meets today's needs and even surpasses the Johnson Matchbox outstanding performance.

Everything You Need

The MFJ-974HB gives you excellent current balance, very wide matching range(12-2000 Ohms) and covers 1.8 through 54 MHz *continuously* including all WARC bands, 160 Meters, 6 Meters and the new 60 Meter band. Handles 300 Watts SSB PEP and 150 Watts CW.

Tuning is fast and easy - - just three tuning controls. You can adjust for highly efficient broadband low-Q operation or use higher Q when you encounter extreme loads.

A large three-inch lighted Cross-Needle SWR/Wattmeter lets you read SWR, peak or average forward and reflected power *all at a glance* on 300/60 or 30/6 Watt ranges.

A ground post is provided to ground one output terminal so you can also tune random wires and coax fed antennas.

Compact 7½Wx6Hx8D in. fits anywhere.

Tunes any Balanced Line

The MFJ-974HB tunes any balanced lines including 600 Ohm open wire line, 450/300 Ohm ladder lines, 300/72 Ohm twin lead - - shielded or unshielded.

Superb current balance minimizes feedline radiation that can cause troublesome TVI /RFI, painful RF bites, mysterious RF feedback problems and radiation pattern distortion.

Excellent Balance, Excellent Design

The MFJ-974HB is a *fully balanced* wide range T-Network. *Four* 1000 Volt air variable capacitors are gear driven. A high-Q air wound tapped inductor is used for 80-10 Meters with separate inductors for 6 and 160 Meters. The tuning components are mounted symmetrically to insure electrical balance.

MFJ-974HB
$209.95

A 1:1 *current* balun is placed on the low impedance 50 Ohm input side to convert the balanced T-Net-work to un-balanced operation. An efficient balun is made of 50 ferrite beads on RG-303 *Teflon*™ coax to give very high isolation. It stays cool even at max power.

Balanced Line = Extremely Low Loss

Balanced lines give extremely low loss.

Doublet, horizontal loop, vertical loop, quad, double extended Zepp, Lazy H, W8JK antennas all give efficient multi-band operation when fed with balanced lines.

6-80 Meter Balanced Line Tuner

MFJ-974B
$189.95

MFJ-974B, $189.95. Same as MFJ-974H but for 6-80 Meter operation (no 160 Meters).

160-6 Meters All Band Doublet Antenna

MFJ-1777, $59.95. 102 feet doublet antenna covers 160-6 Meters with balanced line tuner. Super strong custom fiberglass center insulator provides stress relief for 450 Ohm ladder line (100 feet included). Authentic *glazed ceramic* end insulators. Handles 1500 Watts.

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!

MFJ-976
$499.95

The MFJ-976 is a 1500 Watt 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 superb 10 Meter performance due to 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.

Ladder line, Twin lead, Insulators, Copper wire . . .

Super-strong fiberglass 450 Ohm ladder line insulators

MFJ-16D01, $8.95. *Center* insulator. Double weave ladder line stress-relief. Strong wire tie points. Hang hole.

MFJ-16E01, $9.95. Feedpoint *End* Insulator. Double weave ladder line stress relief. Built-in SO-239 connector.

MFJ-16F01, $8.95. *Middle* insulator. High-strength coax connection at mid-point with SO-239, quadruple weave-through ladder line stress relief.

MFJ-16C06, $4.56. Authentic *glazed ceramic* Insulator, 6-pack.

450 Ohm Ladder Line

Extremely low loss, open-frame construction. Heavy duty black polyethylene. Solid 18 gauge wire. MFJ-18H050, **50 Ft.**, $19.95. MFJ-18H100, **100 Ft.**, $34.95. MFJ-18H250, **250 Ft.**, $89.95.

300 Ohm Twin-Lead

20 gauge stranded copper wire. Black polyethylene. MFJ-18T050, **50 Ft.**, $24.95. MFJ-18T100, **100 Ft.**, $44.95. MFJ-18T250, **250 Ft.**, $99.95.

Copper Antenna Wire

Flexible, 7-strand, 14 gauge, hard solid-copper wire. Strong/long-lasting. MFJ-18G100, **100 Ft.**, $24.95. MFJ-18G250, **250 Ft.**, $59.95.

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MFJ 160-6 Meter Antenna

Self-supporting 43 foot vertical -- no guy wires required . . . 1500 Watts . . . exceptional performance . . . low-profile . . . includes base mount and legal limit balun . . . assembles in an hour . . .

MFJ-2990
$359.95

New!

Operate all bands 160 through 6 Meters at full 1500 Watt with this self-supporting, 43 feet high performance vertical! It assembles in less than an hour and its low-profile blends in with the sky and trees -- you can barely see it from across the street.

Exceptional Performance

The entire length radiates to provide exceptional low angle DX performance on 160 through 20 meters and very good performance on 17 through 6 Meters. You can shorten it by telescoping it down for more effective low angle radiation on higher bands if desired.

With an automatic antenna tuner there's no fuss -- just talk!

A wide-range automatic or manual antenna tuner *at your rig* easily matches this antenna for all bands 160-6 Meters. There's no physical tuning adjustments on the antenna -- you simply put it up!

An optimized balun design allows *direct coax feed* with negligible coax loss (typically less than ½ dB 60-6 Meters and less than 1 dB 160-80 M with good quality, low-loss coax).

Fully self-supporting, Extremely low wind loading, Very low visibility . . .

With just 2 square feet wind load, the fully self-supporting MFJ-2990 -- *no guy wires needed* -- has the lowest wind-loading and lowest visibility of any vertical antenna! The key is a six foot section of tapering diameter *stainless steel* whip that flexes in strong wind instead of stressing the bottom sections. Its 2-inch O.D. and .120 inch thick walled tubing bottom section makes it incredibly strong -- it'll stay up!

Weighs just 20 pounds -- you can easily put it up by yourself because its corrosion resistant *6063 aircraft aluminum* tubing and stainless steel construction make it light *and* super-strong.

Assembles in an hour

You can easily assemble it in an hour! Ground mounting lets you completely hide its antenna base in shrubbery. Includes ATB-65 high-strength antenna mount. Requires ground system -- at least one radial. More extensive ground system will give much better performance.

Great for Stealth Operation in antenna restricted areas

This very low-profile antenna is perfect for stealth operation in antenna restricted areas. Hide it behind trees, fences, buildings, bushes. Use it as a flagpole. Telescope it down during the day. Put it up at night and take it down in the morning before the neighbors even notice!

Quick and easy installation makes it great for DXpeditions, field day and other portable and temporary operations.

MFJ *Automatic* Tuners

MFJ-998
$699.95

For legal limit 1500 Watt SSB/CW amplifiers. Auto-ranging LCD and Cross-Needle SWR/Wattmeter, antenna switch, amp bypass, matches 12-1600 Ohms, 1.8-30 MHz.

MFJ-993B
$259.95

Dual power range -- 300 Watt range matches 6-1600 Ohms. 150 Watt/6-3200 Ohms. Auto-ranging LCD and Cross-Needle SWR/Wattmeter, antenna switch, 1.8-30 MHz.

MFJ *Manual* Tuners

MFJ-989D
$389.95

1500 Watts SSB/CW, 1.8-30 MHz. Active peak-reading Cross-Needle SWR/Wattmeter, balun, dummy load, antenna switch, aircore roller inductor.

MFJ-949E
$179.95

World's most popular tuner! 300 Watts, 1.8-30 MHz. Peak/Average Cross-Needle SWR/Wattmeter, 8 pos. antenna switch, dummy load, 1kV capacitors.

Window Feedthru

MFJ-4602
$69.95

Bring 3 coaxes, balanced line, random wire, ground thru window. Connectors mounted on *stainless steel* panel. ¾" thick *pressure-treated* weather-proof wood.

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10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground system 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 . . .

MFJ-1798
$299.95

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 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.

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* 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.

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.

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.

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.

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 *6-Band* Halfwave Vertical Antenna

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed

MFJ-1796
$229.95

MFJ-1796 is only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments, small lots, trailers. Perfect for field day, DXpeditions, camping.

Efficient end-loading, no lossy traps. Entire length always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting one band has minimum effect on other bands.

MFJ-1796W, $229.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ-1792, $189.95. Full size 1/4 wave radiator for 40 Meters. 33 ft., handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $209.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

6-Band, 40-2 Meters ***Rotatable*** Mini-Dipole

Low profile 14 feet . . .7 ft. turning radius . . . 40, 20, 15, 10, 6, 2 Meters . . . 1500 Watts . . .

MFJ-1775
$249.95

MFJ-1775 is inconspicuous and low profile -- not much bigger than a TV antenna and is easily turned by a lightweight rotator like Hy-Gain's *AR-35*.

It's no Wimp! Its *directivity* reduces QRM/noise and lets you *focus* your signal in the direction you want -- work some *real* DX.

You can operate 6 bands -- 40, 20, 15, 10, 6 and 2 meters -- and run *full 1500 Watts* SSB/CW on all HF bands!

Features automatic band switching and uses highly efficient end-loading with its *entire length* always radiating. With 6 and 2 Meters thrown-in, you have ham radio's most versatile *rotatable* dipole!

Each HF band uses a separate, efficient end-loading coil wound on fiberglass forms with *Teflon*™ wire, and 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, $249.95. WARC band version for 12, 17, 30, 60 Meters only.

MFJ *80/40/20* Meter ***Rotatable*** Dipole

MFJ-1785
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Now you can operate the *low bands* on 80, 40, and 20 Meters with a true rotatable dipole that'll blend in with the sky! Take advantage of excellent low band propagation during this low sunspot cycle. Handles 1500 Watts SSB/CW. 80/40 meter end-loading coils are wound on fiberglass forms with *Teflon*™ wire, and resonated with capacitance hats to ensure extremely low-losses. Full-size on 20 Meters gives incredible DX. Balun included! 33 foot low-profile, inconspicuous. Easily rotatable with a medium duty rotator like Hy-gain's AR-40.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$419.95

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 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.

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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.

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MFJ's G5RV Antenna

MFJ-1778
$44.95

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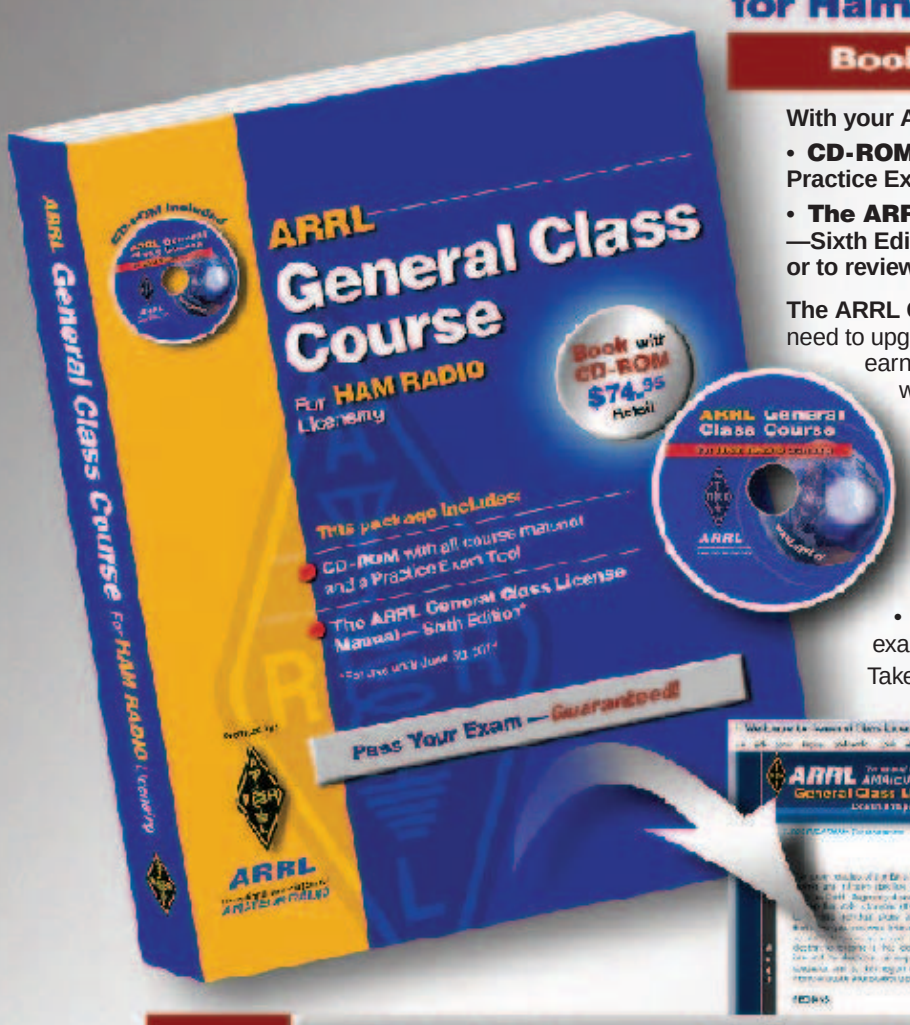

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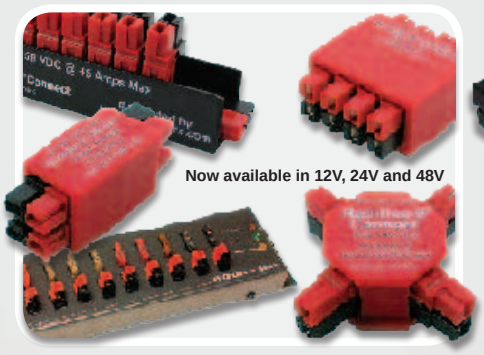

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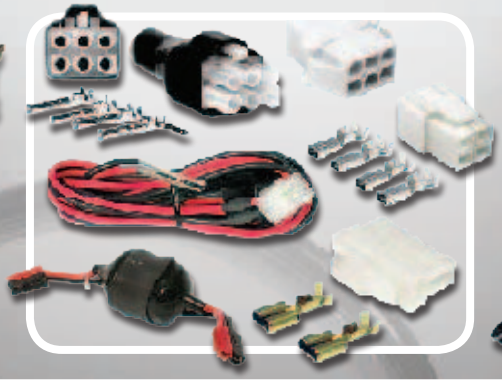

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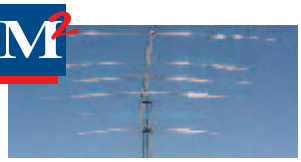

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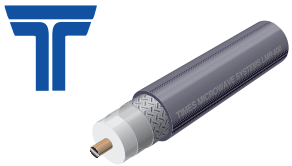

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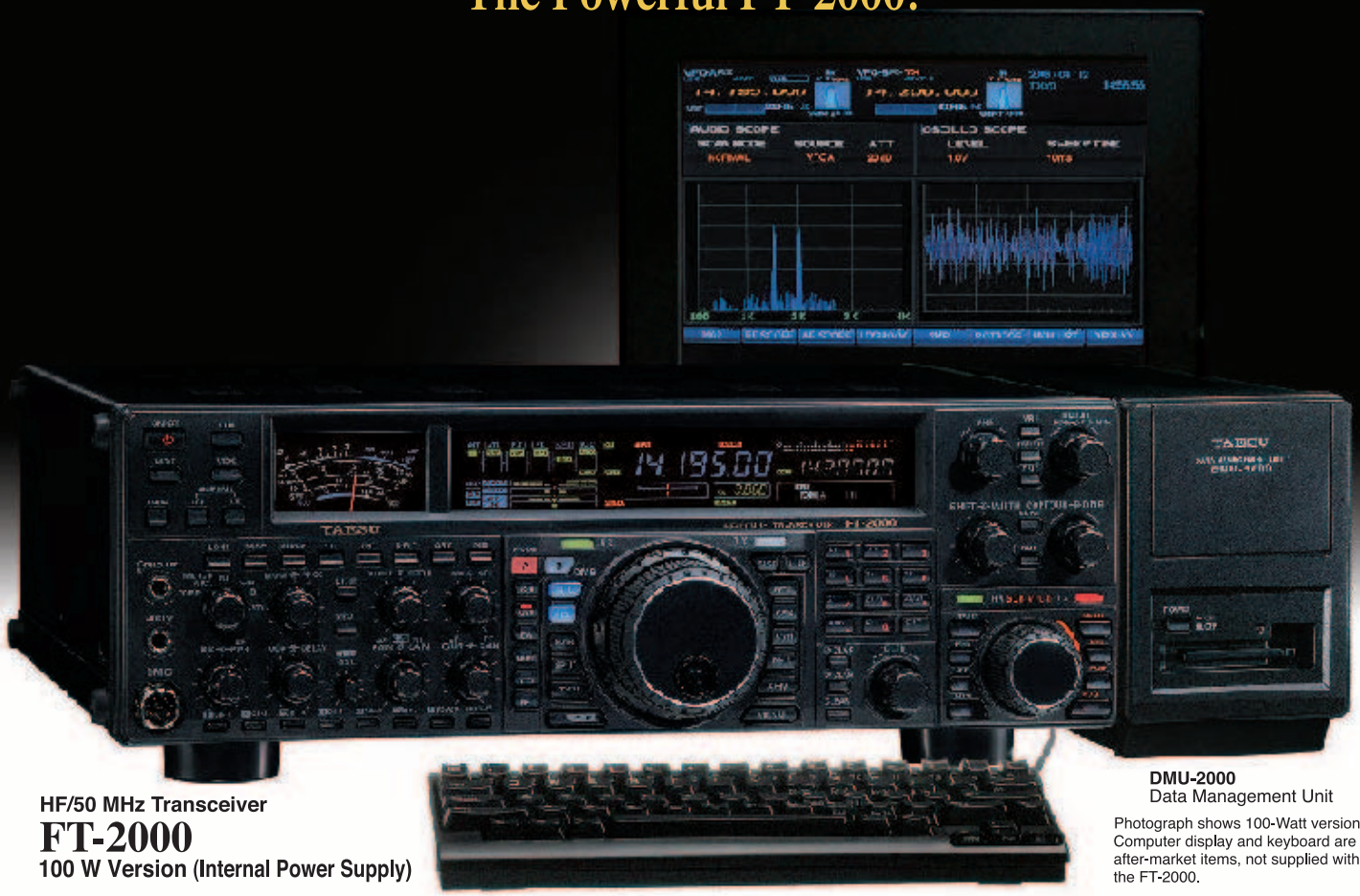

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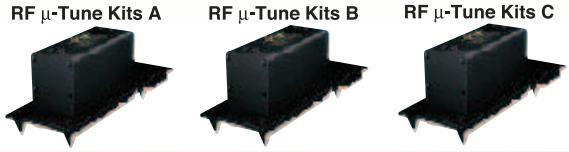

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