Official Journal of
ARRL
The national association for AMATEUR RADIO

QST

devoted entirely to
AMATEUR RADIO

February 2003

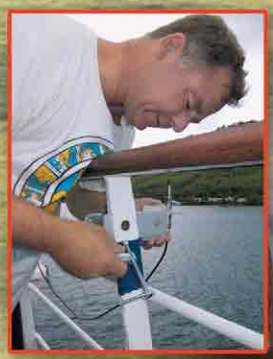
QST reviews

Five manual antenna tuners

Protect Your Battery with the Load Shedder

Computer Programming for Beginners

A VHF-UHF J-Pole Antenna



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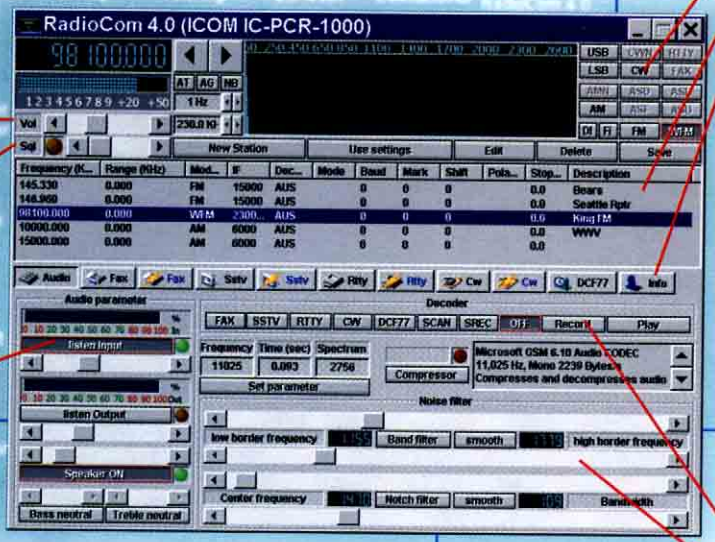

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"ICOM supplied a 'PROII for a recent DXpedition. It worked so well, that I bought TWO as soon as I returned home. Others on the DXpedition bought them, too. I can't believe the performance of the receiver, particularly on the low bands! The pre-amp REALLY works without distortion. The adjustable filters and twin passband tuning are a dream and so easy to operate. The digital noise reduction is truly amazing. You can't get "lost" with the operation of the controls....it's simple to back out a level. I've operated literally every HF radio made in the last 30 years, contesting and DXing, and the 'PROII is in a class all by itself! We have a six ham family and we all love our new PROII's!!! The "fun" is back into ham radio more than ever now."

-Glenn Johnson WØGJ , A50A WW SSB Contest

The IC-756PROII's worked great - we ran them for 11 days, non-stop, ...5 radios, 80,000 QSO's... all bands 160 through six meters... SSB,CW, RTTY, and PSK31! The built-in antenna tuners nice... we could run antennas on other bands... the 40m vertical on 15m... the 30m vertical on 10m... . Temps always above 80...sometimes 110 deg in the operating tents. Humidity above 90% all the time! Radios performed flawlessly. Everything you could want for operating convenience in one box. When you are on the receiving end of the entire world calling you in a pileup, it helps to have a top-notch rig to work them all! I liked the radio so much, I bought one and brought it home!

-Bob Voss N4CD, T19M DXpedition

I was very impressed with the reliability of the IC-756PROII transceivers and IC-PW1 linear amplifiers, given that our environment on the island was challenging in some respects. At the CW site, there was so much talcum-powder fine volcanic ash blowing around that the radios, amplifiers, and everything else in the tent was covered with a thick layer of dust. I was especially concerned about the 'PW1s given that the fans were running almost continuously, pulling in this dust. We also had a troublesome generator which caused large fluctuations in voltage and frequency (we eventually replaced it). Even with these conditions, the ICOM equipment ran perfectly for 10 days, 24 hours per day. I'd feel confident taking your equipment to any location on the planet.

-Michael Mraz N6MZ, XRØX DXpedition

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MH-C401FS4AA180 100 minute cool charger plus Four AA 1800mAh NiMH batteries, car kit and battery case.

MH-C401FS4AA180W 100 minute cool charger plus Four PowerEx AA 1800mAh NiMH batteries, car kit, battery case, and universal adapter (100-240V, 50/60Hz).

SPECIFICATION

Rapid Charge Current	1000mA
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Cell Configuration	1, 2, 3, 4, AA / AAA NiCD or NiMH
Microprocessor	Delta V FLEX negative pulse
Power Supply Voltage	12V 1000mA

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X500HA (UHF-Conn.)
X500HNA (Type-N Conn.)
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COAX CONNECTION AT BASE END

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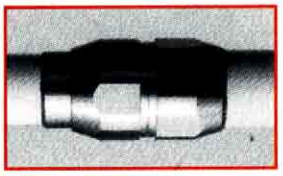


STRONG JOINT COUPLINGS

X50NA

The X50NA is an excellent choice where ruggedness is required in a medium–gain, dual-band, base/repeater application.

Features

- Wide frequency bandwidth
- Heavy duty fiberglass radome
- Stainless steel mounting hardware and radials
- Type–N Cable connection
- Compact size for easy mounting/ installation

Specifications:

Freq.: 2m: 144–148MHz
70cm: 440-450MHz
Power: 200 watts
Wind Rating: 135 MPH (no ice)
Height: 5.6 feet

X500HNA

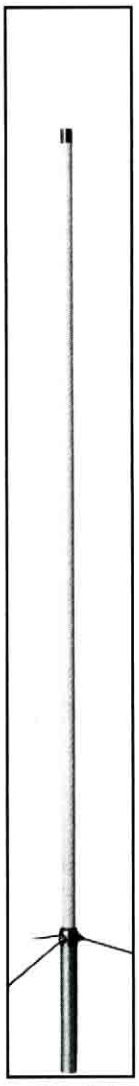
Diamond Antenna's best base station repeater antenna. Designed for strength and performance, the X500HNA is pretuned to achieve maximum gain in both the 2m and 70cm amateur bands.

Features

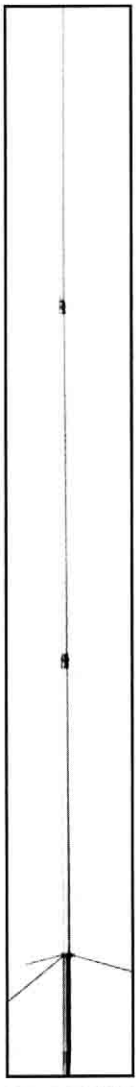
- Heavy duty fiberglass radome
- Overlapping outer shells for added strength
- Stainless steel mounting hardware and radials
- Strong–waterproof joint couplings
- Type–N Cable connection
- Wide band performance

Specifications:

Freq.: 2m: 144–148MHz
70cm: 440-450MHz
Power: 200 watts
Wind Rating: 90 MPH (no ice)
Height: 17.8 feet



X50NA



X500HNA

DIAMOND Mono-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
CP22E [1]	144	200	UHF	9.0	90
DPGH62 [1,6]	50	200	UHF	21.0	78
F22A	144	200	UHF	10.5	112
F23A	144	200	UHF	15.0	90
F718A [2]	440	250	N	15.0	90

DIAMOND Dual-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
X50A	144/440	200	UHF	5.6	135
X50NA	144/440	200	N	5.6	135
X200A	144/440	200	UHF	8.3	112
X510NA [3]	144/440	200	N	17.2	90
X510MA	144/440	200	UHF	17.2	90
X500HNA	144/440	200	N	17.8	90+
X700HNA	144/440	200	N	24.0	90
X2200A	144/222	150	UHF	11.5	112
U200	440/1240	100	N	5.9	135

DIAMOND Tri-Band Base/Repeater Antennas

MODEL	BAND (MHz)	WATTS	CONN.	HT. FT.	RATED WIND MPH (No. Ice)
U5000A	144/440/1240	100	N	5.9	135
V2000A [4,6]	52/144/440	150	UHF	8.3	110
X3200A [5]	146/222/440	100/200	UHF	10.5	112
X6000A	144/440/1240	100/60	N	10.5	112

[1] Heavy duty aluminum construction.
[2] F-718A: 440-450MHz., F718L: 420-430MHz.
[3] X510NJ: 144-147/430-440MHz.
[4] 1/4λ. rated in dBi. Most requirement: 1.4"-2.4".
[5] 2m: 146-148; 100 watts
[6] 52-54MHz. only; DPGH62 adjustable from 50-54MHz.

BAND: 144=144-148MHz., 222=222-225MHz., 420=420-430MHz.,430=430-440MHz., 440=440 450MHz., 1240=1240-1300MHz.

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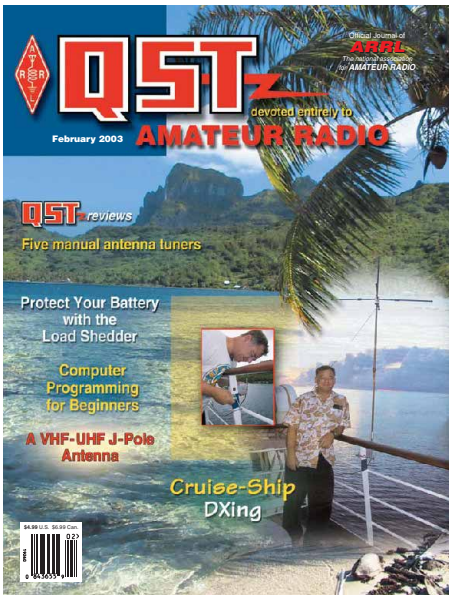

Our Cover
Taking a break from operating as rare DX to take in the dazzling charm of a Bora Bora sunset—it doesn't get much better than that! Photo by David A. Rosenthal, N6TST.

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T-2X, $649.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $14^{1}/_{16}$Hx$9^{3}/_{16}$D in.

CD-45II, $389.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty lower mast support, Rotator size is $17^{3}/_{8}$Hx8 D inches.

AR-40, $289.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty mast support. Rotator size is $17^{3}/_{8}$Hx8D inches.

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Rotator Specifications	T2X	HAM-IV	CD-45II	AR-40
Wind Load capacity (inside tower)	20 sq. ft.	15 sq. ft.	8.5 sq. ft.	3.0 sq. ft.
Wind Load (with mast adapter)	10 sq. ft.	7.5 sq. ft.	5.0 sq. ft.	1.5 sq. ft.
Turning Power (in pounds)	1000	800	600	350
Brake Power (in pounds)	9000	5000	800	450
Brake Construction	Electric wedge	Electric wedge	Disc brake	Disc brake
Bearing Assembly/How many	Tripl race/138	Dual Race/96	Dual race/48	Dual race/12
Mounting Hardware	Clamp plate	Clamp plate	Clamp plate	Clamp plate
Control Cable Conductors	8	8	8	5
Shipping Weight (pounds)	28	24	22	14
Effective Moment (in tower)	3400 ft/lbs.	2800 ft/lbs.	1200 ft/lbs.	300 ft/lbs.

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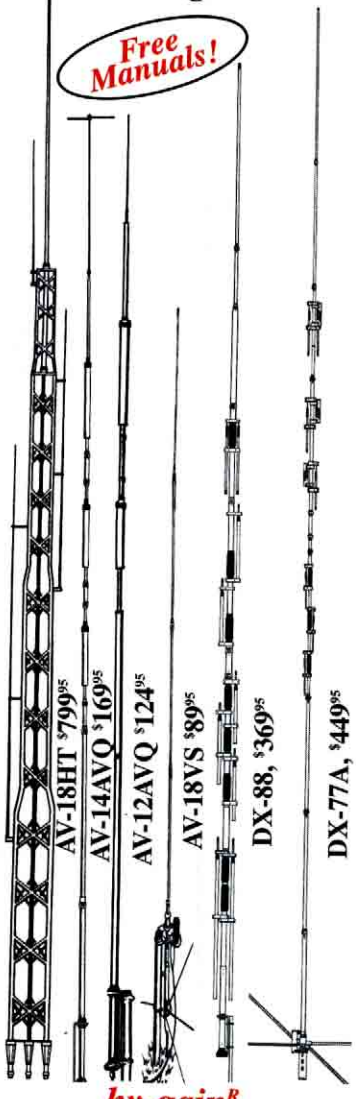

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Heavy duty, slotted, tapered swaged, aircraft quality aluminum tubing with full circumference compression clamps is used for radiators. Includes all stainless steel hardware. Recessed SO-239 prevents moisture damage. Hy-gain verticals go up easily with just hand tools and their cost is surprisingly low. Two year limited warranty.

AV-18HT, $799.95. (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, $169.95. (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, $124.95. (10, 15, 20 Meters). 13 ft., 9 lbs. The 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, $89.95. (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.

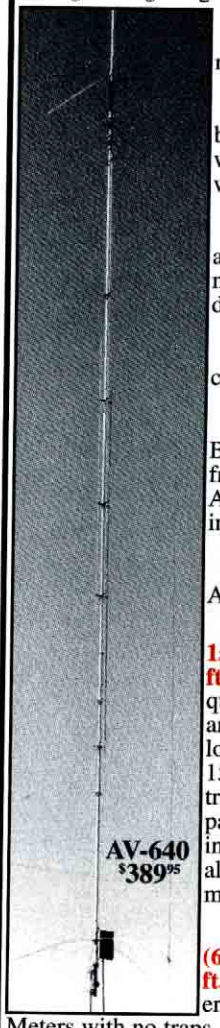
DX-88, $369.95. (10, 12, 15,17,20,30,40,80 Meters, 160 Meters optional). 25 ft., 18 lbs. All bands are *easily* tuned with the DX-88's *exclusive* adjustable capacitors. 80 and 40 Meters can even be tuned from the ground without having to lower the antenna. Super heavy-duty construction. DX-88 OPTIONS: 160 Meter add-on kit, KIT-160-88, $189.95. 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	$799.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$134.95	10/15/20 M	1500 W PEP	13 feet	9 pounds	80 MPH	1.5-1.625"
AV-18VS	**$89.95**	**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[R] PATRIOT

Hy-Gain's new **PATRIOT** HF verticals are the best built, best performing and best priced multiband verticals available today. For exciting DX make full use of your sunspot cycle with the **PATRIOT's** *low 17 degree angle* signal.



No ground or radials needed
Effective counterpoise replaces radials and ground.

Automatic bandswitching
Single coax cable feed. Each band is individually tunable. Extra wide VSWR bandwidth. End fed with broadband matching unit.

Sleek and low-profile
Low 2.5 sq. ft. wind surface area. Small area required for mounting. Mounts easily on decks, roofs and patios.

Full legal limit
Handles 1500 Watts key down continuous for two minutes.

Built-to-last
High wind survival of 80 mph. Broadband matching unit made from all *Teflon*[R] insulated wire. Aircraft quality aluminum tubing, stainless steel hardware.

hy-gain[R] warranty
Two year limited warranty. All replacement parts in stock.

AV-640, $359.95. (6,10,12, 15,17,20,30,40 Meters). 25.5 ft., 17.5 lbs. The AV-640 uses quarter wave stubs on 6, 10, 12 and 17 meters and efficient end loading coil and capacity hats on 15, 20, 30 and 40 meters -- no traps. Resonators are placed in parallel not in series. End loading of the lower HF bands allows efficient operation with a manageable antenna height.

AV-620, $289.95. (6,10,12,15,17,20 Meters). 22.5 ft., 10.5 lbs. The AV-620 covers all bands 6 through 20 Meters with no traps, no coils, no radials yielding an uncompromised signal across all bands.

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"IT SEEMS TO US..."

A Game of Inches

It's become a cliché for almost any sport to be referred to as "a game of inches." It's easy to understand the difference an inch makes when a bat strikes a baseball or a golf ball approaches a cup. Progress on a football field can come down to a matter of inches. An inch can turn a thrilling auto race into a tragic spectacle.

While the difference between success and failure in influencing public policy sometimes hangs on the thinnest of margins, as on the playing field, when we say it's a game of inches we mean that progress is most often made in small steps, not in grand leaps. To invoke a further cliché, a journey of a thousand miles begins with a single step—but you never reach your destination unless you follow that first step with another, and another, and another….

So it is with easing restrictions on amateurs who want to install reasonable antennas on their own homes. As land use regulations became ever more restrictive in the 1970s and early 1980s the ARRL fought on two fronts: on the legal front by assisting individual amateurs who took meritorious cases into court, and on the public policy front by assisting in the drafting of reasonable local ordinances and regulations and in seeking federal preemption. We achieved a major breakthrough in 1985 when the FCC adopted its "PRB-1" declaration of limited preemption of local and state regulation of Amateur Radio. Thanks to PRB-1, amateurs' success rates improved not only in court but also in avoiding costly legal battles in the first place. Since 1985, amateurs' patient efforts have led to 16 states adopting statutes to codify or elaborate upon the basic PRB-1 protections.

Helpful as it was, PRB-1 did nothing for the growing number of homeowners and prospective homeowners who are saddled with private covenants prohibiting the installation of antennas. Arguing that the federal interest in amateurs having effective antenna systems was just as strong in areas afflicted with covenants, we pressed the FCC to take the logical step and extend PRB-1 to those areas. In December 2001 the Commission said in effect, "We will if Congress tells us to." We followed the Commission's suggestion and in less than five months found a sponsor for legislation to do just that. During the final six months of the 107th Congress 35 cosponsors signed on, 90% of whom are returning to the 108th Congress. So, while it may seem as if we have to start all over with the new Congress, in fact we're well ahead of where we were a year ago. There is every reason to expect the bill will be reintroduced in the House early in 2003 while we shop for a sponsor in the Senate.

Legislative sponsors and cosponsors don't just happen. Last year, hundreds of ARRL members asked their elected representatives to support HR 4720 (which will have a new number when it's reintroduced). Led by President Jim Haynie, W5JBP, ARRL volunteer officials and staff visited scores of Congressional offices to tell our story. Not all were immediately receptive; there is an understandable desire to keep the federal government out of private contracts, so we carry a heavy burden of proof that the public interest requires such legislation. Changing public policy means changing minds one at a time. And so we progress, inch by inch.

The same sort of patient approach is called for on other public policy issues, including the all-important protection and enhancement of our access to the radio spectrum. The ARRL maintains a four-person Technical Relations Office in the Washington area under the direction of Technical Relations Manager Paul Rinaldo, W4RI, and with additional support from General Counsel Chris Imlay, W3KD, and the ARRL Lab in Newington. Paul and his team, which consists of Walt Ireland, WB7CSL, Jon Siverling, WB3ERA, and Administrative Assistant Ana Campa, spend most of their time preparing and reviewing documents and attending meetings with government and industry representatives. For example, as reported in Happenings this month, Paul was a member of the US delegation to the ITU Conference Preparatory Meeting (CPM) in Geneva and was chosen from 1000 delegates to chair the ad hoc group that dealt with the details of the 7-MHz issue. Again, this didn't just happen; it resulted from countless hours of work over a period of years to earn the confidence of the leadership of the US delegation and other key participants in the CPM.

The ARRL staff in both Washington and Newington also devote time to supporting volunteers who represent the International Amateur Radio Union at ITU meetings. As a result of this teamwork between volunteers and staff, Amateur Radio is represented in Geneva as effectively and with as much polish as any other radio service. Through your ARRL membership and your voluntary contributions to the ARRL Fund for the Defense of Amateur Radio Frequencies you're an important part of the team.

Process is important, but results are what really count. In 1996 the ARRL led the opposition to a grave threat from so-called "little LEO" satellites, whose commercial proponents refused to put the amateur 2-meter and 70-cm bands off-limits in their quest for additional spectrum. As recently as WRC-2000 they were lobbying vigorously for more spectrum to serve their projected 55 million customers. That projection proved to be as illusory as we predicted on this page in September 1996. The same CPM Report that offers six different methods for addressing the 7-MHz realignment issue identifies just one method for dealing with little LEOs: "No additional allocation."

Even in a game of inches, there can be misses by a mile.—*David Sumner, K1ZZ*

Reach the HF Summit!
The New MARK-V Field

The world's top DX and Contest operators have lauded the leading-edge performance of the MARK-V FT-1000MP. Now you can experience the Mark-V for yourself in the exciting new MARK-V Field, a 100-Watt all-in one HF transceiver with built-in power supply! With all the great features of the MARK-V: the Integrated Digital Bandwidth Tracking, Variable RF Preselector, Class-A SSB transmission, and bullet-proof front end. . .you'll have all the tools to come out on top in the next pile-up.

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Yaesu's FT-2800M, the most ruggedly-built 2-meter amateur transceiver ever, provides 65 Watts of power along with Yaesu's renowned bullet-proof receiver front end. Direct keypad frequency entry, Alpha-Numeric Memory System, the high power output, and unsurpassed ergonomics make the FT-2800M an operator's dream come true!

New Ultra-High-Dissipation Heat Sink Design

The all-new heat sink of the FT-2800M provides more effective cooling than any other design, allowing long transmission periods without dangerous heat build-up or power reduction due to thermal protection.

High power output, a huge, easy-to-read display, and one-touch WIRES™ Internet Linking Access capability are yours with the exciting new FT-2800M.

On transmit, the 65 Watts of true FM power output provides you with excellent coverage and superb voice clarity. On receive, you get extended coverage of 134-174 MHz, with a special memory bank dedicated to the NOAA Weather Broadcast Channels (U.S. version only).

Built to the exacting requirements of both the commercial radio industry, as well as the U.S. military's MIL-STD 810, the FT-2800M is constructed using an aluminum diecast chassis/heatsink assembly, providing outstanding mechanical and thermal stability for the internal components.

With superb ergonomics to go along with its stout RF design, the FT-2800M is ready for action, at home or away!

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ARRL in ACTION

YOUR membership at work

By Dave Hassler, K7CCC, dhassler@arrl.org

Haynie Represents League at JARL's 75th Anniversary

ARRL President Jim Haynie, W5JBP, was in Japan November 14-16 to represent ARRL members at the 75th anniversary of the Japan Amateur Radio League (JARL). Haynie's address at the gala dinner November 15 at the Hotel Grand Palace in Tokyo noted the close ties between the ARRL and JARL.

"As the two largest member societies of the International Amateur Radio Union, the ARRL and JARL are partners in defending and promoting Amateur Radio," Haynie said in his address to over 400 event attendees. "We value the close relationship that has long existed between our two organizations, not only through our membership in the IARU but also through the bilateral efforts of our respective officers and staff members.

SHOZO HARA, JA1AN

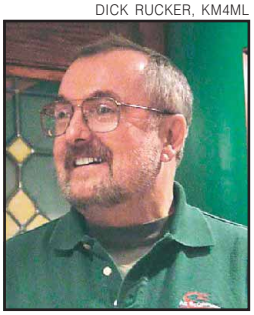
President Jim Haynie, W5JBP, confers with JARL QSL Bureau Chief Kumiko Fujihara, JH4MVN, during the celebration of JARL's 75th anniversary.

"Amateur Radio faces many challenges in our two countries and throughout the world," Haynie said. "By continuing to work together and in concert with the other member societies of the IARU, JARL and ARRL can build upon a long record of success and achievement."

During the trip to Japan, Haynie also met with ICOM President Tokuzo Inoue, JA3FA, to discuss emerging technologies. He also met with Vertex Standard (Yaesu) President Jun Hasegawa for a factory tour and to discuss issues facing Amateur Radio globally.

League keeps an eye on emerging RFI issues

DICK RUCKER, KM4ML



Between the IEEE and VDSL standards meetings, Ed Hare visited the Vic Clark Chapter, No. 91, of the Quarter Century Wireless Association in Washington, DC, to give a one-hour presentation called "RFI to Hams."

ARRL Lab Supervisor Ed Hare, W1RFI, recently attended a meeting of the IEEE C63 "RFI" committee in Baltimore. He had been asked by the committee to do a presentation on the possible impact of Power Line Communications (PLC) on Amateur Radio. Hare also attended a very high bit-rate digital subscriber line (VDSL) standards meeting in Atlanta. Both technologies present a potential to radiate signals that could raise the noise floor to nearby HF receivers by tens of dB. After his presentation, Hare was named to chair the IEEE's ad-hoc working group on PLC.

According to Hare, VDSL presents somewhat less of a challenge than PLC, but for overhead telephone wiring, it is important that the industry include protection for Amateur Radio. ARRL's presence at the meeting is intended to keep the industry on track at keeping this protection as part of their standard. Hare said the League will continue to work with both groups and build on the successes Amateur Radio has had recently with the HomePlug group and Home Phoneline Network Alliance in reducing HF interference.

Most Very Close in W1AW Frequency Measurement Test

The first ARRL Frequency Measuring Test in two decades officially wrapped up Dec 12, 2002 with 122 submissions sent in to W1AW Station Manager Joe Carcia, NJ1Q.

"We're going to send letters out prior to Christmas to everyone who participated with the results," Carcia said. "At least 98 percent of the reports came within 20 to 30 Hz and quite a number of stations were within 1 Hertz."

One station measured a W1AW signal so accurately as to be only 0.3 Hz off of perfection. A number of participants in the event used a computer and sound card software for spectral analysis and seemed to put a lot of work into their reports, Carcia said. "The primary reason we ran the FMT was to give the opportunity for hams to have the experience of learning how to make frequency measurements and gain some general knowledge," Carcia said. "Plus, it was an operating event so people could see just how well they'd do."

He said the tests went very well and that many participants said they enjoyed the challenge and look forward to more measurement tests. "We'll probably have another test in 2003, and possibly a tone measurement test."

W1AW Station Manager Joe Carcia, NJ1Q, puts some fine adjustment to the Harris RF-3200 exciter at the Hiram Percy Maxim Memorial Station.

DXCC Activity Perks Up in 2002

Earthly and extraterrestrial events in 2002 played roles in the increased number of cards checked for the ARRL DX Century Club Award (DXCC), the premier DX award in Amateur Radio. DXCC Manager Bill Moore, NC1L, said that the DXCC Challenge and the surprisingly long-lived peak of sunspot Cycle 23 have something to do with his office checking over 60,000 more cards in 2002 than 2001.

"It took a while for the DXCC Challenge program to catch on, and with that (increased interest) we're starting to see the big boxes of card rolling in here again," Moore said. Through September 25, 2002, the DXCC branch approved 574 regular Mixed awards for 2002. Moore handles about 150 inquiries regarding DXCC every day, with 100 of those arriving via e-mail. In addition to card checking, the DXCC branch also documents DXpeditions to exotic places and maintains the official DXCC list of entities.

For more information on the DXCC Challenge, point your browser to **www.arrl.org/awards/dxcc/listings**.

The DXCC, Contest and Membership Services staffs at ARRL Headquarters check thousands of QSL cards each week. DXCC Manager Bill Moore, NC1L, receives roughly 100 e-mails every day, in addition to phone calls and old fashioned paper mail. Top row: Judy Miller; Kathy Kostek; Ann Figat; Sharon Taratula; Bill Moore, NC1L; Wayne Mills, N7NG. Bottom row: Diana Lamson-Lucas; Mahjabeen Kabir; Bev Fernandez, N1NAV; Jo-Ann Arel.

Newsletter helps hams make public relations contact

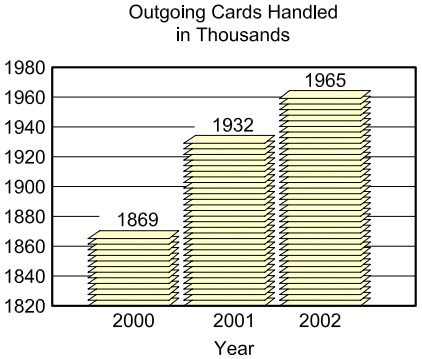
✔ For those interested in Amateur Radio public relations, we've created a new monthly PR newsletter called *Contact!* The Web-based newsletter can be found at **www.arrl.org/pio**. Each issue contains articles and helpful hints to help you make the most of your local public and media relations activities. *Contact!* will also feature fill-in-the-blank news releases and contributions from PR volunteers in the field. Enjoy!

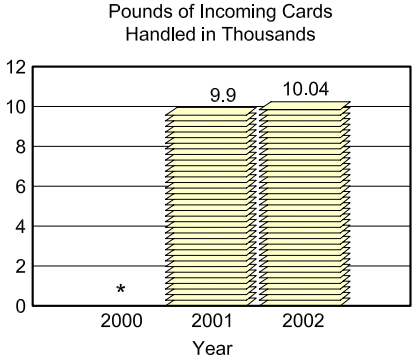
✔ ARRL's public relations reflector continues to generate a lot of interesting discussions on all topics related to promoting ham radio to the public and the media. The list contains many ARRL PR volunteers, ARRL officials and hams who work in media outlets around the country. New to ham radio PR, or do you think you'd like to get involved on behalf of your local ham community? Signing up is easy. Simply send your name, call sign and preferred e-mail address to Media Relations Manager Jennifer Hagy, N1TDY, **jhagy@arrl.org**.

✔ Do you know someone who deserves recognition for his or her PR contributions on behalf of Amateur Radio? The annual call for nominations for the Philip J. McGan Memorial Silver Antenna Award is included in this issue. Call or write for your nomination form today!

Bureau Routes Nearly 2 Million Cards in 2002

The ARRL Outgoing QSL Service came just several thousand cards shy of cracking the two million outgoing card mark in 2002, and handled over 10,000 pounds of incoming cards, according to QSL Service Manager Martin Cook, N1FOC. One-third of all cards going out head to only six countries: Japan, Germany, Russia, Italy, Great Britain and Spain.





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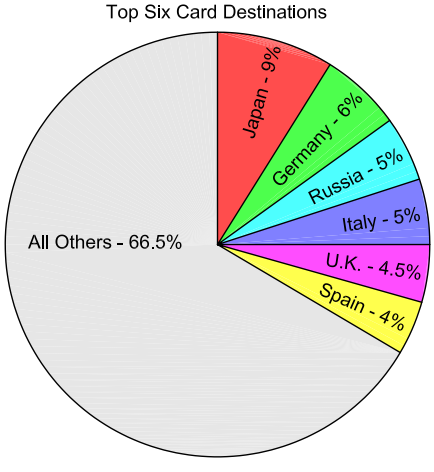

Guide to ARRL Member Services

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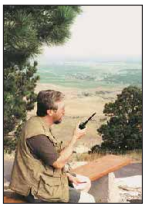



www.arrl.org/services/ 860-594-0200

Technical and Regulatory Information Services

A wealth of problem-solving information is available to you on the ARRLWeb at **www.arrl.org/tis/**. Can't find the answer there? Call the Technical Information Service at 860-594-0214 from 9 AM to 4 PM Eastern Time, or e-mail **tis@arrl.org**.

Do you have a question about FCC Rules or local antenna restrictions? See the Regulatory Information Branch on the Web, call 860-594-0236 or e-mail **reginfo@arrl.org**.

ARRLWeb www.arrl.org

Log on for news, information and ARRL services. Members have access to special ARRL Web site features. Place free classified ads. Download and view *QST* product reviews and search the on-line periodicals index.

ARRL E-mail Forwarding

Life in cyberspace is easier when you have your own **arrl.net** e-mail address. When you switch Internet Service Providers, all you have to do is let us know and we'll change your e-mail forwarding automatically. You're spared the hassle of having to tell everyone that you've changed addresses! Sign up on the Web at **www.arrl.org/members-only/emailfwd.html**.

ARRL News

The ARRL News service is the most credible source of news for the amateur community. Breaking stories are available on the ARRLWeb. You can also listen to ARRL Audio News on the Web, or by telephone at 860-594-0384. Do you have a news tip? E-mail **n1rl@arrl.org**.

QSL Service

The most economical way to send and receive QSL cards throughout the world is through the ARRL QSL Service.

Educational Materials

A complete line of educational materials are available to schools, clubs and individuals.

Insurance

The ARRL "All Risk" Ham Radio Equipment Insurance Plan provides protection from loss or damage to your amateur station and mobile equipment by theft, accident, fire, flood, tornado, and other natural disasters. Antennas rotators and towers can be insured too. Call 860-594-0236.

DXCC/VUCC

The DX Century Club and VHF/UHF Century Club award programs are among the most popular Amateur Radio awards in the world.

Volunteer Examiner Coordinator (VEC)

Are you looking for a place to take your license exam? Do you have questions about the examination process? The ARRL VEC network is the largest in the nation.

ARRL Foundation

This is your source for scholarships and other financial grant programs to support Amateur Radio. See **www.arrl.org/arrlf/** on the Web or call 860-594-0230.

Write for *QST*

We're always looking for articles of interest to amateurs. See our Author's Guide at **www.arrl.org/qst/aguide/**. If you have questions, or wish to submit an article for consideration, send an e-mail to **qst@arrl.org** or simply mail your article to *QST* c/o ARRL Hq.

Interested in Becoming a Ham?

Phone toll free 1-800-326-3942, or e-mail **newham@arrl.org**. We'll provide helpful advice on obtaining an Amateur Radio license. See **www.arrl.org/hamradio.html**.

We're at *your* Service

ARRL Headquarters is open from 8 AM to 5 PM Eastern Time, Monday through Friday, except holidays. Call **toll free** to join the ARRL or order ARRL products: **1-888-277-5289** (US), M-F only, 8 AM to 8 PM Eastern Time.

If you're in Connecticut, stop by ARRL Headquarters for a visit and tour. Located at 225 Main St, Newington, CT 06111, HQ offers tours at 9, 10 and 11 AM, and 1, 2 and 3 PM Monday through Friday, except holidays. Bring your license and operate W1AW anytime between 10 AM and noon, and 1 to 3:45 PM.

If you have a question, try one of these ARRL Headquarters departments . . .

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Publication Orders	Sales Desk	860-594-0355	**pubsales@arrl.org**
Amateur Radio News	Rick Lindquist, N1RL	860-594-0222	**n1rl@arrl.org**
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Educational Materials	Educational Services	860-594-0267	**ead@arrl.org**
Contests	Dan Henderson	860-594-0232	**contests@arrl.org**
Technical Questions	ARRL Lab	860-594-0214	**tis@arrl.org**
DXCC	Bill Moore	860-594-0234	**dxcc@arrl.org**
Awards/VUCC	Eileen Sapko	860-594-0288	**awards@arrl.org**
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Clubs	Field Services	860-594-0267	**clubs@arrl.org**
Hamfests	Gail Iannone	860-594-0262	**hamfests@arrl.org**
Write for QST	Joel Kleinman	860-594-0273	**qst@arrl.org**

Can't find the department you're looking for? Call 860-594-0200 or e-mail **hq@arrl.org**. Sending e-mail to any ARRL Headquarters staff member is a snap. Just put his or her call sign (or first initial and last name) in front of **@arrl.org**. For example, to send mail to Martin Cook, QSL Service Manager, use **n1foc@arrl.org** or **mcook@arrl.org**. And, if all else fails, send a message to **hq@arrl.org** and it will get routed to the right person or department.

ARRL Division Directors

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

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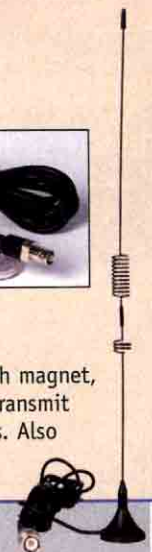

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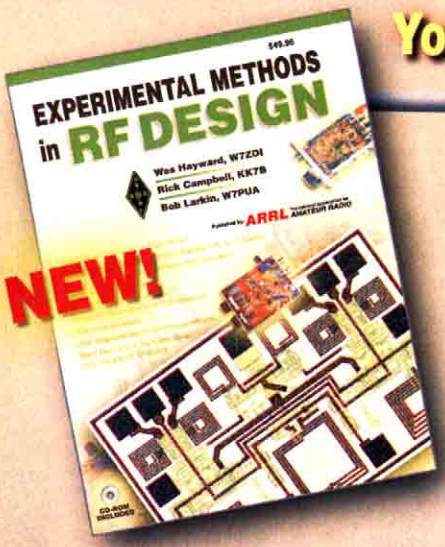

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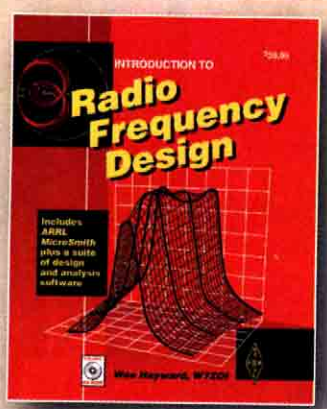

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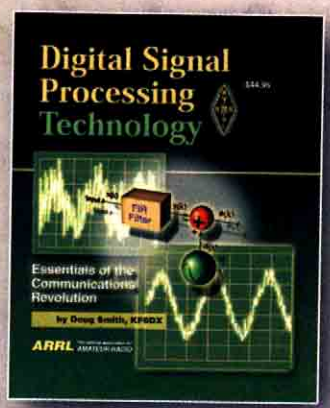

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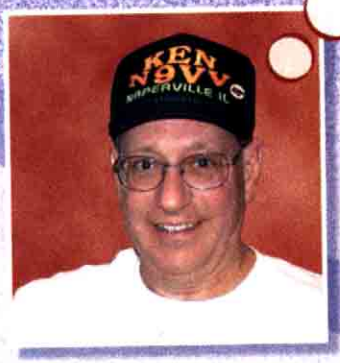

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TNX K6URO

Field Day 2002 provided the first contact for 8-year-old Kyle Rice, KG6MSK, of Portola Valley, California. Kyle loves Amateur Radio, robotics and electronics as well as anything mechanical. His interest in Amateur Radio began when radio equipment began appearing around the house. Kyle helped his dad, K6AK, put up two antennas as well as build a ham shack. So who provided his first contact? Fellow Palo Alto ARA member Art Bolton, NM6K (shown here at age 14), who's now 95!—*Wallace Porter, K6URO*

KD6QDA

When John Chapman, KD6QDA, of Placerville, California, came across this sign, he was glad he had brought his license along. Further investigation revealed that Ham's Station is a pioneer stop on an old toll wagon road, now SR 88, between Jackson and S Lake Tahoe. The good news for hams: It sits at 5600 feet above sea level!

WB2AHK

WB2AHK

This station is *where*? Chet Brown, WB2AHK, sent us some photos of his striking four-tower installation. He writes: "The largest (top photo) is 128 feet with Station Master UHF antennas on it. There are two roof-mounted towers, one 48 feet (bottom photo) and a 54 footer. There is another 40 foot ground mounted tower. I use three towers for hauling up wire HF antennas, including a 75-meter Delta loop, 40-meter dipole and a 265 foot, 160-meter off-center-fed dipole. The tower in the right-hand photo has a large waterproof case with a 1 kW antenna tuner just below the Yagi; it is the tuner and feed point for the 75-meter Delta loop. I have two complete 1 kW HF stations at my workplace, remotely controlled through a tone controlled UHF link. I can operate any HF band, and rotate the Yagi, by a hand-held 440-MHz radio. It has been an eight-year project." The station QTH? Floral Park, in New York City's borough of Queens.

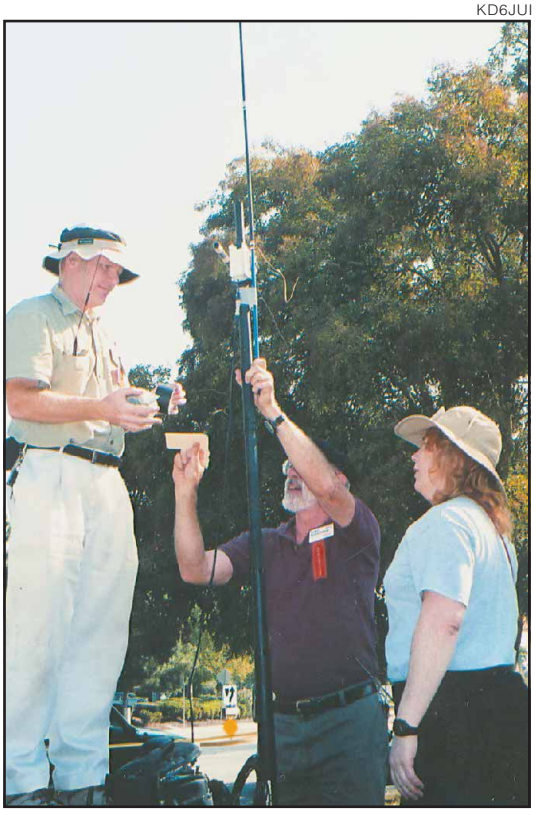
Impressive Repeater in Northern Maine

The St John Valley ARA, based in Fort Kent, Maine, claims to be the farthest-northeast ARRL-affiliated club (and who are we to argue!). Club members installed their new 146.64 MHz repeater last fall on a hilltop near Fort Kent. The new 150-foot tower will extend coverage into Quebec, New Brunswick and northern Maine. Charles D. Ames, N7GLR, of Grand Isle, explains: "The repeater is completely solar powered. Due to the extreme winter weather conditions, sometimes plunging to 40 below zero, extra precautions were taken to insulate the housing unit thoroughly. Club members modified a discarded chest freezer with ventilation ducts and drains—and additional insulation. Aside from the danger involved with working with heavy equipment, including bulldozer, skidder, backhoe and chainsaws, club members had to keep a wary eye open for back bear and moose."

N7GLR

St John Valley ARA members seem pleased with the fruits of their labor on the club's new tower and solar-powered repeater near Fort Kent, Maine.

KD6JUI



Pacificon 2002 in Concord, California, featured the 2nd Annual Pedestrian Antenna Shootout, sponsored by the HFPack group (**www.hfpack.com/**). In the photo, Shootout organizer Bonnie Crystal, KQ6XA, prepares to test a vertical antenna at the event, held this past October. HFPack tests portable antennas and reports the results as a service to those interested in furthering the state of the art for HF portable.

What's Loud and Bright, and Lasts a Fraction of a Second?

"I had not felt a thing, and when I stood up, I decided I was not hurt—or dead." Andrew Flower, WØZUX, of Rogers, Arkansas, could only be describing his close encounter with one force of nature: lightning. He writes:

"I had heard distant thunder, but it sounded so far away, I was not concerned. The next thing I was aware of was the brightest light and the loudest noise I had ever experienced. It was in the room with me! The room was filled with smoke and all the lights were out. As I inventoried the damages, I found neither the 75-meter nor the 2-meter rig would operate. The shelf behind the 2-meter rig had a burned place where the power cables passed through the back, but another HF rig beside this 2-meter rig was unharmed. The power supply was useless and its on/off switch was obviously damaged. The control box was in several small pieces, and a large black spot was on the desk surface where it had been sitting.

"As a professional engineer, I would never connect any type of apparatus without complete lightning protection. But as a ham, I would connect the apparatus, and if it worked, well and good.

"Since then, all the known shortcomings have been corrected. The control cable from the rotator has disconnects both outside the house and inside, as do all the other cables, and they are all disconnected during threat of thunderstorms."

WØZUX

When a sudden, powerful bolt of lightning struck his house, Andrew Flower, WØZUX, was admittedly not prepared. The result is the damage apparent in the photo—and there was more, both in the shack and outside. He had disconnected the coax from his gear, but there were no outdoor disconnects on his rotator cables. There are now…

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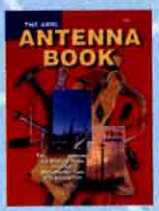

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THE MAJOR CONTRIBUTION

♦ The Op-Ed viewpoint of Greg Lapin, N9GL [Nov 2002, p 101], has nudged me to write concerning what I believe is the major contribution of Amateur Radio to our nation. While technical contributions and disaster communications are certainly important, by far the longest-lasting benefit to our society is to have a large, invisible cadre of scientifically inclined citizens. This cadre forms the nucleus from which we can draw people to help out industry and the military without having to start from scratch each time there is a crisis.

If individual hams and our society continue to inject that spark of interest in very young students, some will become hams and will be guided in their career choices. Most will support the continuation of reasonable frequency allocations for our worthwhile and fascinating endeavor by watching Congress and Government agencies closely. As long as our frequencies are worth money we will have to protect them. Once we lose them we will never get them back.—*John Healey, KH6GRV, Lahaina, Hawaii*

HOW BIG *IS* IT?

♦ I read with much interest your article on Linked Repeater Systems [Dec 2002, p 49]. They are complex and in some places indispensable. We have the largest linked system in the US here in Alaska. It is the only way to span the distances and terrain that we are faced with.

If you are interested in finding about it you can go to **www.kl7kc.com** and use the link for the repeater system. There is a description and a full map of the coverage.—*Linda Mullen, AD4BL, President, Arctic ARC, Fairbanks, Alaska*

222 THREAT

♦ I just read the information regarding the threat to the 222 band ["Happenings," Dec 2002, p 74] and felt compelled to write.

This issue goes way beyond corporations wanting "underutilized" bandwidth to a basic philosophy of the current administration in Washington, DC of selling anything to make money and bowing to special interests whenever possible. Worse yet, the government and ultimately the people are the losers in most of these situations by not getting the full market value of the public commodity being sold.

This is just another fine example of Corporate America bringing forth an idea fully grown and expecting everyone else to get out of their way because it's in the best interests of business. I also never hear mention of compensation to hams for loss of use of their equipment. For example, if by chance the entire 222 MHz band was turned over to public safety needs or, worse, commercial needs, will those interests buy back all ham equipment at the original purchase price? I'll bet not! In a way this is theft and should be dealt with in a like manner.

Little by little our freedoms are being chipped away, disguised like the requests to re-allocate radio frequency spectrum. I applaud the ARRL's efforts to combat these efforts by short sighted, bottom-line, profit motivated interests.—*John Powell, KF6EOJ, Downey, California*

NEW CHARACTER NEEDED

♦ Isn't it curious that the second most popular Amateur Radio mode has no @, the "at" sign or "strudel" (cut a strudel in half and it becomes obvious)? I've done some extensive research and cannot find any present or historical Morse character for @. In the year 2003, this is becoming intolerable. Hardly a QSO goes by without an e-mail address being exchanged. We are forced to send AT. I suppose it works but it's just not right. It's not "at," it's @. It's even more problematic for NTS traffic. It seems like an e-mail address always messes up the check.

The Morse character set includes an awful lot of characters that are never heard on the air. Who ever heard, used or would recognize a parenthesis—not to mention determining if it's left or right? If there's a code character for parenthesis, then I feel the strudel's time has come.

I'm proposing one of those bunched up codes with the bar on top. It could be AT with a funny bar on top but "w" has claim to that. STR (for strudel) works. As a bonus, it's easy to remember, fun to send and sounds pretty like the print character it represents. Di di di dah di dah dit, it just flows and, if I say so myself, it's a pretty cool character (···—·—·) .

I think it's high time Morse code got a new character. It's been about 120 years since the last one.—*John Ceccherelli, N2XE, Wappingers Falls, New York*

DON'T DIM THAT DIMMER!

♦ Tonight, I was having trouble dialing out with my computer. I have an external modem and I heard a "buzzing" or "chattering"—it almost sounded like a relay trying to operate. I turned the modem off and unplugged it, and turned the computer off, and then turned everything back on. No go!

It took a while, but I determined that it was an incandescent light dimmer installed in our bathroom! If the light was up FULL, there was no trouble, but in the DIM position, it was a different story. That dimmer must be full of diodes or SCRs. WHAM! Full noise that you could hear on the telephone line. (I lifted the receiver and listened) and it sounded like a steady "frying" or "hash" coming through!

To prove it I turned the dimmer to off and *voila*!—I could dial out without a problem. Then I turned the light up to full brightness... and again no problem.

If I had a class 5 wiring installed or a shielded cable pair all the way to my shack I may never have noticed it, but everything is strung side by side (ac wiring and telephone wiring) and the power line must simply have been radiating that "hash."—*George Thurner, W8FWG, Laurium, Michigan*

FUN WITH LESS

♦ Several new General class operators have recently mentioned to me, sort of offhandedly, that the privileges they got with their upgrade to the HF license have really opened up the world of ham radio for them. The excitement of working stations outside the usual local repeater system was evident. Being able to stay in touch with friends anywhere was given as one reason, and another was the fun of competitive radio sport: contesting, collecting contacts in quests for DX, Worked All States, working special event stations, and so on.

On the other hand, there are challenges to getting and staying on HF, since the antennas are larger and operation is affected by solar and weather conditions. In fact, some Handi-Ham members find getting on the short-wave bands to be just

too difficult, perhaps because they think that only a large tower and high power will do the job.

Not so! I recently heard from KG0BP, who just set up a fine station consisting of a Kenwood TS-440 equipped with a VS-1 voice module and a Hamstick antenna mounted on an apartment balcony! Another ham recently reported great success with a Warbler PSK-31 station, an attic dipole and only a few watts of power. I've had a lot of fun with an end fed wire and an old Heath antenna tuner, as well as a very low-profile ground mounted vertical.

Of course a big antenna farm is better than a window garden antenna in a flowerpot, but operating skill and persistence can even the odds that you will do well on the HF bands. If you have a photo of a low-profile antenna that you use and want to share with Handi-Hams, send it to me at **wa0tda@arrl.net**. In the meantime, "good DX!"—*Patrick Tice, WA0TDA, Manager Courage HANDI-HAM System, Golden Valley, Minnesota*

OFFPUTTING

♦ For longer than I care to remember, I have been a life member of the ARRL. Despite the fact that I still don't have a call sign, my interest in all things electrical is undiminished. It was my serious desire to become a fully licensed radio amateur—I even bought a used NC-303 receiver. What I heard there really put me off: two guys were having a nice QSO. Then there was some coughing and increasingly deliberate interference. Finally they were told that they were using a net frequency. Quickly they left; it sounded like some emergency. Fascinated, I listened in. But it sounded like a bunch of old geezers checking in and telling each other that they had nothing to report (I am an old geezer of 74 years). Well excuse me! Rarely have I seen such a sorry spectacle of self-importance!—*Willi Wald, Hamilton, Ontario*

KEEP THE CODE!

♦ As an amateur of nearly 50 years' standing, I wish only to make one point that is not often, if ever, mentioned, yet remains a most significant issue: Amateur Morse continues to be used at HF, probably as much as SSB. With the now decreasing solar activity, even more usage at HF will likely be the result as path loss increases over the next few years.

It does not seem to me unreasonable therefore to expect HF newcomers to demonstrate some interest and capability in the CW mode, however elementary, since they may well find it an important attribute as their skills increase and they are absorbed into the ranks of experienced HF operators.

At the Morse speeds now accepted for testing, I cannot believe that this is a serious obstacle for any other than the half-hearted, and do we need the latter in our ranks anyway?

As the HF spectrum becomes squeezed with the talkative, CW remains the most simple and spectrum-efficient technique available to amateurs worldwide and I believe we should nurture this by maintaining our Amateur Radio acceptance standards for Morse.—*Derek Bundey, G3JQQ, Bath, United Kingdom*

SPECIAL EVENTS

♦ I have been QSLing with Special Events stations for the past several years, and find it a unique part of Amateur Radio. In March 2002 [Correspondence, p 25], W7LQU wondered if anyone was having problems getting QSL returns. I have found them to be very prompt with an SASE reply. I corresponded with "Red" and found that we both have had similar experiences. I have closely watched my log sheet for date sent out against date returned. This cycle normally runs from two weeks to six months—much like a DX QSL card.

I personally wish to thank the various groups who give of their time and finances to coordinate these events, furnish and operate the equipment and finally mail the QSL or certificate. These certificates are informative, with a local flavor all their own.—*Larry Robbins, W3CEI, Middletown, Pennsylvania*

RESPECT THE DX WINDOW

♦ I recently was working the 80 meter DX window, only to find two hams ragchewing on 3.8015. They had to have their ovens on as one was +20 and the other was +30. The next closest station was up around 3.811 or so. Now if you have a $5000+. tower and 80 meter beam and a $5000+ HF rig with all the bells and whistles you would have little problem working the window. I have a TS-440 (which is still considered a fairly good radio—even today) and a dipole. I could not work the top half of the window because of the QRM. I know this problem was here before I got here and will still be a problem long after I go, but why do hams continue sit around 3.788 or 3.802 and ragchew with their studio mikes and their 1000 W amps when they have the entire band at their disposal? I realize they have the right to, but a little consideration would be right, too.—*Rick Daniels, VE3LLL, Bridgenorth, Ontario* QST

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*Perfect for HF Radios with added 6 & 2 meter capability				
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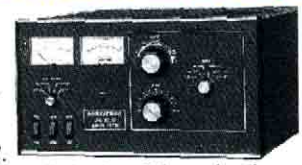

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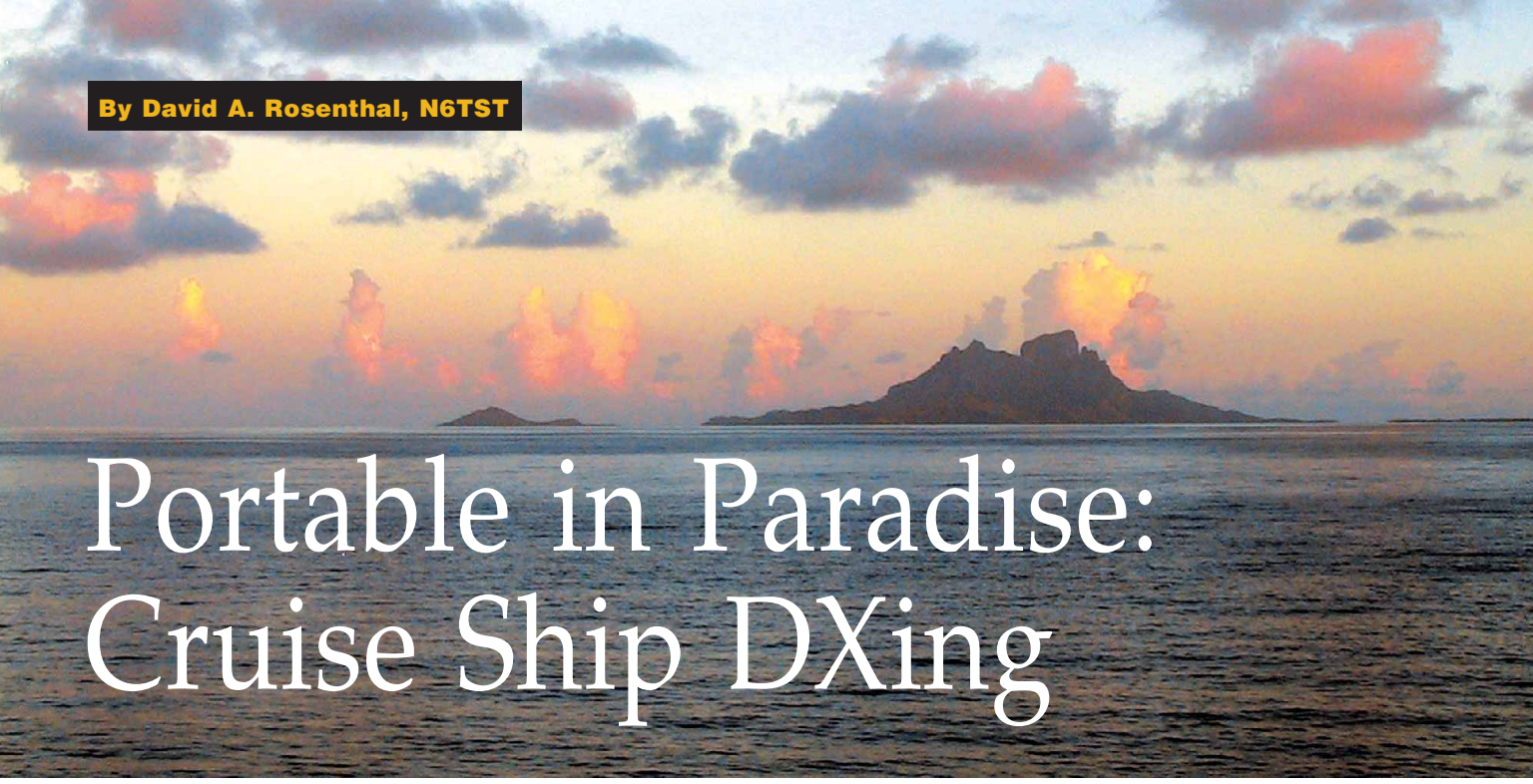


By David A. Rosenthal, N6TST

Portable in Paradise: Cruise Ship DXing

It began innocently enough: Cruise West, a US-based cruise line approached me through my professional travel writer spouse Donna, KF6ZVE, to see whether I might be interested in being the speaker on their 295-foot ship, *Spirit of Oceanus*, for an 11-day South Pacific tour. I'd present programs about the ever-changing sky and other celestial wonders—something I've done for years as an "astronomical popularist."

This sounded pretty good, but, as a ham, the idea of perhaps taking a portable HF station and running Maritime Mobile in a fantasy DX setting added a whole new dimension to the term "fascinating." I told Cruise West I'd love to be their entertainer. But would they mind if I also brought some radio gear? They said they didn't see why not.

Planning for Paradise

Cruise West would fly us both to Tahiti to meet the ship for its departure from Papeete, capital city of French Polynesia. We'd sail to Bora Bora and continue on to the Cook Islands for several days, and then return via a few more French Polynesian islands, finally disembarking at Papeete for the flight back to the US. Throughout, I'd conduct my talks and presentations.

Like any project, the initial excitement stirs as you conjure the image of the end product. For me, it was relaxing on a tranquil, tropical ocean working worldwide DX. That ideal HF environment would feature easy propagation to the Pacific, the Americas, Eastern Asia and who knows where else. Better, my equipment situation seemed well in hand, with the modular portable system I'd built earlier (see "Satellite DXing 'To Go'" in the June 2002 issue) ready to travel. Checking the ARRL Web site's section on foreign operation revealed a straightforward licensing process at each destination, so I took a deep breath and visualized that end-product image once more.

That's when I realized I'd need some sort of compact, broadbanded HF vertical antenna, along with a sturdy mount that could be installed almost anyplace. Aboard an oceangoing ship, anything else would be unrealistic.

My first thought was my venerable, versatile all-band Spider mobile antenna but its 4-foot tubular aluminum base shaft couldn't be packed away and, in this post-9/11 security environment, it might get confiscated if I tried to make it a carry-on item.

I checked out some of the recently offered, ultra-compact "go-anywhere" HF antennas. Their ads promised that, for $100 or $200 (or more), they'd deliver limitless flexibility and incredible ease of use. Looking closely, though, I saw featherweight designs, exposed critical components and flimsy mounts, putting most of them out of contention immediately. If you're traveling beyond the neighborhood picnic ground, you'll likely need a setup tipping the scale at pounds, not ounces. Meanwhile, the newer subcompact vehicular HF antenna systems would still never fit inside a suitcase. My attention turned back to my Spider.

Creative juices flowed and I came up with a surprisingly simple homebrewed solution. To replace my Spider's base shaft, I made a two-piece, take-down arrangement from a same-diameter length of copper water pipe. From scrap aluminum and basic hardware, I assembled a beefy, universally adjustable mounting bracket. This solved all the problems and, attachable to nearly anything with a large C-clamp, my mount worked wonderfully. Check out "The N6TST Travel Mount" sidebar for details.

The remaining gear left lots of room in the suitcase: an ICOM IC-706MKIIG, an MFJ-4245 lightweight switching power supply and a Rigblaster Nomic digital interface. The power supply would run from any line voltage and the internal features of the '706 provided all the setup capabilities I'd need. Equipment packed, I relaxed once more and allowed my mind to wander back to that open ocean and a happy ionosphere.

Following the ARRL Web site's instructions,[1] I made copies of my license and other documents listed as necessary to obtain operating permits when we arrived in our destination countries of French Polynesia and the Cook Islands. This meant two new temporary call signs but I'd planned for that. Because Cruise West's ship was registered in the Bahamas, I'd need yet a third license from there.[2] Once my application paperwork came back approved from Nassau, I was ready. I'd be N6TST/C6A, despite the fact I'd never set foot in that country.

Meanwhile, I searched the Web for in-country hams I might contact in advance

[1]Notes appear on page 31.

of my trip. I e-mailed Des, ZK1DD, on the island of Aitutake. He and his wife Tutai, the reigning queen of the island, operate Gina's Lodge, a ham-friendly set of rental cottages featuring in-place antennas and facilities for visiting amateurs.

Des and I corresponded several times as departure day approached and we looked forward to that eyeball QSO when the ship arrived at Aitutake. He told us he'd give us a personal island tour and we very much looked forward to it.

Arriving and Setting Up

The mercifully uncrowded wee-hours flight from Los Angeles to Tahiti allowed us to stretch across extra seats and sleep. Dawn's glow found us gazing down on incredibly azure waters, topped by the countless tiny vertical cumulus cells that so totally populate tropical seas. We landed and the door opened. For me, a lifelong desert dweller, the perpetual subequatorial combination of 80° and 80% humidity hit like a hot, wet Sunday newspaper in the face.

Amid the astonishingly crowded bustle that is modern-day Papeete, I tracked down Sylvain, FO5RF/F6GGX, at the "Cellule des Postes et Télécommunications." Finding my paperwork package complete and correct, he handled everything. I walked out as FOØROE—soon to be FOØROE/MM.

Aboard the *Spirit of Oceanus*, Donna unpacked while I took the gear for a shakedown setup of my station. Earlier analysis of the ship's floor plans on Cruise West's Web site had revealed a small, open-air dining facility on the Sports Deck. When I got there, I found it well-lit and strategically located for antenna placement. It offered tables, electrical power and a sheltered location; it was perfect!

The ship's chief electrician, an ex-ham from Portugal, smiled at the simple-but-effective design of my all-angle antenna mount. Together, we scraped through the few dozen coats of paint on the ship's railing to expose a spot of shiny steel to give my C-clamp a solid RF contact. Bonded to the ship's actual hull and then the blue Pacific, the railing provided my clamped antenna perhaps the *ultimate* ground!

My homebrewed top-loaded vertical accommodates five different band-specific resonators at once, each fine-tunable by sliding a ferrite collar along its length. This allowed me to use the '706's built-in graphics display to adjust the low SWR point in each band.

This setup mode of the IC-706 is unique and precious among competing ultra-compact HF rigs. It lets you choose a piece of a band and break it into a series of selectable frequency increments, centered on the operating frequency you've dialed in. You hit START and begin pressing the PTT switch. Each time you do, the rig tunes itself to a different frequency increment, sends out a sampling signal to the antenna, and displays the SWR as a segment of a little bar-graph that builds up along the bottom of the display. You simply PTT your way across the band segment and watch where the SWR "dip" occurs. Simple, but amazing!

On my antenna, I could adjust each band's resonator to put the dip nearly anywhere. Once everything was adjusted, I was good to go. I came up on 20 meters and, in a few seconds, I met Scott, VE7QT, in British Columbia. Better, we wound up in a three-way conversation with Peter, ZL1AU mobile, camping in New Zealand!

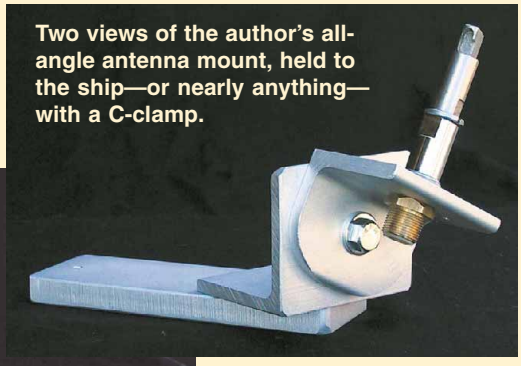
Sweat-soaked (what I found an inescapable part of being out-of-doors here), I

The N6TST Travel Mount

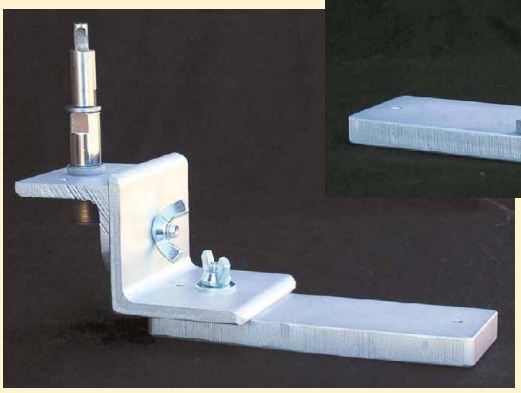
No matter what antenna approach you contemplate, ensure your mounting scheme is versatile and sturdy. On a trip to an unfamiliar place, few of us enjoy the luxury of knowing precisely what kind of antenna installation environment we'll have so it's critical to embody flexibility in the design. Moreover, you might want to take your gear on another trip so mounts made with durable materials offer outstanding long-term payoff.

My own design borrowed from other products I'd seen but added strengths theirs didn't have. I visited scrap bins and found a slab of 3/8-inch-thick aluminum stock and a length of 2-inch aluminum angle. Simple cuts with a band-saw and a few drilled holes yielded a particularly hefty mount, adjustable to any surface angle, and held on with a large C-clamp. Even in a rolling, blowing, open-sea environment, it never slipped or faltered.

The design was so basic, there's little need for drawings or dimensions, just a couple of photos of the finished product. This worked great; give it a shot.



Two views of the author's all-angle antenna mount, held to the ship—or nearly anything—with a C-clamp.



Close-up views of the antenna and the coupling between the two halves of the base shaft.

packed up and headed to the cabin. It had been a long day. The entire station, including my antenna, easily fit into one of our wheeled suitcases so I could quickly move from cabin to shack.

The next morning we'd arrived at Bora Bora and, as we toured that famous tropical paradise, my thoughts drifted to diving into some serious DXing when we departed that evening. As the sun set, I presented my talk on enjoying the colors of the twilight sky and invited my audience to experience some radio activities afterward. Watching the dramatic shapes of that volcanic island disappear into a darkening ocean, I operated as FOØROE/MM, entertaining about 25 interested, non-ham passengers with contacts from the United States, Australia, South America and Japan. I was just getting started.

Oceangoing DX

Reception in the South Pacific has a similar character to most places but with some minor differences. From late morning until the latter part of the afternoon, 12 meters and below is so noisy that any signals there are not discernible from the static. Ten meters is usually the only band open, with a few stations on 12 and maybe isolated signals on 15 and 17.

About 6 PM, 15 and 17 get much better and 20 begins to open up. Late-afternoon and into early evening, 17 provides great paths into the US—even to the East Coast—and, by then, Japan and Australia become available. After sunset and into the evening, 20 opens wide, joining 15 and 17 with good contacts, while 12 and 10 begin fading slowly. Only noise fills 80 meters, but by late evening you can't miss the booming signals from a few of those southeastern US powerhouse stations running kilowatts and big verticals.

It was early morning when we approached Rarotonga in the southern Cook Islands. Eager to get ashore to pick up my local license, I took my camera topside to shoot photos as we docked. The lens, having spent the night in our air-conditioned cabin, fogged over instantly. Hmm. I sighed, wiped away the morning's first jewels of sweat, and soon set out on foot for the half-mile trek to the Cook Islands' equivalent of the FCC. I emerged as ZK1TST.

That evening, my ZK1 CQ on 15 meters somehow found its way to the packet DX cluster. Boom! I was Ground Zero for a pileup like I'd never experienced. I made more than eighty rapid-fire contacts before being rescued by Donna to come to dinner.

On Aitutaki, Des, ZK1DD, and his wife, Tutai, met us at the dock. He's one of the fewer than 20 hams still active in the Cooks and the only amateur operator on this remote island populated by a mere 1500 people. As we spent the day touring together, he chuckled about my account of the pileup, telling me it's a primary operating hazard when you're such a rare QSL species.

At Des and Tutai's Lodge (**pacificresorts.com/ginaslodge**), we saw his two HF beams lying on the ground, temporarily dismantled to protect them during the December-March hurricane season. Seasonal weather is a major hazard in the Cooks; Des even lashes down the roofs of his cottages. Normally, however, a visiting amateur occupying a cottage is presented with coaxes from the beams, plus a third from a G5RV strung nearby.

Des's home station features two HF beams, a full-wave 40-meter delta loop, an 80-meter dipole, a 10-meter vertical and a marine FM vertical (boat-equipped locals use this maritime band extensively). For islanders wanting to view Aitutaki's single TV station, Des also hand-produces multielement quad antennas; we saw them everywhere. But the Near Vertical Incidence Skywave (NVIS) performance of his 40-meter delta loop in the tropics intrigued me, so we made a sked for the next night to talk as the ship sailed toward French Polynesia.

I Get Busy

Back aboard, setting-up had now become a familiar ritual. Nevertheless, the precarious installation of my mounting bracket and antenna out over the water

Below, the arrow shows the antenna mounting location on the 295-foot-long *Spirit of Oceanus*.

The author's QSL (top) and (below) an SSTV image received from JA7EY. Note the returned thumbnail of N6TST's transmitted image in its lower left corner.

meant any fumble-fingered clumsiness would deliver an instant "game-over" catastrophe. Every operation had to be two-handed, deliberate and daydream-free. That Dacron line tied to the antenna in the photo served as more than an anti-wind guy.

As our 40-meter sked time approached, I screwed my pretuned 7 MHz resonator into the antenna. Our more than 200-mile separation was perfect for NVIS propagation and, though I heard no other signals, I shot out Des's call as the clock struck. There he was at S9! We must have rag-chewed about 30 minutes before signing.

Moving into French Polynesian waters, I switched back to my FOØROE call and really got busy. I cranked up the laptop and plugged in my Rigblaster Nomic. PSK31 signals filled the bandwidth at 14.070 MHz, delivering contacts across the US and even as far northeast as Nova Scotia. Between that, RTTY, and a little SSTV, it was nearly midnight by the time I packed up and trudged back to the cabin.

Docked at Raiatea the following afternoon, I got an early start, first working into Michigan and Pennsylvania on 17 meters and then moving to 12 as we departed. Pulling out beneath yet another unbelievable sunset, I got a call from an Ohio station asking if I wouldn't mind him posting my call and frequency on the packet DX cluster. I considered my earlier pileup experience but figured there'd still be quite a few operators who could use an FOØ contact. I said okay, and within two minutes my world exploded all over again.

This pileup was far more frenzied than the first. The perhaps 20 cool-drink-sipping passengers sitting around me witnessed their headset-wearing lecturer suddenly and convincingly approximate insanity as he seemed to go wild, writing, talking, and flailing around. On the radio, I stopped everyone, taking calls region by region while systematically working in the VEs, JAs, VKs and ZLs who waited patiently. By dinnertime, I'd handled nearly 100 contacts and, sweat-soaked again, shut down for the day.

At my evening lecture, the question-and-answer session quickly shifted from astronomy to radio as everyone seemed interested in what had happened to result in my frantic activity earlier. I started explaining pile-ups but ended up giving a quick talk on how the ionosphere delivered signals from all over the world. We moved our nightly star-watching session to the Sports Deck, listening now to DX as people enjoyed the incredible view of the Southern Cross and countless stars only the delicious darkness of an open ocean can deliver.

Using the laptop, I demonstrated SSTV, transmitting some of the digital pictures I'd shot to stations in the US and Japan. A couple of passengers, fascinated that such colorful images could be sent like this, produced blank floppy disks (from where?) and asked for copies. From then on, I was never alone while running my gear on the Sports Deck.

Before I knew it, we'd docked back in Papeete and the odyssey had ended. As people left, they thanked me, not only for their astronomical adventure, but also for introducing them to the radio world. During the trip, several passengers brought me their portable short-wave receivers "that had never worked" and walked away amazed, listening to the HF broadcast stations I'd punched up for them. On a cruise, a little regional short-wave schedule homework can make instant friends for a traveling ham—not to mention providing a direct pipeline to the latest world news.

Not for Everyone

All considered, my actual operating turned out to be the easiest part! It was the logistics and paperwork that accounted for well more than 90% of the total effort.

Is running a station aboard a cruise ship for every ham? I doubt it. For one thing, shipboard contacts do not count toward DXCC. On the other hand, this unique setting can become an unexpected spotlight, demanding a combination of personality, politics and persistence that makes that aforementioned 90% of the effort even more challenging. But if you're the kind of person who enjoys diving into new and unusual adventures, you might find it more rewarding than you expect.

N6TST setting up the antenna.

Ten meters was most active during the day. In the early evening, 17 provided propagation to the US, including the East Coast. Later, 20 took over as the most effective band.

Would I do it again? You betcha. Only next time, I'll pick a MM QTH with a little less relative humidity!

All photos by the author.

Notes

[1]By-country operating permit information for visiting amateurs: **www.arrl.org/FandES/field/regulations/io/recip-country.html**.

[2]International waters: **www.arrl.org/FandES/field/regulations/io/maritime.html**.

David Rosenthal, N6TST, has been licensed since 1989 and holds an Amateur Extra class certificate. He's an EE and a physicist actively working in RF engineering as well as a science lecturer and entertainer. He spent several years as a science correspondent for CNN. You can reach him at 840 W Springer Ave, Ridgecrest, CA 93555; **n6tst@ridgenet.net**.

By Steve Gradijan, WB5KIA

Beginners' Computer Programming for Ham Radio

Part 1—With a little help and the right tools, you can be writing your own software. The Internet is loaded with code you can adapt to your own projects.

Radio amateurs have used computers for several decades to enhance their operating activities. Simple programs calculate engineering values, log contacts, calculate beam headings and track awards and QSL cards. More complicated programs control packet, RTTY or other digital modes, track Amateur Radio satellites, predict radio propagation conditions and make forecasts. Ready to use programs are easily purchased or downloaded from the Internet, but you might consider building your own Windows programs.

In the 1960s and 70s, I built almost a dozen Heathkit ham-related kits. I built several antenna tuners and linear amplifiers from scratch and rebuilt a few Knight Kit projects. It was fun, and building my radio equipment provided a lot of satisfaction, in addition to saving money. Hams who were not electrical engineers routinely built state-of-the art equipment with little or no formal electronic training. We learned basic assembly techniques and developed a better understanding of electronics.

Programming software today is an experience similar to kit building. By writing code for a ham-related process, you can discover why and how software works. Another reward is a product made in your shack. With the right tools, you need not be a professional programmer to write neat software!

If you have never written a computer program before, are still coding in *BASIC* or have been intimidated by people who say you must program in a *C* or *C++* language to write good ham-radio Windows programs, be aware that sophisticated graphics and the tools to easily develop Windows programs are within the abilities of a novice. Beginners can write commercial quality Amateur Radio software to do very complicated things but *without* Herculean effort, provided they have the proper tools.

What's the trick? Use one of the development languages that supports visual objects. Visual objects are programming tools that are dragged to and dropped onto a screen (often called a *form*) to automatically generate much of the source code needed to compile a Windows program. There are visual objects to handle basic input/output, graphics, printing, communication and other chores. *DOS*, *C++* or *C* programmers must solve these complex tasks manually. With visual objects, you don't! You will be writing programs for Amateur Radio reasonably quickly if you combine these visual objects programming tools with the numerous free tutorials on the Internet that teach programming fundamentals.

Borland's *Delphi*, Microsoft's *Visual Basic* and the less well-known Computer Associates' *Realizer* are three visual objects programming tools a beginning Windows programmer can use effectively. These tools can let you develop a Windows

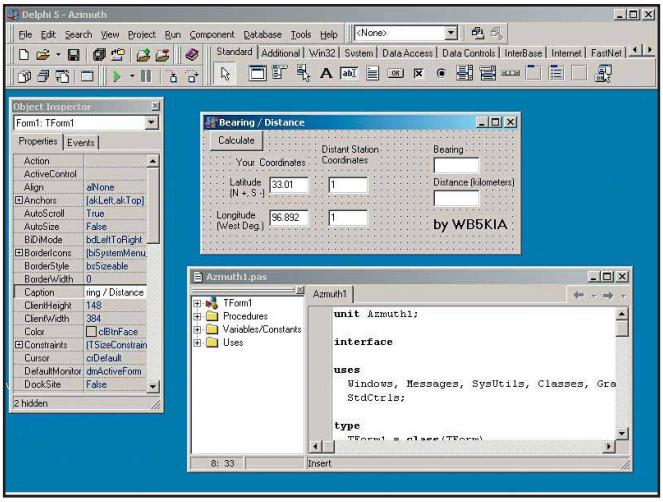


Figure 1—*Delphi* 5 Professional design screen shown with a distance/bearing program that will be discussed in Part 2.

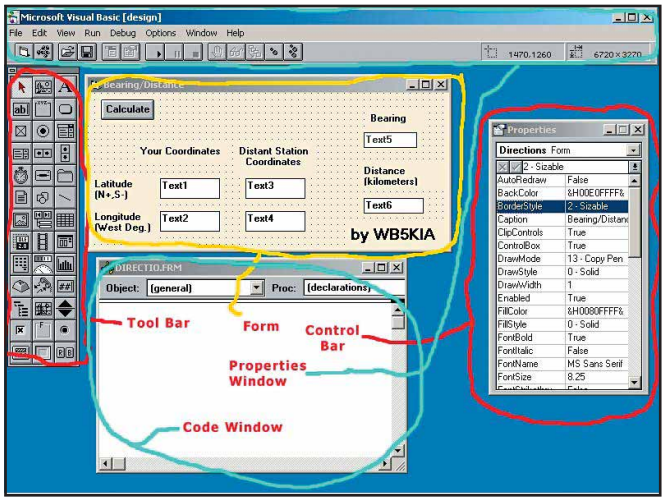


Figure 2—*Visual Basic* 3 design screen shown with a program comparable to that shown in Figure 1.

desktop application, which is a program that resides on your computer without connecting to the Internet. These products make it relatively easy for anyone to program for Windows because they are much easier to use than the *BASIC* or *QuickBasic* languages that were the choice of beginners in the past. Neophytes can develop reasonably sophisticated programs for *Windows* using a minimum effort.

This article gives you the information to determine what programming software you want and can afford; the tables show you where to find the resources you need to develop your own ham-radio projects. Examples of how to code specific ham related projects in *Delphi* and *Visual Basic* will be covered in Part 2. Part 3 is an introduction to some generic ham-radio algorithms that can be used in your own programs to handle complex number-crunching operations. The source code and executable files (the EXE files that Windows knows how to run) for the suggested projects will be posted on the *ARRLWeb* when those parts are published. For now, you can gain more information by reading my *QEX* article on this subject.[1]

Windows Programming Tools for Beginners

The latest "professional" editions of Windows programming software for *Visual Basic.Net* (the new replacement for *Visual Basic* 6) and *Delphi* 6 start at about $400 and $1000 respectively. These editions contain tools to program Internet sites, servers, networks and all kinds of things in addition to desktop applications. What you need is something that will let you program ham-oriented desktop applications. Both Borland and Microsoft have 'beginners' versions of their software that cost under $100. The simplest way to start programming is to invest in one of these products. You will get the latest controls that can be augmented with various freeware and shareware software components available on the Internet.

Earlier versions of the full-featured programs are almost as simple to use as the latest versions and are good values. Buying past years' versions is like buying used ham gear. It will do a great job although it might not have all the latest features. An older version of *Delphi* or *Visual Basic* could give you access to some of the "professional" control objects at a bargain price. Use the "Recent Prices" sidebar to help you choose your software.

Visual Basic 3, *Delphi* 1 and *Realizer* were designed to work with Windows 3.1 (a 16-bit operating system). They also work with *Windows 95*, and such, although the programs developed with them will execute more slowly than those developed with versions designed for 32-bit operating environments.

All of these programs use visual objects to help one write a program with an absolute minimum of coding. Visual objects are tools that are part of the programming package and allow you to construct a program framework that tells your program when to execute a particu-

[1] S. Gradijan, WB5KIA, "Amateur Radio Software: It Keeps Getting Better," *QEX*, Sep/Oct 2002, pp 19-29.

Book List—Beginners' Windows Programming Books

N. Rubenking, *Delphi Programming for Dummies* Foster City, California: IDG Books, 1995) 376 pages.

B. Watson, *Delphi By Example* (Indianapolis, Indiana: Que, 1995), 517 pages.

J. Smiley, *Learn to Program with Visual Basic* 6, Reference Birmingham, UK: Active Path Ltd, 1998), 777 pages, this includes a working VB6 disk.

R. Reselman and R. Peasley, *Practical Visual Basic 6* (Indianapolis, Indiana: Que, 1999), 850 pages with a working VB6 disk.

Using Visual Basic 6, electronic version available at: **nps.vnet.ee/ftp/Docs/Basic/Using%20Visual%20Basic%206/index.htm**

D. I. Schneider, *Essentials of Visual Basic 6.0 Programming* (Upper Saddle, New Jersey: Prentice Hall, 1999) 356 pages. With a working VB6 disk.

Visual Basic 5 Control Creation Edition electronic version available at: **msdn.microsoft.com/vbasic/downloads/updates/VisualBasic5.asp**

W. Wang, *Visual Basic 5 for Windows for Dummies* (Foster City, California: IDG Books Worldwide, 1997), 482 pages.

W. Wang, *Visual Basic 6 for Dummies* (Foster City, California: IDG Books Worldwide,1998) with working *VB6* disk.

Table 1
Windows Programming Tools

✓ ***VisualBasic***
Visual Basic 4-6, 32-bit; *Visual Basic* 3, 16-bit
Commercial Microsoft program, Basic, Professional and Enterprise versions available. Sealed, in the box older versions, may be available for under $50. Compiler with DLL runtime library. Relatively easy to learn although at first the user design interface appears intimidating. Execution is slower than *Delphi* (especially *VB* 3).

CA *Realizer*
Visual Basic-like clone, 16-bit
Commercial Computer Associates program. The program is no longer sold. Sealed, in the box, older versions may be available for under $20. Compiler with DLL runtime library. Easy to program; however, accompanying documentation is confusing. Having a program example is important for a beginner. Requires distribution of runtime libraries in addition to the executable program file.

✓ ***Delphi* 1**
16-bit Visual Objects *Pascal*
Commercial Borland program. Standard and Professional versions. Sealed, in the box, older versions may be available for under $20. Compiler, relatively easy to learn. Support for db IV and Access databases is not included in the Standard edition. Nonstandard databases can be user-developed using Object Pascal code for log books, etc. Programs developed run much faster than with *VB3* or CA *Realizer*.

✓ ***Delphi* 2-6**
32-bit Visual Objects Pascal
Commercial Borland program, Standard, Professional and Enterprise versions available. Sealed, in the box, older versions may be available for under $50. Compiler, relatively easy to learn. Executes faster than *VB,* but a bit slower than *C++*. Support for db IV and Access databases used by some commercial and shareware logging programs is not included in the Standard edition. Try to get *Delphi* 4 or higher.

C++
Comes in various "flavors," commercial Borland and Microsoft programs. Compiler, difficult to program for a beginner. Fast EXE file execution times.

Visual C++, C++ Builder
Various flavors, commercial Microsoft and Borland "Visual C" programs. Compiler, relatively difficult to program for a beginner compared to *Delphi* and *Visual Basic* but easier than *C* or *C++*. Programming is in a visual environment. Awesome EXE file execution time.

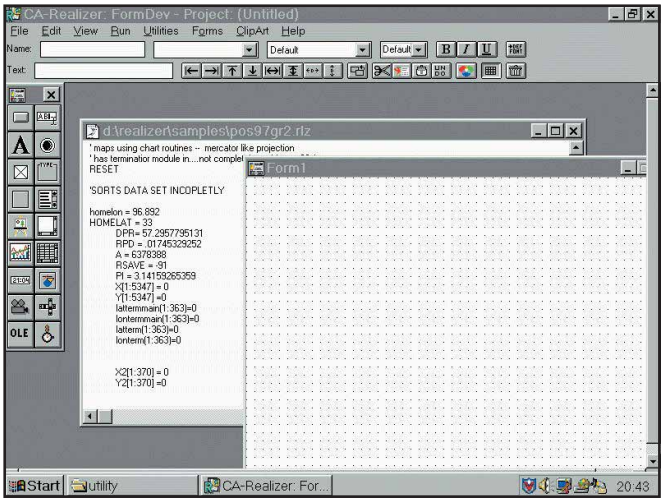


Figure 3—*Realizer* design screen.

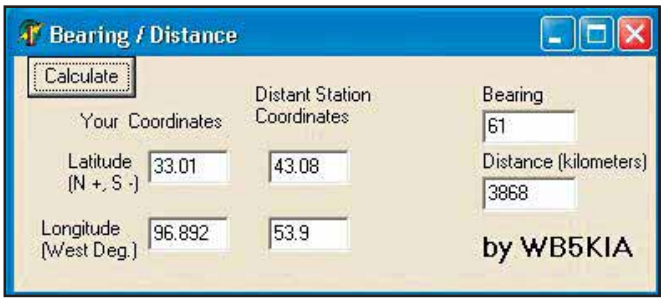


Figure 4—Part 2 of this series will show you, step-by-step, how to program this bearing-distance calculator, using *Delphi* and *Visual Basic*.

Table 2
***Visual Basic* and *Delphi* Code Compared**

Visual Basic	*Delphi* Pascal

If a = b then
Text1.BackColor=vbgreen
d = (a + c) * 3.14
end if
	If a = b then
	begin
	Edit1.Color:=clgreen
	d := (a + c) * 3.14;
	end;

lar mathematical formula, draw a map or communicate with a radio or TNC.

Delphi, *Visual Basic* and *Realizer* use a programming interface to design, compile and debug programs. The interface has a tool bar, a form to display your program and a code window. To program,you place various controls or objects on a form, change the appearance of the object by modifying parameters in a table, and add some code manually. As objects are placed on the form, *Delphi* or *Visual Basic* generate the corresponding code in a separate window that the compiler will use to build the executable program.

Objects are placed on the form by dragging, dropping, resizing or moving the object on the form. Individual control characteristics can be modified by changing values in a table (called the Object Inspector in *Delphi* and the Project Window in *Visual Basic*). Algorithms (routines to execute logic or perform calculations) are entered manually in the program's code window. Detailed coding for many common tasks is eliminated with the controls, allowing you to spend time developing the program logic. The programming interfaces for *Delphi*, *Visual Basic* and *Realizer* as shown in Figures 1, 2 and 3 are very similar.

Several versions of these tools are available. The language choices that make sense for a beginner are highlighted with a check mark (✓) in Table 1. Check it out to help you decide what version or programming environment is appropriate for you.

The executable files generated and compiled by *Delphi* 1, *Visual Basic* 3 and *Realizer* were developed for 16-bit PC operating systems, for example, *Windows* 3.1. They ran slowly on PCs of 10 years ago, but they run significantly faster on the latest PCs. Mathematical routines that brought the earlier PCs to their knees execute rapidly on modern PCs and will run on *Windows* 9x versions through XP using the 16-bit tools. Consequently, a 16-bit version of one of these compilers may make sense if you intend to run your programs on a late-model PC. Conversely, the much faster code generated by the 32-bit versions (*Delphi* 2-6 and *Visual Basic* 4-6) will not run on a computer using the *Windows* 3.1 operating system without additional files that slow the system down.

As you would expect, the mechanics of programming is similar for all of these. The language you choose depends on your budget, software availability and personal choice. My experience is that it is easier to develop programs with *Delphi* than with *Visual Basic* and that *Delphi*-developed programs execute faster. *Delphi's* executable files stand alone; they do not require distribution of "runtime libraries" with them. These helper "programs" need to be available should you give your developed software away or sell it, as is the case with *Visual Basic*. I originally learned *Visual Basic* and the transition to *Delphi's* Pascal was painless. I use *Delphi* 5 Professional almost exclusively now. The drawback is that the latest 'professional' version of *Delphi* is twice as expensive as the comparable version of *Visual Basic*.

Whatever tool you have, you will also need to do some manual coding. The manual code in *Visual Basic* has an appearance similar to the original Basic language. The manual coding in *Delphi* is similar to *Pascal*. Learning the elements of the base language for *Visual Basic* or *Delphi* should be easier than learning Morse code for most people. The base language is shorthand that provides a series of instructions to your compiler. In English, the instructions might look like this, "If 'a' equals 'b' happens, then turn the red text or edit box green and multiply the result of 'a' plus 'c' by 3.14", and so on. In the two languages, the same commands would look as shown in Table 2. Not much difference is there?

The parts of these languages are like your knowledge of resistors, capacitors and fuses. They are the building blocks needed to construct mathematical algorithms and logic to make your program do something useful. *Delphi Object Pascal* and *Visual Basic's BASIC* use structures of code that are the language's vocabulary, which you will combine into meaningful sentences. The various instructions and statements, like *for* loops and *if* statements (as shown above), are common to both languages and provide the logic necessary to perform a task. I will introduce some ham-radio related examples (see Figure 4) with code in Part 2 of this series. You can use them as models for your own projects. Materials that will help you learn the base languages are described in the Book List and Table 3.

Where to Find Programming Tools

Programming tools are available at reasonable prices or even free of charge. As indicated earlier, starter versions of *Visual Basic* (*Visual Basic.Net* Standard Edition) and *Delphi* (*Delphi* 6 Personal) are available for around $100. These are very usable versions of the more robust Professional or Enterprise editions but without all of their parent-program features. The license terms vary with the various versions, but starter versions may not permit commercial distribution of the developed programs. The good news is that many permit a reasonably priced upgrade to the full version after you have developed confidence in your programming

skills. There is enough functionality to develop all but the most sophisticated desktop applications for your shack. Additional free or shareware tools are available on the Internet to augment that functionality.

Delphi 6/7 Personal and Pro is available for a free trial at **www.borland.com/delphi/**. A CD is available at nominal cost. Click on the "Trial Version" icon. The programs you develop with this version are *only* for your personal use.

Several beginners' programming books that cost less than $30 include CD-ROMs with a version of *Visual Basic* 6 Learning Edition. Several of these books are in the Book List. The *Visual Basic* version bundled with them cannot be used to create an EXE file. You can save the source-code files and they can be run from the design environment.

Used bookstores frequently have software available in its original packaging at discounted prices. Various E-vendors may have last year's versions available at discounted or reduced prices. Recently, I found "Professional" editions of *Visual Basic* 4 for less than $50 and of *Visual Basic* 3 and *Realizer* for less than $20 at a national used book chain. They were sealed in their original packaging.

Academic versions of software might be available at reduced prices. Make sure you qualify and be aware that the license terms might not allow you to commercially distribute software developed with these products.

Whatever programming tool you get, make sure the software license terms allow you to either sell or give the resulting program away before you start sharing your final programs. Licenses for pre-owned software may be transferred, in most instances, if the media is exchanged and the programs have been removed from the original owners' computers. Check the terms of the individual software license and *stay legal*.

Table 3
Internet Sites with Programming Information/Source Code/Tutorials

DELPHI RESOURCES

Yahoo Discussion Forum
www.Yahoo.com
Delphi Programming Forum, general code examples and answers to your programming questions. Discussion group for general *Delphi* programming questions.

Borland
www.Borland.com
The main *Delphi* site, with general code examples and downloads for *Delphi* and *C++.*

Delphi Super Page
delphi.icm.edu.pl/
Freeware/shareware controls and code examples.

Torry's *Delphi* Pages
www.torry.net/
Freeware/shareware controls and code examples.

intelinfo.com
www.intelinfo.com/newly-researched_free_training/Delphi.html
Links to various *Delphi* tutorials.

Delphi.about.com
www.delphi.about.com
Freeware/shareware controls and code examples, *Delphi* tutorials.

Efg's Reference Library Delphi
homepages.borland.com/efg2lab/Library/Delphi/
Extensive source for programming code for graphics, math routines, etc, with numerous links and source code for various programming platforms.

VISUAL BASIC RESOURCES

Gary Beene's *Visual Basic* Information Center
www.vbinformation.com/tutor.htm
Free code related to tutorial projects. Links to other tutorials. *Visual Basic* tutorial is nice.

Introduction to *Visual Basic* 5.0 programming
www.dcs.napier.ac.uk/hci/VB50/home.html
Free code related to tutorial projects, links to other tutorials. *Visual Basic* tutorial with lots of screen shots.

Visual Basic.about.com
www.visualbasic.about.com
Extensive freeware/shareware controls and code examples, *Visual Basic* tutorials.

Visual Basic World
www.developer.com/net/vb/
Source code shareware/freeware, tutorials.

QBASIC, Quick Basic RESOURCES

ABC Basic
www.allbasiccode.com
Over 2000 pieces of free source code. Lots of example code and complete non-ham projects

Qbasic.com
www.qbasic.com
300 program examples—not associated with Microsoft

Start to Program

It is not possible to teach programming in a short article; however, the books described in the Book List and the Internet sites indicated in Table 3 contain material that can help you to learn programming fundamentals quickly. On-line free tutori-

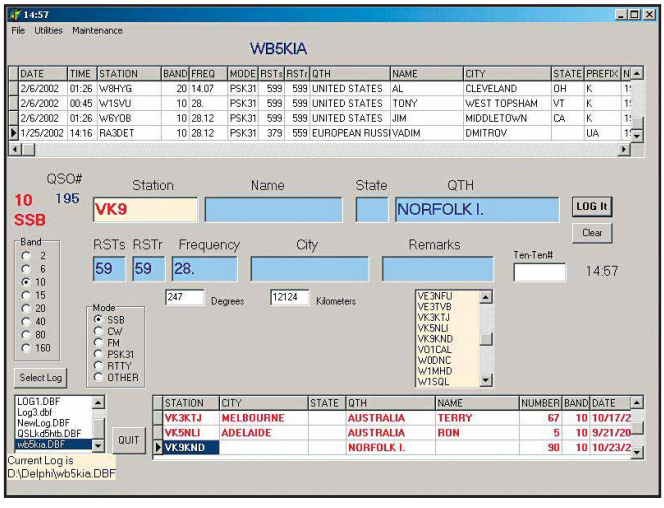


Figure 5—This fleshed-out version of a logging program was made by adding code from several simple programs. Using *Delphi* 5, the base program took about an hour to build.

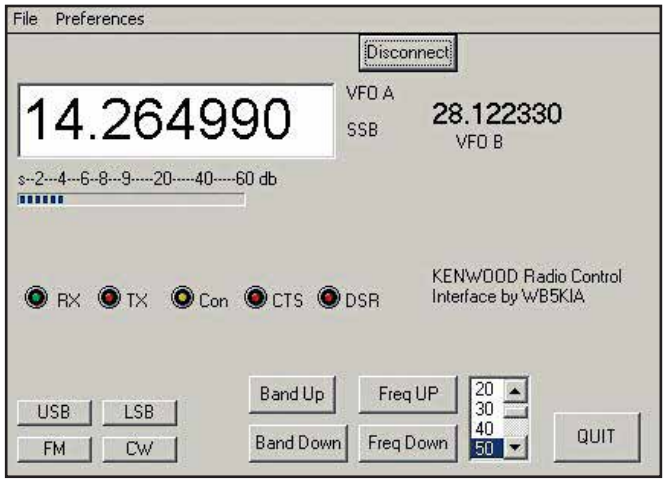


Figure 6—A simple control program for Kenwood radios with EIA-232 ports was also written in an hour.

als make learning to program easier than getting your amateur license. They are an excellent way to learn the basics of programming with *Delphi* or *Visual Basic*. Many of the tutorials walk you through every step of the process just like the old Heathkit manuals, except these are html and not printed documents. Most of this should be straightforward enough, but if you have difficulty, Part 2 of this article will show you how to load source code that can be read by your compiler.

For now, get familiar with your compiler. Arm yourself with one of the programmer study guides. The *Programming for Dummies* book series would be especially helpful to get you started writing your first program. Buy or get a copy from your local library and read about the basics. As you go through the book or the on-line tutorial, you will find it is less intimidating if you have a copy of either *Delphi* or *Visual Basic* running on your computer in order to follow the exercises.

Used or new editions of the books mentioned in the listings are in second-hand bookstores at reasonable prices. Your local library may be an excellent resource. A book covering a program version not too far removed from the one you are using will suit most of you. Some of the *Windows* programming books include a CD-ROM with source-code examples.

Keep your initial programming efforts simple. Once you learn the fundamentals, you can combine program elements from the simple projects into larger, fancier projects.

Programming Resources

Most of the code you will write in *Delphi* and *Visual Basic* will be generated by dropping visual objects onto a form. To execute mathematical routines or algorithms, you will do some manual coding. Very few *Delphi* or *Visual Basic* code listings for Amateur Radio projects are described in the literature. Those with some programming experience can find Internet sites with information appropriate to ham-radio program development in Table 4. Some of these sites provide full source code that can be used as part of your program. If you are lucky, the code will be usable directly with your programming software. *Delphi* and *Visual Basic* are separate products and software companies occasionally modify the visual-object tools between different versions of the same products, so that code you find may need minor changes to work with your product. If the code you find does not run with your compiler, it is probable the source code was programmed in a different version of your software. Don't give up hope. Most probably, only minor changes will be required to make the code function in your environment. When a program does not compile, some compil-

Table 4
Ham Radio Resources for Beginning Programmers

N1MM Logger
www.n1mm.com
Development of contest logging program. Specific source code is available by request. A great site/discussion group.

WA0TTN Web Page
www.netdave.com/wa0ttn
PSK ActiveX control for *VB*, *Delphi*, *C++*. Other controls to make developing PSK programs easier. A remarkable tool for working with a homemade PSK program and it is free.

PSK Core DLL
www.qsl.net/ae4jy/pskcoredll.htm
PSK Core DLL and demonstration code for *Delphi* and *VB6*; free DLL works fine.

MMTTY
www.qsl.net/mmhamsoft/
RTTY DLL by Makoto Mori, JE3HHT. Amazing RTTY DLL and it is free.

MMTTY Programmer's Page
www.qsl.net/mmhamsoft/programmer/engine.html
Examples of how to use the RTTY DLL in your program. Look for the Programmer's page.

SV2AGW Sound-Card Packet
www.elcom.gr/sv2agw/agwsc.htm
Packet Engine for packet without a terminal—hard to use.

G4ILO
www.qsl.net/g4ilo/main.html
Delphi 3 code snippets show how to build a simple PSK program using the AE4JY pskcore dll; other Delphi code.

Official PSK Web site
www.aintel.bi.ehu.es/psk31.html
Code snippets and partial program showing how to use AE4JYs PSK Core DLL with *VB* and *Delphi,* many examples of quality programs coded by hams.

DX Atlas (shareware)
www.dxatlas.com
Advice as how to interface your project to the DX Atlas via COM or OLE automation. Two *Delphi* 5 demonstration programs with code. Example of techniques to interface your project with another project. One of the numerous shareware/commercial sites that provide information for developers to interface with their products.

Ten-Tec Programmers Page
tentec.com/rfsquared
Ten-Tec Programmer's Reference Guide for programming Pegasus and Jupiter radios. General public license source code (MS *Visual C++*, 16-bit) for control of Pegasus/Jupiter and reference guide.

Kenwood
www.kenwood.net/
Free rig control software, free rig interface software for TS-570, free memory-control software for TS-2000. Command codes to control TS-2000 are in the operator's manual appendix.

The Plicht Brothers
www.plicht.de/ekki/
Delphi and *Visual Basic* code snippets for ICOM CT-17 level control. Lots of information about controlling radios with PCs using the CI-V Interface.

AA6YQ / Ambersoft
www.ambersoft.com/Amateur_Radio/index.htm
Visual Basic code fragments for programmers, *eg*, Controlling ICOM radios with a PC.

Commander
www.qsl.net/civ_commander
Free radio-frequency control program for ICOM, Kenwood and Yaesu. Those developing this program solicit your input.

Mapping Site
www.versamap.com/webdoc03.htm
CIA Public domain map of the world in digital form, material to generate map of the world with country boundaries.

Voice of America
www.elbert.its.bldrdoc.gov
VOCAP—Predicts performance of HF broadcast systems. Contains both *VB* and *DOS* source code.

Intel
www.intel.com/software/products/perflib/
Intel Signal Processing Library—free signal-processing DLLs and controls, etc for *Delphi* and *Visual Basic*.

CIA—The World Fact Book
www.cia.gov/cia/publications/factbook/
Public-domain information about countries of the world, including maps.

CIA World DataBank II
www.evl.uic.edu/pape/data/WDB/
Public domain information about countries of the world. Up to date map information; Dave Pape has free digital map data at different resolutions and bit maps for download.

QRZ.com
www.qrz.com
Specifications for format of Keplerian elements in file kep_fmt.txt. Explanation of NASA satellite orbital elements available from NASA, AMSAT, etc.

Recent Prices for Latest Versions of *Delphi* and *Visual Basic*

Delphi 6/7 Personal $45-100
Delphi 6/7 Professional $900
Delphi 6/7 Upgrade $290-400
Delphi 7 Personal download free*
Visual Basic Pro 6 $359-549
*See text

Visual Basic.Net Standard $100
Visual Basic.Net Pro $1000
Visual Basic 6 Learning Edition $71-116
Visual Basic Standard $92-109

Several books include a "usable" version of *Visual Basic* 6 Standard $30 up

Recent Prices in Used Bookstores for Previous Versions of *Delphi* and *Visual Basic* in their Original Packaging

Delphi 1 Standard $10-20
Delphi 1 Professional $35-50
Delphi 2 Professional $50
Delphi 4 Professional $75
Visual Basic 3 Professional $20
Visual Basic 4 Professional $40
Visual Basic Pro 5 $100-149

New copies of *Delphi* 6 and *Visual Basic* 6 software are scarce on store shelves. On-line auctions still have them In their original packaging at reasonable, discounted prices.

The *Visual Basic* source code that will appear in Parts 2 and 3 might not be compatible with *Visual Basic.Net*. Its modified *Visual Basic* language is significantly different from earlier *Visual Basic* versions. *Visual Basic.Net* has a utility to convert VB6 source code, which may or may not work with source code from other VB versions.

ers, like *Delphi*, let you know what controls or code are giving you problems. If you need to translate the code you find into the form and language of your compiler, several Internet sites may help you with translations between the native *Delphi* and *Visual Basic* languages. Use your browser to search for "*Delphi* to *Visual Basic*" or vice versa.

Will My Program look like the Commercial Ones?

Your program can look like the commercial ones with little effort, especially if it is a simple program. The graphic objects can be moved around the form by dragging and dropping them to make your program screens look as you want. Both *Delphi* and *Visual Basic* provide a tool that lets you make your own help files from text rtf files. Most word-processing programs can save files in the rtf format.

There is a high probability that your initial programs will not have bugs. Yet, if they occasionally do strange things, you can fix them. Software bugs are like cold solder joints in kit building. You need to get rid of cold solder joints for the project to function properly. With your software, a small problem might not be critical. As long as the bug does not crash your system and you can live with it, so what? If you want to distribute the program, you will want to eliminate any problems. You will add more features to your programs and use the built-in features of your compiler to track down bugs as you gain experience. Even professionally developed software has bugs.

Can this be Easy?

Delphi 5 Professional was used to code the simple Windows logging program shown in Figure 5 in just under an hour! It took a little longer to add all the bells and whistles. A radio control program similar to the one described by WØDZ in *QST* (Feb 2002, pp 33-35) was written using *Delphi* 5 for use with Kenwood radios (see Figure 6). A free add-on control for *Delphi* (TComport by Dejan Crnila, download at **www2.arnes.si/~sopecrni/**) made it possible to code the software VFO and basic controls in under an hour. Depending on your programming skill and understanding of ham-radio hardware/computer interfaces, your experience might be different.

Conclusion

Programming for Windows certainly is not for everyone, but, with the right tools, it can be an enjoyable and satisfying experience. It takes a little time to become familiar with a programming language just as it takes time to develop good soldering technique. It's time for engineer/programmers to get out of the *DOS* box and into some more user-friendly interfaces. Once you get started, programming can be fun. Hamming and computer programming do go together!

Things to Come

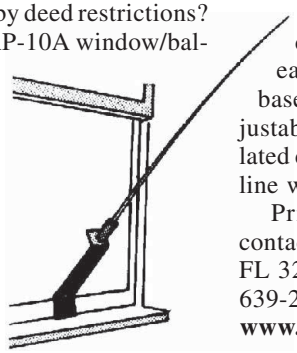
Part 2 of this article will show how to write your first ham-radio program using *Delphi* or *Visual Basic*. It will also describe several simple projects to get you started. Part 3 of this article will describe several algorithms to code more complicated events into your projects. The algorithms will be described in pseudo code (generic code that can be converted into *Delphi* or *Visual Basic*) and in *Delphi* Object Pascal. A bibliography of articles concerning ham-radio projects coded in *BASIC* is a source of ham-radio algorithms that you can translate into either *Delphi* or *Visual Basic* code.

A ham since 1963, Steve Gradijan, WB5KIA, is a geological consultant in the Dallas, Texas, area. He holds an Extra class license. Computer programming has been his second hobby since the late '70s. He was previously licensed as WA8KBK and LAØDY. His wife Chris is WD5EML (ex LAØDZ), and their 16-year old son Francis is KD5HTB. QST

NEW PRODUCTS

BALCONY/WINDOW ANTENNA FROM B&W

◊ No yard? Covered by deed restrictions? B&W's new Model AP-10A window/balcony antenna covers 40 through 10 meters (continuously), plus 6 and 2 meters, and can handle 300 W of RF. Designed for home owners, renters and travelers who can't put up a permanent outdoor antenna, the AP-10A attaches to most windows, chairs, tables, balcony railings, etc, thanks to a $^{3}/_{16}$-inch aluminum bracket with a built-in C-clamp.



The AP-10A consists of an aluminum mounting bracket with built-in clamp, a telescoping whip that collapses to less than 23 inches for easy transport, a high-Q air-wound base loading coil assembly with an adjustable lead for clip-on tuning, an insulated counterpoise wire and a coaxial feed line with an attached PL-259 connector.

Price: $89. For more information, contact B&W at 603 Cidco Rd, Cocoa, FL 32926; tel 321-639-1510, fax 321-639-2545; **custsrvc@bwantennas.com**, **www.bwantennas.com**. QST

By Edison Fong, WB6IQN

The DBJ-1: A VHF-UHF Dual-Band J-Pole

Searching for an inexpensive, high-performance dual-band base antenna for VHF and UHF? Build a simple antenna that uses a single feed line for less than $10.

Two-meter antennas are small compared to those for the lower frequency bands, and the availability of repeaters on this band greatly extends the range of lightweight low power handhelds and mobile stations. One of the most popular VHF and UHF base station antennas is the J-Pole.

The J-Pole has no ground radials and it is easy to construct using inexpensive materials. For its simplicity and small size, it offers excellent performance. Its radiation pattern is close to that of an "ideal" dipole because it is end fed; this results in virtually no disruption to the radiation pattern by the feed line.

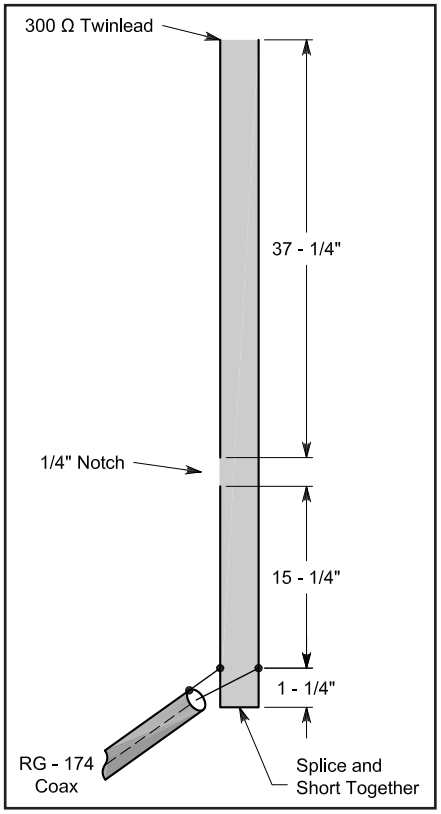


Figure 1—Basic diagram and dimensions for the original 2-meter ribbon J-Pole.

The Conventional J-Pole

I was introduced to the twinlead version of the J-Pole in 1990 by my long-time friend, Dennis Monticelli, AE6C, and I was intrigued by its simplicity and high performance. One can scale this design to one-third size and also use it on UHF. With UHF repeaters becoming more popular in metropolitan areas, I accepted the challenge to incorporate both bands into one antenna with no degradation in performance. A common feed line would also eliminate the need for a duplexer. This article describes how to convert the traditional single band ribbon J-Pole design to dual-band operation. The antenna is enclosed in UV-resistant PVC pipe and can thus withstand the elements with only the antenna connector exposed. I have had this antenna on my roof since 1992 and it has been problem-free in the San Francisco fog.

The basic configuration of the ribbon J-Pole is shown in Figure 1. The dimensions are shown for 2 meters. This design was also discussed by KD6GLF in *QST*.[1] That antenna presented dual-band resonance, operating well at 2 meters but with a 6-7 dB deficit in the horizontal plane at UHF when compared to a dipole. This is attributable to the antenna operating at its third harmonic, with multiple out-of-phase currents.

I have tested single-band J-Pole configurations constructed from copper pipe, 450 Ω ladder line, and aluminum rod. While all the designs performed well, each had shortcomings. The copper pipe J-Pole matching section would be exposed to the

[1]J. Reynante, KD6GLF, "An Easy Dual-Band VHF/UHF Antenna," *QST*, Sep 1994, pp 61-62.

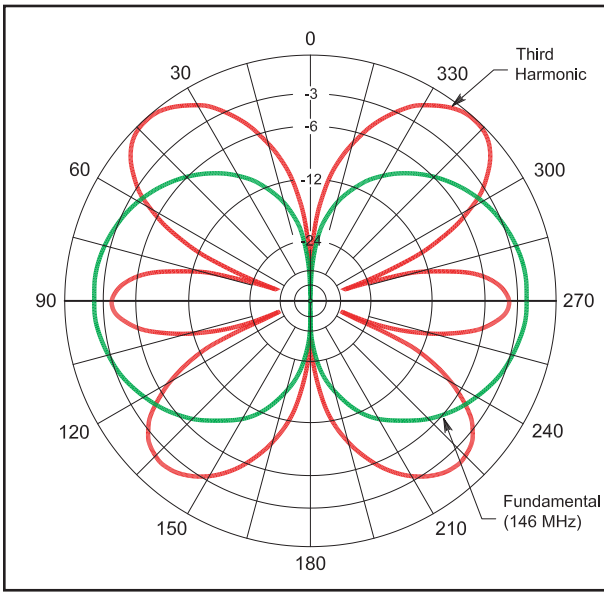


Figure 2—This EZNEC plot shows the difference in the radiation patterns between a vertical half-wave radiator operated at its fundamental (146 MHz) and third harmonic (445 MHz). At the fundamental, most of the energy is directed at right angles to the antenna—and to distant receivers.

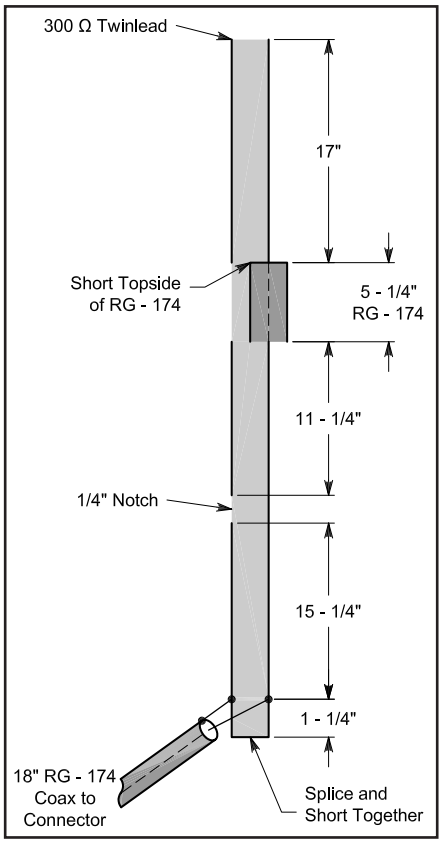


Figure 3—The 2 meter J-Pole modified for both VHF and UHF operation. These measurements are approximate (see text).

air, raising a durability question. The aluminum design would be faced with a similar issue in the salt air of the San Francisco Bay area. I favor the use of 300 Ω twin lead because it is easily obtainable and inexpensive. An advantage of the copper pipe design was an 8 MHz bandwidth—about twice that exhibited by the twin lead version. That was expected, since the copper pipe had a much larger diameter than the twin lead elements used in that version. My final decision was to be based on aesthetics, cost and durability...but the antenna had to be a true dual-band design.

How the J-Pole Works

The basic J-Pole antenna is a half-wave vertical radiator, much like a dipole. What separates this design from a vertical dipole is the method of feeding the half-wave element. In a conventional dipole or groundplane, the radiation pattern can be disrupted by the feed line and there is usually a tower or some other support that acts as a reflector as it is frequently parallel to the antenna. The J-Pole pattern resembles that of an ideal vertical dipole because of its minimal interaction with the feed line. The performance of this J-Pole is, theoretically at least, equal to a ¼ wave radiator over an ideal ground.

The J-Pole also matches the high impedance at the end of a ½ wave radiator to a low feed point impedance suitable for coax feed. This is done with a ¼ wave matching stub, shorted at one end and connected to the ½ wave radiator's high impedance at its other end. Between the shorted and high impedance ends there is a point that is close to 50 Ω. This is where the feed line is attached.

Creating the Dual-Band DBJ-1

So how can one add UHF to the conventional 2-meter J-Pole? First of all, a half-wave 2 meter antenna does resonate at UHF. Resonating is one thing, but working well is another. The DBJ-1 not only resonates, but also performs as a ½ wave radiator on both bands. An interesting fact to note is that ½ wave center-fed dipole-type antennas will resonate at odd harmonics (3rd, 5th, 7th, etc). This is why a 40 meter center-fed ½ wave dipole can be used on 15 meters. Similarly, a 150 MHz antenna can be used at 450 MHz. However, the performance of the antenna at the third harmonic is poor when it is used in a vertical configuration. At UHF (450 MHz) the ½ wave radiator becomes $^3/_2$ wavelengths long. Unfortunately, at UHF, the middle ½ wavelength is out of phase with the top and bottom segments and the resulting partial cancellation results in approximately 2 dB less gain in the horizontal plane compared to a J-Pole operating at its fundamental frequency. Maximum radiation is also directed away from the horizon. Thus, although the J-Pole can be made to work at its third harmonic, its performance is poor, often 6-8 dB below that of a groundplane. Figure 2 shows a polar plot of a vertical ½ wave radiator operating at its fundamental (146 MHz) and third harmonic (445 MHz) frequencies. Note the difference in energies of the two frequencies.

What is needed is a method to decouple the extra length of the 2 meter radiator at UHF in order to create independent ½ wavelength radiators at both VHF and UHF. The DBJ-1 accomplishes this by using a coaxial stub, as shown in the antenna drawing of Figure 3.

There is 18 inches of RG-174 transmission line connecting the bottom RF connector to the radiating element. Eighteen inches was chosen so that the bottom portion of the antenna housing can be used to mount the antenna without disturbing its electrical characteristics. [The use of RG-174 coax in this design limits the power the antenna can handle to less than 60 W at low SWR. By substituting RG-213, RG-8 or RG-58 cable, power ratings can be improved considerably. However, the length of the decoupling stub at the UHF antenna may have to be recalculated, because of the change in velocity factor (VF) of the different cable.—*Ed.*]

The 16½ inch matching stub of 300 Ω twin lead works like a ¼ wave stub at VHF and a ¾ wave stub at UHF with virtually no penalty, except for a slight 0.1 db loss from the extra ½ wavelength of feedline. By experimentation, the 50 Ω point was found to be 1¼ inches from the shorted end of the stub. Although the impedance at this point is slightly inductive, it is still an excellent match to 50 Ω, with an SWR of approximately 1.3:1.

Connected to the open end of the matching stub, the radiating element for UHF is 11¼ inches long. The stub and radiator are constructed of a single piece of twin lead, separated from the matching stub by a ¼ inch notch in one conductor, as shown in Figure 3. The extra wire in the twin lead radiator sections radiates along with the driven wire, creating a thick element that is shorter than its free-space equivalent. To terminate the UHF radiating section, a shorted stub, using RG-174 coaxial cable, is used. As with the input matching stub, the open end presents a high impedance and is connected to the upper end of the UHF radiating section. Note that the stub is only an open-circuit at UHF, acting as a small inductance instead, at VHF.

The RG-174 stub connects to the upper section of 300 Ω twin lead and that completes the VHF radiating element. Note that the total length of the UHF and VHF radiating elements plus the coaxial stub do not add up to a full ½ wavelength at VHF because the inductance of the coaxial stub acts to shorten the antenna slightly.

Construction Details

The dimensions given in Figure 3 should be considered a starting point for adjustment, with final tuning requiring an SWR analyzer or bridge. During the antenna's construction phase, I started at the feed point (see Figure 3) and after each section was assembled, the input SWR was checked. After the ¼ wave VHF matching section is connected to the 11¼ inch UHF ½ wave section, check the SWR at UHF. Then add the ¼ wave UHF shorted RG-174 stub. The stub will require trimming for minimum SWR at UHF. Start with the stub 10–15% long and trim the open end for lowest SWR. As a last step, add the 17 inch section of twin lead. Again, this section should be trimmed for the lowest SWR at your frequency of choice in the 2 meter band.

To weatherize the antenna, enclose it in ¾ inch schedule-200 PVC pipe with end caps. These can be obtained from your local hardware or building supply store. When sliding the antenna into the PVC tubing, I found no need to anchor the antenna once it was inside. [If larger coaxial

Table 1
Measured Relative Performance of the Dual-Band Antenna at 146 MHz

	VHF ¼ Wave Mobile Reference	*VHF Flex Antenna ("Rubber Duck")*	*Standard VHF J-Pole*	*DBJ-1 J-Pole*
Received Signal Strength	–24.7 dBm	–30.5 dBm	–24.3 dBm	–23.5 dBm
Difference from Reference	0 dB	–5.8 dB	+0.4 dB	+1.2 dB

Table 2
Measured Relative Performance of the Dual-Band Antenna at 445 MHz

	VHF ¼ Wave Mobile Reference	*VHF Flex Antenna ("Rubber Duck")*	*Standard VHF J-Pole*	*DBJ-1 J-Pole*
Received Signal Strength	–38.8 dBm	–45.3 dBm	–45 dBm	–38.8 dBm
Difference from Reference	0 dB	–6.5 dB	–6.2 dB	0 dB

Figure 4—The Advantest R3361 spectrum analyzer used in the test.

Figure 5—The completed antenna mounted to the roof.

cable is used for the stub, it is likely that the top of the antenna will require some glue or foam to hold the antenna in place because of the additional cable weight. —*Ed.*] The 300 Ω twin lead is sufficiently rigid so as not to bend once it is inside the pipe. Install an SO-239 connector in the bottom end cap. Once the antenna is trimmed to the desired operating frequency, glue both end caps and seal around the SO-239 connector. Presto! For a few dollars, you'll have a dynamite antenna that should last for years.

The antenna should be supported only by the lower 12 inches of the housing to avoid interaction between the matching stub and any nearby metal, such as an antenna or tower. The results from the antenna are excellent considering its simplicity.

Measured Results

Brian Woodson, KE6SVX, helped me make measurements in a large parking lot, approximating a fairly good antenna range, using the Advantest R3361C spectrum analyzer shown in Figure 4.

The transmitter was a Yaesu FT-5200 located about 50 yards from the analyzer. The reference antenna consisted of mobile ¼ wave Motorola ground plane antennas mounted on an NMO connector on the top of my vehicle. The flex antenna ("rubber duck") was mounted at the end of 3 feet of coax held at the same elevation as the groundplane without radials. The J-Pole measurements were made with no groundplane and the base held at the same height as the mobile ground plane. Table 1 gives performance measurements at 146 MHz, while Table 2 gives those same measurements at 445 MHz.

As can be seen in the UHF results, the DBJ-1 outperforms the standard 2 meter J-Pole by about 6 dB (when used at UHF), a significant difference. The standard 2 meter J-Pole performance is equivalent to a flex antenna at UHF. Also note that there is no significant difference in performance at 2 meters between the DBJ-1 and a standard J-Pole. The flex antenna is about 6 dB below the ¼ wave mobile antenna at both VHF and UHF. This agrees well with the previous literature.

The completed antenna can be seen mounted to the author's roof in Figure 5.

If you do not have the equipment to construct or tune this antenna at both VHF and UHF, the completed antenna is available from the author, tuned to your desired frequency. The cost is $20. E-mail him for details.

Ed Fong was first licensed in 1968 as WN6IQN. His Extra Class came with WB6IQN. He obtained the BSEE and MSEE degrees from the University of California at Berkeley and his PhD from the University of San Francisco. A Senior Member of the IEEE, he has seven patents and two-dozen published papers in the area of communications and integrated circuit design. Presently, he is employed by the University of California at Berkeley teaching graduate classes in RF design and is a Senior Member of the Technical Staff at Foveon Corporation in Santa Clara, California. You can contact the author at 1163 Quince Ave, Sunnyvale, CA 94087; **edison_fong@hotmail.com**.

By John Hansen, W2FS

Add Remote Control to Your ICOM Transceiver

Here's a fun project that finally marries the ubiquitous remote to the most important appliance in the home.

One of the wonderful things about modern ham transceivers is that they are also wideband receivers. I use my IC-756 extensively for shortwave reception, and even listen to AM on the broadcast band from time to time. Many radios, such as the popular IC-706, also support reception of the FM broadcast band and TV audio. In addition, I often casually browse the ham bands—simply to tune around the band to see what's on or to eavesdrop on interesting amateur conversations. I often engage in these activities while I'm doing something else…reading e-mail, building a home-brew project, or reviewing a recent issue of *QST*. When I'm casually listening to my radio, I don't want to be "glued" to it. It dawned on me that what my receiver really needed was a remote control. The TV receiver has a remote control, as does the CD player. Why not the amateur HF transceiver, as well?

Design Criteria

The remote control I envisioned would allow me to tune up and down the band, to change the receiver's volume and to directly access any memory, at any time. In addition, the remote should also work as a direct frequency entry keypad, allowing me to jump to any frequency in the receiver. Finally, it would be nice if the remote also contained a band plan so that it would know what mode to put the radio in for any given frequency. It should know, for example, that when I enter 14250, I want USB, but when I enter 7225, I mean LSB. It should also set the proper mode for shortwave broadcasts, FM frequencies, etc. The simple project presented here meets all of these criteria.

An infrared (IR) remote control system consists of two parts: the hand-held remote and a device that receives and interprets the IR signal, and then uses this information to interface with the radio. Since it is now possible to buy a "Universal" remote control for as little as $10 at stores like RadioShack or Wal-Mart, it made no sense for me to redesign this part of the system. This project is therefore a remote control interface, which contains an IR sensor and the circuitry necessary to control the radio. Universal remote control units can be programmed to command virtually any brand of TV or VCR. All I had to do was to make my transceiver "impersonate" one of these units. I decided to make it appear to the remote control as a Sony TV receiver.

Circuit Description and Construction

There are four major components to the project: an IR sensor, a programmed PIC microcontroller, a digital potentiometer and an audio amplifier (see Figure 1). The IR sensor connects directly to the PIC, which interprets the codes sent from the hand-held remote. It connects to the computer port on the transceiver to execute the user's commands. The interface is designed to work with any late model ICOM radio (more recent than the IC-735). The computer port allows the frequency and operating mode to be set and allows any programmed memory in the radio to be directly accessed. However, it is not possible to adjust the transceiver's volume via the computer port. The ability to adjust the volume was fairly important to me, since my goal was to avoid going near the radio when I was doing casual listening. Audio adjustments are implemented by using a patch cable to connect the external speaker output of the radio to the audio input on the remote control interface. An external speaker is then plugged into the audio output on the interface. A digital potentiometer allows the PIC microcontroller to adjust the volume and an audio amplifier IC boosts the audio to speaker drive level.

This was my first experience using a digital potentiometer, and I found there was quite a bit to learn in order to use these devices effectively. The Dallas Semicon-

[1]Notes appear on page 43.

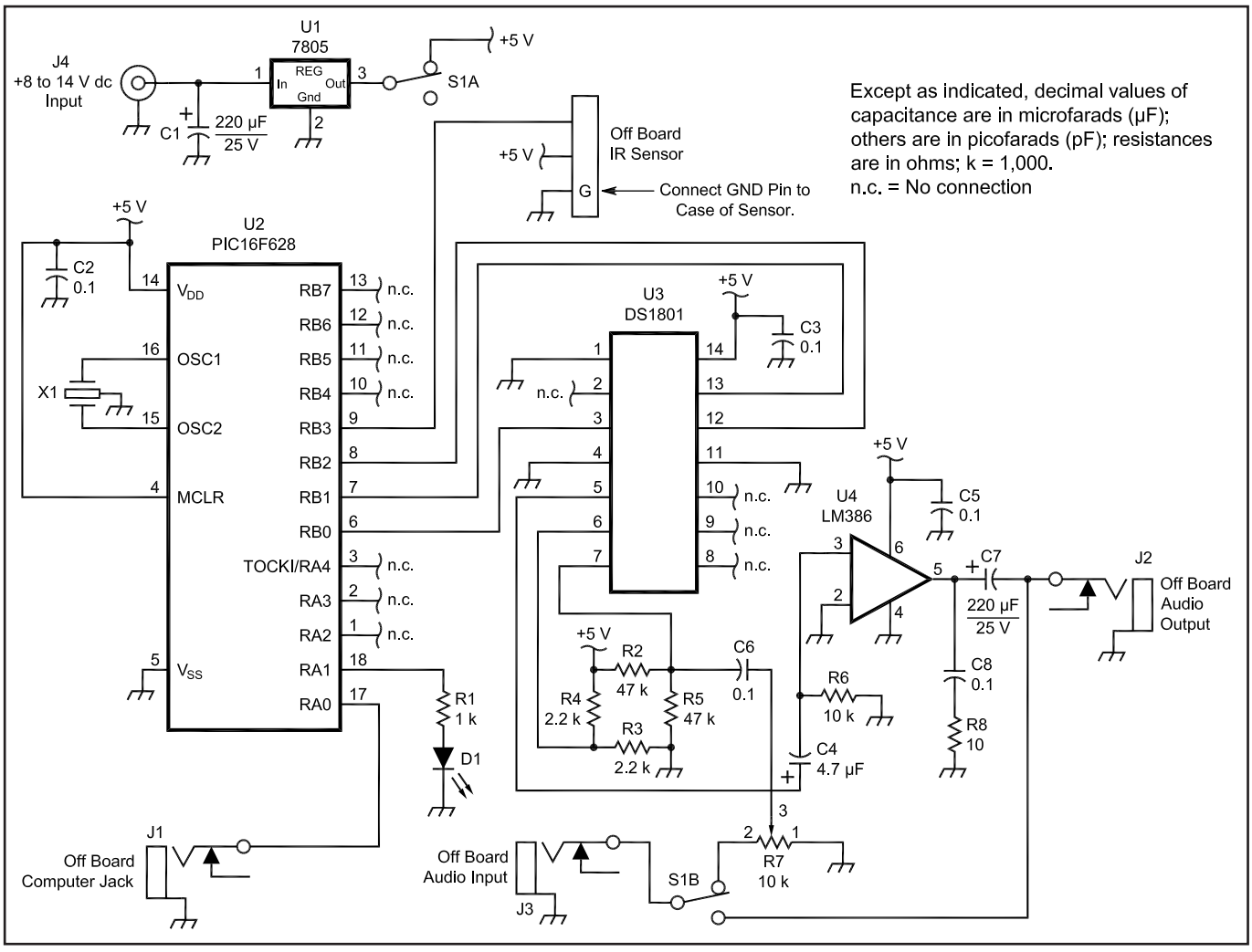


Figure 1—The IR remote control receiver schematic. All resistors are ¼ W, 5% tolerance. Parenthetical part numbers are RadioShack, www.radioshack.com/; all other parts as indicated. Digi-Key Corp, 701 Brooks Ave South, Thief River Falls, MN 56701; tel 800 344-4539; www.digikey.com/. Be sure to solder the ground pin to the IR sensor case, if not already done.

C1, C7—220 µF capacitor, electrolytic, 25 V dc (272-1029).
C2, C3, C5, C6, C8—0.1 µF capacitor (272-1069).
C4—4.7 µF capacitor (272-1024).
D1—LED (276-026).
IR—IR detector module (276-0137).
J1-J3—Mono phone jack (274-251).
J4—Coaxial power jack, Digi-Key SC1153-ND.
R1—1 kΩ.
R2, R5—47 kΩ.
R3, R4—2.2 kΩ.
R6—10 kΩ.
R7—10 kΩ, trimmer potentiometer (271-282).
R8—10 Ω.
S1—DPDT toggle switch (275-626).
U1—7805T, 5 V regulator (276-1770).
U2—PIC16F628, programmed microcontroller, Digi-Key PIC16F628-20/P-ND.
U3—DS1801, digital potentiometer, Dallas Semiconductor; www.maxim-ic.com/.
U4—LM386, audio amplifier (276-1731).
X1—10 MHz ceramic resonator, Digi-Key X906-ND.

ductor DS1801 used in this project actually contains two potentiometers—only one of which is used here. At first glance, three of the pins on the IC (high, low and wiper) seem to correspond to the three pins on a standard potentiometer but the IC can't be used as a simple drop-in replacement for an analog audio control. Audio signals contain both positive and negative voltages. The DS1801, on the other hand, is designed to control signals with only positive voltages. If you simply drop the device in to replace a standard poten-tiometer, you will obtain a very distorted signal at the output since the negative voltage components will have been eliminated.

The solution is to add dc bias to the audio signal so the waveform is preserved but the voltage at every point is raised and never falls below zero volts. Resistors R2 through R5 constitute a Wheatstone bridge, performing this function.

A further problem occurs because the digital potentiometer is designed to work with relatively low voltage (line level) signals. The trimmer potentiometer, R7, allows you to adjust the input level to the device without changing the setting of the volume control on the transceiver. To bring the volume back up to a level that will drive a speaker, some amplification is required. I used an LM386 audio amplifier IC for this purpose. This was adequate to provide room-filling volume in my shack. If you need more audio, you could use a powered speaker of the type typically used with PC audio systems. If you decide you do not wish to control the volume of the radio remotely, you can delete U3, U4, J2, J3 and all associated circuitry, making this into a very simple project indeed.

The unit requires a power supply voltage from 8 V to14 V dc. U2 is a PIC16F628 microcontroller, which must be programmed before it can be used.[1] Kits as well as wired and tested units are available from the author.[2]

Setup and Operation

Two cables are required to connect the

remote control receiver to the radio. J1 should be connected to the radio's CI-V port. A patch cable with mono 1/8″ plugs on both ends will work for this purpose, but use a high quality shielded cable. Another mono patch cable will be needed to connect the transceiver's external speaker jack to J3. An external speaker is connected to J2 and power is applied to J4. The completed remote control receiver is shown in Figure 2. Switch S1 turns the power on and bypasses audio to the IR receiver when it is off.

I used a very inexpensive hand-held remote control from RadioShack (Part Number 15-1989), purchased for under $10. Any universal remote control should work as long as you can configure it for a Sony brand TV receiver. Look for one that has POWER, ENTER, and LAST or PREVIOUS keys. To configure the unit, begin with the transceiver off and the remote control interface on. Follow the instructions in your remote control manual to configure the remote to communicate with a Sony TV receiver. After configuring the remote control, try pressing the ENTER key while pointing it at the remote control interface. The LED on the interface should flash. Now turn on the transceiver and set its computer port baud rate to 9600. Also make a note of the radio's "CI-V address." This can be found in the transceiver's manual or, on newer radios, it can be found by looking at the relevant menu item on the radio. For example, the IC-706MKIIG is address 58h. Ignore the "h"; it merely indicates that the number is being expressed in hexadecimal rather than decimal. Press the POWER button twice, then enter the two-digit CI-V address. For the '706MKIIG, for example, you would press POWER POWER 5 8.

If the CI-V address has a letter in it (a hexadecimal number may contain the digits 0-9 and the letters A-F) the procedure is slightly different. Instead of the letter key, press the MUTE button then press the number of the key that corresponds to the letter of the alphabet you wish to use. For example, the default address of the IC-706MKII was 4Eh. To enter this address press POWER POWER 4 MUTE 5 (E is the fifth letter of the alphabet).

After you have set the CI-V address, try the channel up and down buttons. They should cause the radio's frequency to tune up and down. In sideband and CW modes, the radio will change in 100 Hz steps. In AM and FM modes, it will change in 1 kHz and 5 kHz steps, respectively.

Adjusting the audio is a little trickier. Leave the radio on and turn the remote control receiver off. Adjust the volume on the radio to a normal level. Now turn the remote control receiver on. Hold down the volume up button until the volume no longer increases. Now adjust R7 so that the volume you hear is about the same regardless of whether the unit is on or off. This method will cause you to be listening most of the time at or near the maximum volume level of the digital pot. I have found this produces the best results. Lower digital pot volume levels tend to introduce a "click" sound when the radio is tuned and make the mute function less effective.

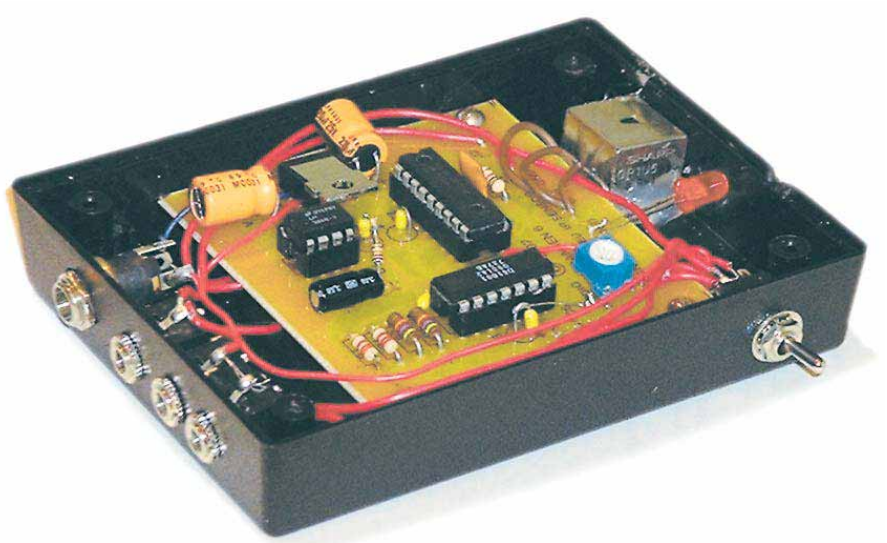


Figure 2—The prototype IR remote control receiver.

Using the Remote

The remote control receiver is now ready for operation. The channel up/down, volume up/down and mute functions are self-explanatory. Direct frequency entry and memory selection may require some additional description. To enter a frequency, simply enter the digits using the POWER key as a decimal, if needed. Finish by pushing the ENTER key. When the ENTER key is pressed, you should see the LED on the remote control interface blink and the radio should respond to your command. You may enter the frequency either in kHz or MHz; the interface is smart enough to figure out which you mean. Here are some examples:

3 7 2 5 ENTER	3725 kHz
3 POWER 7 2 5 ENTER	3.725 MHz
1 4 2 5 0 POWER 5 ENTER	14250.5 kHz
1 4 6 POWER 6 4 ENTER	146.64 MHz
0 POWER 7 3 0 ENTER	730 kHz
1 4 ENTER	14 MHz

Note that you cannot enter a decimal as the first character. If you wish to enter a frequency starting with a decimal point, enter a zero first, then the decimal (POWER).

To go to any memory in the radio, simply press the PREVIOUS or LAST key, then the two-digit number of the memory that you wish to use. For example, to go to memory number 1, press LAST 0 1.

You can use the channel up/down keys or direct frequency entry keys while in memory mode to tune the memory frequency. Pressing the ENTER key without first entering a frequency will cause the radio to switch from memory to VFO mode. Pressing the LAST key three times in a row will cause the radio to shift from VFO mode to memory mode, coming up on the last used memory.

Conclusion

After I installed the remote control on my IC-756, I found that I use the radio somewhat differently than I had previously. I almost never used direct frequency entry on the transceiver because the built-in interface is clumsy, but I make use of it constantly on the remote control. It's easy to operate the radio now while doing other things and I find that I spend more time listening to my transceiver than ever before.

Notes

[1]The .HEX object file is available at **www.arrl.org/files/qst-binaries/hansen0203.zip**.

[2]A PC board for this project is available from FAR circuits 18N640 Field Ct, Dundee, IL 60118-9269; tel 847-836-9148. Price: $4.50. A complete kit is available for $45 from John Hansen, 49 Maple Ave, Fredonia, NY 14063. A pre-drilled enclosure can also be purchased for $10. Wired and tested units are also available: see **john.hansen.net**.

John Hansen, W2FS, has been an Amateur Radio operator since 1966. Dr Hansen is a Professor of Mathematics and Computer Science at the State University of New York, Fredonia. You can contact him at 49 Maple Ave, Fredonia, NY 14063; **hansen@fredonia.edu**.

By Steve Ford, WB8IMY

VoIP and Amateur Radio

An increasing number of amateurs are putting the Internet to work as a bridge for long-distance voice communication. Discover what the Voice Over Internet Protocol buzz is all about!

Voice Over Internet Protocol, better known as VoIP, is not new. People have been enjoying voice communication over the Internet for years. What *is* new are the latest Amateur Radio applications of VoIP. Rather than relying on ionospheric propagation for long-distance communication, a growing number of hams are using the Internet in combination with VHF or UHF FM transceivers to span hundreds or thousands of miles.

There are several flavors of amateur VoIP in use today. Depending on how they are configured, these systems may involve *repeater linking* where two distant repeater systems share signals with one another (Figure 1). Another application is so-called *simplex linking* where one or more users with handheld or mobile transceivers communicate directly with a "base" station (or *node*) that is linked to the Internet (Figure 2). The one element that all amateur VoIP systems have in common is that the Internet acts as the relay between stations.

The appeal of amateur VoIP is easy to understand. Technician licensees without access to HF can use these VoIP systems to enjoy a kind of "Internet-aided" DXing, having conversations with other hams far beyond the range of their FM transceivers. General and Amateur Extra hams without HF stations at home can also benefit from VoIP in the same manner.

Let's take a brief look at a few of the current incarnations of Amateur Radio VoIP.

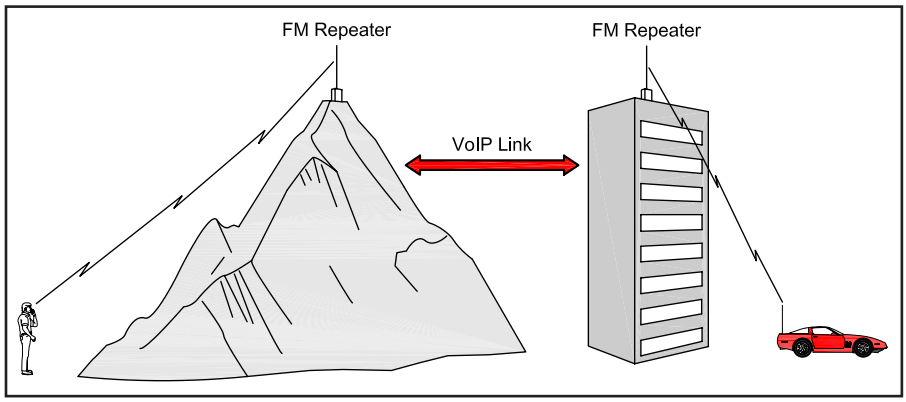


Figure 1—Two FM repeaters linked via VoIP.

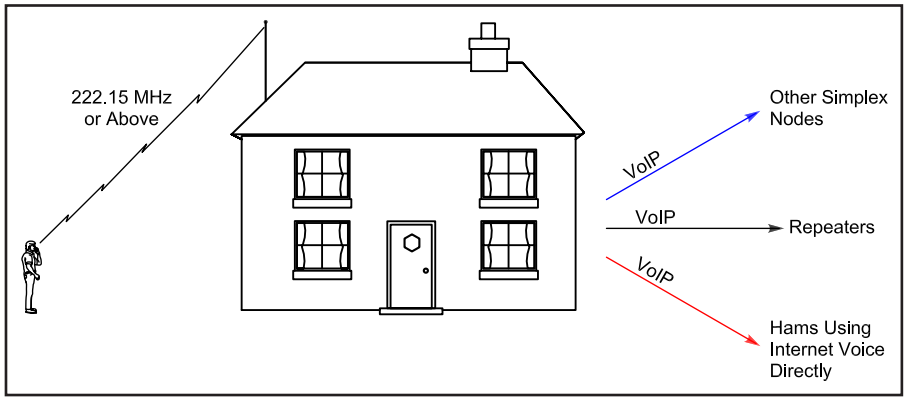


Figure 2—A diagram of a VoIP simplex node. If a control operator is not physically present at the station location and the node is functioning with wireless remote control, the control link must operate above 222.15 MHz. See the sidebar, "Is It Legal?".

EchoLink

EchoLink was developed by Jonathan Taylor, K1RFD, in early 2002. In an astonishingly short period of time, EchoLink has become one of the dominant Amateur Radio VoIP systems with more than 30,000 users worldwide. The free EchoLink software for *Windows* can be downloaded at **www.echolink.org**.

When you start the EchoLink software, your computer taps the Internet to connect to an EchoLink server. Before you can make your first connection to the network, your call sign must be verified with the information in the FCC database. This can take minutes or hours, depending on the state of the system, but it helps reduce the chances of nonhams entering the EchoLink network.

Once you're validated (you only do this once), the rest is easy. The EchoLink server acts like a telephone switchboard in cyberspace. It maintains a directory of everyone who is connected at any moment. After browsing the directory, you can request a connection between your computer and that of another amateur.

Here's where it becomes interesting. The ham on the EchoLink receiving end may be sitting in front of his computer with a headset and microphone. Or he may have his computer connected to a base radio at his station that is acting as an RF relay to a handheld transceiver or mobile rig. Or the destination station may be part of a repeater system. In any case, once the connection is established, any-

Is It Legal?

By Brennan Price, N4QX and ARRL General Counsel Chris Imlay, W3KD

What Part 97 regulations govern VoIP-assisted Amateur Radio?

All of them or none of them, depending on whether you're asking about the "VoIP-assisted" or the "Amateur Radio" part of VoIP-assisted Amateur Radio.

Many callers to the ARRL's Regulatory Information Branch over the last few years have focused on the novelty of the Internet when asking questions about the legal uses of certain systems. Such focus is misdirected. Part 97 does not regulate systems; it regulates stations. The Commission doesn't care what a ham has feeding his or her station; it cares that the *station*—not the Internet, but the *station*—is properly operated. And all the rules that apply to any Amateur Radio station apply to one that retransmits audio fed to it by VoIP.

Fine, so the Commission doesn't care about the VoIP part. Are there any particular rules a ham considering such an operation should be aware of?

The obvious answer is *all of them*, but we'll focus on a few that are easy to overlook, particularly for stand-alone, single channel operations. The main points to remember:

- All stations must be controlled.
- Only certain types of stations may be automatically controlled.
- Simplex voice operations do not qualify for automatic control.
- Any station that is remotely controlled via radio must utilize an auxiliary station to execute said control, and auxiliary stations are restricted in frequency.

It's not as hard as it sounds. All you have to do is think about the type of station you're operating and how it's controlled. Let's look at a few examples.

Two automatically controlled repeaters are linked via VoIP. Is this legal?

Forget the VoIP linking, because that's the Internet. We're talking about two repeaters. Are repeaters legal? Yes. May repeaters be automatically controlled? Yes. There is no difference between this setup and two repeaters linked by another wired mechanism or by auxiliary stations. Assuming the two linked stations are repeaters, it is difficult to conceive of a situation where a VoIP link would not pass regulatory muster. The only caveat is that the VoIP software must prevent nonhams from accessing the repeaters from the Internet. The key here is to avoid any configuration that would (1) permit a nonham to key an amateur transmitter without the presence of a control operator, and (2) prevent the initiation by a nonham of a message via an Amateur Station without the presence of a control operator.

Is it permitted to enable *automatically controlled* simplex nodes?

No. Only certain types of Amateur Radio stations may be operated unattended, under *automatic control*. This means that there is no human control either at the station location or at a distance. These types of stations are space stations, repeaters, beacons, auxiliary stations and certain types of stations transmitting RTTY or data emissions.

Simplex VoIP nodes are neither repeaters, beacons nor auxiliary stations. Presumably, most are within 50 kilometers of the Earth's surface and are therefore not space stations. The VoIP technology implies a voice transmission, not RTTY or data. Therefore, none of the stations that qualify for automatic control describe a simplex VoIP node, and such a station must be locally or remotely controlled (as *any* Amateur Radio station is allowed to be).

Locally or remotely controlled—what does that mean?

A simplex VoIP node may be locally controlled by an operator who is present at the node. Such a node may also be *remotely controlled* at some other point, with the operator issuing commands via a wireline or radio control link. If a radio control link is used, it must utilize an auxiliary station, and such stations are restricted in frequency to 222.15 MHz and above (with the exception of the CW, SSB and amateur satellite portions of the 70-cm band). It's this *remotely controlled* aspect that allows VoIP simplex nodes to operate legally—as long as they are on the right bands.

Let's consider seven scenarios:

- A control operator is stationed and active at the VoIP node on any frequency. This is a locally controlled station, not at all unlike a typical operation on FM simplex. ***This is legal.***
- A control operator communicates with and controls a simplex VoIP node with a handheld, transmitting and listening to the node on 223.52 MHz. This is wireless remote control. Such control must be executed by an auxiliary station and 223.52 MHz is an allowed frequency for such a station. ***This is legal.***
- A control operator communicates with and controls a simplex VoIP node with a handheld, transmitting and listening to the node on 147.41 MHz. This is wireless remote control. Such control must be executed by an auxiliary station, but 147.41 MHz is *not* an allowed frequency for such a station. ***This operation is* not *legal.*** It may be made legal by locally controlling the node, choosing a control frequency on which auxiliary station operation is permitted, or controlling the node via a wireline link. The next three examples show each option in action.
- A control operator operates a simplex VoIP node at 147.41 MHz and is stationed at the node's transmitter. User stations access the node on the same frequency. ***This is legal.*** The VoIP node is being locally controlled, and any station may be locally controlled.
- A control operator operates a simplex VoIP node at 147.41 MHz. The control operator continually monitors the node's transmissions and can call a dedicated telephone line or use a dedicated Internet connection to turn the node on and off. User stations access the node on the same frequency. ***This is legal.*** The VoIP node is being remotely controlled via a wireline connection, and any station may be controlled in this manner.
- A control operator communicates with and controls a simplex VoIP node with a multiband handheld, transmitting to and continuously monitoring the node on 147.41 MHz. He or she sends power on/off commands with the same handheld on 223.52 MHz. This is wireless remote control. Such control must be executed by an auxiliary station, and 223.52 MHz is an allowed frequency for such a station. ***This is legal.*** The VoIP node is being remotely controlled via an auxiliary station of appropriate frequency, and any station may be controlled in this manner.
- Same configuration as either of the above two situations, except the control operator does not continuously monitor the VoIP node's transmissions. ***This operation is* not *legal.*** When a simplex VoIP node is enabled, it must be continually attended, either locally or remotely. A simplex VoIP node is no different than other FM simplex operations, and such operations may not be automatically controlled.

thing you say will wind up being heard in the other amateur's headset, or transmitted over the air.

At your end of the EchoLink connection, you may be the one wearing the headset, or using a simplex connection to your base radio, or using a repeater. When you connect to an individual station, the custom is to call in the same fashion as you would during a traditional on-air conversation: "W1ABC from WB8IMY." Or if you are connecting to a distant repeater system: "WB8IMY, Wallingford, Connecticut." (You need to hesitate about 2 seconds before speaking to compensate for the delay.)

The EchoLink servers also support *conferencing* where several amateurs can converse in roundtable fashion. There are even EchoLink nets that meet within these conference areas on a scheduled basis.

EchoLink Setup

To run EchoLink you'll need a PC with *Windows 98/2000/XP* and a sound card. The software is easy to set up. A "wizard" function guides you through each step.

If you want to enjoy EchoLink conversations while sitting at your computer, you will need a microphone headset. These are commonly available from several *QST* advertisers as well as RadioShack. The microphone plug attaches to the microphone input jack of your sound card and the headphone plug typically attaches to the SPEAKER OUT jack. In addition to setting up the EchoLink software, you may also need to adjust your sound card VOLUME and RECORDING control settings in *Windows*.

If you plan to connect a radio to your computer so that you can use EchoLink over an RF link, you'll need an interface. The strong enthusiasm for EchoLink is driven by the fact that it does *not* require a specialized hardware interface for connections to transceivers. All timing functions and DTMF decoding take place within the EchoLink software. This means that you can enjoy EchoLink with the radio of your choice by using common sound card interfaces such as those sold by West Mountain Radio (the RIGblaster folks), MFJ, TigerTronics and others. If you are already operating PSK31, RTTY, SSTV or similar modes with a sound card interface, you can become an EchoLink operator by simply downloading and installing the software—no additional hardware or cable connections required.

There are also hardware interfaces specifically designed with VoIP in mind. Check out the ULI (Ultimate Linking Interface) from James Milner, WB2REM, at **www.ilinkboards.com**. The ULI works with VoIP as well as the various Amateur Radio digital modes. It also offers built-in computer control of your radio. You can change frequencies, for example, by issuing commands on a remote UHF link, or via the Internet. It even allows remote rebooting of the station PC.

Also take a look at the multimode interface board designed by VA3TO. You'll find it on the Web at **www.ilinkca.com**.

iLink

The iLink system is the brainchild of Graeme Barnes, MØCSH. iLink is one of the VoIP pioneers and is functionally quite similar to EchoLink, although it requires a specialized radio interface such as the ULI or VA3TO boards mentioned above. The iLink software is available for free downloading on the Web at **www.aacnet.net/radio.html**.

EchoLink and iLink users are on separate server systems. With the rise of EchoLink, however, iLink has seen dramatically reduced activity in recent months.

eQSO

eQSO, created by Paul Davies, MØZPD, was designed to operate like a worldwide ham radio net. It is based around dedicated servers, and can be used from a personal computer or through a radio link (known on eQSO as an "RF gateway").

The eQSO software for *Windows* is available for free downloading on the Web at **www.eqso.net**, with on-line support available at **www.eqso.org**. A link-

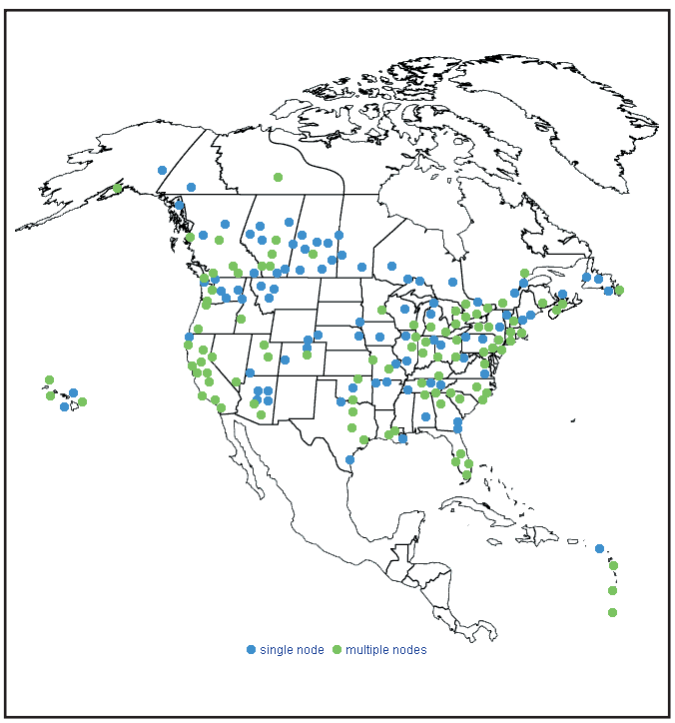
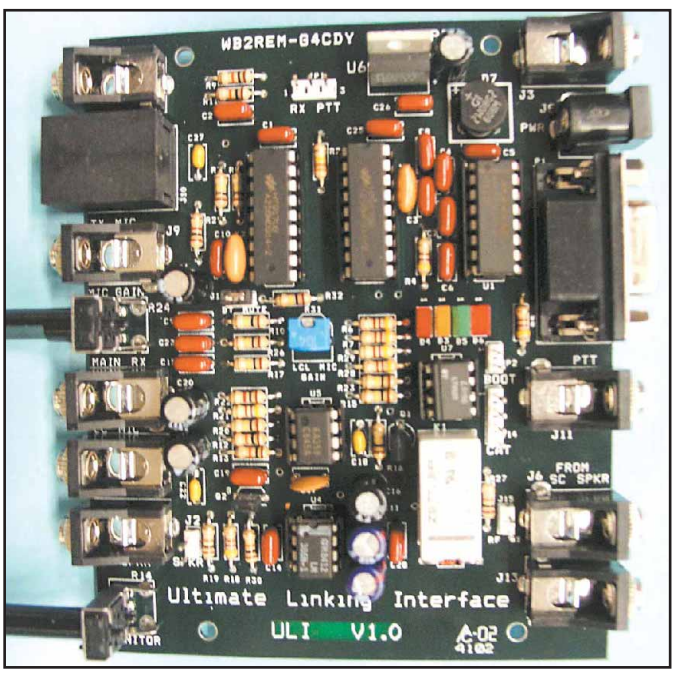


Figure 3—This is an example of one of the node maps maintained by WW4M at status.irlp.net.



The advanced ULI interface can be used with iLink, EchoLink and eQSO, as well as other Amateur Radio digital modes such as RTTY and PSK31. The ULI offers versatile remote control capability. See www.ilinkboards.com.

ing version of the software offers courtesy tones and a CW ID, and uses the computer's COM port for keying the transmitter and reading the receiver's squelch status. If a squelch line is not available, eQSO has an internal VOX function that can be selected. eQSO works with all the usual PC-to-radio interface boards mentioned previously.

Because there is no call sign validation, eQSO has security features that can be activated by "administrators." Administrators can mute or even block people who don't operate according to license privileges.

Shortwave listeners (SWLs) are also encouraged to use eQSO, and they are trusted not to talk in "rooms" containing radio links. Those who do are muted or banned. However, SWLs can talk with hams in "off-air" rooms and many consider this as further encouragement to gain a license. Operators of RF gateways should avoid connecting their stations to these "off-air" rooms.

IRLP

With IRLP—the Internet Radio Linking Project—we enter the realm of VoIP networks that can only be accessed by radios.

David Cameron, VE7LTD, is the creator of IRLP. Dave and Michael Illingby, VE7TFD, set up the first two IRLP nodes to link Vancouver and Vernon, British Columbia.

The IRLP network consists of nodes on either FM repeaters or simplex. All node systems run IRLP *Linux*-based software and use specialized IRLP interfacing hardware. Individual users need only access the node and use the appropriate DTMF codes to set up an IRLP contact. Unlike iLink, EchoLink and eQSO, you cannot use IRLP directly from a PC without a radio, which makes it more secure against nonham access.

Using an IRLP node is a lot like using a repeater autopatch. The first thing you must do is obtain the access code from the node operator or group. As with some autopatches, you may be required to join a club before you receive the access codes. Some IRLP nodes also use CTCSS subaudible tones in addition to DTMF codes to control access.

An interactive map and list of IRLP nodes is available on the Web at **status.irlp.net** (see the example in Figure 3). To connect to an IRLP node, you usually begin by identifying yourself and sending the DTMF access code. If you are successful, the node will respond. After that, it is a matter of stating your intentions and sending the 4-digit code for the distant node you wish to access: "WB8IMY accessing Node 5555." Once the connection is set up, you'll hear a voice ID from the target node. When you hear the confirming ID, you're free to make your call and start a conversation.

IRLP also supports roundtable conferencing on *reflectors*. These reflectors allow only one person to talk at a time, but quite a few stations can connect simultaneously. Every other Sunday the IRLP International Net convenes and invites check-ins from around the world. To participate in the net there must be a local net controller for your node. If a local controller is not available, you can only monitor. Young hams will find the IRLP4KIDs Net on IRLP Reflector 5, Channel 8 (node 9508) every Saturday at 0100 UTC. For more information about this net, see **www.qsl.net/irlp4kids** or e-mail **irlp4kids@qsl.net**.

To set up a node you need a computer running *Linux*, the IRLP software and an IRLP hardware interface. The nodes are tightly coordinated within the IRLP network and they use PGP cryptography to authenticate each other. All of this technology is transparent to most IRLP users, though. If an IRLP node exists in your area, all you need is an FM transceiver to join the fun. You can find more information about IRLP on the Web at **www.irlp.net/**.

WIRES-II

WIRES-II—Wide-coverage Internet Repeater Enhancement System—is a VoIP network created by Yaesu that is similar in function to IRLP, except that the WIRES-II node software runs under *Windows*. Like IRLP, WIRES-II is entirely radio based; you cannot access a WIRES-II node directly from the Internet. A WIRES-II host server maintains a continuously updated list of all active nodes.

The hardware portion of WIRES-II is the HRI-100 interface (Figure 4). The HRI-100 connects to a PC, which in turn is connected to the Internet via high-speed or dial-up access. The HRI-100 also acts as the interface between the node radio and the computer. Even though the HRI-100 is manufactured by Yaesu, it is designed to work with any transceiver.

There are two WIRES-II operating modes. The SRG (Sister Repeater Group) mode allows users to connect to any other WIRES-II node (up to 10 repeaters or base stations) within a group specified by the node operator. As with IRLP, DTMF tones are used to control access. Depending on how the node operator has configured his system, you may need to send a single DTMF tone before each transmission, or just at the beginning and end of your contact.

The FRG (Friends' Repeater Group) operating mode allows you to connect to any other WIRES-II node in the world. The FRG mode also allows group calling of up to 10 nodes, a kind of conferencing function. To make a regular FRG call, you press #, then five more DTMF digits depending on the ID number of the WIRES-II node you are attempting to access.

Figure 4—The hardware controller at the heart of the Yaesu WIRES-II system.

But Is It Ham Radio?

The answer to that question depends on how you define "ham radio," and there is no shortage of opinions. Some radio purists reject amateur VoIP completely. They feel that hams shouldn't incorporate the Internet into any aspect of Amateur Radio communication. It must be all RF or nothing. Others take a more expansive view and only draw the line at VoIP communication that lacks radios at both ends of the Internet path.

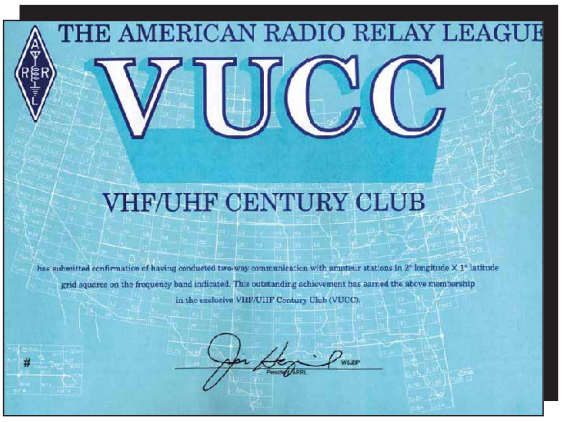
One thing that can probably be said with certainty is that amateur VoIP is here to stay. Amateurs young and old are embracing the technology, and the growth of affordable broadband Internet access is acting as a catalyst. To invoke the shopworn cliché, amateur VoIP isn't everyone's cup of tea. It is just one of the dozens of interests that comprise Amateur Radio. If amateur VoIP offends your radio sensibilities, avoid it. If not, a new operating experience awaits.

Thanks to Chris Kirby, G4FZN, Jonathan Taylor, K1RFD, James Milner, WB2REM, Paul Cassel, VE3SY, Dave Cameron, VE7LTD, Chip Margelli, K7JA, Brennan Price, N4QX and Chris Imlay, W3KD, for their assistance during the preparation of this article. Steve Ford, WB8IMY, is the Editor of QST *and can be contacted at* **sford@arrl.org**.

By Dr Anthony R. Curtis, K3RXK

VUCC—20 Years and Counting

Twenty years ago, the brand new VHF/UHF Century Club boosted Amateur Radio passion to new heights above the HF bands and challenged us with something new called grid squares.



As tired old Father Time turned his job over to the fresh kid in a diaper on New Year's Day 1983, a fresh day also dawned in ham radio with a brand-spanking-new ARRL achievement award. The VHF/UHF Century Club (VUCC)—cousin to the venerable DXCC—fired the enthusiasm of hams around the globe who rushed into their shacks, cranked their Yagi rotators and crushed their mike buttons in search of operators in as many grid squares as possible above 50 MHz.

Hams were racing breathlessly toward the brave new world. Our operator population had grown by more than a third in the past decade, and there were nearly 80,000 Technician licensees. Repeaters were everywhere and the packet racket was heard on the 2-meter band. Experiments in spread spectrum were hopping. The FCC authorized ASCII and a ham was packing his gear to fly aboard the space shuttle in 1983. While up there, he would contact hundreds on 2 meters. VHF and UHF bands were blossoming with all kinds of signals.

The Maidenhead Locator System

January 1983 *QST* carried big news for the VHF/UHF community in the landmark article "VHF/UHF Century Club Awards" by John Lindholm, W1XX. Lindholm was ARRL Communications Manager at the time and he became a tireless promoter of grid squares and VHF/UHF operating activities. The League's sponsorship of the VUCC awards program grew out of a VHF/UHF Ad Hoc Committee, and the article also credits the Central States VHF Society for paving the way with a grid-based awards program in 1981. See the sidebar "How it all Happened" for more background.

We knew about working states, counties and countries. But what, exactly, were these new grid squares? From January 1983 *QST*, we learned they are elements of the Maidenhead Locator System, named after a town outside London where in 1980 European VHF managers had overlaid the entire globe with a pattern of grids measuring 1-degree latitude by 2-degrees longitude. There are 32,400 grid squares around the globe. Each grid in the continental US measures about 70 miles by 100 miles (of course they are

How it all Happened

Initiating the ARRL's VUCC awards program was predicated on the acceptance of worldwide grid locators. The seed for North American participation began quietly during my WARC preparation trip to Sweden and Finland. It was there that I learned firsthand the popularity of QTH locators in Europe and of IARU Region 1 acceptance of the Maidenhead plan.

The pages of *QST* had made some attempts to familiarize North Americans with grid locators, but US hams were turned off because the system seemed too complicated. In 1981 and 1982, I was fortunate to be involved with an ad-hoc committee created to review the League's VHF/UHF contest program and suggest improvements. In conjunction with the VHF/UHF Ad Hoc Committee meeting in Dayton, not only were the VHF contest formats standardized, but also grid locators were endorsed as the exchange and VUCC was born.

The key was to explain the system such that every VHFer would know his grid square. Drawing upon my experience in education, simple easy-to-read charts in January 1983 *QST* did the trick. I was privileged to make many presentations at the time on grid locators at conventions throughout the country. Bill Gates and the proliferation of PCs (and locator programs) did the rest.

Two quick anecdotes: The ARRL Grid Locator map, which shows major cities like New York City, Atlanta, and St Louis, also shows Urbana, Illinois in EN50. How come? The cartographer was Curt Roseman, K9AKS, and showing his hometown was a condition of doing the map. The map was crucial to early acceptance by VHFers. Thanks, Curt.

Gaining universal IARU acceptance of the Maidenhead System was a priority. Acceptance became official at the June 1983 IARU Region 2 Conference held in Cali, Colombia, at which I was honored to be elected VHF chairman. Asked to do a presentation at the conference on South American grid squares, I began in my limited Spanish with "los colegas estimados." This effort at the predominant language drew a standing ovation as I then continued the presentation in English to an appreciative audience. I shall never forget it.—*John Lindholm, W1XX*

rectangular, but everyone calls them "squares"). At high latitudes, the 2° × 1° grids actually do look square.

Each grid locator is labeled with two letters—the *field*—and two numbers—the *square*. A popular example in ARRL literature is FN31, which includes the Maxim Memorial Station, W1AW.

Of course, it wasn't enough to have big squares. The system was refined down to sub-squares designated by two letters after the grid square, as FN44ig. A sub-square measures 2.5 minutes latitude by 5 minutes longitude, roughly corresponding to 3 miles by 4 miles in the US. Such precise locators are more often used on the microwave bands. (The Maidenhead system actually extends beyond six characters for more precision, but the additional characters are not often used.)

My six-digit grid square position is FM04gs. According to the ARRL Grid Square Calculator on the ARRLWeb at **www.arrl.org/locate/grid.html**, the center of my subsquare is 15.6 miles from the northern edge of my grid and 30.5 miles from the western edge.

Collecting Grid Locators

The original VUCC rules called for awards on 50 through 1296 MHz (including 902 MHz, which had been won at the World Administrative Radio Conference in 1979 but would not be available to US hams until 1985). This "century club" requires 100 grid squares on 50 and 144 MHz, 50 grids on 222 and 432 MHz, and 25 grids on 902 and 1296. Awards for 2.3, 3.4, 5.7 and 10 GHz were added in 1985, and over time all amateur bands through 300 GHz were included in the program. There is a separate award for satellite contacts. See the sidebar, "VUCC Requirements" for an outline of the program as it stands today.

In his 1983 article, John, W1XX, noted that grid squares redefined "rare" locations. One example: The southern half of San Clemente Island in California's Santa Barbara Channel, the only land mass in DM02.

Lindholm explained that in Europe, where VHF/UHF hams were already collecting grid squares and their predecessor, "QTH locators," expeditions to activate rare squares were common, especially during contests. He encouraged North American hams to go on "gridpeditions" and partake in the fun and games. During the past 20 years, "rover" stations operating portable from remote mountaintops, mobile from unpopulated grids and even maritime mobile from all-water grids has added greatly to the excitement of the chase.

The world above 50 MHz exploded with

VUCC Requirements

Here is an overview of the current VHF/UHF Century Club (VUCC) award requirements. The complete rules and forms are available from the ARRL Web site at **www.arrl.org/awards/vucc** or with a 9×12-inch self-addressed, stamped envelope (3 units of postage) to the Awards Branch at ARRL HQ.

The VUCC award is available to amateurs worldwide. ARRL membership is required for hams in the US, its possessions and Puerto Rico. Only contacts dated January 1, 1983, and later count for these awards. You can make contacts using any mode, but crossband and repeater contacts don't count except for the Satellite award.

Unlike DXCC, where the basic award is available for working 100 countries on a combination of bands, VUCC awards are earned by working grids on a band-by-band basis. The minimum number of grids needed to qualify varies by band:

Band	***Minimum Grids***
50 MHz, 144 MHz and Satellite	100
222 MHz and 432 MHz	50
902 MHz and 1296 MHz	25
2.3 GHz	10
3.4 GHz, 5.7 GHz, 10 GHz, 24 GHz, 47 GHz, 75 GHz, 119 GHz, 142 GHz, 241 GHz and Laser (300 GHz and above)	5

Awards for 222 MHz and 432 MHz are designated as *Half Century*. Awards for 902 MHz and 1296 MHz are designated as *Quarter Century*. Awards for 2.3 GHz and higher are designated *SHF*. Once you have the basic award, you can qualify for endorsements in the following increments:

Band	*Grids*
50 MHz, 144 MHz and Satellite	25
222 and 432 MHz	10
902 and above	5

For VUCC awards on 50 through 1296 MHz and Satellite, you have to make all contacts from one or more locations within the same grid locator, or from locations in different grid locators that are no more than 50 miles apart. For SHF awards, contacts must be made from a single location, defined as within a 300-meter diameter circle.

QSL cards and application forms for the VUCC program are all checked in the field by approved VHF Awards Managers. You can find the closest VHF Awards Manager by following the links on the VUCC Web page or by contacting the Awards Branch at ARRL HQ. Outside the US, VUCC applicants should have their QSLs checked by the Awards Manager for the IARU society in their country.

Table 1
VUCC Awards Issued by Band

Band	*Awards Issued*	*First VUCC*
50 MHz	1271	K8WKZ (SK), June 13, 1983
144 MHz	611	K9MRI, June 23, 1983
222 MHz	110	W1JR, February 13, 1984
432 MHz	300	W1JR, April 15, 1983
902 MHz	34	K1RO (ex AA2Z), October 20, 1986
1.2 GHz	137	WW8M (ex WB8BKC), September 29, 1983
2.3 GHz	67	W5LUA (ex WB5LUA), December 10, 1984
3.4 GHz	62	W2SZ, April 3, 1985
5.7 GHz	44	W2SZ, April 3, 1985
10 GHz	130	W2SZ, April 3, 1985
24 GHz	16	W2SZ, June 15, 1986
47 GHz	2	W2SZ, May 19, 1998
75 GHz	1	W2SZ/4, June 1, 1999
119 GHz	0	Could be you!
142 GHz	0	Could be you!
241 GHz	0	Could be you!
300 GHz (laser)	7	K7AQJ (ex KY7B), August 9, 1989
Satellite	123	OH5LK, August 27, 1992

Table 2
Top 5 Endorsement Levels by Band

50 MHz	
K1TOL	1100
SM7FJE	1000
K5UR	975
W5OZI	975
WD5K	975
W4DR	950
W5FF	925
144 MHz	
K9MRI	525
W4ZD	500
AF9Y	475
I1ANP	475
K5UR	450
K5YY	400
222 MHz	
K5UR	190
WW8M	130
N9LR	120
NN9K	110
WB9OJR	110
KE8FD	100
W5RCI	100
432 MHz	
K1FO	340
WØRAP	240
KØRZ	220
W5RCI	210
K5UR	200
902 MHz	
K1TEO	45
N2WK	45
WW8M	45
AA5C	35
K2DH	35
WB9OJR	35
WØFCL	30
K8TQK	30
N2BJ	30
N8DJB	30
1.2 GHz	
W5LUA	145
K3AX	100
WØRAP	95
WW8M	85
K5UR	80
2.3 GHz	
W5LUA	55
W2DRZ	50
G6DER	40
K1TEO	30
N2WK	30
AA5C	25
G4FRE	25
K2DH	25
WB9OJR	25
3.4 GHz	
KMØT	25
AA5C	15
K1TEO	15
N2WK/FN03	15
W5LUA	15
WB9OJR	15
G6DER	10
K2DH	10
N6CA	10
W1VT	10
WA2LTM	10
WA5VJB	10
WB5AFY	10
5.7 GHz	
K5PJR	35
WA5ICW	30
W5UGO	25
AA5C	20
G6DER	10
N2WK/FN03	10
W5ZN	10
W5LUA	10
10 GHz	
AA5C	40
W6HCC	40
WA6EXV/DM14le	35
W6HCC/DM14le	30
WA6EXV	20
G3JMB/P	15
G8LSD	15
K1TEO	15
K6KLY	15
W7LVO	15
W1VT	15
W6HCC/DM14kf	15
WA1ECF	15
24 GHz, 47 GHz, 75 GHz, and 300 GHz (laser)	
None higher than the 5 minimum grids.	
Satellite	
N7SFI	800
K5OE	700
KK5DO	700
W1NU	700
K6YK	600
OH5LK	550
XE2AT	475

Note: VUCC standings are updated regularly on the ARRL Web site at **www.arrl.org/qst/worldabove/grid-chase.html**.

activity as stations around the country competed to work—and confirm—enough grids to earn an award on their favorite band. The first VUCC awards for 50 MHz (to K8WKZ), 144 MHz (to K9MRI), 432 MHz (to W1JR) and 1296 MHz (to WW8M) were issued in 1983. Today, aided by growing activity levels, more commercially available equipment and worldwide propagation, the top 6-meter operators have worked more than 1000 grids. The most recent "first" VUCC, for 75 GHz, was issued in 1999 to W2SZ/4. Still available: 119, 142 and 241 GHz. See Tables 1 and 2 for a summary of VUCC activity on the various bands.

It's All About Challenge

When you ask VHF/UHF operators what attracts them to the bands, a common thread is that success at these frequencies requires some effort and skill. Love of a personal challenge attracted these operators to the VUCC program like ducks to water.

"I was drawn to VHF/UHF because of the challenge," says Dan Clevenger, WØVD, of Missouri. "It takes a bit more effort to put together a good VHF/UHF station. I wanted to see how far I could push the envelope of distances worked. VUCC gave another challenge for the operators to strive for," he says. WØVD is also an active HF DXer who has worked 316 DXCC entities.

Pete Fountain, WD4IXD, of Florida agrees. "I was drawn to VHF/UHF work because of the technical challenges it posed," he recalls. Included in those challenges are watching weather patterns to help predict propagation, optimizing the station for minimum system losses, and improving receiver performance. "VUCC has given me the opportunity to challenge myself and my station's capabilities in working as many grid squares as possible and the quest to work new ones," he explains.

"Most any operator can get an HF rig and enjoy the shortwave bands with frequent DX contacts," says Stan Laine, WA1ECF, of Massachusetts. "However, for the real techies who enjoy the intricacies of building complex radio communication systems, the VHF/UHF/microwave bands provide an entirely different playground."

Ohio dairy farmer John Fridenstine, W8PAT, recalls that he started TV DXing during high school 15 years before becoming a radio amateur. "I was fascinated by the different forms of [VHF/UHF] propagation that could bring distant TV stations to my screen," he recalls. "The VUCC program started as I was finishing WAC and WAS on 6 and 2 meters and it provided another challenge. Trying something new is always the most fun for me."

VUCC is challenging, but it *is* something that all hams can aspire to. "Certainly, VUCC is attainable to any ham who can put some metal on his roof or get to a hilltop during the summer," said Paul Carter, N1TMF, editor, in his Boston Amateur Radio Club *SPARC* newsletter in 1998.

And then there is the element of luck... Robert Pepper, N1NUM, of New Hampshire writes, "6 meters is known as the Magic Band, and that it is. As I type this, my radio is set to 50.125 MHz [the 6-meter SSB calling frequency—*Ed.*] in the background. I worked a station in Chile not long ago. There he was, then he was gone. Just happened to have it on, heard him, got his call first time, two calls and he's in my log. Just luck. I'm not a big gun, just a ham having lots of fun."

Roving: Amateur Radio Road Rally

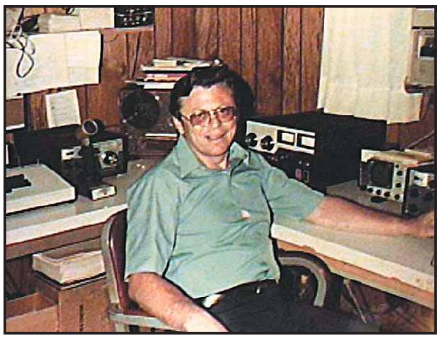
So what do you do when you've worked all the grids within range that have permanent stations? Hams have long taken stations to local hilltops to extend their VHF/UHF range, but the thirst for higher VUCC grid counts took this activity to a new level. Hams developed sophisticated "rover" stations to activate rare grids, particularly during contests. Some of these rovers cover bands well into the SHF region with amplifiers and directional antennas, and are capable of working stations hundreds of miles away. There's even a separate category for rovers in ARRL VHF/UHF contests. In last June's ARRL VHF QSO Party, there were 84 rover entries (about 13% of the total). ND3F, the top scoring rover station, visited 11 different grids during the weekend, made nearly 800 contacts, and operated on 12 bands above 50 MHz.

Roving is "akin to a road rally with Amateur Radio equipment aboard," explains Wayne Overbeck, N6NB, of California, on his Web page at **commfaculty.fullerton.edu/woverbeck/rover.htm**. "It has enormous appeal to people who might not otherwise operate a VHF radio contest."

N6NB describes how some amateurs spend months planning an itinerary that will take them on a 1200-mile trek through 20 or more grid squares during a contest. "Roving stations have dramatically increased the activity level in sparsely populated areas, while providing otherwise unavailable multipliers to fixed contestants," he says.

Dianna Killeen, KB6NAN, of California, credits rover stations with providing almost 100 grids for her 6-meter VUCC. "I found, in grid chasing, the Rovers will go out of their way to activate rare grids," she says. "There are many Rovers, or mobile 6-meter ops, especially during contests. Some of my most memorable rovers are Randy Simons, NØLRJ [of Colorado], Carol Maher, W4CLM [of North Carolina], and Clint Walker, W1LP [of Massachusetts, who often operates maritime mobile from water grids in the Atlantic, Pacific and Caribbean]."

In fact, Stan, WA1ECF, thinks VUCC should "develop a Rover Award within the VUCC program to reward the significant



The late David Bostedor Sr, K8WKZ, operated from grid square EN72. On June 13, 1983, he became the first to accomplish VUCC on 6 meters.

Chuck, K5IX/r (red truck), and Scott, KI5DR/r, meet on the beach in South Texas as their rover paths cross during a contest.

effort of the many rovers who add a lot of interest to the VHF/UHF/microwave contests."

Although roving is very popular, it also can be controversial, according to Wayne, N6NB. "Many rovers attempt to visit as many grid squares as possible," he says. "That causes rovers to keep moving, never venturing far off the major highways and never stopping to operate with directional antennas. If they are to visit as many grid squares as possible, rovers have no choice but to leave rare grid squares quickly and go on to grid squares that are not rare. Some fixed operators say this makes it more difficult to contact rovers in the rare and distant grid squares that they visit, defeating the whole point of roving."

Some Remarkable Experiences

Most VHF/UHF operators have a favorite story about an unusual opening or a contact with a rare grid. Once you've worked the close-in grids, it's the unexpected propagation conditions that make things exciting. The bands generally are not open for days on end — patience and perseverance are the key to higher grid totals.

There's nothing like VHF/UHF for learning about remarkable propagation. "One morning, I was working from Florida into the northeast US on 432 MHz," recalls Pete, WD4IXD. "Although not uncommon for tropospheric ducting, it was very unusual that I was the only one in the state that could work them that day. Evidently, the duct was so narrow on my end that even a well-equipped station less than a mile from my location heard nothing at all. I made a number of contacts that morning while no one else ever heard a peep. Others could hear me working the 1s and 2s, but no one else in Florida worked out of the area that day," he explains.

Sometimes, the remarkable experience is the people you get to meet. "I was introduced to 6 meters by Joel, N6AMG (SK)," recalls Dianna, KB6NAN. "He was a great mentor [and] introduced me to some of the best 6-meter ops in the world—W6JKV, K6MYC, W5FF, VK3OT, W5OZI, K6QXY. I had expert advice."

Another time, KB6NAN says, "I saw that J87AB was spotted in *DX Telnet*. I turned my beam to him, listened and kept listening to a dead band. All of a sudden, I heard J87AB. I grabbed my mike and yelled, in excitement, my call several times. He came back to me. I almost died. Then, in one minute the band died." KB6NAN's motto is "you have got to have the rig on or you will miss 'em."

Fun for Everyone

There are many VHF/UHF communicators today, and the VUCC ranks include hams with a mix of license classes, interests, station capability and experience.

Pete, WD4IXD, says, "I believe that VUCC may have helped bring operators into the VHF/UHF weak-signal aspect of the hobby. The added activity on the higher bands helps to justify our use of these frequencies and protects them from commercial uses. I also believe it has helped in the development of better equipment for the higher bands."

VUCC "promotes VHF activity," says Larry Lambert, NØLL, of Kansas, who has certificate number 24 on 6 meters, number 5 on 2 meters, number 62 on 222 MHz, number 99 on 432 MHz, number 80 on 1296 MHz and number 27 on Satellite. "I still get lots of QSL cards from hams looking for this grid for VUCC," he adds.

"Every ham who takes on the challenge of operating and improving their VHF/UHF stations is notable to me," says Dan, WØVD. "The most notable are the ones that have operated the bands for many years. They didn't come for a short time and then leave, but stayed active, keeping the bands alive year after year. The VUCC award program provides a unique way to gauge how well your station is performing or how 'lucky' you were to catch that rare grid locator."

"I'm just a small guy, having fun with VHF/UHF, and collecting those fun-to-get grids," says Robert, N1NUM. "And I'll be looking to work you on the bands, put you in my log, and swap cards, if you need, or I need, the grid, or even if you just want a card."

"The VUCC program has created, in essence, an ongoing contest," says John, W8PAT. "The grid square often becomes the reason for the QSO. Pleasant conversation with our fellow amateurs is sometimes lost in the pursuit of grid squares."

What's his solution? "I collect grid squares as an added bonus to my normal amateur activity," W8PAT says. "I do not make it the purpose of my operating."

"Does VUCC do anything for me? Sure," exclaims Dianna, KB6NAN. "I get to know people in my own country, make good friends in the states when DX is not in, and around the world when it is. Find yourself a new or used 6-meter rig and join the fun."

ARRL Life Member Anthony R. Curtis, K3RXK, wrote about OSCAR 6 in the October 2002 issue of QST. Licensed since 1954, he originally was W8TIZ. Living in Laurinburg, North Carolina, he is an Extra class op with a PhD in mass communication, Curtis has written 72 books about space, astronomy, computers and electronics and is editor of Space Today Online at **www.spacetoday.org**. *Curtis has served as SEC, emergency net manager and club president. An ARRL Educational Advisor, Roanoke Division Assistant Director, NASA Solar System Ambassador, and Apple Distinguished Educator, Curtis is chair of the Mass Communication Department at the University of North Carolina Pembroke. Readers can contact Tony Curtis via e-mail at* **k3rxk@arrl.net**. QST

By Jennifer Hagy, N1TDY

Announcing the 12th Annual McGan Award

Throughout the year, ARRL Public Information Coordinators, Public Information Officers and other public relations volunteers "in the field" strive to keep Amateur Radio visible in their communities. They accomplish this by publicizing special events, writing press releases and maintaining good relations with local media, among many other valuable activities. The job is an important one, it's not always easy and their efforts benefit us all. If you know someone who has achieved public relations success on behalf of Amateur Radio, nominating him or her for the Philip J. McGan Memorial Silver Antenna Award is the perfect way to bestow much deserved recognition.

The award's namesake, journalist Philip J. McGan, WA2MBQ (SK), served as the first chairman of the ARRL's Public Relations Committee, which helped reinvigorate the League's commitment to public relations. Unfortunately, Phil never got to see how well his efforts paid off. In honor of Phil, his friends in the New Hampshire Amateur Radio Association joined with the ARRL Board of Directors to pay a lasting tribute to the important contributions he made on behalf of Amateur Radio.

The 2003 McGan Award will go to that ham who has demonstrated success in Amateur Radio public relations and best exemplifies the volunteer spirit of Phil McGan. A committee of volunteers knowledgeable about Amateur Radio public relations will pick the winner, subject to approval by the ARRL Board of Directors.

Call for 2003 Nominations

1) The award is given only to an individual (not a group), who must be a full ARRL member in good standing at the time of nomination. The nominee must not be compensated for any public relations work involving Amateur Radio (including payment for articles) and may not be a current officer, director, vice director or paid staff member, or a member of the current selection committee.

Phyllisan West, KA4FZI (right), presents the McGan Award to last year's winner, Sherri Brower, W4STB, at the ARRL Southeastern Division Convention. Brower succeeded West as Southern Florida Section Manager October 1.

2) The winner of the Philip J. McGan Memorial Silver Antenna Award will demonstrate volunteer public relations success on behalf of Amateur Radio at the local, state or national level, and will live up to the high standard of achievement exemplified by Philip J. McGan.

3) Anyone may make a nomination. Nominations must be on an official entry form, available from ARRL Headquarters. The nomination will include a written summary whenever possible.

4) Deadline: Nominations must be received at ARRL HQ in Newington by 5 PM May 23, 2003. Nominations arriving after the deadline or without an entry form cannot be considered.

5) Eligible nominations will be screened by a committee of Amateur Radio operators knowledgeable about public relations. The committee will forward its recommendation to the Volunteer Resources Committee of the ARRL Board of Directors. The Board will make a final determination at its July meeting, and the winner will be notified shortly thereafter.

6) To obtain an entry form, call ARRL HQ at 860-594-0328 or e-mail **jhagy@arrl.org**. Ask for an official McGan Award entry form.

7) Return the completed entry form and supporting materials to Philip J. McGan Memorial Silver Antenna Award, c/o Jennifer Hagy, N1TDY, ARRL, 225 Main St, Newington, CT 06111. QST

Public Relations vs Public Service

In the past, there has been some confusion about the difference between "public relations" and "public service." Public Relations activities for which the McGan Award is given include efforts specifically directed at bringing Amateur Radio to the public's attention (and most often the media's) in a positive light. This may include such traditional methods as news releases or such nontraditional methods as hosting a radio show or being an active public speaker.

Some candidates have erroneously been nominated for their public service activities, such as emergency communications, net leadership and other activities that, while helping maintain a positive impression of Amateur Radio among the public, don't fit the definition of "public relations." So, if you're considering nominating someone in your area for the 2003 award, please ask yourself if your candidate's work fits the *public relations* criteria.

STRAYS

I would like to get in touch with...

◊ anyone with service experience with the Drake L7 amplifier. I am looking for an antenna-changeover relay, RLY-1, or a substitute. I. Martinides, HB9ACQ, Flurlingerweg 38, CH 8212 Neuhausen, Switzerland; e-mail **i.martinides@swissworld.ch**.

◊ any former Navy/Coast Guard crew members of the Icebreaker *Burton Island*, AG88/AGB1/WAGB283. Contact Jack Clark at **w9hjm@arrl.net**.

By Alan Kaul, W6RCL

Pray for Snow!

A dedicated QRPer meets the challenge of a dual-purpose weekend getaway.

If you thought contesting was already a challenge, how about entering the 2002 ARRL DX (CW) Contest under "handicap" conditions. No, I don't mean contesting with one hand tied behind your back—I'm thinking a *real* handicap, like contesting while away from home, during your family's annual Presidents' Day ski vacation.

Not challenging enough for you?

Then ratchet up the degree of difficulty by maxing out at 5 W.

Still not tough enough?

Okay, okay. Use compromise antennas—an 8-foot, loaded 40 meter mag-mount stick by Iron Horse, and a 4-foot, base loaded 10 meter K40 whip, lip mounted to the corner of the hood.

You're probably thinking no one could be that dumb. Yet that was me last February. I'm the perpetual optimist trying to take part in a family ski trip while sending CW with my left hand (that's normal; I'm a southpaw). Someone once told me that contests aren't about winning—they're about having fun!

Oops...I forgot to tell you, I only brought 60 feet of coax, which barely made it from the sliding door of the ski condo out across the 3-foot snowdrift to the lot where the four-wheel drive was parked.

"Handicap?" Just consider the effort to change bands. A push button puts the Yaesu FT-817 transceiver on a new frequency, but changing antennas requires (1) putting on my snow boots, (2) going outside in freezing temperatures, (3) trudging through knee-deep snow to the car, (4) loosening the sometimes-frozen coax at the barrel-connector in order to plug in the other antenna, before (5) returning to the warmth of the condo. Don't forget step (6): sufficiently thaw fingers to operate CW! *I think the 10-minute rule was written for guys like me!*

Off and . . . Crawling!

It would be an understatement to say I got off to a slow start. Not that I wasn't trying. But the contest was 52 minutes old before the first QSO on 10 meters with JA7AFR made the log. Followed in relatively quick order (2 minutes between them) by LW3ETE, my second mult, and two more JAs. *Wow, is this terrific or what?*

Just when I was getting the hang of it, my wife announced, "Time for dinner." The 33 of us (we went skiing with five other families) finally got a table (actually several tables) and by the time the waiter (actually several waiters) brought all the food, I was sure I had missed countless multipliers and Qs. *Am I the only one who cares about a 40 meter opening?*

After dinner, my wife *hints* that we'll take time to socialize (well, perhaps *insists* is more accurate). Call me Mr Social!

Finally, back to the radio at 0700Z (11 PM local time). Forty is a mishmash of signals, most of them ignoring me. I try repeatedly. Finally, I tap F1 on my laptop one last time. *TR-Log* sends W6RCL at 27 WPM and I pause to listen. Then, a moment of magic—I copy a call. My gawd, it's mine! I hit <ENTER> and KH7R is in the log!

After that, I play F1 like it's the action key on a *Game Boy*. But there are no takers, until …

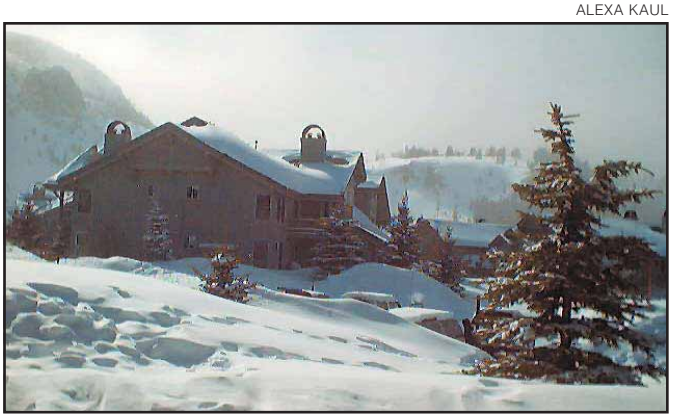
"Come to bed," my wife shouts, "we're getting up early to go skiing."

She's always right, of course. I go. And nod off quickly, but not for long.

It's the Humidity

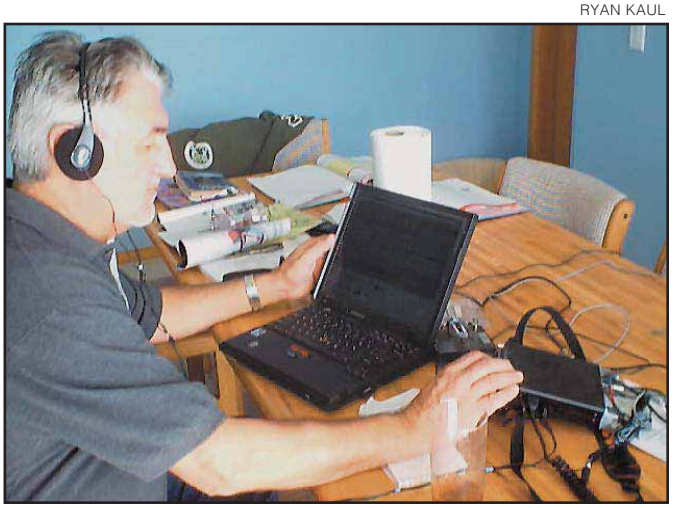
Three hours later I'm awake. The problem is the humidity—there isn't any! Plus the thinner air at 8000 feet, making my lungs work too hard. *Hmmm, maybe*

ALEXA KAUL



The view toward Japan. Note the tracks in the snow leading to the parking lot. Each time the author wanted to change bands, he had to brave the snowdrifts to walk to the car, where he would have to unplug one antenna from the coax and plug in the other. The Christmas-like tree at the right of picture held one end of the 10 meter dipole.

RYAN KAUL



As if running QRP wasn't hardship-enough, author W6RCL also used "compromise" antennas in order to work his 60 contacts.

if I just listen to the radio for a little while, I might get tired enough to fall back to sleep!

Just after 2 AM local time, I work RAØFU plus 4 JAs in quick order. Wow—two new 40 meter mults and I'm happy. Well, *happy enough* to get to sleep.

At 7 AM, Bandit, our 4-month-old puppy wakes me up *(I did say "family" ski vacation and, after all, she is part of the family).* After I put the dog out, I bag two more JAs and a JK1 on 40 before donning my South Pole gear again and wandering over to the car so I can dig out the coax joint under 5 inches of drifted snow. I make the antenna change, enabling me to QSY to 10 meters, then slip and fall on loose snow, getting both cold and wet.

At first, the signals don't seem worth it—they aren't that strong. But, finally, at 8:11 AM (1611Z) the frustration ends when I'm heard in Europe and work S53O for contact number 14. *Amazing!* Followed by 8P6JA, EA8BH, ZF2NT and VP5U. *Wow!*

Even if it took me almost an hour to work five stations, I'm having a great time. I ignore the *TR-Log* rate meter, which is hovering between "don't bother and don't care."

My wife brings the bliss to an end when she reminds me it is time to unplug the coax and to load the skis onto my antenna platform, which inconveniently doubles as the family car.

Mammoth Mountain on California's Eastern Sierra is one of those premier areas that few people know about. The skiing is terrific, but I just can't get back to the radio fast enough. By now, on the contest clock, the competition is more than half over. I've got only 18 stations in the log, and my score is a paltry 540 points. I can't wait for the shuttle bus to go for the car. Still in my ski boots, I half-jog-half-hobble the half mile to the parking lot. *Get the car, load the skis, pick up the family and race back to the condo!*

I park the antennas and plug in the coax and by 4:30 PM local time I'm back in front of the rig. During the next 90 minutes I'm knocking them off one by one. VK2AYD for another mult, followed by a dozen Japanese. I've almost doubled my score! *Is this fun or what?*

Then, from out of nowhere, my wife reminds me it's time for our dinner reservations. Adults only this time. Aha, I'm thinking, there's a chance for an early evening tonight and plenty of time later for radio.

My Prayers are Answered

Boy, was I mistaken. We come home late and I hook up the 40 meter antenna but can only work KL7Y, my last 40 meter contact of the contest. I go to bed, and remind everyone to pray for snow!

I awake Sunday to find *it is snowing*—heavily. A foot or more is predicted. I look at my wife, I glance at the kids. I announce my position.

"I think it is snowing too hard to go skiing. Don't you agree?"

"Yes," said my wife. "Yes," admitted the teenaged daughter. "Yes," echoed the 10-year-old son.

Yes!

I had to act fast. It is not yet 8 o'clock local time on the last morning of the contest. Barely 8 hours left and Europe is pounding in. I ponder a risky gamble. I can either continue to use the 10 meter base-loaded whip and be on the air immediately, or I can take a little extra time and try to make a better antenna. Hmmm. I don't need the wisdom of Solomon; I'd just be real happy with some kind of a sign from LB Cebik, W4RNL, the antenna guru.

I play a hunch, and move rapidly toward plan B, turning some wire into a 10 meter dipole and looping it over branches at the 10-foot level of the two Christmas-like trees in the front yard. *Oops—I slip and fall again. Wet, cold, miserable. This had better be worth it!*

There's an opening to Europe and my fingers are too frozen to work the paddles. But I persist. By 8:30 AM local time (1630Z), I nail LA7MFA for another new one, then P4ØW, OE2S, V26G, HB9CZF, OA4O, V47KP, J37ZA, G4TSH/P and KH7R, again, for Hawaii on a second band. *The dipole was the right choice!*

I again work Argentina, the Azores and Japan before picking off my last new multiplier, OH6RX, at 2120 UTC. After that it was all downhill. I race toward the finish with my best hourly rates—eight Qs per hour for two consecutive hours! *Does it get any better than this?*

At 2301Z, JA2FSM is the last entry into the logbook. I shut down an hour early and take the kids sledding.

Sixty QSOs. *What great ears those 60 stations had! I can't thank them enough.* But at least they won't have to wait long for the QSL. When I get home I home-brew a card using Microsoft Word, noting that the QTH was California's rare Mono County. I head for Kinko's, print the cards on bright yellow stock, then attach QSO labels before mailing them to the ARRL's Outgoing QSL Service.

I work 60 Qs and 23 mults for 4140 total points. Single op, all-band, QRP, San Joaquin Valley section. Not much to brag about, but then again I was able to go "family skiing" during the ARRL's busy DX CW Contest weekend. My log is also the QRPer's dream—many of the QSOs are 1000-miles-per-watt or more.

Best of all, no one ever catches on that when I say "Pray for snow," I'm not talking about skiing!

Alan Kaul, W6RCL, was first licensed as KN7EHW at age 15 in Spokane, Washington. He moved to California in 1973, where he became W6RCL. When his employer, NBC News, transferred him to Amman, Jordan, in 1985, he worked about 85 countries QRP on 20 CW as JY9RL. He has also operated QRP CW from KH6, KL7, G4 and FØ. Alan is a member of the ARRL, 10-X, Norcal QRP Club and QRP-ARCI. He enjoys contesting, especially the ARRL Sweepstakes, where he continues to chase the elusive QRP "clean sweep." Alan has won ARRL section awards in a half dozen contests. You can contact the author at 3774 Chevy Chase Dr, LaCanada, CA 91011, tel 818-790-6707; **w6rcl@amsat.org**.

NEW PRODUCTS

THE AR8600 MARK II MOBILE/ BASE RECEIVER FROM AOR

◊ AOR's new AR8600 Mark II multimode communications receiver features expanded frequency coverage, an improved front end, better receive audio response and the ability to accept a new video reception module (under development). Similar in appearance to the AR8600, the Mark II now covers 100 kHz to 3 GHz (cell frequencies are blocked on US models).

Features include a TCXO high-stability oscillator; wide, narrow and super-narrow FM, wide and narrow AM, USB, LSB and CW reception modes; 1000 memory channels; computer control (with free software); scan and search functions; a 10.7-MHz IF output and more. When completed, a video reception module will add the ability to receive broadcast television signals (NTSC) and allow monitoring of video feeds from law enforcement and news media sources.

The AR8600 Mark II, which runs on 12 V dc to allow mobile and base operation, can accommodate up to five optional modules that enhance certain functions, with up to three in use at any one time. Additional modules include a Collins mechanical filter, CTCSS, Digital Recording, Tone Eliminator and additional memory.

Price: Suggested retail price $999. For more information, contact AOR at 20655 S Western Ave, Ste 112, Torrance, CA 90501; tel 310-787-8615; fax 310-787-8619; **info@aorusa.com**; **www.aorusa.com**.

By Dan Bates, KD7LHF

A New Ham's Dipole Adventure

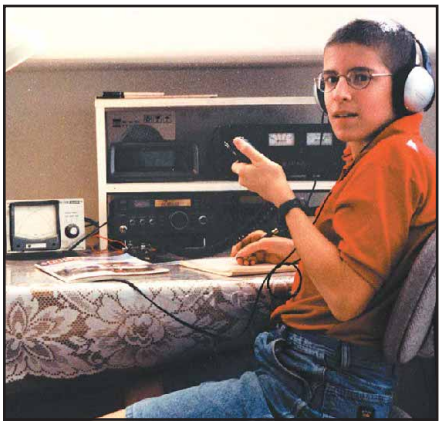
A dipole's a dipole, right? Well, it's not always that simple.

I suppose most hams have a "dream station" that they think about occasionally. I know I do! My setup would have three or four top-of-the-line radios, a couple of 200-foot towers, stacked monobanders...All this fades when I see the numbers in my bank account, understandably. At 12 years old, my income is not big enough for those expenses. But, maybe when I have a *real* job...

In the present, however, my station isn't shabby at all. The radios (an ICOM IC-728 for HF and an IC-2100H for 2 meters) work very well and 100 W has netted me a good bit of DX. The place where I'd like to improve is in my antenna system. To chat on the local repeaters and simplex frequencies, I use a quarter-wave ground plane or a $^5/_8$-wave J-pole. We needed to find a way to keep it out of sight and clear of surrounding objects. My dad, KD7MRM, devised a great way to do that—we found a 2½ by 3-inch piece of PVC pipe and spray-painted it—along with the quarter-wave antenna and the coax—a dusty brown color to match the roof and vent pipes. This done, we secured the antenna to one of the vent pipes. It almost disappeared from view, and at 20 feet higher, it sure improved my reception!

Making it Better

For HF, I have a multiband vertical and a 20-meter dipole; the vertical has radials and about 8 square feet of heavy steel mesh as a ground. It performs adequately, but it seems that I can't leave well enough alone. I had some wire lying around; an SO-239 coax connector somehow appeared and a 20-meter dipole was made. I had to be careful how I installed it. The neighborhood committee didn't concern me, as they had approved the aforementioned 25-foot vertical, but our neighbors did. Our backyard has no trees high enough to hold an antenna, so I figured I could put the dipole under the eaves of the house. I failed to consider that our house has stucco wire in the walls. This would cause trouble later on.



My shack consists of a speaker, AM/FM clock radio, Astron RS-35M Power Supply, ICOM IC-2100H 2-meter transceiver, IC-728 HF rig, SWR meter, headphones, CW key and logbook.

Our backyard antenna farm (the dipole is barely visible in center).

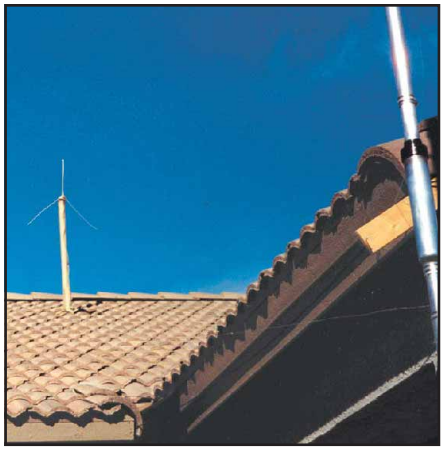
Having recruited my dad to do the ladder work, I gathered the materials and we started off. The installation was done in one afternoon. I sat down to check the SWR through the tuner, fully expecting they would be in the vicinity of 1.5:1. But it was not to be. The meter showed 3.5:1! Now, I thought, surely the meter has to be wrong—didn't we measure the length three times?

Only the meter wasn't wrong. When my Elmer, Charlie Cox, K7AQ, lent me his meter, it showed the same thing, and I knew his meter was accurate. Now the radio could not be the culprit, so it was either the coax or the antenna. The coax checked out fine, so it must be the antenna.

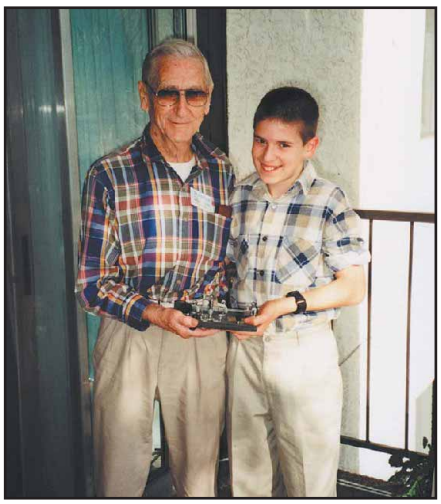
Oops!

All this time I had been adjusting the antenna's length ±3 inches (in ¼ inch increments) on each end. That was a ridiculous amount of adjustment as the SWR had only changed fractionally. Now there was a real puzzle! When my Elmer came over, we checked the coax again. The multimeter showed no resistance at the radio end (bad) and infinite resistance at the antenna end (good). Now this was worse! After half an hour of thinking about this, I discovered that the coax in question was really two pieces! I had taken the jumper going from the SWR meter to the radio instead of the antenna-radio cable. After this, I decided to double-check which cable I had before making measurements.

The coax was fine after all, so the an-



The roof-mounted quarter-wave ground plane, with a piece of the vertical at the far right.



Let the bug be passed... **The author's Elmer, K7AQ, passes his bug on to the next generation.**

tenna got a look-over. Just to see what happened, we installed it on top of the 6-foot block wall. A few days of fiddling produced nothing new; the SWRs were as immovable as ever, do what we would. Charlie Cox came over yet another time, and we tried raising the dipole higher off the block wall (to no avail). By this time, Charlie said that never in his 70+ years as a ham had he had this much trouble with a dipole—and he'd built quite a few. He wanted to put the antenna into "free air," as that would improve the radiation.

My Introduction to Contesting

Someone hit on stringing it between the roof and the wall; this proposal was acted on immediately. The SWR dropped to 1.5:1 at our chosen frequency (14.300 MHz)! That was better than the vertical (1.9:1). That day just happened to be the day of the North American QSO Party. Under the pretense of "checking out the dipole," I made 13 contacts, from California to New Jersey (I live in Arizona). That was fun! What I really like about Amateur Radio is that a 12-year-old can talk all over the world with a home-built antenna!

All photos by the author.

Dan Bates, KD7LHF, received his General license in December 2000. The next month he upgraded to Amateur Extra. His Elmer, Charlie Cox, K7AQ, helped him and his whole family to get licensed. Dan's father is KD7MRM, his mother has KD7LNU, and his sister uses KD7LNT. You can contact the author at 16803 W Tonbridge St, Surprise, AZ 85374; **jackfrosty1@msn.com**.

NEW PRODUCTS

DIGITAL COAXIAL ANTENNA SWITCH FROM ALPHA DELTA

◊ Alpha Delta Communications says its new six-position digital coaxial antenna switch has innovative safety and operational features never before available in coaxial switches. Dubbed the PathMINDER, the switch's microprocessor and RF sensor will not allow "hot switching," which can damage switch contacts and equipment. The switch also automatically connects the antenna ports to ground (there are several grounding configurations) when the radio is turned off or timed out, or if station power is lost. The PathMINDER is rated for 1500 W through 54 MHz.

Price: $139.95 plus $8 s/h. For more information, contact Alpha Delta Communications at PO Box 620, Manchester, KY 40962; tel 606-598-2029; fax 606-598-4413, **www.alphadeltacom.com**.

STRAYS

ARRL DIAMOND CLUB

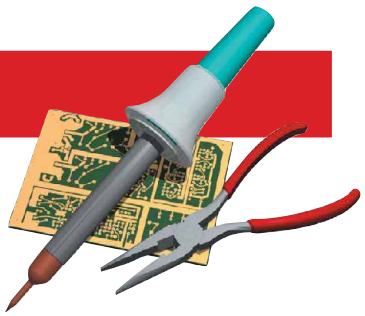
◊ The ARRL Diamond Club is a donor recognition program of annual support that includes *QST* and all the benefits of ARRL membership, plus additional benefits. Contributions begin at $75 a year ($50 a year for Life Members). Gifts to the Diamond Club are for one year of benefits and are tax deductible to the full extent of the law. ARRL members may contribute to the Diamond Club at any time during their membership year using their membership renewal form, by phone or on the ARRLWeb. Donors wishing to contribute $500 or more may donate in monthly or quarterly credit card installments. Diamond Club information and contribution form are at **www.arrl.org/diamondclub**, or call 860-594-0397 for a brochure. An article on the Diamond Club appeared in the November 2002 issue of *QST*.

ARRL FRIENDSHIP AWARD

◊ The purpose of the Friendship Award is to encourage friendly contact between radio amateurs and thereby discover new friends through personal communication with others. The ARRL Friendship Award is available to any ARRL member who submits log extracts that show two-way communications with 26 stations whose call signs end with each of the 26 letters of the alphabet. (For example: W4RA, KØORB, W3ABC... K1ZZ.) A self-addressed, stamped envelope will bring you the rules and application form, or you can get them from the ARRLWeb, **www.arrl.org/awards/**.

110 YEARS OF CHIEF PETTY OFFICERS

◊ During calendar year 2003, the Rocky Mountain Navy ARC (KØUSN) will operate a special event recognizing 110 years of service by chief petty officers. Operation will be on SSB, CW and RTTY utilizing the 10-20 meter bands. Most activity by the Rocky Mountain Navy crew will be on weekends. For more information, visit the club's Web page at **www.qsl.net/rmnarc**.—*POC Mike Anderson, WV7T, Chief Petty Officer, USN, Ret;* **WV7T@arrl.net**.



The Doctor is IN

Q Hugo, VE7HVA, asks, "I want to charge some batteries. Could you tell me what percentage of a full charge is considered a trickle charge?"

A First, let's clarify the question a bit. *Full charge* refers to a state-of-charge. *Trickle charge* on the other hand refers to a slow charging rate. Unfortunately, the term trickle charge is not always well defined. The basic idea however is easy to understand. Trickle charge is a charge rate sufficiently small so as not to overcharge or damage a battery even after an extended or indefinite charge period.

While the exact rate can vary, a trickle charge rate is considered to be well below the maximum charging rate, usually around a few percent of C. Rechargeable NiCd batteries will typically lose about 20% of their charge per month, so a small "trickle" current is often used to maintain a battery's full charge if stored in a charger. Some chargers sense when a battery has reached full charge and will switch to a "trickle" mode to maintain the battery.

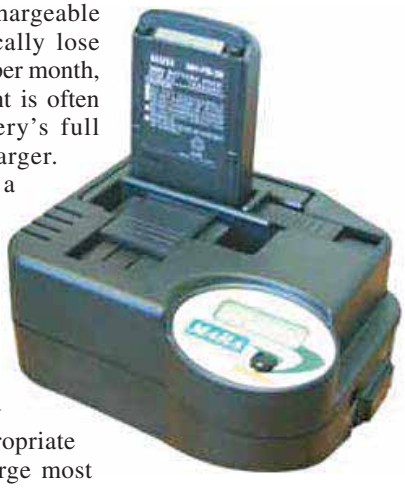


Figure 1—The Maha MH-C888 Universal Drop-in Charger and Conditioner is an example of a device that can help prolong the life of your batteries.

If C is the charge capacity of a battery in ampere hours, typically, 0.05 to 0.1 C is generally accepted as being the appropriate amount of current to charge most NiCd batteries. This would typically charge a battery in about 10 to 20 hours. Internal evolved gas recombination structures in each cell grab oxygen as it is produced at the cell plate, which prevents the cell from outgassing. This evolution/recombination process continues indefinitely with no detrimental effect to the cell except for internal heating (which is why cell temperature is often monitored by high-rate charger). At low charge rates, this heating is negligible, and can be ignored.

Let's now consider a charge rate example for a 1000 mAh battery. The 0.1C rate would be 100 mA. While most NiCd batteries will do quite well on that rate to charge the battery from a discharged state, it is not a good idea to continue to push significant current through a battery once it is fully charged. Once a battery reaches full charge, if a charger continues to try to charge it, the current is simply passing through the battery, to be dissipated as heat, in the battery, in the charger or both. Permanent battery damage can occur and its longevity compromised.

Overcharging can also result in a phenomenon known as voltage depression. The telltale symptom is a reduced battery voltage resulting from secondary chemical reactions. Voltage depression is often mistaken for the virtually non-existent but much feared memory effect.

By the way, the NiCd charging aspects of this discussion also apply to nickel metal hydride (NiMH) cells. Lead-acid batteries however have significantly different "trickle charge" requirements. A "float voltage" is introduced when the battery is fully charged. This essentially means that the output of the charger should be at the same voltage as a charged battery—almost no current flows.

A lead-acid charger of this type typically pushes the cells into fully-charged states and then into mild overcharge in order to equalize the level of charge throughout the cells, and then drop down to the maintenance, or *float*, voltage-limited state. Since the battery voltage is equal to the charger's voltage, there is no current flow. As this is analogous to a float level control in a tank of liquid, hence the name. Unfortunately, the ideal charging voltage is sensitive to temperature—the better designs have temperature compensation of the charging voltage.

It is important to note that constant-voltage charging "float voltage" techniques do not apply to NiCds. The nickel-cadmium cell has a much flatter charge/discharge curve of cell voltage versus state of charge, so voltage sensing is not a good indicator of charging progress. Top-of-the-line NiCd chargers rely upon several factors to determine the fully charged state, such as negative-slope region at full charge, cell temperature, terminal overvoltage, and time limiting. After reaching this point, the charger will switch to a constant-current (not constant voltage) mode.

My general recommendation is to charge batteries and battery packs as slowly as you have the patience for—lower charge (and discharge) rates lead to longer life. Of course, there is probably something to be said for finding the best personal tradeoff between the cost of waiting around vs. the cost of buying new battery packs. NiCds can be stored at either full or no charge. The bottom line is that the best source of information for a *particular* battery is the battery manufacturer. Consult their Web page or data sheet.

More information on batteries and charging is found on the ARRL Technical Information Service "Batteries" information page. See **www.arrl.org/tis** and follow the links to the page.

Q Bill asks, "Where can I find information on how to tune a trap vertical antenna with or without an antenna analyzer?"

A information on tuning an antenna is the antenna's manufacturer. Failing that, you want to mount the antenna up in the clear and check SWR on the highest band on several frequencies across the band. If the SWR is lowest at the low end of the band, then you want to shorten the section of the antenna that operates on that band. Conversely, if the SWR is lowest at the high end of the band, you would want to lengthen that section.

Once you get the SWR where you want it for that band, you should move down to the next lower-frequency band and

Figure 2—The MFJ-259B HF/VHF SWR Analyzer.

adjust that in the same fashion. Repeat for the remaining bands.

Depending upon the antenna's design, the adjustments may be interactive and in that case, you may have to repeat the whole process (starting with the highest band and working downward) several times to get the tuning just right.

This can be done with a transmitter and SWR bridge, although if you use an SWR meter and your transmitter, you are limited to transmitting only in the ham bands for which you hold a license. If you use an antenna analyzer, you can check the SWR outside the ham bands, in case the initial tuning is so far off that the SWR is high across the entire ham band. If you are using a transmitter, see which end of the band has the highest SWR and make the adjustments as described above.

Q Chester, KD5TFK, asks: I am presently using a multiband mobile antenna mounted about 15 feet high as my base station antenna. I find that I work more DX than local stations on 10 meters using 100 W. Is this normal considering I have a very simple antenna setup? Would a low angle of elevation or the antenna's polarization have anything to do with it?

A Ten meters can be open for worldwide communications when conditions are right. Part of what you are seeing is the fact that there are a lot more DX stations in the world than the number of hams near you. Even a modest antenna and 100 W can work the world when the band is open.

DX communication on HF involves the ionosphere. The ionosphere consists of several layers at varying heights above the earth, from about 50 to over 200 miles. The layers are known as the D, E and F layers, with the F layer usually combining at night—the F1 and F2. The layers bend or reflect radio energy back toward the earth. The actual reflection is usually from the F2 layer. This is shown in Figure 3, which shows how signals can travel from one point to another by reflecting off an ionized layer in the ionosphere.

Not all angles are actually reflected, though. Note that energy that is sent upward at high angles can be bent into space rather than returning to the earth. There is a "skip" zone where no signals can be heard at all. Near your station, the signal from your antenna can travel directly to another local station (this is often termed the "ground wave," indicating that the signal has traveled close to the earth). In the skip zone, no signals can be heard (or a very faint signal might be audible from various scatter effects). At longer distances the signals become loud and strong. At higher frequencies—10 meters for example—the skip zone can be hundreds of miles.

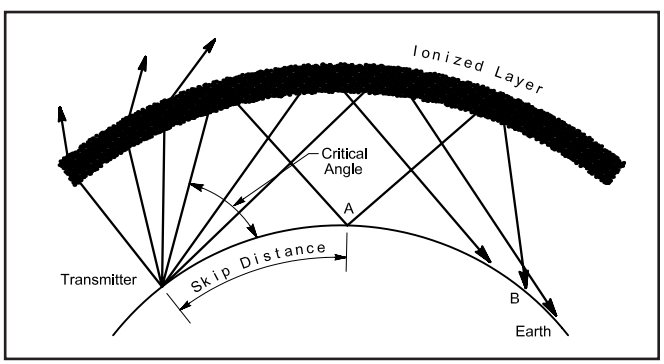


Figure 3—How signals can travel from one point to another by reflecting off an ionized layer in the ionosphere.

The vertical antenna also produces more low-angle radiation than high-angle radiation, so it does not send as much signal upward that could be heard by closer stations, nor does it hear them very well. The relative number of DX and local stations, the skip zone and the low-angle performance of your vertical antenna both contribute to your hearing more DX than stateside QSOs on 10 meters.

For true local work on 10 meters, you and the other local stations should use the same polarization. For local 10-meter FM, vertical polarization is almost universal. If, however, the local stations you want to communicate with use horizontal antennas, you should, too. For local work, you should mount this vertical as high and in the clear as reasonable, to help get your signal more directly to the other station by avoiding the losses caused by buildings and other ground clutter.

For DX work the antenna polarization doesn't matter because the reflections off the ionosphere change the polarization anyway. Most DX takes place with low angles of radiation from the antenna. A vertical generally has good low-angle performance in all azimuth directions. Over ground with average characteristics, a high dipole can actually be a better DX antenna than a vertical antenna, but it attains that performance only in directions broadside to the antenna. Off the ends, the DX performance suffers.

Q W4FTP wants to know: What are the formulas for calculating full wavelengths and partial wavelengths? I'm interested in building a wire antenna in some trees in my backyard.

A The answer depends on what you are trying to calculate. In free space (that is, traveling through the air or a vacuum), the formula to calculate 1 wavelength is:

Wavelength = 984 / F where the wavelength is in feet and the frequency is in MHz.

It is easy to calculate fractional wavelengths from this formula by multiplying the numerator (the 984) by the fractional wavelength you want to calculate. For example, a half wavelength = 0.5 wavelength = (0.5 × 984) / F = 492 / F

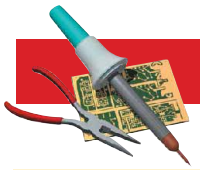
A free-space ¼-wavelength in feet would be 246/F.

However, when you are talking about wire (or coax), additional factors have to be considered. For antennas using straight wires, the open wire ends exhibits a "self-capacitance" (commonly known as *end effect*) that causes them to appear electrically longer than they are physically. To compensate, the calculated physical dimension must be shortened about 5 percent.

So for half-wave dipoles, the correct formula is 0.95 × 492/F = 468/F and for $^1/_4$ wave, the formula is 234/F. For a $^5/_8$-wave vertical, it would be 0.95 × 985/F × $^5/_8$ = 584/F.

In a closed loop antenna, the loop does not exhibit end effect, but the loop adds some inductance. To compensate, the antenna must be made somewhat physically larger, hence the one wavelength formula of 1002/F. HF loops are usually close to 1005/F.

Do you have a question or a problem? Ask the Doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; www.arrl.org/tis/. Add your comments: "The Doctor is On-line" at www.arrl.org/members-only/qst/doctor/. QST



THE HELP DESK

The Considerate Operator's Frequency Guide

The following frequencies are generally recognized for certain modes or activities (all frequencies are in MHz).

Nothing in the rules recognizes a net's, group's or any individual's special privilege to any specific frequency. Section 97.101(b) of the Rules states that "Each station licensee and each control operator must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies. No frequency will be assigned for the exclusive use of any station." No one "owns" a frequency.

It's good practice—and plain old common sense—for any operator, regardless of mode, to check to see if the frequency is in use prior to engaging operation. If you are there first, other operators should make an effort to protect you from interference to the extent possible, given that 100% interference-free operation is an unrealistic expectation in today's congested bands.

1.800-1.810	Digital
1.810	QRP CW calling frequency
1.800-2.000	CW
1.843-2.000	SSB, SSTV and other wideband modes
1.910	SSB QRP
1.995-2.000	Experimental
1.999-2.000	Beacons
3.500-3.510	CW DX
3.560	QRP
3.590	RTTY DX
3.580-3.620	Data
3.620-3.635	Automatically controlled data stations
3.710	QRP Novice/Technician CW calling frequency
3.790-3.800	DX window
3.845	SSTV
3.885	AM calling frequency
3.985	QRP SSB calling frequency
7.040	RTTY DX
	QRP CW calling frequency
7.075-7.100	Phone in KH/KL/KP *only*
7.080-7.100	Data
7.100-7.105	Automatically controlled data stations
7.171	SSTV
7.285	QRP SSB calling frequency
7.290	AM calling frequency
10.106	QRP CW calling frequency
10.130-10.140	Data
10.140-10.150	Automatically controlled data stations
14.060	QRP CW calling frequency
14.070-14.095	Data
14.095-14.0995	Automatically controlled data stations
14.100	IBP/NCDXF beacons
14.1005-14.112	Automatically controlled data stations
14.230	SSTV
14.285	QRP SSB calling frequency
14.286	AM calling frequency
18.100-18.105	Data
18.105-18.110	Automatically controlled data stations
18.110	IBP/NCDXF beacons
21.060	QRP CW calling frequency
21.070-21.100	Data
21.090-21.100	Automatically controlled data stations
21.150	IBP/NCDXF beacons
21.340	SSTV
21.385	QRP SSB calling frequency
24.920-24.925	Data
24.925-24.930	Automatically controlled data stations
24.930	IBP/NCDXF beacons
28.060	QRP CW calling frequency
28.070-28.120	Data
28.120-28.189	Automatically controlled data stations
28.190-28.225	Beacons
28.200	IBP/NCDXF beacons
28.385	QRP SSB calling frequency
28.680	SSTV
29.000-29.200	AM
29.300-29.510	Satellite downlinks
29.520-29.580	Repeater inputs
29.600	FM simplex
29.620-29.680	Repeater outputs

Note: ARRL band plans for frequencies above 28.300 MHz are shown in *The ARRL Repeater Directory* and *The FCC Rule Book*.

VHF/UHF/EHF Calling Frequencies

Band (MHz)	*Calling Frequency*	
50	50.125	SSB
	52.525	National FM simplex frequency
144	144.010	EME
	144.100	CW
	144.200	SSB
	146.520	National FM simplex frequency
222	222.100	CW/SSB
	223.500	National FM simplex frequency
432	432.010	EME
	432.100	CW/SSB
	446.000	National FM simplex frequency
902	902.100	CW/SSB
	903.100	Alternate CW/SSB
1296	1294.500	National FM simplex frequency
	1296.100	CW/SSB
2304	2304.1	CW/SSB
3456	3456.1	CW/SSB
5760	5760.1	CW/SSB
10000	10368.1	CW/SSB

VHF/UHF Activity Nights

Some areas do not have enough VHF/UHF activity to support contacts at all times. This schedule is intended to help VHF/UHF operators make contact. This is only a starting point; check with others in your area to see if local hams have a different schedule.

Band (MHz)	*Day*	*Local Time*
50	Sunday	6 PM
144	Monday	7 PM
222	Tuesday	8 PM
432	Wednesday	9 PM
902	Friday	9 PM
1296	Thursday	10 PM

STRAYS

AO-40 QSO PARTY

◊ Reinhard Sual, YBØKTQ, of Jakarta, Indonesia, is coordinating an AO-40 QSO Party 2003 on January 24-25 (orbits #1016 and 1017).

Objective: To encourage more Amateur Radio stations to have two way communication via AO-40, especially while the satellite is in good condition.

Rules of Operation: All rules from local/international organizations take precedence over these rules. Any station can participate, as long as it has its own facility (both uplink and downlink). No relay/repeater use in any kind is permitted.

One station is only valid for one entry.

Station can be a single operator with his/her own call, or a group of operators with a club station call, providing they use only *one* set of equipment (multi-op with single radio).

If you cannot hear your return signal, do not call.

Frequencies/Mode: Downlink: S-band, USB; uplink: U-band LSB or L-band LSB (only one band per station is allowed during the event); SSB only.

E-mail address: Send electronic log sheets (in ASCII text, ADIF or Microsoft Excel format) to **ReinhardSual@TheTempoGroup.Net**. The closing date for electronic log-sheet submission is January 31, 2003.

Post Office Address: Certificate available via Reinhard Sual, YBØKTQ, Pulo Gebang Permai G1/9, Jakarta Timur 13950, Indonesia. See Web site for requirements.

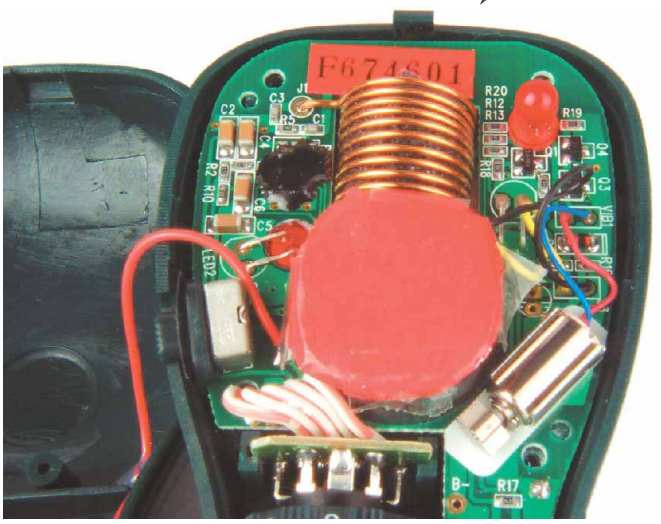
Web site: For more information, please see **202.158.39.236/AO40QSOParty2003.asp**.

Zapchecker

"Zapchecker" is an unusual name for a highly useful device. In essence, the Zapchecker is a wideband (10 MHz to 4.5 GHz) receiver that provides visual indications of the presence of RF energy. Common field-strength meters do the same thing, and they've been around for many years, but the Zapchecker takes the concept several steps further.

The Zapchecker is a field-strength meter on steroids. First of all, it is quite sensitive. When I turned on the Zapchecker, I adjusted the sensitivity control to maximum, just to see what would happen. What happened was a pinned meter needle and a brightly glowing red LED. What was I picking up? The signal turned out to be emanating from the 900-MHz cordless telephone my wife was using in an adjacent room.

After reducing the sensitivity considerably, I began walking around the house, waving the Zapchecker at any electronic device I could find. When I passed it within about a foot of my computer monitor, I saw a strong indication. No surprise there. My monitor generates plenty of RF, to my everlasting dismay. With the Zapchecker I was able to trace how RF was being radiated not only from my monitor, but from various interconnecting computer cables as well. The bright LEDs were a big help during this test. When I reached behind and beneath my station table, I couldn't see the meter in the dim light, but the red and green LEDs were easy to read.



The detecting antenna is the foam centered coil at top center. The red piece of paper is taped over the potentiometer swing point for protection. The motor at lower right generates the vibrations when this feature is turned on. The vibrations are pulsed by the LED at top right, which blinks (unseen) periodically while in vibrate mode. The motor does not run when the LED is lit. The ground wire to the batteries is connected to the right of R17 (bottom left); it was separated for this picture.

A Lot of Features in a Tiny Package

The Zapchecker is compact at only about 2 inches wide × 5 inches long × 1 inch thick, and it weighs just 5 ounces. It fits easily in your hand and can slip into a shirt or pants pocket.

Using the Zapchecker for a back yard fox hunt. The red LED glows when Zapchecker detects a strong signal.

There are two switch-selectable measurement modes: Linear and Logarithmic. In the linear mode the Zapchecker has a maximum sensitivity of 100 µV at 10 MHz. In the logarithmic mode, the Zapchecker maintains a 45-dB logarithmic conformity. I found the linear mode to be best for detecting relatively weak signals, such as when I made some crude far-field pattern measurements of my HF antenna.

The logarithmic mode is useful when you need to detect sudden changes in strength. This may come in handy during foxhunts when you are close to the "fox" transmitter. To test the idea, I concealed a transmitter in a small area of our backyard and challenged my 8-year-old daughter to find it with the Zapchecker. She managed to locate the fox in less than 10 minutes, and was so fascinated she wanted to do it again.

The Zapchecker offers a unique feature that may be of interest to the visually impaired. You can enable a vibrator mode in which the Zapchecker will vibrate in varying degrees of strength when it detects signals.

Serious Test Equipment

My encounter with the vibrator mode notwithstanding, the Zapchecker is a serious piece of test equipment. While testing the unit for this review, I used the Zapchecker to hunt down some RF leakage in our cable TV wiring. The sensitivity and ease of use made short work of what might have been a frustrating search.

Manufacturer: Alan Broadband Company, 93 Arch St, Redwood City, CA 94062; tel 888-369-9627; **www.zapchecker.com/**. *$89 plus $7 shipping and handling.* QST

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

By Rod Kreuter, WA3ENK

The Load Shedder

Save your battery and your rig. Build a voltage monitor and low-voltage disconnect circuit that lets you start the car before it's too late.

This project is a bit out of character for me. As a QRPer, a bicycle mobile operator and a backpacker, I don't often have any (electrical) load to shed. So how did the Load Shedder come to be?

Like many projects that I embark on, this one came to me as a question: "How hard would it be to build a...?" The question came one night on the 75 meter band from a new friend, Jerry, AG4NV. Seems Jerry has a camper and, on more than one occasion, has allowed his battery to get low enough that starting the engine wasn't an option. I asked him how he could possibly drain a battery that size in just a weekend and his reply was something cryptic about preferring microwave popcorn. I can understand operating on our microwave bands from a camper, but where does the popcorn come in? In any case, perhaps some of you portable, mobile or high power folks with (or without) campers might find the Load Shedder useful.

Just what is a Load Shedder? Well, I've been told that some call it a low-voltage disconnect or an under-voltage crowbar. It works somewhat like a fuse, to protect your battery. While a fuse disconnects the load if it (the load) draws too much current, the Load Shedder disconnects a load if the battery (source) voltage drops too low. It requires only three connections to your system: input, output and ground.

This circuit monitors the battery and as the voltage drops (the battery discharges), an LED flashes and a Sonalert chirps out a warning (the warnings can be disabled). If the battery voltage continues to fall, the Load Shedder acts like a simple switch—it opens. This disconnects (sheds) the load, hopefully saving the battery from an untimely demise while protecting the equipment from under-voltage. It also saves the owner from a dead battery and a vehicle that won't start.

Both the warning voltage and the trip voltage are adjustable from about 11-13 V, the trip voltage always being lower than the warning voltage. Other voltages could be designed into the circuit by changing the voltage divider resistors but these would have to be in the range of 9-15 V. Lower voltages won't work because the gate-drive dc-dc converter will not produce enough voltage for the FET switching gate.

Theory of Operation

Figure 2 shows the complete schematic of the Load Shedder, together with the parts list. The pin layout for the MOSFET switch is shown on the schematic.

The heart of the Load Shedder is a precision voltage reference. Much more precise than a simple Zener diode, this diode provides a stable 2.5 V reference even when powered from a severely discharged 12 V battery.

This voltage reference is compared to two other voltages, the warning voltage and the trip voltage, by comparators U1A and U1B. The warning comparator, U1A, enables a low frequency (about 1 Hz) oscillator (U2C), which controls what I term the "Fries Up!" circuit. Like many fast food restaurants, I find a pulsing tone to be more obnoxious and "attention-getting" than one of constant pitch. U2C drives Q2 and Q3, which pulse the LED and the piezo (Sonalert) noise maker.

The oscillator formed by U2D does double duty. First, it makes the tone to drive the piezo device and also serves (with diodes D2 and D3 and capacitors C7 and C8) as a charge pump to provide 24 V to drive the gate of the FET switch.

When I first talked with folks about this project, I wanted to use a P-channel FET, which would not require the 24 V supply. We were discussing this on the air and Tom, W4LLK pointed out that the "on" resistance of even the best P-channel MOSFET was much worse than an N-channel version. Too much power would then be wasted in the FET switch. His suggestion was to use an N-channel device, even though it meant some additional circuit design.

There are two ways to use an N-channel MOSFET in this circuit. The first is to switch the ground lead of the load in-

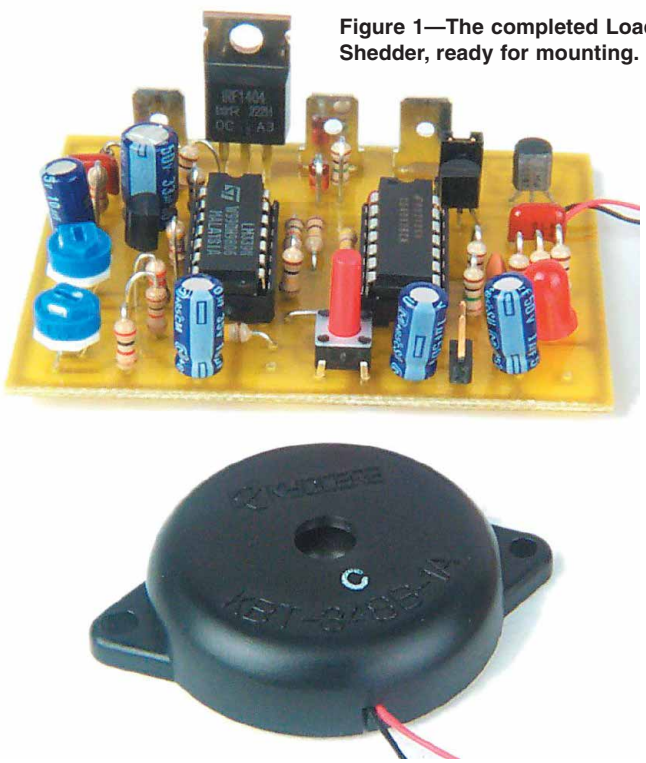


Figure 1—The completed Load Shedder, ready for mounting.

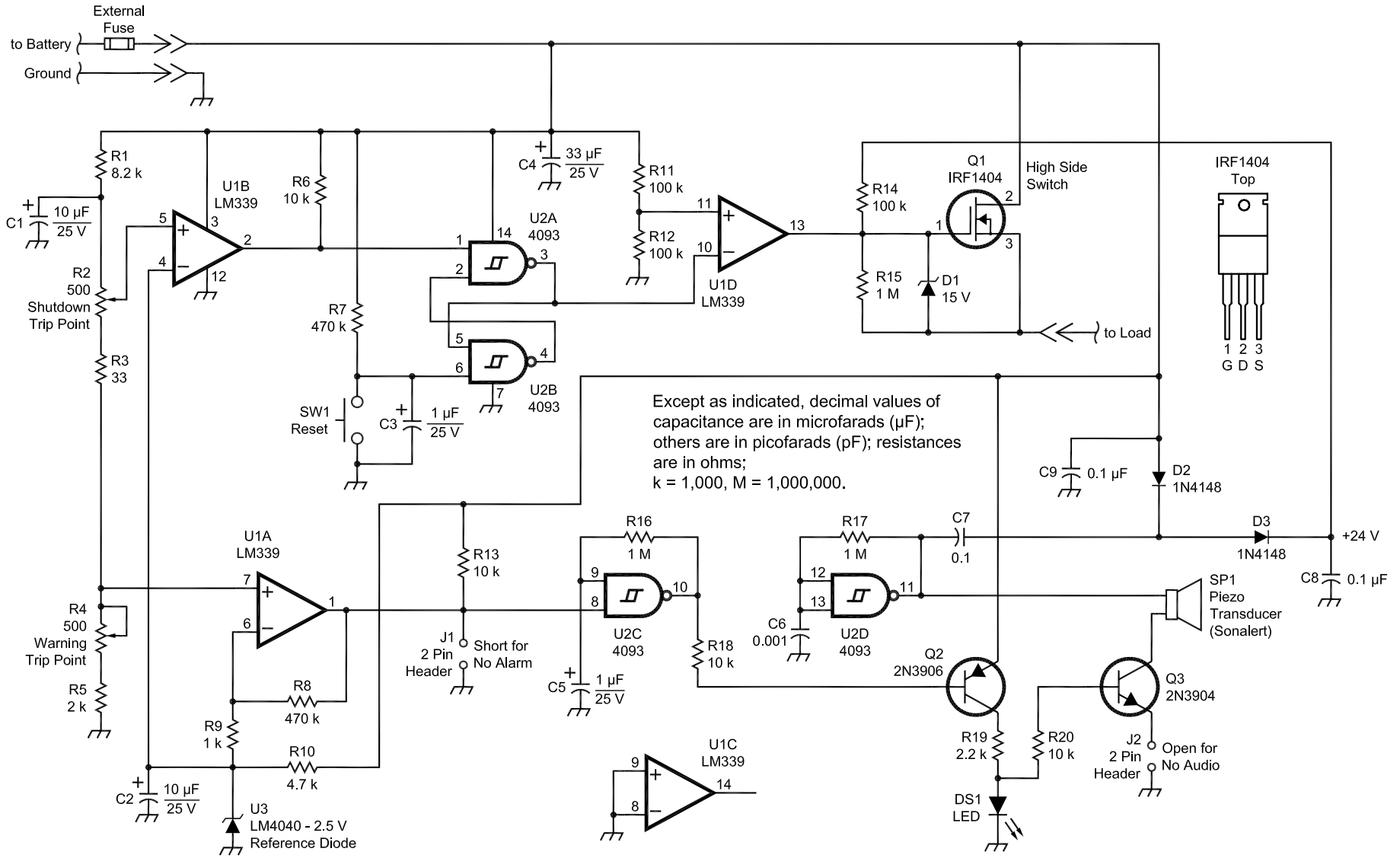


Figure 2—The Load Shedder schematic and parts list. PC boards and kits are available from Q-Sat, 319 McBath St, State College, PA 16801. Charge cards are not accepted and a phone number is not available. PC boards are $7 plus $2 shipping; a complete kit (including printed circuit board) is $22 plus $2 shipping. Pennsylvania residents must add sales tax. Please allow 3 to 4 weeks for delivery. All resistors 5%, ¼ W, unless otherwise noted. Parenthetical part numbers other than those marked RS are Digi-Key, 701 Brooks Ave South, Thief River Falls, MN 56701; tel 800-344-4539; www.digikey.com/. RS denotes RadioShack part numbers, www.radioshack.com/.

C1, C2—10 µF, 25 V (P5161-ND).
C3, C5—1 µF, 25 V (P6260-ND).
C4—33 µF, 25 V (P6266-ND).
C6—0.001 µF, 50 V (RS272-126).
C7, C8, C9—0.1 µF 50 V (P4525-ND).
D1—15 V Zener diode (1N4744ADICT-ND).
D2, D3—1N4148 diode (RS276-1122).
DS1—LED (RS276-026).
J1, J2—2 pin PCB header.
Q1—IRF1404 MOSFET (IRF1404-ND).
Q2—2N3906 (2N3906-ND).
Q3—2N3904 (2N3904-ND).
R1—8.2 kΩ.
R3—33 Ω.
R2, R4—500 Ω trimmer potentiometer (36G52-ND).
R5—2 kΩ.
R6, R13, R18, R20—10 kΩ.
R7, R8—470 kΩ.
R9—1 kΩ.
R10—4.7 kΩ.
R11, R12, R14—100 kΩ.
R15, R16, R17—1 MΩ.
R19—2.2 kΩ.
S1—Reset switch, SPST momentary (EG2506-ND).
SP1—Piezo transducer (RS273-078).
U1—LM339 quad comparator (LM339ANFS-ND).
U2—4093 quad NAND Schmitt trigger (CD4093BCN-ND).
U3—LM4040-2.5, 2.50 V reference diode (LM4040DIZ-2.5-ND).

Misc
Quick connect terminals (1287K-ND).

stead of the positive lead. This can be anywhere from inconvenient to impossible. The other way is to use the N-channel switch in the positive lead and "high-side" drive the FET gate.

To high-side drive an N-channel FET, one needs a gate voltage that is about 10 volts higher than the supply voltage (to insure full enhancement and hence complete turn-on). Generating this voltage with this configuration required an oscillator and a charge pump, so the Sonalert driver was pressed into double duty.

The second comparator, U1B, is the trip comparator. If the voltage falls to the trip voltage, the output of the trip comparator sets the flip-flop formed of U2A and U2B. A flip-flop was used because if the circuit disconnected a heavy load from the battery, the battery terminal voltage would rise slightly. This would reconnect the load causing the voltage to fall which would cause the circuit to disconnect again, which would cause …you get the idea…we'd have an oscillatory loop. In the old days, we'd term this "motorboating." A simple flip-flop avoids all of this by disconnecting the load until the user resets it.

Lastly, some comments on the FET switch. I was amazed at the current capacity of some modern MOSFETs. Some can handle over 600 A, pulsed! The FET I chose is rated at 162 A continuous, 650 A peak current, with an on-resistance of 4 milliohms (0.004 Ω). This translates to a 10 A switch with no heat sink to (at least) a 30 A switch with a simple heat sink. [Actually, with the junction-to-ambient thermal resistance ($R_{\theta JA}$) (62°C/W), maximum operating junction temperature (T_J) (175°C) and maximum drain-source resistance ($R_{DS(on)}$) (0.004 Ω) specified for the IRF1404, a current of 18 A can be safely handled with no heat sink, provided the ambient temperature is 75°C or lower. A minimal (8.8°C/W) heat sink would insure a current capacity of 50 A without exceeding the maximum operating junction temperature of 175°C, at the same ambient temperature. A simple heat sink is recommended, regardless of load current. Neat devices, these power MOSFETs!—*Ed.*]

Adjustments

The only equipment needed to adjust the Load Shedder is an adjustable dc power supply, a dc load, such as a 12 V incandescent lamp and an accurate digital dc voltmeter.

Place a jumper on J2 but leave J1 open during the following calibration. R2 and R4 should also be turned fully counterclockwise. Connect your load (the 12 V lamp) between the output and ground. Next apply a voltage equal to your desired warning voltage. A good warning voltage might be 12.4 V.

If your load is not on, push the RESET button. At this point the load should be energized (lamp on) and the warning LED should be off. Now adjust R4 slowly until the warning LED begins to blink and the Sonalert sounds.

Next, lower your applied voltage to the desired trip voltage, let's say 12.2 V. Adjust R2 until the load is switched off. Check the voltages again until you are satisfied that the warning and trip points are accurate. The Load Shedder has now been calibrated. Figure 1 shows a view of the completed Load Shedder printed circuit board, ready for mounting.

Conclusion

Since the Load Shedder is designed to switch high current, I didn't intentionally build the circuit as a low-power design. Still, the circuit draws only about 8 mA from the source. Since no switching relays are involved, you should get many years of service from the Load Shedder, as long as the FET is kept cool with adequate heat sinking. My only question is: "What do you folks do with all that battery current?"

Rod Kreuter, WA3ENK, earned his Technician class license at age 15 and currently holds an Amateur Extra class ticket. Rod's interest in Amateur Radio led to a career in electrical engineering. He holds a BSEET from The Pennsylvania State University and is Director of Research Instruments for Penn State's Chemistry Department. Rod enjoys biking, backpacking, tinkering and ragchewing. You can contact him at 319 McBath St, State College, PA 16801; **rak10@psu.edu**.

STRAYS

GACW KEY DAY

◊ The GACW KD is neither a competition nor contest but an event to encourage all Amateur Radio operators to bring out their old manual and non-electronic keys and make as many QSOs as they can with other participants.

Date: February 22-23.

Time: 1800Z Saturday to 0600Z Sunday.

Frequencies: Close (but always up) to 3530/7030/14,030/21,030 and 28,030 kHz. QSOs in the 10, 18 and 24-MHz bands are allowed but not recommended.

Mode: CW, straight key and non-electronic key only.

Call: CQ KD, CQ GACW KD, etc.

Exchange: Greetings and RST plus your GACW #. Non-GACW members send KD.

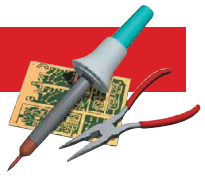
If you make more than 10 QSOs, you are invited to vote for the three stations with the best fist. The "GACW KEY DAY" certificate will be awarded to the five top stations.

Logs: Simple list using log book format, etc.

Deadline: Not later than March 15.

Logs can be sent via e-mail as a text file to **gacw@lan.no-ip.org** or by postal mail to GACW, PO Box 9, B1875ZAA - Wilde, Buenos Aires, Argentina.

SHORT TAKES



Gregoire TR-2000 Communications Headset

Reviewed by Steve Ford, WB8IMY

I put a Warren Gregoire & Associates TR-2000 headset to the test during one of the most demanding phone contests of the year—the 2002 Sweepstakes. I knew that I'd gain a fair sense of what this low-cost headset could do within the first few hours of SSB bedlam.

Before I could use the TR-2000, however, I had to adapt it to my ICOM IC-706 transceiver. Gregoire & Associates offer custom connector installation, but I opted for the hair-shirt approach of doing it myself. The TR-2000 sports an electret microphone, which means that you must supply a polarizing voltage for it to operate. In the case of the TR-2000 microphone, that was 9 V at about 100 µA. Like many modern transceivers, the IC-706 makes 9 V available at the microphone jack. The well-written instructions that accompany the TR-2000 advise you to place a 10 kΩ resistor in series with the voltage source. The instructions also suggest adding a 0.01 µF capacitor between the microphone and the transceiver mike jack to isolate the polarizing voltage from the radio. Some radios don't require the resistor and capacitor, and my '706 may be one of them, but I chose to be safe rather than sorry.

Maty Weinberg, KA1EIB, models the TR-2000 headset.

The TR-2000's 5-foot cord is divided into two sections: the microphone wiring and the headphone cable. Both sections are shielded. The IC-706 and quite a few other radios make the receive audio available at the microphone jack. I could have wired the TR-2000's headset directly to the microphone jack in this fashion but for one drawback: The IC-706 doesn't mute the speaker audio unless you use the front-panel headphone jack. There's no sense blasting the radio's speaker to the outside world while wearing headphones (it kind of defeats the purpose!), so I soldered a separate 1/8-inch plug to the headphone section of the cord, plugged it into the headphone jack and thereby silenced the '706. Now I could enjoy deafening receive audio in my ears without annoying the rest of the household.

Sweepstakes

The TR-2000 headset is light and comfortable. That's important when you're going to be spending hours on the air. The foam ear cushions kept out much of the external noise without squeezing my head like a vice. The headphone audio seemed to emphasize the high and midrange frequencies.

The electret microphone element is on a spring-loaded boom. As the instructions advise, you need to adjust the boom by bending it radically in the direction that you wish it to go, then allowing it to spring back. For obvious reasons, you must remove the headset for this adjustment—at least to get the boom position in the ballpark. Once you have the boom close to its final destination, you can make fine adjustments while wearing the headset. All this adjusting and springing takes a little getting use to. On the other hand, when you finally reach a position you're happy with, the boom will stay put, even when bumped.

For me, the best microphone position was resting right on my lips. The TR-2000's noise-canceling microphone element is designed for *very* close talking. I found that the element pickup dropped dramatically when it was more than about 1/2-inch from my mouth.

Audio reports were consistently favorable. Even with my low-profile station I had little trouble punching through pileups to compete for the rarer Sweepstakes sections.

Conclusion

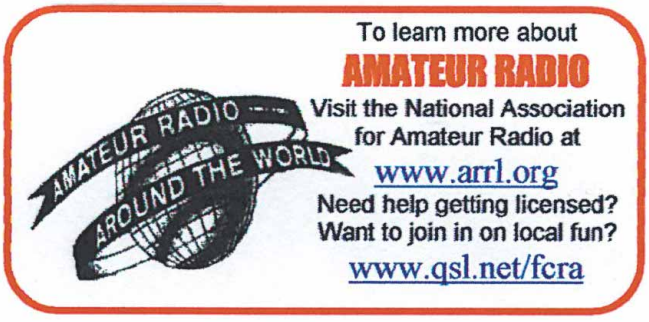
The Gregoire TR-2000 worked flawlessly throughout the contest. This comfortable headset is a winner, especially considering the cost. And if you want to shave about $15 off the price, you can purchase the TR-2000 as a kit. Not a bad deal at all.

Manufacturer: Warren Gregoire & Associates, 229 El Pueblo Place, Clayton, CA 94517; tel 800-634-0094; **www.warrengregoire.com**. *$44.95, assembled and tested, without connectors; $29 kit without connectors.* QST

STRAYS

SPREADING THE WORD

◊ Out of storage room? Rather than throw away that old ham radio magazine, a Georgia club uses them to try to get others interested in Amateur Radio. The Fayette County Repeater Association has printed stickers to put on the cover of magazines that directs people to the ARRL and to our Web site. We just leave the magazines in waiting rooms of doctors' offices, barber shops, car repair shops, etc. Printing stickers is cheap advertising that we hope will attract future members.—*Lynn Bianco, KN4YZ* QST



The Fayette County Repeater Association has found a creative way to recycle unwanted copies of ham radio magazines.

Experiment #1—The Common-Emitter Amplifier

Our first experiment will feature the *common emitter* (CE) *amplifier*. Why the CE amplifier? It is the most common amplifier configuration of all—it is found in analog and digital circuits, from dc through microwaves and it is made of discrete components and fabricated in integrated circuits (ICs). If you understand the CE amplifier, you've made a good start in electronics.

Background

The CE amplifier (Figure 1) is used when modest voltage gain is required along with an input impedance (the impedance seen by the circuit supplying the signal to be amplified) of a few kΩ or more. The output of the CE amplifier is inverted from its input. (We call this 180° of phase shift.) As the input signal swings positive, more current flows into the transistor's base, which also causes more current to flow from the collector to the emitter. This causes more voltage drop across Rc and so the voltage at the collector also drops. The reverse is true when the input signal swings negative.

In order for the circuit to amplify both positive and negative swings of the input signal, its collector current (I_c) must be offset from zero so that it can both increase and decrease. An amplifier that has a continuous output current, even with no input signal, is called a Class A amplifier. The method of controlling this continuous current is called biasing. Resistors in the voltage divider R1 and R2 cause a small amount bias current to flow into the base and thus keep the collector current flowing at all times. The amplifier is then said to be operating in its "active" region. The resulting continuous collector current equals the base bias current multiplied by the transistor's current gain, β. Using Ohm's Law to find the voltages across R_c and R_e, the transistor's collector-to-emitter voltage (V_{ce}) is also determined by the bias current. The combination of continuous I_c and V_{ce} is called the Q-point of the circuit, where Q stands for "quiescent." When an input signal is applied, output voltage and current changes are centered around the Q-point.

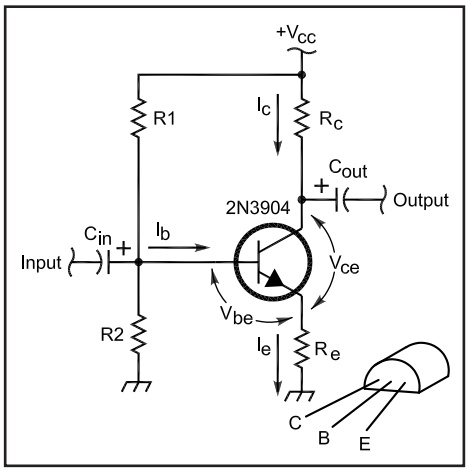


Figure 1—The common-emitter amplifier.

As the collector current changes in response to an input signal, the circuit's output voltage is developed across the collector resistor, R_c. For a given input signal, a larger R_c means a larger output voltage change—a higher voltage gain (A_v). The function of R_e is to set the transistor's Q-point such that the collector voltage can make wide swings without running up to the power supply voltage (V_{cc}) or down to ground. By being in the collector current's path, along with R_c, larger values of R_e work against R_c to reduce voltage gain. In fact, the voltage gain is approximately the ratio of R_c to R_e.

Figure 1 shows capacitors at the input (C_{in}) and output (C_{out}). This is called an "ac coupled" design. The capacitors block the flow of dc current to the load or to the circuit driving the amplifier. These capacitors also cause the gain at very low frequencies to be reduced, as the impedance of a capacitor increases at low frequencies—hence the gain at dc is zero. For this experiment, all capacitors will be 10 µF—a value large enough to act as a short-circuit for most audio signals. If polarized capacitors are used, the positive side should be connected to the circuit.

Terms to Learn

A_v—Voltage gain, the ratio of output to input voltage.

Beta (β)—DC current gain, the ratio of collector current to base current.

Cutoff—Collector current reduced to zero.

I_b, I_c—Base and collector current, respectively.

Q-Point—Quiescent or resting values of collector current (I_{cq}) and voltage (V_{ceq}) with no applied input signal.

V_{ce}, V_{be}—Voltage from collector-to-emitter and base-to-emitter, respectively.

Key Equations

$$I_c \approx I_e,\ I_c = I_b \times \text{Beta}\ (\beta) \quad [1]$$

$$V_{cc} = (I_c \times R_c) + V_{ce} + (I_e \times R_e) \approx I_e \times (R_c + R_e) + V_{cc} \quad [2]$$

$$A_v \approx R_c / R_e \quad [3]$$

$$V_{R2} = V_{be} + (I_e \times R_e) \quad [4]$$

Designing the Amplifier

1. Choose the circuit's operating requirements:

V_{cc} = 12 V *(our power supply voltage).*

A_v = 5 *(a medium value of gain).*

Q-point of I_{cc} = 4 mA *(a value to keep power dissipation low)* and V_{ceq} = 5 V *(rule of thumb—about one-half of V_{cc}).*

Assume the transistor's β is 150 and base-to-emitter voltage, V_{be} = 0.7 V. *(The actual range of β can be read from the transistor's data sheet and V_{be} is typically 0.7 V for silicon transistors.)*

2. *From equation 2,* $V_{cc} = I_c (R_c + R_e) + V_{ce}$

$(V_{cc} - V_{ce}) / I_c = R_c + R_e$, so $R_c + R_e = (12\ V - 5\ V) / 4\ mA = 1.75\ k\Omega$

3. *From the above,* $R_c = 1750\ \Omega - R_e$ and with $A_v = 5$, $R_c / R_e = 5$ *(equation 3)* so

H. Ward Silver, NØAX ♦ 22916 107th Ave SW, Vashon, WA 98070 ♦ n0ax@arrl.org

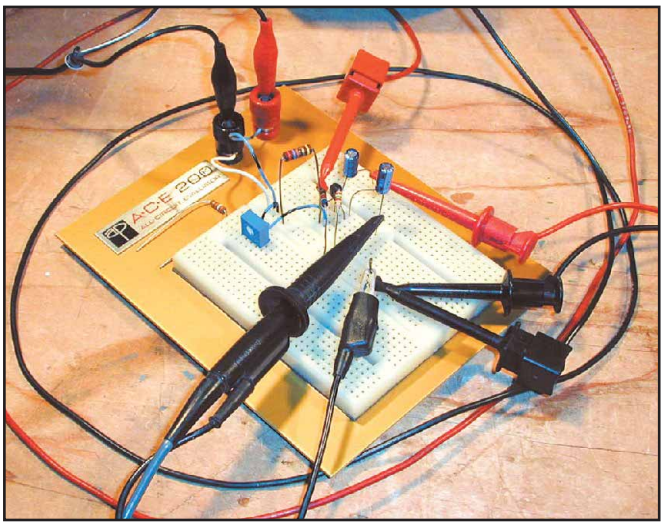


Figure 2—The experimental setup, showing the prototype board and connections to the power supply, oscilloscope and voltmeter. Note that the signal instrument grounds are all connected to a single point—this helps to prevent noise pickup and ground loops.

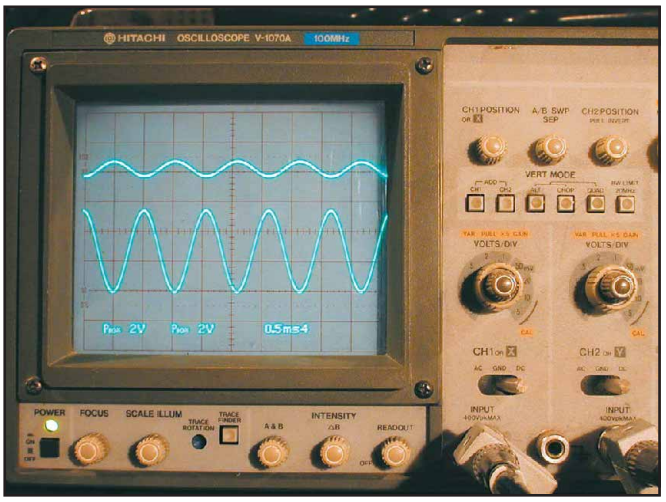


Figure 3—The oscilloscope shows the input (top trace) and output (bottom trace) waveforms. The output is inverted with respect to the input and the voltage gain is approximately 5.

$R_c = 5\ R_e$ and $(1750\ \Omega - R_e) = 5\ R_e$, so $6\ R_e = 1750\ \Omega$ and $R_e = 1750\ \Omega / 6 = 292\ \Omega$ *(use 270 Ω, a standard value).*

4. *From equation 1,* base current, $I_b = I_{cq} / \beta = 4\ mA / 150 = 26.67\ \mu A$ (27 µA). Set the current through R1 and R2 equal to 10 times I_b or 270 µA. *(This is a rule of thumb simplifying calculations and keeping I_b stable with a "stiff" bias supply.)*

The voltage across R2 = $V_{be} + I_c\ (R_e) = 0.7\ V + 4\ mA\ (270\ \Omega) = 1.8\ V$ *($I_c \approx I_e$ and equation 4).*

By Ohm's Law, R2 = 1.8 V / 270 µA = 6.7 kΩ *(use 6.8 kΩ, a standard value).*

The voltage across R1 = $V_{cc} - 1.8\ V = 10.2\ V$ *(voltage divider)*

By Ohm's Law, R1 = 10.2 V / 270 µA = 37.8 kΩ *(use 39 kΩ, a standard value).*

Testing the Amplifier

1. Connect the power supply only after double-checking all connections, especially the transistor leads.

2. Use a VOM to measure the dc voltage from collector to emitter (it should be about 5 V), from base to emitter (0.6-0.7 V), and from collector and emitter to ground (7 V and 2 V, respectively).

3. Replace R1 with the 100 kΩ potentiometer, set to about 39 kΩ. Confirm that all the dc voltages remain about the same. Connect the VOM between collector and ground and observe what happens as R1 is decreased and increased (raising and lowering base current). Use Ohm's Law to determine what is happening to the collector current as you adjust R1. Reset the pot to 39 kΩ.

4. Set the signal (function) generator to output a 1 kHz sine wave of 200 mV_{p-p}, then connect it to C_{in}. If you are using an oscilloscope, you should see a sine wave at the output of C_{out} with an amplitude of about 1 V_{p-p} and inverted (180° of phase shift) with respect to the input. (A VOM measuring ac RMS voltage will show values of about 70 mV RMS at the input and 350 mV RMS at the output—a gain of 5.)

5. Adjust R1 in each direction and observe the output signal with the oscilloscope. As you lower the collector current, you will begin to see the output waveform clip on positive peaks as the collector current is cut off. Raising collector current will eventually result in distortion on negative peaks as the transistor enters the saturation region.

6. Return R1 to 39 kΩ and increase the input signal to observe distortion on the output. If you are using a VOM, note that the RMS output increases more slowly as the signal is clipped.

7. Turn down the input signal as far as possible. Connect the third 10 µF capacitor across R_e. (Connect the negative side of a polarized capacitor to ground.) Slowly increase the input signal and observe the new gain of the circuit. By bypassing R_e, the dc operation of the circuit is unaffected, but now the emitter circuit is effectively grounded for ac signals. The gain is now limited only by the internal impedance of the transistor emitter.

8. Now that you have a working circuit—experiment with it!

- Rework the math for a Q-point with 10 times more and 10 times less collector current.
- Raise and lower the input frequency to see where the gain drops to 70% of the peak value. These are the –3 dB frequencies that determine the amplifier's bandwidth. (These frequencies may be out of range, depending on your instruments.)
- Depending on your generator's capabilities, try different waveforms, such as square or triangle waves, at different frequencies. Does the amplifier faithfully reproduce them?
- Substitute other transistors of the same type and of different types to see what happens to the dc and ac performance.

Suggested Reading

"Transistor Amplifier Design—A Practical Approach" in Chapter 8 of *The ARRL Handbook*. For a more complete discussion of the common emitter amplifier, check out Chapter 2 of *The Art of Electronics*.

Shopping List

You'll need the following components:

- 100 kΩ potentiometer.
- ¼ W resistors of the following values: 270 Ω, 1.5 kΩ, 6.8 kΩ, 39 kΩ.
- 3—10 µF capacitors with a voltage rating of 25 V dc or more (electrolytic or tantalum are fine).
- 2N3904 transistor.

Next Month

The common collector amplifier, also known as the emitter follower, will be the subject of next month's experiment. With the exception of a few more resistor values, you'll be able to reuse the components from this month's exercise. See you then! QST

WHICH WAY DOES THE WIND BLOW?

◊ Thank you, N9PUG. Your article on the poor man's anemometer (see Dec 2001 *QST*) brought back many memories and a rekindled interest. Back in the early 1970s, I was instrumental in providing materials to members of our local radio club to homebrew anemometers for our work with the local weather service during periods of severe weather activity.

As mentioned by N9PUG, my version used the ubiquitous "Leggs eggs" to catch the wind. They were mounted on the ends of 6-inch-long rods attached to a central hub, which then turned the shaft of a small motor similar to that used by N9PUG. They worked great, but Leggs eggs are not very durable. Now, 25 years later I seriously doubt that any still exist.

Our good editor wondered if someone could add a remote wind-direction indicator, and that took me back an additional 25 years. In the late 1940s, I put up my first beam antenna: a 2-meter beam turned by a war surplus bomb-bay-door motor. It worked perfectly. For a direction indicator, I used two war-surplus selsyns: the big model 2J1H1 versions that measure about 2+ inches diameter by 4+ inches long. Much smaller versions are sometimes available.

Lo and behold, the Fair Radio Catalog[1] still listed both types. [At the time of printing, Fair Radio's site lists only the 2J1H1.—*Ed.*] The 2J1H1 and the smaller one (about 1×$^{11}/_{16}$ inches) both sell for about $10 apiece. They call the small one "wind-sel"; how appropriate. I ordered two of the small ones and used them to build a remote wind-direction indicator that that can't be beat. As shown in Figure 1, I made a small compass rose that I placed next to my wind-speed meter. The indicating hand for wind direction is a spare electric-clock second hand from my junk box; it is epoxied to the shaft of the selsyn. A visit to a clock repair shop might get you one free of charge.

Mounting the indicating selsyn can be a bit of a problem since it must be mounted horizontally. I used a couple of **L** brackets fastened to a piece of PVC pipe holding the selsyn (see Figure 2). Fair Radio also sells a radio-compass indicator that would work equally well and mounts like a meter in a single hole. With that approach, you would only need one selsyn. As an old sea dog, I prefer the compass rose. Ex-"flyboys" might prefer the radio-compass indicator. The rest of you take your choice.

A word on the selsyns: Both types were designed for use in aircraft and operated at 400-Hz. To use them on 60 Hz, it is necessary to reduce the voltage. If memory serves me correctly, I used 24 V on the 2J1H1. My tests show that the smaller version will operate as low as 4.7 V ac; 6.3 V is the obvious choice.

Your direction indicator can be accurately set on the ground. Just be sure the sensor that will be mounted in the air is in a

[1]Fair Radio, 2395 St Johns Rd, PO Box 1105, Lima, OH 45802; tel 419-227-6573, 419-223-2196, fax 419-227-1313; **www.fairradio.com**.

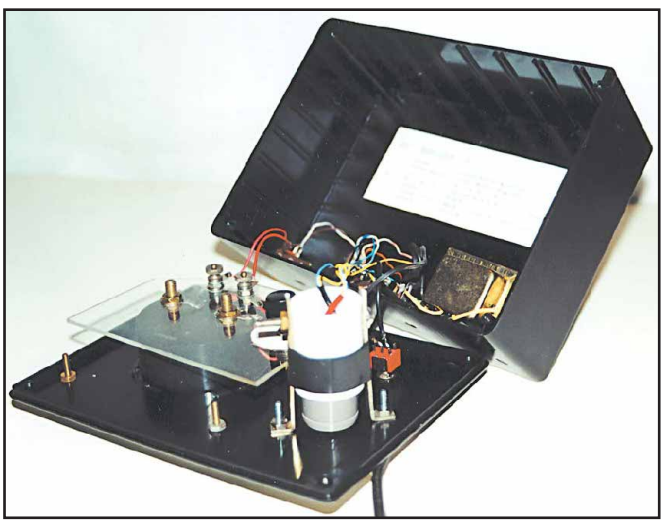


Figure 2—A view showing direction-indicating selsyn in the PVC with mounting brackets. The partly visible knob at the top left of the PVC is for the wind-speed calibration pot.

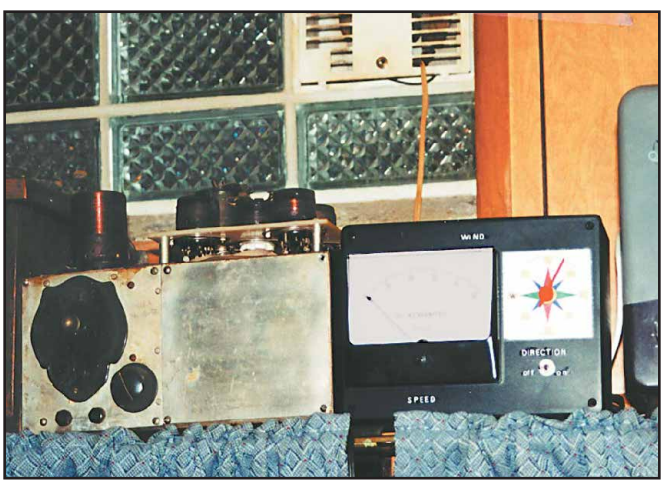


Figure 1—The finished unit installed in my shack. Notice the old homebrew receiver on its left. Circa late 1920s or early 30s, it uses a single UV199.

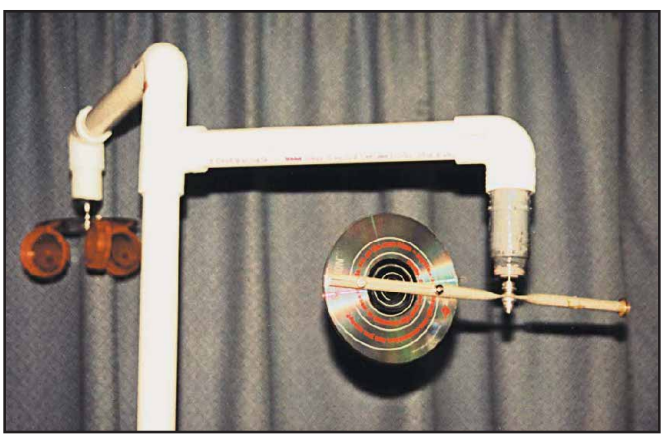


Figure 3—N9PUG anemometer, W8OZA remote wind-direction sensor. Direction-sensor rod is made from a piece of an old TV-antenna element. The grey PVC holding the direction selsyn is required to fit selsyn diameter to the PVC elbow fitting.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor ♦ h&k@arrl.org

known direction and the indicator in the shack corresponds before gluing the clock hand in place. When you erect your outdoor sensor, remember what you did on the ground.

To get accurate readings of wind speed and direction, I have mounted the collectors up on a leg of my antenna tower with two **U** bolts. A piece of eight-conductor cable from RadioShack (#278-1583, about 15¢ / foot) feeds the information to the indicators in my shack. Yes, I've a few bucks in it. About $40 for an assembly that I will put up against anything I've seen on the market, which costs about $400 and up.—*Russell F. Sievert, W8OZA, 1411 Lonsdale Rd, Columbus, OH 43232*

SMALL-KNOB CURE FOR YAESU VX-150

◊ Some time ago, I purchased a Yaesu VX-150. I was quite pleased with the new rig, which is my first new hand-held in 10 years. After a short time operating, I realized that I had trouble turning the rig on and off, because the on-off knob was placed so close to the other knob and the antenna. I have large fingers and it was difficult for me to turn the small knob. One time I was finished with the rig and turned it off—except I didn't. This resulted in a dead battery the next time I wanted to use it. I began to think of how I could prevent this from happening again. After experimenting with several ideas, I decided that the knob was just too small and short given its location between the larger channel-selector knob and the antenna.

I tried several things to eliminate this problem. The one that worked was a short piece of latex tubing. I managed to slip the short piece over the existing knob. Doing so made the knob larger as well as a little longer. This solved my problem, and now I can turn the rig on and off without any trouble at all.

In working with this problem, I realized the small knob can slip off the switch shaft. I also noticed a small shim used to fit the knob to the stem of the volume control. Anyone that might try this solution should be careful not to lose that small shim. I removed the knob to install this piece of latex tubing because I thought the force required to push it down onto the knob might damage the volume control or the on-off switch. I do not recommend using any lubricant or adhesive with the tubing, because this would probably void the warranty. My fix has worked for many months of turning the rig on and off. I've never suffered a dead battery again.—*Richard Bergantzel, K6TRZ, 11134 Gaynor Ave, Granada Hills, CA 91344-3910*

ANOTHER TWO-BATTERY SOLUTION FOR MOBILES

◊ I write this in response to Steve Sparks, WK5S, his problem with the battery isolator and his solution.[2] I have the similar battery set up in my '94 Chevy van, in which I run a dual-band radio in cross-band mode that is left on most of the time. I also have a HF rig, scanner and a CB radio along with various amplifiers for RF and stereo (not the CB).

As a member of a Fire Department, I have experienced firsthand the problems with running an isolator for dual batteries. The newer trucks that I've seen now have the batteries wired parallel, no isolator. Understanding how these work, I've realized that there is at least a 0.7-V drop measured (depending on the manufacturer) from a diode on each battery—not good.

A slight modification is needed to the wiring on WK5S's dual battery setup by adding an on/off/on switch between the ignition switch and the continuous-duty relay coil (see Figure 4). The center terminal is connected to the relay, the up-position to the ignition switch (as in Steve's original schematic) and the down-position terminal wired to the second battery. This will activate the relay with the engine off. This allows

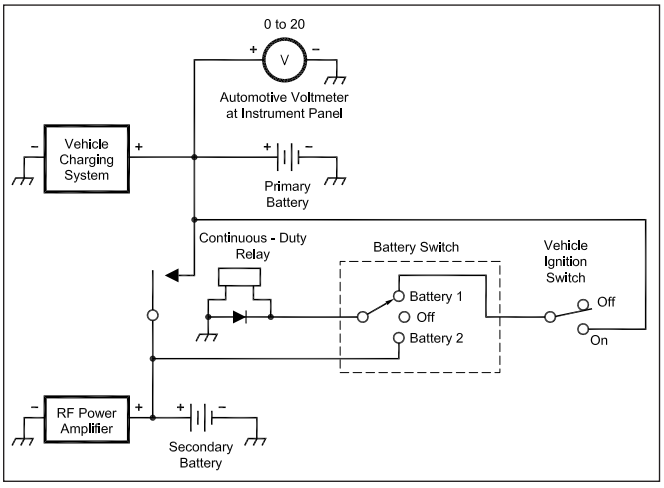


Figure 4—N9XUG's modification to WK5S's two-battery mobile installation.

me to eventually self jump-start my van when I leave my lights or dome light on all night. The center-off position works well for copying weak HF signals by eliminating wiper and turn signal noise. It also works well for shutting down the second battery if it shorts from all my deep cycling.

This setup does work great, and it would be good for campers, trucks with winches, trailer lights and so on.—*Chuck Blum, N9XUG, Machesney Park, IL 61115-2809;* **Smoke896@yahoo.com**

SMART WALL-WART + CO DETECTOR = RFI

◊ This nasty combination (Figure 5) is sure to get your attention! Mixing a carbon-monoxide (CO) detector and an "intelligent" wall-wart style charger on the same ac outlet, surely got noticed in my home at about 2 AM. As the transformer cycles through various levels of its charge cycle, it generates electrical noise that triggers the CO detector. In particular, this charger, for a pair of Motorola FRS radios, won't find itself anywhere near a CO detector while in use. It's best to let safety devices monopolize their outlet and find other locations for all those radio chargers. Unless of course you want to wake up in the middle of the night with your heart beating faster than the little LED on the face of the charger!—*Chris Brady, N3CB, 5 Yale Rd, Plymouth Meeting, PA 19462;* **n3cb@arrl.net**

Figure 5—A smart wall-wart charger may falsely trigger a CO detector when they're on the same outlet.

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 (see page 10), 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

[2]S. Sparks, WK5S, "A Two-Battery Solution for Mobiles," *QST*, Jun 2001, p 71.

QST Reviews Five High-Power Antenna Tuners

Reviewed by Jim Parise, W1UK, ARRL Technical Advisor

One piece of gear that finds its way into most everyone's shack at one time or another is an HF antenna tuner. First of all, the name "antenna tuner" is something of a misnomer. It does not tune the antenna at all, but acts as an impedance transformer that provides your transmitting equipment with the proper load, usually 50 Ω. Who needs an antenna tuner? Well, anyone who has the need to match an antenna with an impedance outside the range of their transmitter or amplifier's output circuits. Modern transceivers typically have built-in tuners that are capable of matching SWR mismatches up to 3:1. Beyond that they need help, and if you use an amplifier you most surely will need one. Many hams find themselves with limited antenna choices and the desire to operate on frequencies other than what they were designed for, or use non-resonant multiband antennas that require a tuner.

The five HF tuners we tested are all in the kilowatt class, meaning the manufacturer rates their power handling capability at 1 kW output or more. With the wide range of frequencies in the HF spectrum and the huge diversity of antenna types in use, tuners are expected to perform under an incredible number of possible combinations. Some are more efficient at it than others. A measure of a tuner's ability to transform impedances efficiently is energy loss. Under extreme conditions a tuner can get quite hot or arc over at power levels well under the manufacturers rating. Heat in a tuner is a product of loss. RF energy being dissipated as heat is lost power that will not find its way to your antenna and onto the air.

Tuner losses generally get higher as the impedance of the load decreases. If a ham were running 1500 watts into a tuner that was 50% efficient, 750 watts would be dissipated in the tuner. Most of the loss in a tuner occurs in the coil, and no coil can withstand 750 watts of power. A high-power tuner could probably be safely used at 50% efficiency and 100 watts, but hams should be careful with high SWR and high power, or a tuner failure is a real possibility.

Each tuner was tested into impedances that ranged from 6.25 to 400 Ω, and their respective percentage of loss and 1.5-SWR bandwidth measured. The tuners were also used in everyday communications on all bands at power levels up to 1 kW, matching a G5RV fed with balanced ladder line and a 160-meter inverted L fed with coax.

Table 1
Comparison of Five Antenna Tuners

	Ameritron ATR-30	MFJ MFJ-986	Palstar AT1500CV	Ten-Tec 238A	Vectronics HFT-1500
Circuit type	T-network	T-network	T-network	L-network	T-network
SWR/wattmeter	Cross-needle	Cross-needle	Cross-needle	Single-needle	Cross-needle
Balun type	4:1 current	4:1 current	4:1 voltage	4:1 voltage	4:1 voltage
Manufacturer's claimed PEP rating	3000 W	3000 W	1500 W	2000 W	2000 W
Manufacturer's claimed matching range	35-500 Ω	35-500 Ω	20-1500 Ω	5-3000 Ω	Not specified
Physical dimensions (HWD) in inches	5.25×13×14.4	4.1×11×15.2	4.5×12.5×12	5.5×13×11	5.5×12.5×12

Brennan Price, N4QX ♦ Assistant Technical Editor ♦ n4qx@arrl.org

AMERITRON ATR-30

The ATR-30 is Ameritron's legal limit T-network antenna tuner offering. It is housed in a plain, all black aluminum enclosure with a scratch resistant coated front panel. A look under the cover reveals two large variable capacitors and an air core edge wound silver plated roller inductor. Like most of the other tuners reviewed here, the capacitors are adjusted with vernier reduction drives, and although they tune smoothly, they require a lot of force to turn. The roller inductor is adjusted with a plastic lever type knob and is quite stiff to crank. The roller itself is a pinch roller, and the physical resistance in turning the crank may be offset by lessoned contact resistance.

The balun is constructed with three large cores and wound with wire covered with Teflon tubing. The cross-needle meter displays both average and peak power in switchable 300 W or 3 kW ranges. The wattmeter requires dc to function. It is illuminated by either a 12-V barrel connector on the back panel or a 9-V battery accessible through a trap door on the bottom of the unit. With 12 V, both the meter and inductor turns counter are illuminated. When a 9-V battery is used, the meter will function, but the panel lamps will not light.

Finding a match on 80 meters on the G5RV required quite a bit of time finding the right combination of capacitor tuning and inductance, and the stiff controls didn't make it much fun. Finding the sweet spot on the higher bands was much easier.

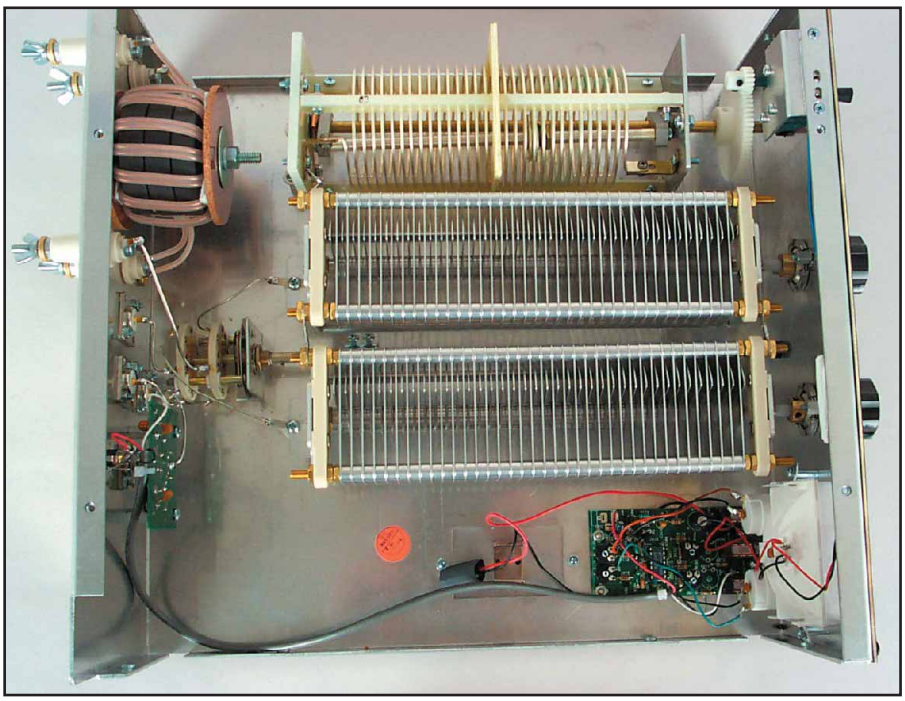
There are three coax outputs on the ATR-30, including two that may be switched direct or through the T-network and a third direct only. Single or balanced feed lines connect to large ceramic binding posts with wing nuts.

Manufacturer: Ameritron, 116 Willow Rd, Starkville, MS 39759; tel 662-323-8211; fax 662-323-6551; **www.ameritron.com**. Price: $599.95.

Table 2
Ameritron ATR-30

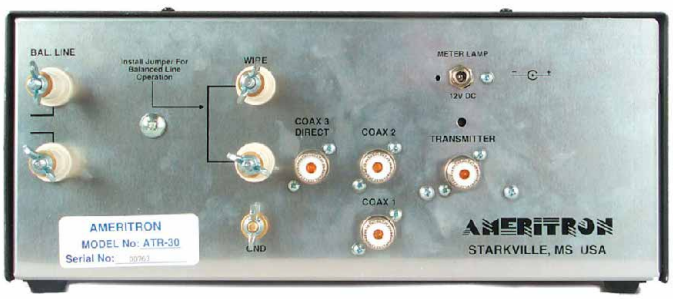
SWR	*Load (Ω)*		*160 m*	*80 m*	*40 m*	*20 m*	*10 m*
8:1	6.25	Power Loss %	20	12	<10	<10	<10
		1.5 SWR BW	1	3	>5	4	>5
4.1	12.5	Power Loss %	15	<10	<10	<10	<10
		1.5 SWR BW	3	4	>5	>5	>5
2:1	25	Power Loss %	10	<10	<10	<10	<10
		1.5 SWR BW	4	>5	>5	>5	>5
1:1	50	Power Loss %	<10	<10	<10	<10	<10
		1.5 SWR BW	>5	>5	>5	>5	>5
2:1	100	Power Loss %	<10	<10	<10	<10	<10
		1.5 SWR BW	>5	>5	>5	>5	>5
4:1	200	Power Loss %	<10	<10	<10	<10	<10
		1.5 SWR BW	>5	>5	>5	>5	5
8:1	400	Power Loss %	<10	<10	<10	<10	<10
		1.5 SWR BW	>5	>5	>5	>5	3

Notes
Power losses are expressed as a percentage. A 21% loss of power is 1 dB.
The 1.5-SWR Bandwidth (SWR BW) represents the bandwidth over which an SWR of 1.5:1 or less was maintained as a percentage of the measurement frequencies (1.8, 3.5, 7.2, 14.2 and 29.7 MHz).



Interior circuitry of the Ameritron ATR-30.

Front panel of the Ameritron ATR-30.



Rear panel connections on the Ameritron ATR-30.

MFJ-986

The 986 is one of more than 20 antenna tuner products currently offered by the prolific MFJ. It is rated for 1500 W PEP within the 35-500 Ω impedance range, positioning it alongside the 989C as one of their high power units. Unlike the traditional T-network with a pair of variable capacitors, the 986 makes use of a single variable capacitor and a wire wound air core roller inductor with a three digit turns counter. The tuner uses what MFJ describes as a "differential" capacitor. It has two discrete sets of fixed plates and one variable set, with a single capacitor control, forming a T-network with the inductor.

The cabinet is narrow and extends nearly 18 inches deep. The cross-needle meter has a high (3000 W) and low (300 W) setting switched by a front panel button, and it can display average and peak power as well as SWR. Providing 12 V to the connector on the back panel brightly illuminates the meter. Both the capacitor and roller inductor are directly driven. The inductance knob has a finger depression, such as often found on a transceiver's tuning knob. It is somewhat awkward to turn due to binding. The tuner had a tendency to creep around the operating desk when the inductor is rapidly turned. A check inside revealed several loose screws holding the inductor to the chassis. Tightening these did improve the smoothness somewhat.

The 986 provided a match to both antennas quickly, but arced over on 80 meters with the inverted L at 900 W. While this tuner does provide ease of use, one should give careful consideration to the loss figures in the tables. During operation the meter developed an intermittent problem with both needles going off scale even with very low power applied and a low SWR. Movement of the SWR bridge circuit board on the inside back panel seemed to correct the problem.

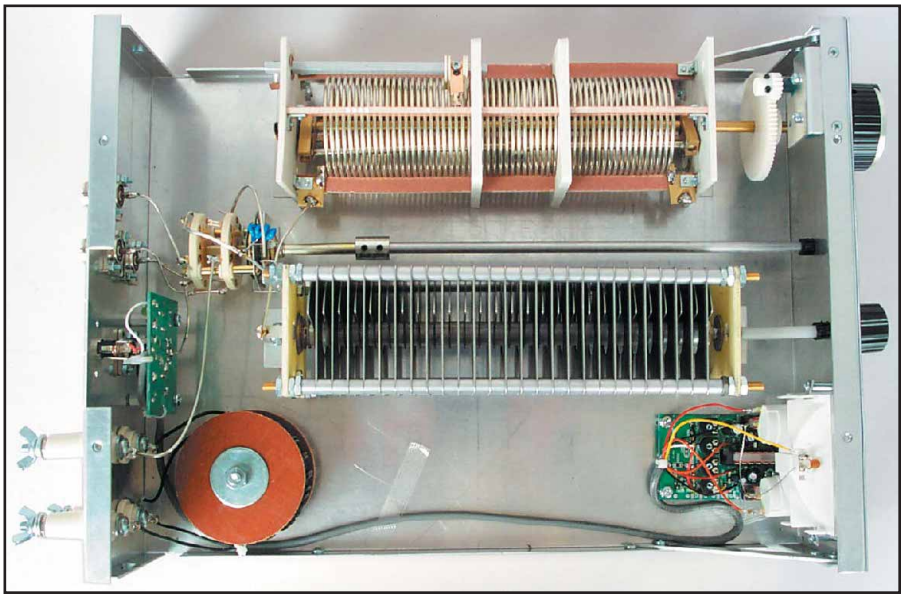
Two coax outputs are provided that can be switched to bypass the tuning circuit, as well as a third output for a dummy load. Balanced and single-wire feed lines connect to large ceramic feed through posts with wing nuts. A 4:1 two-core current balun is provided at the output.

Manufacturer: MFJ Enterprises, Inc, PO Box 494, Mississippi State, MS 39762; tel 800-647-1800; fax 662-323-6551; **www.mfjenterprises.com**. Price: $329.95.

Table 3
MFJ-986

SWR	*Load (Ω)*		*160 m*	*80 m*	*40 m*	*20 m*	*10 m*
8:1	6.25	Power Loss %	47	31	21	16	13
		1.5 SWR BW	1	1	2	4	>5
4.1	12.5	Power Loss %	33	22	14	12	11
		1.5 SWR BW	1	1	4	5	>5
2:1	25	Power Loss %	25	20	10	<10	10
		1.5 SWR BW	1	2	4	>5	>5
1:1	50	Power Loss %	22	12	<10	<10	<10
		1.5 SWR BW	2	3	>5	>5	>5
2:1	100	Power Loss %	15	10	<10	<10	19
		1.5 SWR BW	3	5	>5	>5	>5
4:1	200	Power Loss %	11	<10	<10	<10	<10
		1.5 SWR BW	3	>5	>5	>5	>5
8:1	400	Power Loss %	10	<10	<10	11	16
		1.5 SWR BW	3	>5	>5	>5	5

Notes
Power losses are expressed as a percentage. A 21% loss of power is 1 dB.
The 1.5-SWR Bandwidth (SWR BW) represents the bandwidth over which an SWR of 1.5:1 or less was maintained as a percentage of the measurement frequencies (1.8, 3.5, 7.2, 14.2 and 29.7 MHz).



Interior circuitry of the MFJ-986. When viewed from the side, two sets of fixed plates are seen on the differential capacitor.

Front panel of the MFJ-986.

Rear panel connections on the MFJ-986.

PALSTAR AT1500CV

The Palstar AT1500CV is a T-network tuner solidly constructed in a compact aluminum enclosure. Inside, the metering and SWR bridge circuitry are encased in their own aluminum boxes. The moderately sized variable capacitors are mounted side by side and feature large calibrated dials and silky smooth vernier tuning that allows for precise adjustment. Palstar indicates that newer units incorporate a roller bearing assembly which makes inductor adjustment smoother. The roller inductor is quite large. It is an air core silver plated edge wound coil with heavy-duty ceramic forms. Control of the inductor is via a lever handle and mechanical turns counter. It is not as smooth as some of the other tuners and tends to lurch as it is rotated during fine adjustments. The cross-needle meter displays SWR and average forward and reflected power in 300 and 3000 W ranges, with no option for peak power metering. It is illuminated with 12 V from an included wall adapter.

Achieving a 1:1 SWR on the G5RV was possible on all bands from 80 through 10 meters at its rated power maximum of 1000 W single tone. Similar results were noted on the inverted L. Although the tuning chart provided in the manual does not include settings for 30 meters, the tuner easily matched both antennas on that band. This tuner has a solid feel to it and doesn't creep around while making adjustments.

In laboratory tests, the AT1500CV had more difficulties on 160 meters than on other bands. A 1:1 SWR was only obtainable with the 25 and 50-Ω loads. Even at those loads, the power losses at 160 meters were measurably greater than those on other bands at the same loads. The variable capacitors are 240 pF maximum, which explains the 160 meter performance. The tradeoff results in lighter weight.

Antenna connections on the back panel include three coax inputs. Two are available direct or through the tuning network and one is bypassed straight through. The bypass output can also be used with an optional 4:1 balun available for $39.95. Balanced or single wire feed lines are attached to Delrin terminal posts with wing nuts. Longer threaded material on the terminal posts would be a welcome improvement and make attachment of larger gauge wire much easier.

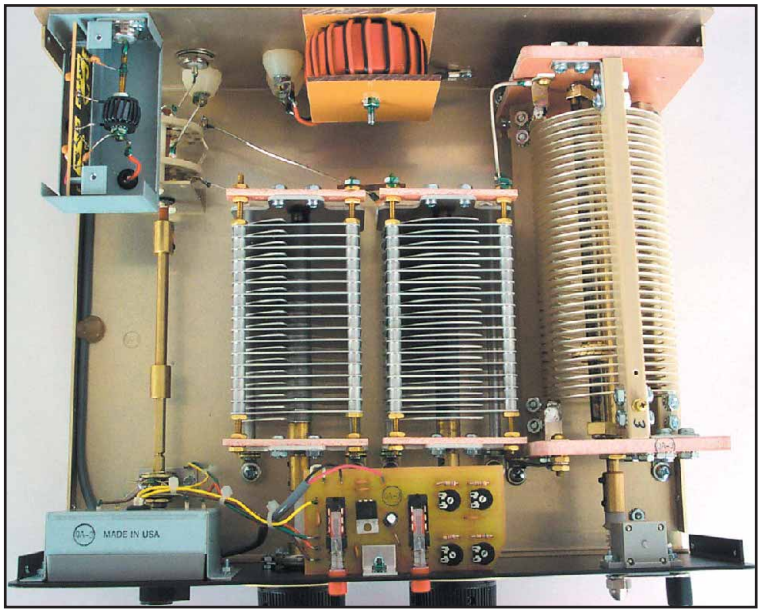
In one isolated circumstance during lab testing, our engineer felt an RF bite on 10 meters through the metal portion of the inductor crank. This did not seem to be a pervasive problem, and Palstar indicates that the grounding on the crank has also recently been improved.

Manufacturer: Palstar, Inc, 9676 N Looney Rd, PO Box 1136, Piqua, OH 45356; tel 937-773-6255; fax 937-773-8003; **www.palstarinc.com**. Price: $429.95, optional 4:1 balun $39.95.

Table 4
Palstar AT1500CV

SWR	*Load (Ω)*		*160 m*	*80 m*	*40 m*	*20 m*	*10 m*
8:1	6.25	Power Loss %	No Match	25	16	12	12
		1.5 SWR BW		1	2	>5	3
4.1	12.5	Power Loss %	No Match	16	13	<10	11
		1.5 SWR BW		2	4	>5	>5
2:1	25	Power Loss %	21	13	<10	<10	<10
		1.5 SWR BW	2	3	>5	>5	>5
1:1	50	Power Loss %	13	<10	<10	<10	<10
		1.5 SWR BW	3	>5	>5	>5	>5
2:1	100	Power Loss %	No Match	<10	<10	<10	13
		1.5 SWR BW		>5	>5	>5	>5
4:1	200	Power Loss %	No Match	<10	<10	<10	12
		1.5 SWR BW		>5	>5	>5	>5
8:1	400	Power Loss %	No Match	<10	<10	<10	<10
		1.5 SWR BW		>5	>5	>5	5

Notes
"No Match" means that a 1:1 SWR could not be obtained.
Power losses are expressed as a percentage. A 21% loss of power is 1 dB.
The 1.5-SWR Bandwidth (SWR BW) represents the bandwidth over which an SWR of 1.5:1 or less was maintained as a percentage of the measurement frequencies (1.8, 3.5, 7.2, 14.2 and 29.7 MHz).



Interior circuitry of the Palstar AT1500CV.

Front panel of the Palstar AT1500CV.

Rear panel connections on the Palstar AT1500CV.

TEN-TEC 238A

The Ten-Tec 238A is the only tuner in our roundup to utilize an L-network. Using an innovative switching arrangement, the 238A actually provides five different circuit configurations to maximize efficiency. A look at the low loss figures in the table confirms this. The well-constructed tuner makes us of a single variable capacitor and a smooth turning wire wound roller inductor to match impedances up to 3000 Ω. Additional capacitance is switched into the circuit by means of a front panel switch. Five settings each are available for high and low impedances, as well as a bypass choice. A ceramic feed through post on the back panel provides a connection to add an additional 1000 pF capacitor (included with the tuner) to the circuit for matching 160 meter antennas. The small dual use meter can be switched to display SWR or RF power in either a 2000 or 200 W range. The meter lamp is powered by 12 V on the back panel.

The 238A handily matched all bands on both test antennas at full legal limit power. On 10 meters using the G5RV, the capacitor and inductor controls were a bit sensitive to small adjustments. One minor complaint: Measuring forward power in the high power range on the meter caused the indicator to slap the right extreme position during CW keying.

In laboratory tests, the 238A did not match on 160 meters into a 6.25-Ω load until 2700 pF of external capacitance was added. Ten-Tec indicates they will provide additional capacitors to purchasers at no extra charge. Also, the power losses on 10 meters were considerably greater than those on other bands. However, the 238A performed very admirably on most other bands, quite often exhibiting the least losses on given band and load combinations.

The four-position antenna switch on the front panel allows selection of four coax outputs or a balanced/random wire. The balanced output and one coax connector share position four. A two-core balun is provided for matching the balanced output.

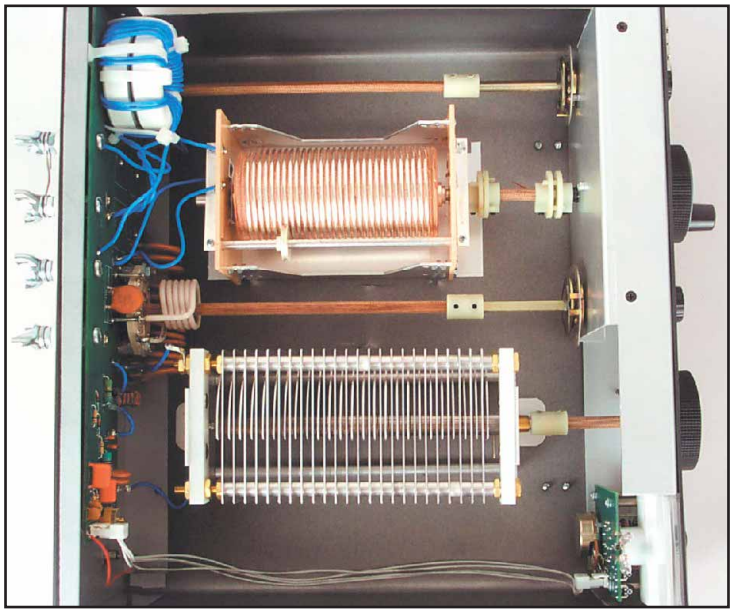
Table 5
Ten-Tec 238A

SWR	*Load (Ω)*		*160 m*	*80 m*	*40 m*	*20 m*	*10 m*
8:1	6.25	Power Loss %	No Match	<10	<10	<10	28
		1.5 SWR BW		>5	>5	>5	2
4.1	12.5	Power Loss %	<10	10	<10	<10	22
		1.5 SWR BW	>5	>5	>5	>5	2
2:1	25	Power Loss %	<10	10	<10	<10	17
		1.5 SWR BW	>5	>5	>5	>5	3
1:1	50	Power Loss %	<10	<10	<10	<10	<10
		1.5 SWR BW	>5	>5	>5	>5	>5
2:1	100	Power Loss %	<10	<10	<10	<10	20
		1.5 SWR BW	>5	>5	>5	>5	4
4:1	200	Power Loss %	<10	<10	<10	<10	20
		1.5 SWR BW	>5	>5	>5	>5	4
8:1	400	Power Loss %	<10	<10	<10	10	13
		1.5 SWR BW	>5	>5	>5	>5	1

Notes
"No Match" means that a 1:1 SWR could not be obtained, even with the included 1000 pF external capacitor attached. A match on 160 m at 6.25 Ω was achieved with 2700 pF of external capacitance; the power loss was less than 10%, and the 1.5 SWR BW was greater than 5%.
Power losses are expressed as a percentage. A 21% loss of power is 1 dB.
The 1.5-SWR Bandwidth (SWR BW) represents the bandwidth over which an SWR of 1.5:1 or less was maintained as a percentage of the measurement frequencies (1.8, 3.5, 7.2, 14.2 and 29.7 MHz).

Since we purchased our review unit, Ten-Tec has produced a substantially identical antenna tuner, the 238B. The Tennessee manufacturer is now selling only the 238B model.

Manufacturer: Ten-Tec, 1185 Dolly Parton Pky, Sevierville, TN 37862; tel 865-453-7172; fax 865-428-4483; **www.tentec.com**. Price: $475.00 (current model 238B).



Interior circuitry of the Ten-Tec 238A. The 238A is the only one of the five tuners reviewed here without an air-core inductor. The inductor here has a linen phenolic core.

Front panel of the Ten-Tec 238A.

Rear panel connections on the Ten-Tec 238A.

VECTRONICS HFT-1500

The first thing you notice about the HFT-1500 is the LED bar graph on the front panel, which is used to display relative peak forward power. The bright green bar graph is adjusted to its maximum scale with a level control on the front panel to a known forward power reading on the cross-needle wattmeter. While it doesn't show actual power readings, it does give a quick visual indication of peak power. The cross-needle meter displays only average power and SWR in two power ranges selected by a pushbutton switch. The traditional T-network design uses two 4.5-kV variable capacitors adjusted with large comfortable knobs and very smooth vernier tuning. This tuner stays put on the desk while you utilize a lever handle and gear driven 5 digit mechanical turns counter to adjust the air wound roller inductor.

Tuning the 160-meter inverted L and the G5RV on all bands except 10 meters was easily accomplished, with no problems handling 1 kW. In the field, the best SWR that could be obtained on 10 was 2.33:1; this is possibly due to the additional "loading" when a human touches the all-metal inductor crank. The ARRL Lab adjusted the inductor with a wooden pencil in some cases to obtain a match.

The HFT-1500 provides two coax inputs and a third that completely bypasses the tuning network. The balanced and single wire inputs are Delrin terminal posts connected to a large single core 4:1 voltage balun.

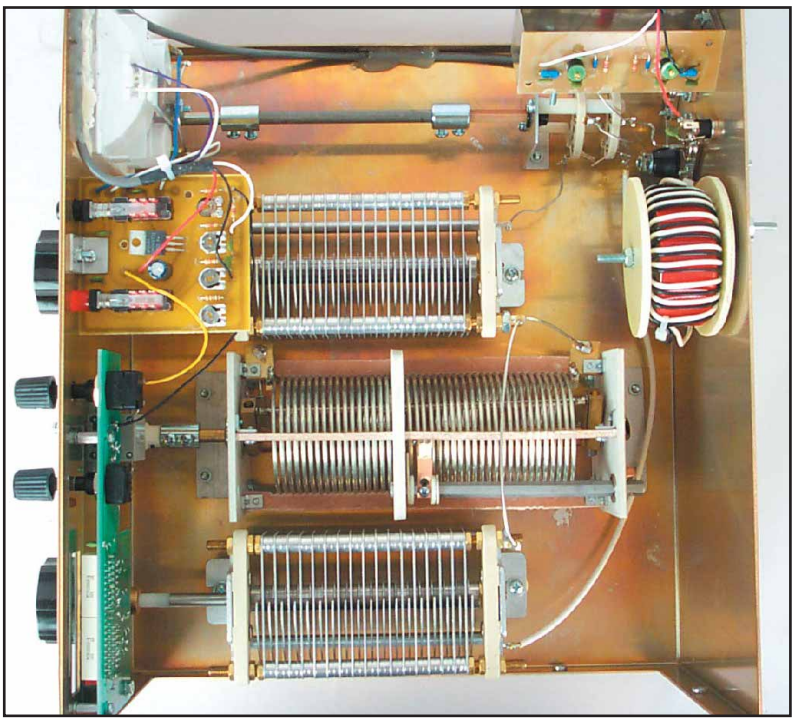
In some circumstances during lab testing, our engineer felt RF bites through the metal portion of the inductor crank. Later units feature a metal shaft bushing, which provides a better ground. This was not experienced in field testing, but tuner adjustments were not made at high power.

Manufacturer: Vectronics, 300 Industrial Park Rd, Starkville MS 39759; tel 662-323-5800; fax 662-323-6551; **www.vectronics.com**. Price: $459.95.

Table 6
Vectronics HFT-1500

SWR	*Load (Ω)*		*160 m*	*80 m*	*40 m*	*20 m*	*10 m*
8:1	6.25	Power Loss %	45	42	16	15	8
		1.5 SWR BW	1	<1	2	5	>5
4.1	12.5	Power Loss %	32	31	11	<10	<10
		1.5 SWR BW	>5	>5	3	>5	>5
2:1	25	Power Loss %	19	24	<10	<10	<10
		1.5 SWR BW	2	1	>5	>5	>5
1:1	50	Power Loss %	12	<10	<10	<10	<10
		1.5 SWR BW	3	>5	>5	>5	>5
2:1	100	Power Loss %	12	<10	<10	<10	<10
		1.5 SWR BW	3	>5	>5	>5	>5
4:1	200	Power Loss %	<10	<10	<10	<10	<10
		1.5 SWR BW	4	>5	>5	>5	>5
8:1	400	Power Loss %	<10	<10	<10	11	16
		1.5 SWR BW	4	>5	>5	>5	4

Notes
Power losses are expressed as a percentage. A 21% loss of power is 1 dB.
The 1.5-SWR Bandwidth (SWR BW) represents the bandwidth over which an SWR of 1.5:1 or less was maintained as a percentage of the measurement frequencies (1.8, 3.5, 7.2, 14.2 and 29.7 MHz).



Interior circuitry of the Vectronics HFT-1500.

Front panel of the Vectronics HFT-1500.

Rear panel connections on the Vectronics HFT-1500.

Antenna Tuner Testing Methods vs Accuracy

In the last round-up of manual antenna tuners, all of the test data was created using the test methods devised by Frank Witt, AI1H (described in depth in April and May 1995 *QST*). This method uses an antenna analyzer and measures changes in SWR with changes in loads on the tuner. That change in SWR can be used to calculate the tuner losses. Following the Product Review, we received some correspondence that suggested that the method was insufficient to produce "laboratory grade" accuracy in measurements. At the time, this prompted some further investigation on the part of ARRL Lab staff. The results of this study indicated that AI1H method was reasonable over the *useful* range of the tuners (the conditions for which the loss was reasonable). The Lab concluded at the time that the accuracy decreased as the tuner losses increased.

When the Product Review Editor brought the Lab another collection of tuners to test, it was decided to employ a more direct method of loss measurement, and to perform many measurements by the AI1H method as well, so as to put the issue to rest. By comparing the two sets of results, a reasonable conclusion could be drawn about the correlation of both methods used.

In this review, the method used to measure the loss of the tuners was as follows. Two test fixtures were built which would hold combinations of high power 50-Ω "non-inductive" carbon resistors (one fixture for parallel combinations and one for series). Even with the non-inductive resistors, some net fixture inductance was apparent at some frequencies, so a variable capacitor was used to compensate. The fixture accuracy was measured using the Lab's vector impedance meter.

Each fixture used an input connection (for the tuner) and an output connection. The output connection went to a 50-Ω input power attenuator, which took the place of one of the resistors in the load (for the series loads, it was always the one on the ground side of the network). The output of the power attenuator was connected to a high accuracy laboratory wattmeter, and the actual attenuation was measured for each frequency. The tuners were matched at low power, then 100 W of RF was applied at the input, with the output being measured by the Lab's wattmeter.

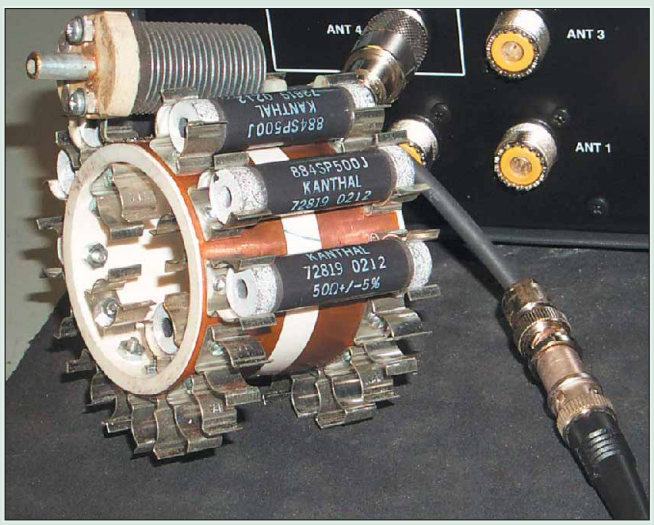
Because of the extra steps involved, the process was more time consuming than the AI1H method. Therefore, to reduce the required test time to a reasonable amount, the number of tests were reduced by eliminating the 16:1 SWR tests (outside of the claimed matching range of most tuners) and by eliminating the balanced output tests (non-trivial to perform by the direct measurement method).

The results of these "direct method" tests appear in the tables in this review. However, that still leaves the question of how the older test method compares with these results. Before getting into the nitty-gritty, it should first be noted that a variation of a few tenths of a decibel (excellent RF measurement precision indeed) translates to a significant difference in loss percentage for relatively low losses. That is to say that if one method indicates a loss of 3 percent and the other indicates a loss of 6 percent, a good portion of the difference is in the limits of the measurement accuracy.

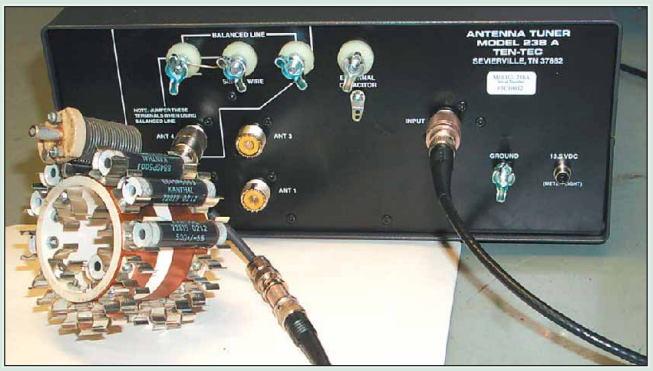
In comparing the results for both methods using the Lab's test equipment, when the tuner losses were less than 20 percent, there was excellent correlation between measurement methods (loss differences of 2-3 percent). For losses between 20 and 40 percent, loss differences *generally* ranged around 5-6 percent, with a couple of measurements that differed by 7 percent. (An accuracy difference of 7% is about 0.3 dB.)

In a "big picture" examination, the raw data seemed to suggest that one of the sources of error was related to the measurement of reactive components in an impedance measurement. This is part of the 2:1 SWR measurements made in the AI1H method. It appeared that for higher reactive values, the measurements were not being accurately reported by the antenna analyzer being used for the test. Given previous tests of antenna analyzers, this is not entirely surprising. The current spate of SWR analyzers in use by hams do a good job at measuring the SWR and impedance of antenna systems. However, expected variations in the manufacture of these types of equipment can lead to significant variations in the results, especially with resonant loads as found in matched antenna tuners. With the luck of the draw—as apparently happened with the ARRL Lab's instrument—the accuracy can be quite good, but the next meter off the shelf might give different results under the same test conditions. Although the differences in terms of percentage might be relatively minor, reading 90% loss under circumstances where the loss was really 80%, this "10%" difference does mean a 3 dB change in the amount of power the tuner can safely dissipate under those conditions, possibly a consideration for the high-power operator.

The bottom line is that the original test method was reasonably accurate, but not necessarily reproducible. To the extent practical, the Lab will continue to use the more-accurate "direct" method for future testing. The AI1H method will still be used for some testing, but only with careful cross-checking of the instrumentation used.—*Michael Tracy, KC1SX, ARRL Lab*



This is how each tuner was connected for testing in the ARRL Lab. A 100 W RF source (off picture rear) fed the input of the tuner. The resistive load was connected to the antenna output. The load was connected to a 50-Ω power attenuator (off picture right), which took the place of the final resistors.



This is a close-up of the parallel load test fixture. The variable capacitor was used to compensate for fixture inductance encountered at some frequencies.

Going Once, Going Twice . . .

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from dealers. ARRL receives no remuneration from anyone involved with the sale or manufacture of items presented in the Product Review, Short Takes or New Products columns.—*Ed.*]

The ARRL-purchased equipment listed below is for sale to the highest bidder. Prices quoted are the minimum acceptable bids, and are discounted from the purchase prices. All equipment is sold without warranty.

Kenwood LF-30A low pass filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $40.

MFJ-704 low pass filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $30.

Nye Viking 020-001 low pass filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $40.

Vectronics LP-30 low pass filter (newer design) (see "Product Review," Aug 2002 *QST*). Minimum bid: $45.

Vectronics LP-2500 low pass filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $90.

Bencher YA-1 low pass filter filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $50.

Gold Line 1089 low pass filter filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $40.

Gold Line 1089S low pass filter filter (see "Product Review," Aug 2002 *QST*). Minimum bid: $65.

Yaesu FT-1000 MP MARK-V Field HF transceiver, serial number 2C010120 (with repaired VRF circuitry) (see "Product Review," Aug 2002 *QST*). Minimum bid: $1600.

West Mountain RIGrunner, model 4012, with cable and connectors (see "Short Takes," Oct 2002 *QST*). Minimum bid: $70.

West Mountain RIGrunner, model 4008, *without* cable and connectors (see "Short Takes," Oct 2002 *QST*). Minimum bid: $45.

West Mountain RIGrunner, model 4005, with cable and connectors (see "Short Takes," Oct 2002 *QST*). Minimum bid: $35.

Yaesu FT-8900R quad-band FM transceiver, serial number 2H020415 (see "Product Review," Dec 2002 *QST*). Minimum bid: $325.

RadioShack HTX-420 dual-band FM handheld transceiver, serial number 0001350 (see "Product Review," Dec 2002 *QST*). Minimum bid: $170.

MFJ-890 DX beacon indicator (see "Product Review," Dec 2002 *QST*). Minimum bid: $50.

Sealed bids must be submitted by mail and must be postmarked on or before April 1, 2003. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, clearly identify the item you are bidding on, using the manufacturer's name and model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by ARRL. Please include a daytime telephone number. The successful bidder will be advised by telephone or by mail. Once notified, confirmation from the successful bidder of intent to purchase the item must be made within two weeks. No response within this period will be interpreted as an indication of the winning bidder's refusal to complete the transaction. The next highest bidder will then have the option of purchasing the item. No other notifications will be made, and no information will be given to anyone other than successful bidders regarding the final price or the identity of the successful bidder. If you include a self-addressed, stamped postcard with your bid and you are not the high bidder on that item, we will return the postcard to you when the unit has been shipped to the successful bidder.

Please send bids to Bob Boucher, Product Review Bids, ARRL, 225 Main St, Newington, CT 06111-1494. QST

NEW BOOKS

WIND POWER FOR HOME AND BUSINESS

By Paul Gipe

Chelsea Green Publishing, PO Box 428, White River Junction, VT 05001. 6×9 inches, 414 pages, B&W illustrations. Available from the ARRL: **www.arrl.org/shop**, *tel (toll free in the US) 888-277-5289. $35; ARRL Order No. 8867.*

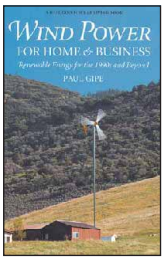
Reviewed by Steve Ford, WB8IMY

◊ Solar power gets a fair amount of attention in Amateur Radio circles, but the subject of wind power is often neglected. *Wind Power for Home and Business* doesn't speak directly to the Amateur Radio audience, but the information it contains is clearly applicable. Power for repeater installations comes immediately to mind. The author, Paul Gipe, states that a wind turbine installed at site with an average wind speed of 9 MPH can produce more power than a comparable gasoline-powered generator. Wind power could also be appropriate for portable operations.

Before you can even consider wind power, you have to evaluate the amount of average wind energy available at your location. *Wind Power for Home and Business* devotes an entire chapter showing you how to calculate the average daily wind speed. Yes, there are some mathematic exercises involved, but Gipe approaches this in an easygoing, conversational style. He explains how terrain and seasonal variations effect average wind speed. He also shows how you can set up temporary anemometers to take measurements. After all the measurements and calculations are complete, the result is a reliable estimate of how much power you can expect your wind turbine to generate.

When you're ready to take the next step, *Wind Power for Home and Business* guides you through the various wind-generator technologies available to you. Some are appropriate and affordable, but others are not. This book helps you sort the wheat from the chaff.

An entire chapter details tower and mast installation. This portion of *Wind Power for Home and Business* could be removed and repackaged as a guide to putting up ham towers. Gipe covers guy anchors, concrete bases and much more. The book also sets aside a large chapter on safety—particularly as it applies to electrical and mechanical safety.



Gipe has managed to condense a wealth of practical information into *Wind Power for Home and Business*. If you're ready to take on the challenge of wind power, or if you're considering wind power in your future, this book is an essential reference. QST

FEEDBACK

◊ Chessbyradio.com [Strays, Dec 2002, p 94] is looking for a new home server. In the meantime, please use **www.chesswarrior.com/chessbyradio**, my main chess site.—*John Dutton, WA2HSO*

◊ The "Old Radio" column [Dec 2002, p 85] states, incorrectly, that the HR-1680 receiver had a digital display; it does not. It's still a nice $100 radio, though, and you can have a hundred dollars worth of fun with it.—*John Dilks, K2TQN*

◊ Clarification: The article about the recent ARRL Director and Vice Director election ("Happenings," Jan 2003, p 69] did not include the fact that Bill Edgar, N3LLR, was elected without opposition to a full three-year term as Atlantic Division Vice Director.

◊ In my December article ["Try Copper for 2 Meters—The Cu Loop," p 46], it should be noted that the photo in Figure 2 showing the antenna mounted in the vertical plane is actually a physical compromise being used to work both horizontal and vertically polarized signals without change. This polarization is still horizontal but does have a vertical component that gives it an advantage over the full horizontal mounting for working repeaters, etc. If you intend to work primarily vertically polarized signals the antenna should be mounted with the split element in the vertical plane. The maximum radiation would then be on a line through the feed point and gap. I hope to have radiation patterns available for a future article. For handheld direction finding, the antenna should be oriented as shown in Figure 2 with the null on a line through the shorter sides.—*Dick Stroud, W9SR* QST

TECHNICAL CORRESPONDENCE

OPTIMIZING THE HEATHKIT HW-101, SB100-102 TRANSCEIVERS

By Mark Graalman, WB8JKR, 5004 South Ave, Toledo, OH 43615-6429; **wb8jkr@juno.com**; *and Len Greenberg, WB8JCJ, 23202 Cuervo Dr, Valencia, CA 91354-2222;* **wb8jcj@arrl.net**

◊ The Heathkit HW/SB transceivers were popular in the late 1960s through 1970s and are fairly plentiful on the used market even today. These modifications will increase the audio quality of both receive and transmit, improve operation on CW, enhance strong-signal handling of the rigs and make them usable with low-impedance headphones. These changes require no new holes or mechanical changes at all; the rig can be easily restored to original condition at anytime. The text deals with the HW-101, but the changes are applicable to the above mentioned SB-series as well.

Conversion to Low-Impedance Headphones

These rigs are designed for high-impedance headphones, but if low-impedance phones are used the outboard speaker will not mute completely. To convert for low-impedance phones, make these wiring (refer to WebFig 1,[1] pictorials 8-4 and 8-5 of the HW-101 manual):

1. Move the black wire from terminal strip BA lug 2 to lug 3 (ground).
2. Remove the green wire and the 100-Ω resistor from jack AB (speaker).
3. Connect the green wire to terminal strip BA lug 2.
4. Connect the 100-Ω resistor removed in Step 2 to lugs 2 and 3 of terminal strip BA.
5. Remove the jumper wire from lugs 1 and 2 of headphone jack L.
6. Run a new wire along the wiring harness from speaker jack AB lug 1 to the headphone jack lug 2.

The external speaker should now mute completely with low-impedance phones.

Improved CW Operation

In the CW mode the rig's relays are energized by the CW sidetone driving the VOX relay amplifier. The sidetone drive to the VOX amplifier is a bit weak for fast relay action, and at speeds approaching 20 wpm the first-dot RF may be clipped due to the slow response time. Correcting this is a very simple modification—simply replace the 470-kΩ resistor R328 on the audio board with a 1-kΩ resistor (see WebFig 2). This increases the drive to the VOX amplifier so the relays pull in quicker. Now the rig will key reliably at 20 WPM. The first dot tends to be shortened at 25 WPM but the rig is usable.

Another annoying problem with these rigs is the CW sidetone. Although the sidetone amplifier is in deep cutoff, there is enough coupling through the tube for the sidetone to be heard even when the key is up. Fortunately, this is also fairly easy to correct:

1. Connect a 0.001 µF disk capacitor (*do not* use a higher value) from relay RL1 pin 1, to ground (see WebFig 1).
2. Connect an 8-inch piece of wire to pin 1 of RL1 and run this wire through the same opening in the shield as the wiring harness.
3. On the audio board, replace 1-MΩ resistor R326 with a 2.2-MΩ resistor (see WebFig 2).
4. At the circuit-board junction of R326 and C311, connect one side of a 0.005 µF, 500 V disk capacitor; connect the other side to the wire from RL1 pin 1.

During receive, the sidetone will now be bypassed to ground by the normally closed contact on RL1. During transmit, RL1 opens and the sidetone works normally.

Transmit Improvements

The transmitter audio quality can be improved by changing the value of coupling capacitor C11 on the modulator board from 0.001 µF to 0.01 µF (see WebFig 4). This increases the low-frequency response and gives the transmit audio a little more "body."

If 10 kΩ resistor R202 is present between the IF (L101 pin 4) and band-pass circuit boards (V5 pin 2), replace it with a piece of insulated hook-up wire (see WebFig 3). This increases drive to the first transmit mixer. (This change is already incorporated in later model HW-101s.)

Receive Improvements

The receiver's strong-signal-handling capability and audio quality can be vastly improved by the following changes.

1. During alignment, check to see if T-102 (WebFig 3) peaks at two points—one for transmit and a slightly different setting for receive. If so, peak the transformer for maximum transmit drive rather than maximum receive gain. The receiver has an abundance of gain, but the transmitter could use a little extra. This lowers the receiver gain but *does not* affect receiver sensitivity.
2. Change screen dropping resistor R113 in the second IF amplifier (V4) from 1 kΩ to 10 kΩ (see WebFig 3). This reduces the stage gain a bit and improves gain distribution.
3. The receiver improvement is to increase the BFO (carrier oscillator) drive to the product detector. This should be about five times the voltage level of the IF signal to minimize distortion, but on these rigs, the IF signal can equal the BFO level under strong-signal conditions, resulting in a very raspy, distorted audio quality. The major problem is that during receive, the BFO signal is coupled to the product detector cathode through C17, a 12-pF silver-mica capacitor and a piece of coax. The capacitance of the coax cable exceeds the value of C17, and the combination of the two acts as a voltage divider, greatly reducing BFO drive to product-detector V13C. To correct this increase the BFO coupling and decrease, the IF drive to V13C.

To increase BFO coupling, replace C17 on the modulator board with a 100-pF silver mica, and replace the 33-kΩ resistors R6 and R7 on the modulator board with 27-kΩ resistors (see WebFig 4). To reduce the IF drive, change resistor R123 on the IF board from 470 Ω to 75 Ω (see WebFig 3).

4. Additional high-frequency roll off removes the raspy nature of the receive audio. This is accomplished by changing the value of capacitor C119 on the IF board from 500 pF to 0.001 µF (see WebFig 3). The low-end response of the audio amplifier increases slightly if you replace coupling capacitor C306 on the audio board with a 0.01-µF disc capacitor (see WebFig 2).
5. Any voltage-regulator hash generated by V18 can be reduced by connecting a 0.001-µF, 500-V disk capacitor from V18 pin 1 to the ground foil on the audio board.
6. Some birdies heard in the tuning range of the receiver are weakened

[1]Because of space constraints, the figures cannot be presented within Technical Correspondence. The description here is sufficiently detailed for readers to perform the modifications. Readers who want the graphics can download a graphics package from the ARRLWeb at **www.arrl.org/files/qst-binaries/**. Look for 03TC02.ZIP.

considerably by bypassing the filament string to ground with a 0.01 µF capacitor connected from the filament common point on the bandpass circuit board to ground. This is the point where the four brown wires connect, about an inch below pin 1 of V19 (WebFig 5).

IF Filter Passband Improvements

I believe the crystals for the carrier oscillator are of fairly wide tolerance, so the injected LSB/USB/CW carrier may be improperly positioned on the slope of the IF filter. This can affect both receive and transmit audio responses greatly. Telltale signs of this are audio responses that vary between USB and LSB, and reduced CW power output when using the CW filter.

It is relatively easy to tell if the USB/LSB carrier insertion points aren't placed equidistant from the center of the IF filter passband. After a $^1/_2$-hour warm-up, disconnect any antenna and peak the preselector for maximum receiver gain. Next turn up the volume control to a slightly higher than normal level and listen closely to the hiss coming from the speaker. Switch to the opposite sideband. The pitch of the receiver background noise should be the same, if the USB and LSB carriers are equidistant from the filter center frequency.

If the carrier oscillator frequency is too far from the filter passband, the receive and transmit signals lack "lows," but the opposite sideband rejection is high. If the carrier oscillator frequency is too close to the filter center frequency, the receive and transmit signals will have excessive "lows" and the opposite sideband rejection and carrier suppression will suffer. Balance is the key.

On my particular HW-101, the measured carrier-oscillator frequencies were 3393.8 kHz (LSB), 3395.9 kHz (USB) and 3395.17 kHz (CW). This resulted in a "tinny" sounding audio response in LSB compared to USB, and a very "bassy" USB. The CW power output while using the SSB filter was 110 W, but since the CW carrier oscillator injection was so far from the CW filter center-frequency of 3395.4 kHz, the CW power output was 50 W while using the CW filter!

Heath's intended frequencies for the carrier oscillator were 3393.6 kHz (LSB), 3396.6 kHz (USB) and 3395.4 kHz (CW). With the specified filter center-frequency of 3395.0 kHz, the USB and LSB carrier positions would be 1.6 kHz each side of the filter center-frequency. Unfortunately, the filter center-frequency may not be exactly 3395.0 kHz. In order to determine the filter center-frequency one must balance the audio response between both sidebands, measure the USB and LSB carrier frequencies, add them and divide by two. The result will be the IF filter center frequency of your rig.

For example, if the USB/LSB audio responses are balanced, and the measured carrier frequencies are 3396.31 kHz and 3393.51 kHz, actual filter center frequency is (3396.31 + 3393.51) / 2 = 3394.91 kHz.

I like audio a tad "bassy," so I placed my carrier points closer (1.4 kHz) to the filter center frequency than Heath's recommended 1.6 kHz. The oscillator frequency is lowered by placing a small capacitance across the crystal, and raised by adding capacitance in series with the crystal. To put a capacitor in series with the crystal simply cut one circuit board trace just before the crystal pin as indicated in WebFig 4 and solder the capacitor across the opened trace. A 100-pF series capacitor moves the crystal frequency upward about 100 Hz, but a 100-Hz downward shift requires only about 10 pF across the crystal. In the Heath manual, the positions of Y1 and Y3 were interchanged and have been corrected here.

On my HW-101, I put the capacitors (silver micas) directly on the circuit board foils. I got one sideband to sound the way I liked, and then simply adjusted the other to match it. I needed a 10-pF capacitor across the LSB crystal, 100 pF in series with the USB crystal and 80 pF in series with the CW crystal. Following these changes, the new carrier oscillator frequencies for my rig are 3393.51 kHz (LSB), 3396.31 kHz (USB) and 3395.38 (CW). The audio is perfectly balanced when switching between sidebands, indicating a true IF filter center frequency of 3394.91 kHz. The CW power output while using the CW filter went from 50 W to 110 W. I also soldered a short loop of wire to the center lug of the carrier null pot to serve as a test point to measure the carrier oscillator frequency. Be sure that once you have determined the filter center-frequency, you place the oscillator frequencies no closer than about 1.4 kHz and no further than 1.6 kHz from the filter center-frequency.

To recap, match the responses between USB and LSB by ear. Then verify with a frequency counter that each carrier is between 1.4 kHz and 1.6 kHz from the filter passband center. We can match the pitch between USB and LSB by ear, but we can't tell exactly *where* they are—only that they are at the same point on the filter slope.

When the carrier-oscillator frequencies are changed, the signal level of the oscillator outputs may consequently change and therefore should be adjusted to be equal. Connect a scope or RF probe to the carrier-null pot center-lug test point and switch between sideband modes, checking for equality in level. If need be, adjust R6 or R7 to achieve equality. The level should be at least 1 V RMS or 3 V P-P.

Stabilizing Meter Zero Settings

S-meter zero-setting instability is mainly caused by heat-related resistance changes in R106 (22 kΩ, 1-W) on the IF board. Replace R106 with a 22 kΩ 2-W wire-wound resistor (WebFig 3).

The problem of the meter reading below zero during transmit while in the ALC position is corrected by connecting a 10-MΩ resistor from the meter ZERO-ADJUST pot pin 3, to pin 2 of T-102 on the IF board (hint from N4NRW).

After all the above mentioned changes are made, give the rig a touch-up alignment and enjoy a much improved vintage rig!

MORE ON ANOTHER, CHEAPER AUTOMATICALLY "SAFE" CHARGER

By Zack Lau, W1VT, ARRL Lab; **zlau@arrl.org**

◊ *The Rechargeable Batteries Application Handbook* by the Technical Marketing Staff of Gates Energy Products has good advice on storing batteries (pp 203-204): "The key to successful storage of sealed-lead batteries is maintaining a minimum level of charge in the cell or battery. As long as the open-circuit voltage remains above this cutoff, the battery does not experience any irreversible changes that affect capacity or life."

Page 8 of **www.batteryweb.com/manuals/techman.pdf** says that "one recharge per year is sufficient to maintain the original capacity of a battery not in use." However, the technical data for the PS-1212 (12 V, 1.2 Ah) found at **www.power-sonic.com** has a note that "due to the self discharge characteristics of this type of battery, it is imperative that they be charged after 6-9 months of storage. Otherwise permanent loss of capacity might occur as a result of sulfation."

Technical Correspondence items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given idea will work for your situation, we make every effort to screen out harmful information.

Letters for this column may be sent to Technical Correspondence, ARRL, 225 Main St, Newington, CT 06111, or via e-mail to **tc@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 a work, please send the author(s) a copy of your comments. The publishers of *QST* assume no responsibility for statements made herein by correspondents. QST

WRC-03 Conference Preparatory Meeting Expands 40-Meter Options

Paul Simon sang of 50 ways to leave your lover, but participants at November's Conference Preparatory Meeting (CPM) for World Radiocommunication Conference 2003 heard just five ways to fix 40 meters—plus a sixth that would just leave things as they are.

"The five options for change all represent improvements in the amateur band, although two fall short of fulfilling the 300-kHz worldwide requirement," said ARRL Chief Executive Officer David Sumner, K1ZZ. He attended the Geneva gathering in his role as International Amateur Radio Union (IARU) secretary. "All six options maintain the existing 300-kHz exclusive amateur allocation in Region 2."

The objective of the CPM was to complete work on a 700-plus page extensive technical *CPM Report*, which outlines methods to address the more than three dozen items that are on the WRC-03 agenda. In addition to the possible realignment of the 7-MHz amateur and broadcasting allocations—agenda item 1.23—WRC-03 also will consider possible revision of specific rules for the amateur and amateur-satellite services, including how call signs are formed—agenda item 1.7.

While agenda item 1.7 is not very controversial relative to many other WRC-03 issues, Sumner says 7-MHz realignment or harmonization "is one of the most difficult issues facing WRC-03." As he explains the situation, three major interests—amateurs, shortwave broadcasters, and users, mainly military, of the fixed and mobile services—have a stake in the outcome.

"Amateurs seek a return to the 300-kHz allocation that existed worldwide prior to World War II but that now exists only in the Americas," Sumner said. Achieving this, he added, would require the fixed and mobile services to make room for broadcasters and for the broadcasters to change their operating frequencies. The five methods for change the *CPM Report* describes include a variety of transition schedules to ease the impact on these other services:

- Method A would shift Region 1 and 3 broadcasters up by 200 kHz to 7300-7550 kHz in two stages and would provide the same band for broadcasting in Region 2.
- Method B is similar but would have amateurs in Regions 1 and 3 sharing the upper 100 kHz of their newly expanded band with fixed and mobile.
- Method C would provide just 200 kHz for amateurs in Regions 1 and 3. Amateurs in Region 2 would continue to contend with broadcasting interference from Regions 1 and 3 in the 7200-7300 kHz segment.
- Method D, proposed by Canada at the CPM, would provide 300 kHz worldwide for amateurs by shifting broadcasters in Regions 1 and 3 up by 200 kHz but would not expand the Region 2 broadcasting allocation. This plan would minimize the impact on fixed and mobile services in Region 2.
- Method E, proposed by the Republic of Korea at the CPM, would provide amateurs in Regions 1 and 3 with an additional 100 kHz shared with fixed and mobile (7100-7200 kHz). As with Method C, however, Region 2 amateurs would continue to face broadcasting interference from Regions 1 and 3 in the 7200-7300 kHz segment.
- Method F, proposed by Australia at the CPM, would simply maintain the status quo. This plan reflects concerns about the impact of realignment on military and national security communications capabilities.

"There is no guarantee that proposals will be limited to the six methods described in the *CPM Report*," Sumner said.

Sponsored by the International Telecommunication Union (ITU), the CPM drew more than 1000 participants to Geneva during the last two weeks of November. Delegates represented administrations, telecommunications companies and organizations throughout the world. Substantive work of the CPM wrapped up November 28—Thanksgiving in the US, but just another work day in Geneva.

Regional telecommunications organizations and groups (CEPT, CITEL, and Asia-Pacific Telecommunity, the African Telecommunications Union, and Iran and the Arab States) as well as individual administrations will be developing their

(L-R) IARU Vice President David Wardlaw, VK3ADW, and President Larry Price, W4RA, greet CPM Chairman Eberhard George, DL7IH, at the start of the IARU reception.

Opening day at the WRC-03 Conference Preparatory Meeting (CPM) in Geneva.

Rick Lindquist, N1RL ♦ Senior News Editor ♦ n1rl@arrl.org

proposals in advance of WRC-03, which takes place in Geneva in June and July.

Amateur Radio was well represented at the CPM. Chairing was Eberhard George, DL7IH, of Germany. A three-member IARU team was headed by President Larry Price, W4RA, and included Sumner and Wojciech Nietyksza, SP5FM. ARRL Technical Relations Manager Paul Rinaldo, W4RI, served on the US delegation. He also was named to chair the *ad hoc* group that dealt with the substance of the 7-MHz text. Several other amateurs were on their national delegations, some of them specifically to represent Amateur Radio and others in professional capacities. IARU Vice President David Wardlaw, VK3ADW, was on the Australian delegation.

On November 21, the IARU hosted a reception for approximately 150 CPM attendees. The event provided the opportunity to debut a new series of attractive posters describing the benefits of Amateur Radio. A commemorative lapel pin created by the IARU for the CPM was in great demand.

On November 26, the International Amateur Radio Club, 4U1ITU, held its annual dinner to thank departing ITU Radiocommunication Bureau Director Bob Jones, VE3CTM/VE7RWJ, for his support of the club during his two terms and eight years in office. The IARC and the IARU each presented a gift to Jones, who was not eligible for a third term and is retiring to British Columbia.

FIRST TRANSATLANTIC AMATEUR HF DIGITAL VOICE QSO REPORTED

Radio communication pioneers Ten-Tec and Thales have reported the first transatlantic Amateur Radio HF digital voice linkup. Ten-Tec's Doug Smith, KF6DX, and Thales' Didier Chulot, F5MJN, successfully transmitted and received digital speech signals on 15 meters November 22 between Paris, France, and Ten-Tec headquarters in Sevierville, Tennessee.

FCC News

JONATHAN ADELSTEIN SWORN IN AS FIFTH FCC MEMBER

The FCC now is back at its full strength of five members with the swearing in December 3, 2002, of Jonathan S. Adelstein. He's filling out the unexpired term of former Commissioner Gloria Tristani, which ends in June.

"The issues before this agency touch every American in the most basic ways—their phone services, television, radio, cable and Internet access," Adelstein said. "During my time on this Commission, I will work to ensure that Americans have the best possible communications services by enhancing competition, promoting universal access to all communications services, and efficiently managing the public spectrum."

FCC

Jonathan S. Adelstein (right), standing with his wife, Karen, and their son, Adam, takes the oath of office before FCC Chairman Michael Powell.

A Democrat, Adelstein's nomination had been held hostage to political wrangling in the US Senate. Before joining the FCC, Adelstein served for 15 years as a staff member in the US Senate and for the past seven years was a senior legislative aide to Senate Majority Leader Tom Daschle (D-SD). Prior to his service in the Senate, Adelstein held a number of academic positions.

Amateur Enforcement

♦ **Repeater changes hands, but familiar problems persist:** The former W6NUT repeater in the Los Angeles area has a new owner and a new call sign, N6SAP. Nonetheless, complaints of the same sort of on-the-air behavior that inspired an FCC inquiry of the previous trustee more than a year ago have occurred under the new regime. The new owner says he's in the process of changing things for the better, however. A November 5 letter from FCC Special Counsel for Enforcement Riley Hollingsworth publicly put the machine's new trustee, Scott A. Press, N6SAP, on the spot because of allegations that some users had interfered with an attempt to pass emergency traffic. Two users identified as having caused the interference received similar inquiries.

"We view these allegations as extremely serious," Hollingsworth told Press and those said to have been involved in the October 2 incident. He also cautioned those accused of perpetrating the problem against retaliating in any matter toward the complainants.

A League member, Press told ARRL that he's been working hard to turn around the repeater's past reputation but change will not happen overnight. "I knew what I was getting into when I bought the system and have made some strong progress with the exception of a few bad apples who have not seen the light yet," he said. "They are being shaken from the tree one by one."

Press purchased the former W6NUT repeater, once owned by Kathryn Tucker, AA6TK. In 2001, the FCC terminated Tucker's authority to operate the repeater under automatic control. The earlier FCC review into the repeater's operation followed allegations that the licensee or control operator failed to address incessant jamming, broadcasting, the playing of music and other potential violations.

An N6SAP repeater user, Anthony Cardenas, WA6IGJ, complained to the FCC that he was jammed while attempting to use the repeater to report a motorist stranded in the midst of freeway traffic. Cardenas alleged that Ledge Musselman, KC6NCN, and Anton Johnson, N6OAY—who also received FCC letters of inquiry—blocked his efforts to alert the California Highway Patrol to the potentially hazardous situation via ham radio. Cardenas says he was able to contact the police via another repeater.

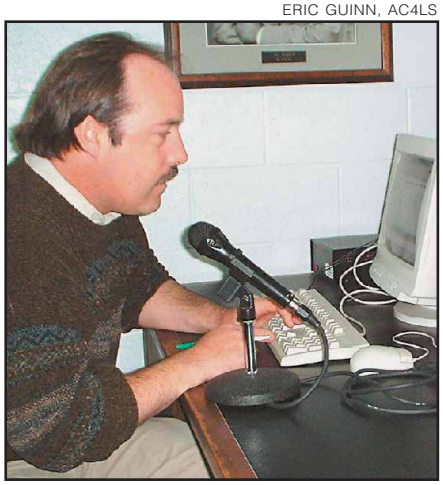
Information from Press and others who monitored the incident indicated that Press shut down the N6SAP repeater for 20 minutes after other operators were unsuccessful in efforts to convince the interfering stations to let Cardenas pass his traffic. Transcripts of the recordings indicate that the interference consisted mostly of disparaging remarks, unmodulated carriers and singing.

Press has told the FCC that Cardenas' account of the incident was "accurate and true." He told ARRL that he'd been promptly in touch with the complainant and with an ARRL Official Observer who forwarded the complaint to the League.

According to the FCC, Press has told Johnson and Musselman to stay off the N6SAP repeater at least until the current dispute is resolved. He has since also banned Cardenas from the repeater.

Press said he's been working closely with the FCC to "clear up many things that are just out of my reach." Hollingsworth commended Press for "trying very hard to change what was a disgrace to Amateur Radio into a viable Amateur repeater" and said the FCC supports his efforts.

ERIC GUINN, AC4LS



Doug Smith, KF6DX, at the US end of the first transatlantic Amateur Radio digital HF voice QSO. Smith used a Ten-Tec Orion transceiver operating in USB on 15 meters.

"We view this as a significant accomplishment," said Smith. "Amateur Radio has long been at the forefront of technological development. It's nice to be able to show that our legacy is alive and well." Tests are being conducted under the auspices of ARRL's Digital Voice Working Group, which Smith chairs.

Calling it "a major breakthrough," a Ten-Tec news release said the two amateur stations "demonstrated the advantages of digital audio during the conversation, including noise-free, FM-like reception and the potential for simultaneous voice and data." The feat was accomplished on 15 meters using Ten-Tec transceivers and Thales Communications *Skywave 2000* digital audio software. Operating as F8KGG, Chulot spoke with Smith for several minutes over the HF digital link, operating within a 3-kHz bandwidth.

Smith said he and F5MJN used unmodified Ten-Tec transceivers in upper-sideband mode, although he said that AM or FM mode also would work. No additional hardware was required beyond the cables connecting the transceiver and the microphone to the PC sound card. Smith said audio quality was roughly the same as a conventional telephone circuit.

The Ten-Tec/Thales system is based on a new international broadcasting standard adopted last year by the International Telecommunication Union (ITU). An Amateur Radio version of the Thales system was expected to appear on the market early this year. "At this stage, the system is experimental-only for ham radio, but it looks like it's going to take off," Smith predicted.

In terms of Amateur Radio digital equipment, Alinco was the first manufacturer to come out with a digital voice option for some of its transceivers. ICOM debuted its D-Star digital "concept radio" system at the 2002 Dayton Hamvention—where Smith chaired the Digital Voice Forum—and demonstrated it at the ARRL-TAPR Digital Communications Conference last fall. The unit, which operates on 1.2 GHz, was scheduled to hit the ham radio market soon.

Speaking on behalf of the ARRL High Speed Multimedia Working Group, Chairman John Champa, K8OCL, was among those congratulating Smith and his colleagues for the historic accomplishment.

Technical details of the Thales system appear in an article by Demeure and Laurent entitled "International Digital Audio Broadcasting Standards: Voice Coding and Amateur Radio Applications" in the January/February 2003 issue of *QEX*, which Smith edits. (The article is also available on the ARRL Web site, **www.arrl.org/tis/info/pdf/x0301049.pdf**.) Smith has authored two additional articles on digital voice in *QST*: "Digital Voice: The Next New Mode?" in the January 2002 issue, and "Digital Voice: An Update and Forecast" in the February 2002 issue.

Additional images and background are available on the TAPR Web site, **www.tapr.org**. Look for the Digital Voice Forum page and the presentation by Cédric Demeure.—*Ten-Tec news release; Doug Smith, KF6DX*

DAVE HASSLER, K7CCC, JOINS ARRL HEADQUARTERS STAFF

Dave Hassler, K7CCC, joined the ARRL Headquarters staff November 18 as assistant news editor. A native of Portland, Oregon, Hassler, 36, edits *QST*'s new "ARRL in Action" column and handles news and feature stories for the ARRL Web site and *The ARRL Letter*.

Licensed for two years, Hassler holds a General ticket and has had a long-term interest in all things scientific. "Both of my grandfathers were engineers (one was W7GER, SK), and they encouraged me to explore and helped me build things," he said. Sidetracked by high school activities, educational pursuits and careers as a guitar player, volleyball coach and sportswriter, Hassler took advantage of his recuperation from knee surgery a couple of years ago to study for his ham ticket. Hassler holds a bachelor's degree in English and an associate's degree in journalism. He also has completed some graduate coursework.

Most recently, he served as editor-in-chief of *The Chronicle* in St Helens, Oregon. Hassler enjoys AM and SSB

New All-Ham Crew Settles In Onboard International Space Station

NASA

(L-R) ISS Expedition 6 crew members Nikolai Budarin, RV3FB, mission crew commander Ken Bowersox, KD5JBP, and Don Thomas, KD5MDT.

With the early December departure of the space shuttle *Endeavour* from the International Space Station, one all-ham crew has replaced another onboard the space outpost. This time around, however, no female voices will grace the amateur airwaves from NA1SS to Earth. The new Expedition 6 crew is entirely male and the third all-ham crew to serve aboard the ISS. The crew change also marks the first time since Expedition 3 that a US astronaut is serving as crew commander.

The Expedition 6 crew—Commander Ken Bowersox, KD5JBP; Flight Engineer Nikolai Budarin, RV3FB, and NASA ISS Science Officer Don Thomas, KD5MDT—lifted off November 23 on a four-month scientific mission. The new team replaced the all-amateur Expedition 5 crew of Commander Valery Korzun, RK3FZ; Sergei Treschev, RK3FU, and Peggy Whitson, KC5ZTD.

In space since June 5, Whitson, Korzun and Treschev ended up staying up a bit longer than expected. The launch of the *Endeavour* and the new ISS crew was delayed—first by an onboard oxygen leak and later by weather problems in possible emergency landing zones. Subsequently, inclement weather on Earth frustrated the *Endeavour*'s efforts to return home until December 7.

A schedule of Amateur Radio on the International Space Station (ARISS) school contacts was to resume in late-December. ARISS is an international project with US participation by NASA, ARRL and AMSAT.

ragchewing and building simple radios and station accessories. He's also getting his feet wet with digital modes. Welcome aboard, Dave!

ARRL EXECUTIVE COMMITTEE MEETS IN TELECONFERENCE

The ARRL Executive Committee met December 5 in a rare telephone session to discuss items of League business that needed attention prior to the January Board of Directors meeting. ARRL Chief Executive Officer David Sumner, K1ZZ, said that, among other things, holding the meeting by telephone helped to hold down expenses at a time when the Committee was dealing with issues that did not warrant an in-person meeting. The Executive Committee is required to meet twice yearly.

During the approximately 90-minute session, the EC reviewed suggestions regarding possible changes to the League's standing committee structure and responsibilities. The EC agreed to share its suggestions with the rest of the Board for comment.

The EC also authorized the ARRL to support an AMSAT-NA petition to the FCC that seeks to eliminate a 27-month pre-launch information filing requirement for the Amateur-Satellite service. "The requirement is routinely waived, because launch commitments for amateur satellites are not available that far in advance," Sumner noted in the EC's official minutes.

The committee also directed ARRL General Counsel Chris Imlay, W3KD, to provide a "white paper" and to draft formal comments in response to the FCC's request for comments on the Spectrum Policy Task Force report in ET Docket 02-135. Comments are due at the FCC January 27, and reply comments by February 28. After a review by Imlay regarding other pending FCC items of interest to the ARRL, the EC agreed that no further ARRL comments were required in ET Docket 02-146. Among other things, that proceeding realigns the 76-GHz amateur allocation effective in 2006 to conform to WRC-2000 decisions.

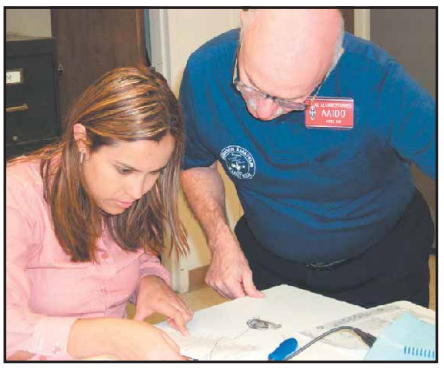
The committee reviewed a recent FCC *Notice of Proposed Rulemaking* concerning the implementation of digital broadcasting. The EC concluded that the proceeding revealed no implications for the Amateur Radio Service. The EC also briefly discussed concerning the implications for the Amateur Radio Service of the Homeland Security Act of 2002.

Imlay also offered a status report on a comprehensive Board-ordered study of allocation and utilization policy for the amateur bands between 902 MHz and 24 GHz. Imlay, the ARRL Technical Relations Office and First VP Joel Harrison, W5ZN, are collaborating on the study, which has been delayed by other pressing obligations as well as by developments in the regulatory environment. The EC targeted the July ARRL Board meeting as a completion date for the study.

Sumner also briefed the members on the recent Conference Preparatory Meeting for WRC-03 and the status of 7-MHz worldwide "harmonization" efforts.

In other business, the EC affirmed a recent e-mail vote approving 12 pilot schools and one progress grant in the ARRL Amateur Radio Education & Technology Program—also known as "The Big Project."

On-line for the telephone conference in addition to Sumner—who serves as the EC's Secretary—Imlay and Harrison were committee members President Jim Haynie, W5JBP, who chaired the session, and Directors Frank Butler, W4RH, of the Southeastern Division; Frank Fallon, N2FF, of the Hudson Division; Tom Frenaye, K1KI, of the New England Division; and Rick Roderick, K5UR, of the Delta Division. Minutes of the December 5 EC meeting are available on the ARRL Web site, **www.arrl.org/announce/ec_minutes_470.html**.



ARRL Technical Information Specialist Al Alvareztorres, AA1DO, advises USTTI trainee Ivannia Marcela Blanco of Costa Rica in constructing her HF receiver project in the ARRL Lab.

USTTI CLASS OF 2002 LEARNS ABOUT AMATEUR RADIO

Six students from around the world attended the United States Telecommunications Training Institute (USTTI) course on Amateur Radio administration at ARRL Headquarters November 4-8. Coordinated by USTTI and presented by ARRL staffers, the program covered—among other topics—the International

Media Hits

♦ The *National Journal*, a weekly publication distributed to some 5000 Washington policymakers, ran an article November 23 on the volunteer groups that have stepped up to assist with homeland defense. ARRL and the federal grant to train amateurs across the country in emergency communications techniques figured prominently in the article. ARRL's Chief Development Officer Mary Hobart, K1MMH, was interviewed.

♦ *The Herald* of Sharon, Pennsylvania, ran a story on the role hams played after devastating tornadoes swept through several states last November. Interviewed was Jerry Parkany, N8PY, president of the Mercer County Amateur Radio Club. Parkany explained what local hams did to assist during this emergency and what amateurs typically do to help their communities in times of disaster. The newspaper article also included some information from an ARRL press release regarding Amateur Radio's role in the tornadoes.

♦ The new Hospital Emergency Amateur Radio System (HEARS) was the focus of a writeup in *The York Dispatch* of York, Pennsylvania. The Eastern Pennsylvania volunteer group is currently being organized to assist hospitals with emergency communications during disasters. Group organizer Susan Graybill, KB3EVC, was interviewed along with Eastern Pennsylvania Section Manager Eric Olena, WB3FPL; Mary Gundlach, N3RBT; and Harold Hartley, KA7TBB.

♦ Brothers Lee Walter, WDØHEO and Ernie Martin, WAØAUU, of Cresco, Iowa, were interviewed by their local paper, the *Courier*. The two cofounded the Tri-State Amateur Radio Club, a group that assists with emergency communications in Iowa, Wisconsin and Minnesota. The article detailed some of the club's public service activities. After the article appeared in the *Courier,* the Associated Press picked it up, and the piece ran in the *Des Moines Register* and in the Rochester, Minnesota, *Post-Bulletin.*

Telecommunication Union and ITU regulations, the International Amateur Radio Union (IARU), spectrum management, emergency communication, digital communication, satellites, electromagnetic interference, international licensing and US Amateur Radio testing and licensing. The trainees also constructed a simple 40-meter receiver in the ARRL Lab.

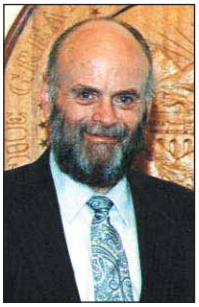
Attending this year's session were Ivannia Marcela Blanco of Costa Rica, Mabel Doku of Ghana, Antonio Edward Eba Padre of the Philippines, Nicolae Ghibu of Romania, Sung-Chul Chae of South Korea, and O'Connor Malambo of Zambia. All of the students are in occupations in their home countries that involve the use of telecommunications.

Teaching the majority of the course were ARRL Technical Relations Specialists Jon Siverling, WB3ERA, and Walt Ireland, WB7CSL—both of the ARRL's Washington, DC office. ARRL Lab Supervisor Ed Hare, W1RFI, and his staff were on hand to help with the receiver construction. ARRL staff member Lisa Kustosik, KA1UFZ, served as USTTI coordinator.

For more information on USTTI, visit the USTTI Web site, **ustti.org/**.

NEW SECTION MANAGER APPOINTED IN NEVADA

The ARRL Nevada Section got a new Section Manager on January 1, 2003.



Jan Welsh, NK7N, stepped down at the end of 2002 for personal reasons. She had served as SM since March 2000. ARRL Field and Educational Services Manager Rosalie White appointed Dick Flanagan, W6OLD, of Minden, to fill out the remaining six months of her term.

An Amateur Extra class operator and ARRL Life Member with 40 years of continuous membership, Flanagan was the recipient of the ARRL 2000 Excellence in Recruiting Award and was active in the successful effort to secure an Amateur Radio antenna (PRB-1) bill in Nevada. He has been serving as an Assistant SM. He holds field appointments as an ARRL Official Observer, Official Emergency Station and ARRL VEC volunteer examiner. He also serves as an ARRL Certification and Continuing Education Program mentor, instructor and examiner.

Nevada members may contact Flanagan via e-mail at **w6old@arrl.org**.

In Brief

- **RFI course starts in February:** The ARRL Certification and Continuing Education Program's seventh on-line course, "Radio Frequency Interference" (EC-006), will begin its first class February 3. C-CE Program Coordinator Howard Robins, W1HSR, said about 30 people representing a variety of interests and experience levels have reviewed the material. Every ham faces an RFI problem at some time or another, and the course material aims to reach newcomers to the hobby as well as seasoned operators. Robins said that while the course incorporates technical material to deal with a technical subject, one does not have to be an Extra to complete the course successfully. After a basic introduction to RFI, the course covers topics such as filters, shielding, intermodulation and RF generators. From there, it explores the special environments of automobiles, televisions and computer equipment. In addition to troubleshooting and FCC regulations, one of the most important sections of the course deals with what Robins calls the "non-technical aspects" of an RFI problem. "The unit really stresses how best to deal with your neighbors," he said. "There are tips and strategies covered, including a lot of Web links and outside information, that can help to clear up a problem." Activities and quizzes follow each unit. Participants must pass a 25-question final assessment with an 80 percent minimum score. The course fee is $65 for ARRL members and $95 for nonmembers. Registration opens January 27 via the ARRL Certification and Continuing Education page, **www.arrl.org/cce/**.

- **Vote on *QST* Cover Plaque Award:** The winners of the *QST* Cover Plaque Award for November were Stan Schretter, W4MQ; Brad Wyatt, K6WR, and Keith Lamonica, W7DXX, for their collaboration on the article "A Ham Radio Public Utility HF Station." Congratulations, Stan, Brad and Keith! The winner of the *QST* Cover Plaque award—given to the author—or authors—of the best article in each issue—is determined by a vote of ARRL members. Voting takes place each month on the Cover Plaque Poll Web page, **www.arrl.org/members-only/qstvote.html**.

- **Radio Club of America makes donation to "The Big Project":** The Radio Club of America announced in December that it would give at least $6500 during 2002 to the ARRL Education and Technology Program—"The Big Project." The club said it hoped to give even more this year. ARRL Chief Development Officer Mary Hobart, K1MMH, who attended the club's 93rd annual banquet November 22 in New York City, said she was thrilled with the gift. "This means that we'll be able to add three more schools to the project, serving up to 100 more children," she said. The Radio Club of America, officially founded in 1909 in New York City as "the world's first radio communications society," was involved with some of the earliest defenses of Amateur Radio before Congress. One of its early members, Paul Godley, was involved with the ARRL's 1921 transatlantic tests. The ARRL Education and Technology Program is aimed at putting Amateur Radio in classrooms, enrichment programs and after-school activities. More information on "The Big Project" is available on the ARRL Web site, **www.arrl.org/FandES/tbp/**.

- **Daniel K. Robbins, KL7Y, SK:** Well-known contester Dan Robbins, KL7Y, of Wasilla, Alaska, died October 31 as a result of a motorcycle accident in Hawaii. He was 54. According to a report in the *Honolulu Star-Bulletin*, Robbins lost control of the motorcycle he was riding in Kona, on the "Big Island" of Hawaii, and drove into a lava field. Robbins, who was not wearing a helmet, reportedly suffered fatal head and other injuries. At the time of the mishap that ended his life, Robbins—an ARRL Life Member—was vacationing in Hawaii, where he'd been part of the KH7R multi-multi operation for the CQ World Wide SSB contest the previous weekend. "We who knew him and enjoyed this last opportunity to radio contest with him are still in shock," said Kimo Chun, KH7U, of the KH7R team in a CQ-Contest reflector posting. "We all benefited from his presence and contributions." Donations were invited to the Daniel K. Robbins Memorial fund, c/o Bridgeview Bank, 11411 W Wadsworth Rd, Beach Park, IL 60099.—*some information from the CQ-Contest mailing list*

An NTS Traffic Handler Visits KPH

By Scott Walker, N3SW

It is just after 1700 Pacific Daylight Time on the Point Reyes peninsula of California, and in the brightly lit radio room of the old RCA building near Inverness, there is excitement in the air. The small group of former commercial radio operators and Amateur Radio enthusiasts is waiting for someone to send out the first call of the evening. The multiple receivers in four different operating positions are tuned to their HF and MF frequencies, the landline connection to the transmitters 18 miles away in Bolinas has been tested, and everything is ready.

Denice Stoops, a former KPH operator and one of the relatively few female operators to ever work in the maritime mobile radio business, sits down at position one, adjusts the weights on the Vibroplex Classic bug to her liking, and keys up the transmitters. CQ CQ CQ DE KPH KPH KPH. It's the third annual "Night of Nights" at KPH, and I feel privileged to be a witness.

Night of Nights

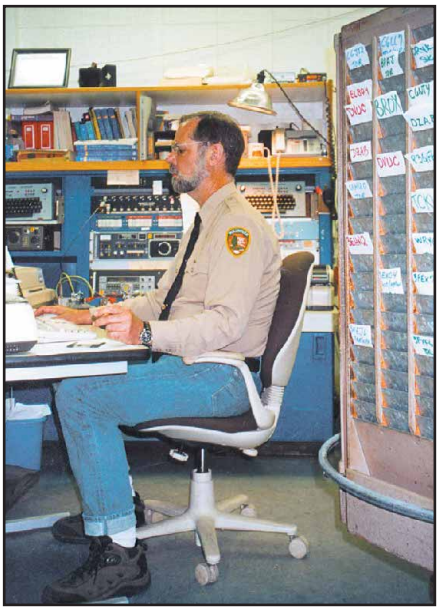
On July 12 each year, the members of the Maritime Radio Historical Society activate the original transmitters and receivers of KPH for a night of broadcasts and commemorative contacts with shipboard operators in port and at sea. Thanks to the work of Richard Dillman, W6AWO; Tom Horsfall, WA6OPE, and Steve Hawes, WB6UZX, the receiving station in its historic building near Inverness and the separate transmitter site near Bolinas are in good working order. With the cooperation of the National Park Service and the Globe Wireless Corporation, which holds the license, the Maritime Radio Historical Society puts the KPH call sign back on the air in CW mode several times each year. For the 2002 event, another Globe Wireless call sign, KFS, was activated by two former operators from that station, Paul Zell and Mike Rems.

Much of the original KPH equipment was used, including the RCA commercial 5 kW transmitters that were installed in the 1950s. The transmitting antennas include a Marconi T for MF, double extended Zepps for 4, 6 and 8 MHz, and "H over 2s" for 12, 16 and 22 MHz. With excellent saltwater take off angles across the Pacific Ocean, the KPH signal could be heard practically worldwide. The receivers were working through an omnidirectional vertical instead of the original wire antennas, which have fallen into disrepair.

The NTS Connection

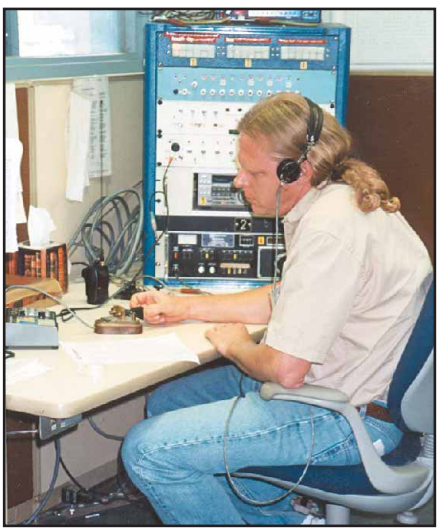
I first got involved in traffic handling in 1999 through participation in the Eastern Pennsylvania Section CW nets of the ARRL National Traffic System. I stumbled across the Pennsylvania Traffic Training Net (PTTN), listened for a while, and then began checking in and taking messages. Under the tutelage of experienced operators, I quickly learned the ropes. Within a year, I was a Net Control Station (NCS) and became the Net Manager of the PTTN.

The National Traffic System (NTS) has been a prominent part of the public service activities in Amateur Radio since



Richard Dillman, W6AWO "RD" composes a commemorative message. Visible to the right is the traffic rack that's still holding the last undelivered messages that were on hand when KPH shut down on July 12, 1999.

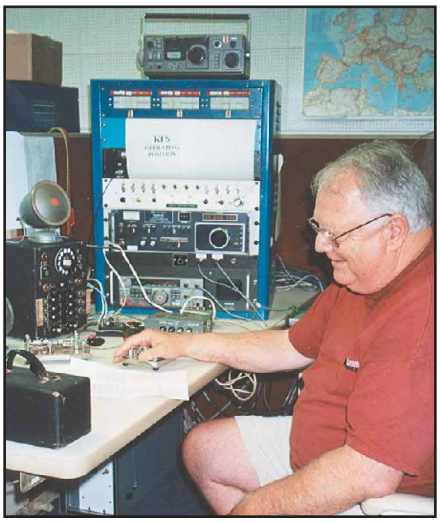
The author, Scott, N3SW, with the KPH receiving antennas in the background. Visible to the right is the cypress-lined driveway which leads out to the RCA building.



Rick Wahl, KK6PR "FW" sends a commemorative message.

Steve Ewald, WV1X ♦ Public Service Specialist ♦ sewald@arrl.org

Denice Stoops sends the initial CQ from KPH on the "Night of Nights."



Mike Rems "MD," at the KFS operating position, displays his "overhand" technique on the Bencher paddles.

the ARRL established it in 1949 as a formal successor to the trunklines system that had been operation since the League was founded in 1914. Today's NTS is an efficient vehicle for moving messages by CW, SSB and digital modes (such as Pactor) using a daily cycle of hierarchically organized nets at fixed times on the HF and VHF bands.

As a result of my activity, I became interested in traffic handling of the commercial variety and its similarities and differences with the NTS. How does what we do in ham radio compare with what the "big guns" in the maritime service do? Unfortunately, my burgeoning interest coincided with the demise of Morse code traffic handling on the high seas, so the opportunities to see it for myself were limited.

Perspective

Until its shutdown on July 12, 1999, KPH was one of the big guns in the Pacific. I wanted to see the place for myself. When I heard that the third annual "Night of Nights" event would be open to the public, I decided to visit.

For the better part of the last century, high frequency radio and medium frequency radio were an important part of the commercial success of international shipping, and the safety at sea of mariners and their cargoes depended on shipboard radio electronics officers and shore stations. From the time of the *Titanic* disaster in 1912 until 1997, the presence of an onboard radio officer was mandated by the International Maritime Organization (IMO). This requirement was eliminated due to the increasing use of satellite telephones for routine communications ship to shore.

The IMO also developed the Global Maritime Distress and Safety System (GMDSS), which automates distress communications using satellites and further reduces the need for traditional radio in case of disaster. Until 1997, the IMO required a continuous watch be kept by human operators on the maritime distress frequencies in the HF and MF bands, but that watch-keeping function was made obsolete by the GMDSS.

Until the late 1990s, operators such as Denice Stoops and Rick Wahl, KK6PR, kept those watches at KPH and handled traffic in much the same ways that NTS operators do by holding an active list of messages and listening on the designated frequencies for the appropriate relay or addressee to check in. The operators used their initials as a signature or "sine." Thus, Denice Stoops was "DA" and Frederick Wahl was "FW." The list of active traffic was broadcast several times each day, and the paper copy of each message was filed in a large, rotating rack in the middle of the operating positions. It was ready at hand in case of that ship's call. The paper copies were color coded: black for personal traffic and red for ship's business. There was no limit imposed on message length, but the average telegram contained 27 words.

To keep the frequencies clear and announce their availability, the commercial stations sent a repetitious automated "wheel" message similar to VVV VVV VVV DE KPH KPH KPH QSX_4/6/8/12/16/22 QRU? OBS? AMVER? K. This told the afloat operator that KPH was listening on the standard ship's calling frequencies in the HF maritime bands and was ready to accept message traffic, weather observations and position reports. In the early days, the wheel was driven with a paper tape loop. Later, computers were used to key the transmitters.

Like the NTS net system, designated frequencies allowed senders and receivers to find each other when necessary. Unlike NTS, the "nets" could be said to occur 24 hours per day, seven days per week, instead of predetermined times. Propagation would determine where and when the contact would take place. Coast stations did have on-the-air nets between themselves for the exchange of traffic and service messages until the advent of the landline telegram circuits or direct telex connections with each other.

MRHS is Active

The Maritime Radio Historical Society also goes on the air from Point Reyes as K6KPH for several annual ham radio events such as Straight Key Night and International Marconi Day. On these occasions, the transmitters are re-tuned for the Amateur Radio bands. See the MRHS Web site at **www.radiomarine.org** for more information about all of their activities.

Get the Message Delivered

On this Night of Nights, propagation conditions were not the greatest, but three ships were logged by the operators on duty. Commemorative messages were sent by all the former operators in attendance, and marine weather and traffic lists were broadcast. Amateur Radio operators and shortwave listeners in all parts of the world put the KPH and KFS call signs in their monitoring logs. As in previous operations, many QSL cards were issued using the classic "RCA Marine Radiogram."

Despite the fact that KPH and the other coastal maritime stations were commercial operations within a competitive industry, one similarity between their approach and that of the NTS became obvious to me as I observed the coast station veterans that night and later corresponded with the last station manager, Jack Martini, "DM." According to him, the primary interest of the maritime operators was always to "get the message delivered," and the various stations assisted one another to make it happen. That creed applies to the National Traffic System as well.

The NTS is now the only living legacy of Morse code traffic handling in existence in North America. We NTS operators are keeping an honorable tradition alive. As they say in the business, ZUT (CW Forever).

Scott Walker, N3SW, is from New Cumberland, Pennsylvania, and he may be reached via e-mail **n3sw@arrl.net**.

He has been radio amateur since 1972 and also holds a Second Class Radiotelegraph Operator's Certificate. He is active in NTS through the Pennsylvania Traffic Training Net where he is the Net Manager.

Acknowledgments: Thanks to former KPH Station Manager Jack Martini, and MRHS volunteer Richard Dillman, W6AW, for much of the information in this article.

NTS METHODS AND PRACTICES GUIDELINES

Here is an *ARRLWeb* resource that is worth checking out: **www.arrl.org/FandES/field/nts-mpg/**. The *NTS Methods and Practices Guidelines (NTS MPG)*, is the working reference manual on traffic net and message handling procedures in the ARRL National Traffic System (NTS). It also serves as an appendix to the *ARRL Public Service Communications Manual* (available on the ARRLWeb at **www.arrl.org/FandES/field/pscm/**).

According to the manual's introduction, written by Al Nollmeyer, W3YVQ, "the methods presented are a reasonably accurate snapshot of current practices. They are indeed practices, and not strict rules, but the beginner, Section, Region, Area and Transcontinental Corps net operators and management alike will find it beneficial to have a uniform protocol reference to be used by operators."

Thanks go to the many traffic handlers and NTS leaders and participants that had a guiding hand in the production of this manual. Al, W3YVQ, held the reins on this project as it was written and edited, and Tom Hogerty, KC1J, prepared it for *ARRLWeb* presentation.

Content Highlights

In nine chapters, the manual presents details on how to format a standard ARRL formal radiogram that's used throughout Amateur Radio for written message traffic. Additional chapters focus on the procedures and guidelines for transmission of formal written traffic by voice, CW and digital modes. The NTS Digital Guidelines are included.

Net management and operation along with net control station duties are also covered. You'll find tips for delivering messages to addressees, sending service messages back to the station of origin to report on progress or problems, and notes on originating messages from the public.

The *NTS Methods, Practices and Guidelines* is available for viewing/download via PDF files (Adobe Acrobat is required) and in text documents (in MS Word format).

"The future of the NTS is in the hands of those who understand the value of formal third party communication and the technology required to make it effective in today's environment," Al, W3YVQ, says. "To assure opportunities for all amateurs to enjoy the rewards of public service traffic handling, it is essential to pass along the knowledge developed over the years, and to introduce newcomers to this particular subset of Amateur Radio activity. Everyone can participate. Formal traffic handling is an essential part of Amateur Radio emergency communications public service as well."

Field Organization Reports

Compiled by Linda Mullally, KB1HSV

Public Service Honor Roll November 2002

This listing is to recognize radio amateurs whose public service performance during the month indicted qualifies for 70 or more total points in the following 6 categories (as reported to their Section Managers). Please note the maximum points for each category:
1) Participating in a public service net, using any mode. — 1 point per net session; maximum 40.
2) Handling formal messages (radiograms) via any mode. —1 point for each message handled; maximum 40.
3) Serving in an ARRL-sponsored volunteer position: ARRL Field Organization appointee or Section Manager, NTS Net Manager, TCC Director, TCC member, NTS official or appointee above the Section level. — 10 points for each position; maximum 30.
4) Participation in scheduled, short-term public service events such as walk-a-thons, bike-a-thons, parades, simulated emergency tests and related practice events. This includes off-the-air meetings and coordination efforts with related emergency groups and served agencies. - 5 points per hour (or any portion thereof) of time spent in either coordinating and/or operating in the public service event; no limit.
5) Participation in an unplanned emergency response when the Amateur Radio operator is on the scene. This also includes unplanned incident requests by public or served agencies for Amateur Radio participation. - 5 points per hour (or any portion thereof) of time spent directly involved in the emergency operation; no limit.
6) Providing and maintaining a) an automated digital system that handles ARRL radiogram-formatted messages; b) a Web page or e-mail list server oriented toward Amateur Radio public service — 10 points per item.
Amateur Radio stations that qualify for PSHR 12 consecutive months, or 18 out of a 24 month period, will be awarded a certificate from Headquarters upon written notification of qualifying months to the Public Service Branch of Field and Educational Services at ARRL HQ.

590 W7TVA
450 W2MTA
440 N9TVT N2CCN
420 N2LTC
404 KC2DAA
395 KC2HUV
386 K6SOJ
348 N9VE
330 KA2ZNZ
302 K2YS
282 NN2H
269 KB4G
268 NQ4U
260 W2LC
240 KB2KOJ
237 KA0DBK
235 KB2ETO
232 W5JYJ
221 KA2GJV
220 KB2RTZ
219 AB2IZ
210 KB2CCD W8JEB
202 N5JCG
198 N2YJZ
195 WI2G
190 N2OPJ KB2SNP
178 N2JBA
177 NN7H
174 NC2F
172 N2HQL
169 K8CQF KB2ZTF
168 K9JPS
161 N3WKE
160 KB2VRO N5NAV
158 W6IVV
155 WJ2F W5ZX
151 N1IST WN0Y
150 W5OMG
145 K0IBS
141 KA2YKN
140 N2GJ KK3F AA3SB N5CRR N8IO
138 KG9B
136 AL7N
135 K1CFI W3YVQ W4EAT K4RLD K5DPG
134 KE4GYR
132 W9RCW
130 N1LKJ VE3EUI AG9G KK1A KF6OIF N2IKR
126 AA4AT
125 K9FHI K4YVX KM5YL N7CEU
123 N3WAV N2RTF
121 KD5SWI
120 W1GMF KW1U W8YS N7YSS KB8ZYY KA4FZI W6QZ AB4XK K9LGU W3BBQ WA4DOX AC7DD N7YSS K6YR AC5XK W4ZJY K4IWW WA2WMJ
119 KG4CHW WB4BHH N4TAB KD1SM
117 WD4LSS W5XX
116 W4AUN W4CC
115 N3RB K2DBK N2AKZ K5IQZ K4BEH
113 WA1QAA
112 WB5NIC W2GUT
110 WA1FNM W7GB WA5OUV N5IKN KA4LRM W7QM W7ZIW K8GA KD4GR WA2YL KC4ZHF K5UPN KC5OZT KB9KEG W6DOB K2UL W0LAW W5GKH KE4JHJ K5MC AF4NS N3SW KC8KYP
109 WA1JVV
107 N2WDS AC5SU
106 WD0GUF
105 WA2MSU K4DND K4BB WB1CHU
104 KO4OL WB2KNS
103 KB0YTM
KB3GFC
101 WB2UVB
100 N1IQI KD1LE W1ALE K4DZM K7GXZ NJ5M K4DZM WX4J WD9F W7GHT K4FQU WA9VND KB5TCH KD4EFM KF4OPT K4SCL N6NKO N3KB KG4OTL WA0TFC WB2GTG KB2KLH WA2YOW N5OUJ NM1K N1VXP AF2K KC2EOT WB2QIX KD4CQJ KA4UIV N8OD WA8SSI
99 N8NMA
98 KA2BCE W1QU
97 KB4KA AC5VN
96 WW8D KJ7SI WA2GUP
95 WA4JPK N0SU W4DLZ
94 WB2LEZ N5JU
93 W7EP
92 NB4K K5CZD WB4GGS
91 WA5KQU KC3Y KB5PKW
90 KB1CVH W8IM KK5GY AF4QZ KA8WNO WD8DHC WX8Y WB7VYH WB4PAM AD5KE W7TC KV4AN AA2SV WA2CUW N3WK AA3GV KU6Z N5SIG KA1GWE KA2IWK KG2D WB2IJH W4CKS W4PIM KG4OQA KB5WY W5NK K1FP K4WKT W4WXA K4FUM K2BCL N8DD
89 W7VSE W4FAL N5KWB
88 WA4EIC KG4FXG
87 N1TPU W4NTI KD5ITA
86 K8VFZ N8ZJU WJ3K
85 KD6YJB
K6IUI W2CC N8PAM
84 WB4BIK
83 KB8NDS KE2SX KJ5YY
81 KC8SZR K3CN KB2GEK
80 WA8DHB WX4H AG4DL KG4MLC KG4MLD KG4QIP KE4UOF KC6SKK W2MTO N3OR AA4YW
79 K1TSV K3SS AD4BL
78 W5IM
77 KL5T
76 AK6DV K2PB N2ECR K2DN W5PY
75 W7DPW KC2JXM
74 K8SH
73 KB4O KC7SGM
72 W3CB
71 N4VVX NR2F
70 KC6NBI W4DGH K5ER

The following stations qualified for PSHR points in previous months, but were not recognized in this column: (Sept) KB4KA 144. (Oct) KC8KYP 185, N8IO 170, N8OD 110, WA8SSI 100, N8DD 90, K4WWV 90, KE4GYR 90, KB4KA 85.

Section Traffic Manager Reports November 2002

The following ARRL Section Traffic Managers reported: AK, AR, AZ, CT, EB, EMA, ENY, EPA, GA, KY, LA, ID, IL, IN, ME, MDC, MN, NE, NFL, NH, NLI, NM, NNJ, NNY, NV, OH, OK, OR, ORG, SB, SC, SD, SDG, SFL, SJV, STX, SNJ, TN, VA, WCF, WI, WNY, WPA, WV, WWA, WY.

Section Emergency Coordinator Reports November 2002

The following ARRL Section Emergency Coordinators reported: AK, AZ, IA, IL, IN, KY, LA, MDC, MN, NC, NLI, SDG, SFL, SNJ, SV, WNY, WPA, WMA, WWA.

Brass Pounders League November 2002

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

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
KK3F	37	2882	2828	54	5801
W1GMF	0	727	1900	38	2665
W4ZJY	0	1057	1128	1	2186
W1PEX	2	63	1975	0	2040
NM1K	751	231	943	10	1935
N2LTC	0	882	889	43	1814
K7BDU	99	453	578	19	1149
W4EAT	0	544	524	5	1073
WX4H	0	391	633	3	1027
KW1U	0	568	404	24	1001
W6IVV	24	460	484	0	948
K9JPS	0	415	33	401	849
K2BCL	4	422	352	48	826
N1IQI	349	45	364	0	758
NG1A	0	350	350	0	700
K9GU	0	288	31	288	687
W7TVA	38	271	243	66	618
W9CBE	0	314	264	27	605
KA2ZNZ	38	268	248	42	596
K5UPN	21	267	259	3	550
W6DOB	*0*	*143*	*385*	*10*	*538*
WA9VND	2	321	168	14	505
W9RCW	0	233	20	224	477

BPL for 100 or more originations plus deliveries: N7CEU 192, N9VE 155, NJ5M 129, K8CQF 106.

Leonids 2002: Sic Transit Gloria Mundi

The Leonids meteor shower is associated with the Earth's passage through the dust trails left by Comet 55P/Tempel-Tuttle. Normally this is a minor shower with Zenith Hourly Rate (ZHR) of about 10 meteors/hour. This shower has two interesting characteristics for meteor-scatter enthusiasts. These are fast meteors—~70 km/hr—so they tend to ionize at relatively higher altitude and thus support longer-distance contacts. Furthermore every 33 years the comet approaches perihelion and its dust trails can induce a highly enhanced shower that can approach or exceed storm levels with the potential for ZHRs in the thousands. The most recent peak was expected 33 years after the spectacular peak in 1966 (see below).

To take advantage of an enhanced meteor shower, two things must happen: The peak of the shower must occur while the radiant is above the horizon. For the Leonids, this means during the period of ~0600Z to 1700Z in North America. Second, the shower meteors must be of sufficient size that as they burn up in the atmosphere they can support ionization to reflect the frequencies of choice.

The current peak got underway in earnest in 1998 with a bimodal peak ZHR of 340 bright meteors (the kind of large meteors that support many MS contacts) alas peaking over Europe and not visible from North America. The peak arrived right on schedule in 1999 with a ZHR >4000 associated with 200-300 fireballs per hour peaking again in Europe at 0210Z. While one of the peaks in 2000 did occur early during the North American window, not one Leonids QSO was reported in this column. Our turn came in 2001 when we crossed the seven-revolution dust trail at 1039Z with a ZHR of 1620 with many attendant fireballs and bolides. This year's Leonids was marked by unprecedented anticipation and yes—let's call it what it was—hype. The astronomers predicted a meteor storm with two peaks, one around 0400Z over Europe associated with numerous fireballs and an even larger one, albeit with fewer large meteors, at ~1030Z over North America. Most but not all amateur magazines and Web sites, while very hopeful, were somewhat more restrained.

1966

So what's the big deal?

After poor displays in 1899 and 1933 due to a perturbation of the meteor stream by Jupiter, the Leonids returned in full force on November 17, 1966 in a spectacular visual display estimated at a ZHR >100,000 over North America. There are still a few MS aficionados who remember the radio results fondly.

Rich, K1HTV, operating from Connecticut, remembers an all CW operation on 2 meters with almost continuous ionization and waves of enhancement bringing signals up to very strong levels. This year, he notes, 2 meters was very poor and 6 meters sounded like 2 meters did in 1966. Rich worked about two-dozen stations on 2 meters in 1966, spread over a wide geographic area. Meanwhile John, WØLER, describes the 1966 Leonids as "very spectacular with visual rates over Minnesota in excess of 10,000 per hour and the sky turning blue/green from the ionization. The radio results were thrilling to say the least. The pileup from the rigs all crystal controlled on 144.100 was incredible making it difficult to tell who worked whom. When he would send a "RS3" he would get eight or ten "RRRRR" all on slightly different frequencies, an event not so terribly different from what we encounter on 144.200 these days. Finally, Tommy, WD5AGO, reports that he made five contacts and heard 11 more on 2 meters in 1966 running only 80 W.

This year the predictions ranged from several hundred to several thousand meteors per hour at the peak with numerous fireballs likely during the European peak around 0400Z. With rates at storm levels, big things were expected on the meteor-scatter front with numerous contacts likely even on 222 and 432. Let's see what happened.

Leonids 2002

I am indebted for reports from every US call area, Canada and several stations in Europe including: K1HTV, K1JT, K1SG, K1TEO, K2ERG, K2TXB, AK3E, N3IQ (ND3F), AA4H, K4ZOO, KE4YYD, N4OFA, W4KXY, K5AM, K5LLL, K5SW, WD5AGO, N6ZE, W6OAL/Ø, WA6GYD, K7CW, K7ICW, K7JA/6, K7UV, N7MWV, NL7CO/W5, W7MEM, W7XU/Ø, KE8FD/4, W8PAT, N9LR, N9RLA, W9GKA, W9JN, W9SZ, WX9M, KØGU, NØJK, NØLL, NEØP, WØLER, VE3AX, VE4KQ, VA6SZ, DL8EBW, EA6VQ, G4ASR, GØNFA and LAØBY.

This Month
February 16 Excellent EME conditions*
*Moon Data from W5LUU

How many ways can you say mediocre? "Not so good," "marginal," "let down," "disappointing," "bust," "depressing"—all of these words were used to describe the 2002 Leonids. Astronomer Joe Rao, as reported by Shelby, W8WN, on his WSJT Web site, notes that for the North American peak, the Tempel-Tuttle dust trail was somewhat late in encountering Earth with the actual peak at 1048Z on November 19. The trail appeared to consist of very small particles with fewer fireballs and bolides than reported in 2001 with a sharp peak probably at the low end of the estimated predictions lasting 15-20 minutes. The International Meteor Organization (IMO) initial activity analysis fixes the initial maximum (European peak) at 0410Z with a similar ZHR. The radio conditions on both peaks were substantially below expectations. The expected long-distance contacts did not materialize for the most part, and activity above 2 meters was quite limited (see below).

Overall, most of the US correspondents had anywhere from a few to two-dozen contacts on 2 meters. The common theme was comparing poor results this year to excellent results last year. "3 contacts on 2 meters this year compared to 60 Qs last year in 30 grids" was a representative comment. In the extreme, VE3AX had 15 contacts this year on 2 meters compared to 120 contacts in 2001. As expected, conditions on 6 meters were considerably better. Several reports pointed to much more continuous ionization on 6 meters and most had a relatively easy time making contacts on SSB. For instance, K1HTV had 22 scatter contacts in the hour between 1100 and 1200Z.

One interesting set of contacts was the only success between the US and Alaska. As reported by K7CW, KLØRG (CO45di) worked N7EPD, K7NQ, KE7SW and K7ND all in CN87 and WI6Z (CN84). Other schedules between the US mainland and KL7 apparently were unsuccessful including those with AL7EB (BP40).

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AL7EB was able to work KL7XL (CO27HB), however.

Al, K2ERG, has the ability to listen on 2 and 6 meters simultaneously. He notes many 6-meter peaks at times when there was nothing on 2 meters. That is to be expected with very small rocks and dust which support ionization/reflection at 6 meters but not on 2. However, he saw instances in this shower where there was activity on 2 meters when there appeared to be nothing heard on 6 meters. The latter is *not* expected; the question is whether anyone with a similar receiving capability has observed 2-meter openings without seeing 6 meter open at the same time. Of course, the trivial explanation is possible—that there just were no stations on 6 at precisely that time, but this seems unlikely during a major shower.

Brian, ND3F (using N3IQ), noted that the shower was basically dull. From my FM19jd location, I was surprised that I did not hear or work many well-known calls, even when they were on: K5YY, N6CL, WD5AGO and W7XU among others. I did query the members of both the Stanford Reflector and the VHF Contesting Reflector about this perceived lack of activity. Was it real? If so, was it caused by the poor performance of the shower, a switch to WSJT and/or by the shower falling on a workday, when folks were not willing to give up a day of work? The consensus from the two dozen replies I received is that all three were factors. Most people were disappointed by the shower and some of them probably gave up and went away.

The Ping Jockey site (which supports FSK441 scheduling by Internet) reported activity at unprecedented levels. Requests scrolled off the screen before one could read them. Nonetheless, those using FSK441 heavily did not think that it reduced the amount of activity on SSB and NØUK/G4JEC reported that the days leading up to the peak appeared to have been worse than random-meteor days. In fact at the peak and just thereafter, there was Joe Taylor, K1JT, in the trenches on 144.200 MHz with the rest of the troops grinding out SSB contacts—and doing rather well I might add. Finally, a number of respondents pointed to work obligations cutting into their operating time or reducing it almost to zero, so this was clearly an important factor.

Long-Distance Contacts

Shelby, W8WN, points to the request from Dr Noah Brosch to receive reports of long-distance MS contacts (2400 km, or especially beyond 2550 km) in order to clarify the existence and nature of putative high-altitude meteor burns. A summary of some long-distance contacts from both the US and Europe appears in Table 1. Notice that this shower did not yield much in the way of unusually long contacts—with one notable exception. There was a contact between G7RAU (IO90ir) on the Isle of Wight and RW3PF (KO93cd) at an astounding 2695 km. Otherwise, there are three partials listed of interest. KD6VS (CM97cf) heard two seconds of W9JN (EN54dn) at 2803 km (too bad that one was not completed!). There were 2400-km partials listed between G4ASR (IO81mx) and OH8K (KP55as) and VE3AX (FN02cw) and KB2FKO (DM75). Peter, VE3AX, also reports a new North American record with K5VH (EM00xe) on a 222 random!

Table 1

Some long-distance contacts in the 2002 Leonids in the US and Europe. Where six-digit grids are known distances are calculated using *BD*. Abbreviations: S = SSB; C = complete; P = partials (calls).

US

Band	*Between*	*Type*	*Distance (km)*
144	W3XO (EM00kd) - W3ZZ (FM19jd)	SC	2236
222	VE3AX (FN02cw) - K5VH (EM00xe)	SC	2153
144	K1TEO (FN31jh) - NTØV (EN08oc)	SC	2151
144	K7ICW (DM26ja) - KØMQS (EN31uw)	SC	2084
144	KE8FD (EM84kn) - KØGU (DN70mq)	SC	2037
144	W9JN (EN54dn) - KD6VS (CM97cf)	SP	2803
144	VE3AX (FN02cw) - KB2FKO (DM75)	SP	2408

Europe

144	G7RAU (IO90ir) - RW3PF (KO93cd)	SC	2695
144	G4ASR (IO81mx) - RX1AS (KO59fx)	SC	2238
144	G4ASR (IO81mx) - OH7HDU (KP32rd)	SC	2135
144	DL8EBW (JO31nf) - UR3EE (KN88dc)	SC	2120
144	DL8EBW (JO31nf) - OH8K (KP55as)	SC	2075
144	LAØBY (JO59ix) - IKØBZY (JN61gw)	SC	2011
144	G4ASR (IO81mx) - OH8K (KP55as)	SP	2398

222 and 432

The lack of fireballs and larger meteor burns took their toll on contacts above 2 meters. The highlight already mentioned was the new North American record set by VE3AX and K5VH on 222. Peter (AX) also reported two other contacts on that band. John, W8PAT (EN81), reports a single completion with WD5AGO. He notes that there were only 90 minutes of useful time on 222 this year, compared with 9 hours in 2001. WD5AGO had four random completions on 222 this year versus dozens in 2001. Others reporting success included K1JT (FN20) with two contacts both on WSJT, N9LR (EN50) two contacts, WB2SIH (FN31) two contacts both on FSK441 and K4ZOO (FM08) three contacts and K7ICW (DM26) 1 FSK441 contact. W7XU, a very successful 222-MS operator in the past, tried six schedules with no completions and only one ping for his trouble. Results on 432 were even worse with none of the respondents claiming a completion and only NEØP (EM04) having partials with W8PAT and pings from KIØLE.

Europe

Five reports from Europe provide a flavor of what the Leonids was like on that side of the pond. A hearty "thank you" goes to DL8EBW, EA6VQ, G4ASR, GØNFA (144 MHz in Europe report) and LAØBY. David, G4ASR, reminds us that activity is much denser in Europe than here in the US, so it is not surprising that there were larger numbers of stations with larger number of contacts in Europe. Still, their impression was, overall, the same as ours. This shower was disappointing and did not live up to its potential. Although the earlier European peak at 0410Z was supposed to be associated with more fireballs, neither numbers nor distance was particularly evident.

Brendan Trophies

Amateur groups using the call signs EI2TAA (DK5DQ, DL5DAW, EI7BMB, EI8JK) operating from western Irish coast and VO1BZM (VO1HE, VO1DZA, DL2DAO) operating from the Society of Newfoundland Radio Amateurs (SONRA) club station VO1AA, located at the Signal Hill National Historic Site of Canada, failed in their attempt to use the Leonids meteor storm to make the first two-way transatlantic VHF contact. This was part of the quest to win the Brendan Trophies **(www.irts.ie/brendan.htm)** offered by the Irish Radio Transmitters Society **(www. irts.ie/)**. The Brendan Trophies will go to each of the operators of the two Amateur Radio stations that first establish two-way communication between Europe and North or

Microwave Standings

Published Microwave Standings include only regional leaders as of December 1. For a complete listing of all stations, check the VHF/UHF/Microwave Standings Boxes at **www.arrl.org/announce/standings/**. To ensure that the Standings Boxes reflect recent activity, submit reports at least every two years by e-mail to: **standings@arrl.org**. Printed reporting forms are available by sending a request with SASE to: Standings, ARRL, 225 Main St, Newington, CT 06111. Stations are grouped into regions based on call area.

33 cm (902-928 MHz)
Minimum Terrestrial DX = 800 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
K1TEO	CT	17	2	45	1125
AF1T *	NH	17	1	24	849
WA1ECF	MA	9	1	19	843
KU2A	NH	8	1	10	814
W1AIM	VT	5	2	8	1078
K2AN	NY	14	2	28	1401
WA2FGK	PA	14	2	31	940
W4DEX	NC	8	1	10	1214
KØVXM	FL	3	1	8	1747
W5LUA *	TX	21	2	60	1725
AA5C	TX	12	1	38	1596
W5ZN	AR	12	1	32	1050
N5QGH	TX	5	1	20	1062
K5LLL	TX	5	1	15	1041
N6CA	CA	4	3	19	3978
W6CPL	CA	1	2	17	825
K2YAZ	MI	11	1	38	960
K3SIW/9	IL	17	2	58	1200
WØGHZ	MN	10	2	27	1353

23 cm (1240-1300 MHz)
Minimum Terrestrial DX = 1000 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
K1TEO	CT	18	2	47	1125
W1JR *	NH	13	4	36	1054
W1AIM	VT	11	2	21	1103
K2AN	NY	14	2	35	1401
K4QI *	NC	34	29	147	—
W4TJ *	VA	22	23	64	8000
W4DEX	NC	14	1	23	1078
W4WTA	GA	9	1	16	1023
KØVXM	FL	3	1	14	1696
W5LUA *	TX	41	40	257	2060
WD5AGO *	OK	39	37	210	1705
K5UR	AR	17	1	82	1102
AA5C	TX	17	1	60	1721
K5SW	OK	15	1	55	1583
W5ZN	AR	15	1	41	1050
N5QGH *	TX	14	7	45	1545
W5HNK	TX	7	1	—	1272
W5UWB	TX	6	1	14	1664
K5LLL	TX	4	1	20	1540
N6CA *	CA	8	11	44	3978
K6QXY	CA	4	2	18	3794
W6CPL	CA	3	3	27	3984
K2YAZ	MI	18	2	58	1300
N8KOL	OH	14	2	31	1006
W8PAT	OH	12	2	29	1342
K3SIW/9	IL	22	2	76	1207
WB9SNR	IL	16	2	52	1250
WØOHU	MN	15	2	44	1310
NØHJZ	MN	15	1	44	1530
NØLL	KS	13	1	46	1321

13 cm (2300-2310 2390-2450 MHz)
Minimum Terrestrial DX = 800 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
K1TEO	CT	16	1	31	1125
WA1ECF	MA	9	1	13	843
KU2A	NH	3	1	5	814
WA2FGK	PA	11	1	21	900
W4DEX	NC	7	1	9	1030
KØVXM	FL	3	1	9	1609
W5LUA *	TX	22	22	101	1533
AA5C	TX	8	1	26	1596
W5ZN	AR	8	1	21	1050
N5QGH	TX	5	1	15	1013
K5LLL	TX	3	1	16	1524
N6CA	CA	3	3	20	3978
K2YAZ	MI	8	1	27	924
K3SIW/9	IL	13	1	51	1041
WB9SNR	IL	6	1	15	812
WØGHZ	MN	9	2	25	1353
NØHJZ	MN	7	1	14	1086

9 cm (3300-3500 MHz)
Minimum Terrestrial DX = 400 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
K1TEO	CT	11	1	19	590
KU2A	NH	3	1	4	814
W3RJW	PA	8	1	12	447
W4DEX	NC	5	1	6	714
W5LUA *	TX	10	6	35	1353
AA5C	TX	5	1	16	1048
W5ZN	AR	3	1	9	1050
N6CA	CA	3	3	20	3978
W6CPL	CA	1	2	8	508
N6CA/6	CA	1	—	11	986
K2YAZ	MI	3	1	4	412
K3SIW/9	IL	9	1	40	880
WB9SNR	IL	5	1	14	518
WØGHZ	MN	5	1	17	1353

5 cm (5650-5925 MHz)
Minimum Terrestrial DX = 300 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W1GHZ	MA	6	1	8	367
WB2AMU	NY	9	1	10	325
W5ZN *	AR	8	3	10	1050
W5LUA *	TX	7	14	43	1187
AA5C	TX	5	1	21	1134
WD5AGO	OK	3	1	6	342
N6CA	CA	3	3	20	3978
W6OYJ	CA	1	1	1	344
N6CA/6	CA	1	—	10	986
K2YAZ	MI	5	1	11	924
K3SIW/9	IL	8	1	33	800
WB9SNR	IL	5	1	12	614
WØGHZ	MN	5	2	7	655
VE1ALQ *	NB	3	9	13	—

3 cm (10-10.5 GHz)
Minimum Terrestrial DX = 400 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
K1TEO	CT	13	1	17	634
WA1ECF	MA	10	1	18	843
AF1T/1	MA	10	1	13	772
AF1T	NH	9	1	14	443
W1VT	CT	9	1	13	651
K1LPS	VT	8	2	15	486
K1AE	NH	7	1	10	486
W3RJW	PA	11	1	15	447
W4DEX	NC	10	1	12	1030
W3IY	VA	6	1	6	829
W5LUA *	TX	11	16	66	617
AA5C *	TX	7	16	45	475
W5ZN	AR	4	1	10	1050
N6CA	CA	2	2	19	1142
W6OYJ	CA	2	2	16	916
W6CPL	CA	1	2	9	510
W6ASL/6	CA	1	1	15	770
N6CA/6	CA	1	—	14	410
K2YAZ	MI	3	1	7	412
K3SIW/9	IL	7	1	21	464
WB9SNR	IL	5	1	14	742

12 mm (24-24.25 GHz)
Minimum Terrestrial DX = 50 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W3IY	VA	1	1	3	174
W4SW	VA	1	1	3	204
W5LUA *	TX	3	3	8	542
K5RHR	NM	1	1	5	118
W5ZN	AR	1	1	4	80
WW2R/5	TX	1	1	3	110
WW2R/5	MS	1	1	2	542
N6CA	CA	1	1	5	171
W6CPL	CA	1	1	5	175
W6OYJ	CA	1	1	3	147
WB9SNR	IL	2	1	2	179
K3SIW/9	IL	1	1	4	113

6 mm (47-47.2 GHz)
Minimum Terrestrial DX = 10 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
W3IY/4	VA	1	1	1	174
W4SW	VA	1	1	1	174
WW2R/5	TX	1	1	3	110
WØEOM/6	CA	1	1	3	153

4 mm (75.5-81 GHz)
Minimum Terrestrial DX = 10 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
WW2R/5	TX	1	1	1	55
WØEOM	CA	1	1	2	145

2.5 mm (119.98-120 GHz)
Minimum Terrestrial DX = 10 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
WØEOM/6	CA	1	1	1	15.4

2 mm (142-149 GHz)
Minimum Terrestrial DX = 10 km

Call Sign	QTH	States	DXCC	Grids	Best DX† (km)
WØEOM/6	CA	1	1	1	15.4

†Terrestrial
—Information not supplied
*Some stations worked as EME

South America on 2 meters. The two teams were running high power and stacked Yagis, while using FSK441 meteor scatter to attempt contact across the Atlantic. A previous 1999 effort to complete a transatlantic 2-meter contact between Newfoundland and Scotland on CW also was unsuccessful. Given the great 3100-km distance between the stations, the lack of meteor-storm levels and fireballs/bolides in the 2002 Leonids and problems with both the weather and the amplifiers, the lack of success was not surprising. (Thanks to the *The ARRL Letter* and *Practical Wireless* [G4ASR]).

Bottom Line

As they say in Downeast Maine, this shower was "better than a poke in the eye with a sharp stick"—but not much. On an absolute scale compared to other active meteor showers, this one was not bad. Given its potential as a meteor storm supporting long repeated bursts of ionization on two meteors and above and the expectation that it would be much better than 2001, this shower was a real disappointment. According to the astronomers, chances for meteor storms in association with the Leonids will probably have to wait until 2099. By that time, were we still here, we could enjoy the best of both worlds by going outside to see the storm

while our software runs MS contacts unattended, logs them, looks up their addresses on the Net and e-mails them encrypted QSL cards that count for every award.

ON THE BANDS

Aurora, Auroral E and E_s

Auroral activity normally decreases in November as we approach the winter solstice in the Northern Hemisphere. This November was no exception. Using his portable two-element Yagi on a 5-meter pole, VYØAAA (VE3NR) operating from FP53 (the same grid square as the VE8BY beacon) reports potentially good auroral-E conditions on 6 meters in the Canadian arctic for several hours on November 2. Several beacons were heard with strong signals, but only two contacts were made with VA6SZ (DO33) and VE3KKL (FN25). The following day Ray reports a short but strong E_s opening to EL87, 96 and 97 in Florida. Gary, NW5E, reports a particularly intense E_s opening to kick off the winter E_s season on November 30 to W1, 2, 3, 4, 8, 9, 0, VE1-3 and a few W5 with over 200 contacts going in the log.

EME

On November 24, Paul, WA6PY, reports an amazing EME contact with Jan, DL9KR, on 70 cm using only Paul's dual-polarization dipole feed as an antenna. Listening to Jan on horizontal polarization, he was able to complete the contact by switching his transmitter to vertical polarization. As *432 and Above EME News* Editor Al Katz, K2UYH, says, "This contact proves that EME is not limited to stations having big antennas. It is also a tribute to DL9KR's operating and technical ability." As an EME-challenged VHFer whose location is covered with 25-meter-high oak trees and who occasionally does EME portable, I can affirm Al's comment. Using an EME-capable array, Jan's station and operating ability are so good that working him is no more difficult than running Europeans on 20 meters from here during an HF DX contest.

6 Meters

As predicted by Emil Pocock, W3EP, the former conductor of this column in the October 2002 issue of *QST*, six-meter F2 propagation is definitely on the decline. In November, solar flux levels began at the 170 level, rose slowly to a peak of 191 on the 11th and then declined to 137 on November 26 before beginning to rise slowly at the end of the month. A smattering of contacts were made from both New England and Florida into western Europe, but since levels at 200 and over are usually required for openings from North America across the North Atlantic to Europe. It is no surprise that F2 propagation this month was erratic and not very exciting most of the time. Most of the action occurred early in the month associated with high geomagnetic activity—A = 22 to 36—and an active geomagnetic field. That is not to say that there were not some very interesting contacts to be made.

The month began with an unusual long-path opening from Southern California and Arizona to Okinawa (JR6), which actually began on October 31. NØKE operating mobile in DM13 worked JS6CDB (PL36) with 100 W and a λ/4 whip (see Figure 1). Jack, N6XQ (DM12), reports a contact with JA1VOK/6 on the 31st and 14 more on November 1. Conditions appear to have been best in the very southern part of California, being degraded somewhat up toward Los Angeles and then moving east into Arizona. AA7A was the big winner in Arizona having three contacts with N7IR, W7RV and WA7CJO all reporting success.

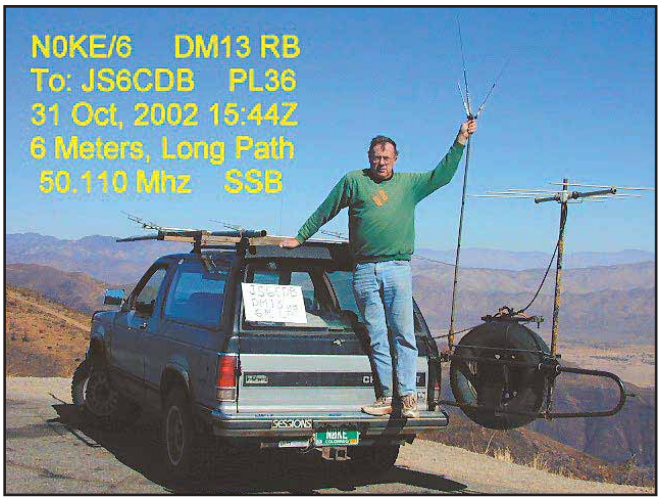


Figure 1—Phil, NØKE/6, celebrates working JS6CDB (Okinawa) long path from his mobile in DM13 using only a λ/4 whip.

The big event was a solid opening from the Caribbean, South and Central America to most parts of the US on November 3. A wide array of DX stations were worked, including KP4, TI5, HR3, TG9, HP2, FG5, CO8 and both of the big North American DXpeditions, J3/W6JKV/K6MYC and VP2MJD. At midday at the path midpoint, Tom, N6RA, reports transcontinental F2 contacts between W6 and the East Coast. Meanwhile, 3XY7C penetrated to the western states contacting N6XQ, N6CA and K5AM (New Mexico) as well as working some in the East like W3EP. The most interesting propagation did not result in a contact. John, W5UW, (EL17) was heard by Chris, A45XR, and Chris was heard by Sam, K5SW. Chris informs this conductor that he has yet to make a contact in the States this year.

The rest of the month was marked by erratic propagation involving some quite rare countries that often had propagation to one area or another for only brief periods. These include contacts with a variety of stations throughout the US with the 3XY7C (the DXpedition to Guinea) and ZD7MY, and stations in the western US to ZK1AKX (South Cook Island). The opening between VK and Florida on November 30 that yielded contacts between VK2QF and K2RTH (EM95) and W4SO (EL96) and between VK2ZXC and N4IS (EL96) was likely via an E_s/F2 link. Both ends of the link were hearing XEs when the contacts occurred. Dick, K5AND, operating VP2MJD reports working VK3CP/VK6 on the long path and wonders if this path has ever been encountered before on 6 meters. Meanwhile Jimmy, W6JKV, and Mike, K6MYC, operating portable from J3 worked into Europe on almost a daily basis reaching as far eastward as JY9NX on November 3 and A45XR on November 9.

Finally and as usual, conditions in Europe were generally much better than here in the States. Among the more notable achievements were contacts between EA5RM and VU2RM; 9M2TO and central Europe (9A, OE); 9H1CG and VK8AH, 9H1BT and XY1M (Myanmar); and 5B4FL to 8N1OGA (Ogasawara).

Are the F2 good times really done? Most probably, but stay tuned and let's see what happens in December.

HERE AND THERE

Reporting MS Contacts

In keeping with this month's meteor-scatter theme, I would like to remind those that report MS contacts that they need to specify the mode by which the contacts were made—SSB, CW, FSK441 (WSJT) and/or HSCW. Already there have been a few errors where WSJT (FSK441) contacts were listed as SSB contacts and vice versa.

Well-known 6-meter Operator C56RF SK

The *London Daily Telegraph* and the world news services reported in early November that Ron Ford, G3NKO, was kidnapped and murdered only a few days after moving to the Gambia to live in retirement. Ron held the call C56RF where he was well known to European 6-meter operators. Farewell, Ron—we'll miss you.

First EME Contact from Thailand (HS)

During the EME contest Dave, W5UN, reports working HS2JFW for a new country. This was the first ever EME contact made from Thailand. His contact was followed shortly by KB8RQ's. These were the only two contacts during the HS2JFW operation. The operators were Joe, HS2JFW, and Long, HS2CRU, who promised that they would do this again in the future. Their equipment consisted of a single 2-meter eight-wavelength Yagi and 180 W. Dave describes their signal as being surprisingly good. They operated from a remote site near HS2CRU's home, putting up a tent to shield them from the occasional rains. They did all antenna control by the arm-strong method.

903/1296 Beacons in the Northeast

K1TR's 903 and 1296-MHz beacons have a new home atop K1CA's 30-meter tower in FN42iv, 50 km northeast of their original location in FN42fm at the K1EA QTH. (Thanks K1TR.)

Bob White, W1CW, and the Integrity of DXCC

By Wayne Mills, N7NG

When Bob White, W1CW, who died in November at age 83, took over the DXCC program in 1952, it was a fledgling award with a total of less than 10 years under its belt. While DXCC was initiated in 1937, it was suspended along with Amateur Radio during WWII, and not restarted until 1947. For 26 years, Bob wrote rules, checked cards and succeeded in molding the program into the world's premiere DX operating award. For his efforts, he became known as "Mr DXCC" and was inducted into the CQ DX Hall of Fame in 1998. Following his passing in late November, it might be timely to reflect on certain aspects of DXCC, where it's been and where it's going.

DXCC began in the late '30s, in response to DXers' demands for a program that would recognize their accumulating DXploits. DeSoto discussed the parameters in 1935, and by 1937 the new program was in place. After the war, DXCC was restarted with a new countries list. When Bob began administering DXCC, the annual list contained fewer than 1500 mixed postwar DXCC holders. Since then, more than 30,000 Mixed DXCC awards alone have been issued.

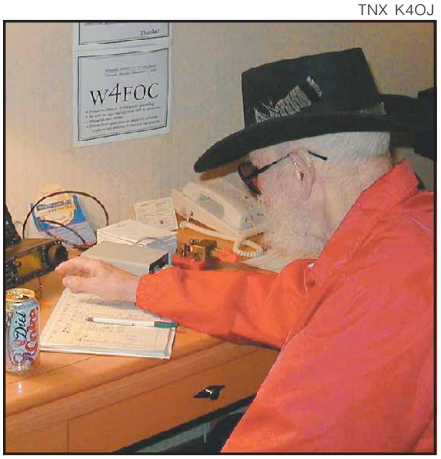
Bob (along with Don Search, later) is well known for spending countless hours checking the authenticity of virtually all of the cards passing through the DXCC Branch. This chore wasn't missed by those who preceded Bob, either. It turns out that this was the key to establishing DXCC as a premier award. Was it really necessary to check cards? After all, if someone cheats, he is only cheating himself, right? Consider this quote from the How's DX? column in *QST* for April 1939:

> No doubt a few of the readers of this page envy those fellows up near the top of the DXCC, what with all their confirmed countries and stuff. The listing is designed, of course, to be the rating of those fellows interested in working a flock of countries, and confirmation is required simply as evidence that the foreign station worked was not a phoney or a product of the DX man's imagination. The rush for new countries and cards has developed a few cut-throat operating practices with which everyone is familiar, so they don't need mentioning here. Some of that can be forgiven and excused on the basis of over-enthusiasm (or selfishness), but a new practice seems to be cropping up that isn't going to be tolerated on any ground. Believe it or not, some of your big-gun DX idols, listed in the CC, have been so anxious to improve their standing that they have been altering and forging cards submitted as evidence! Nice guys, what? The obvious insult to the intelligence of W1JMY (who handles the CC listing) might be overlooked, but one can't dismiss the fact that, if the DXCC is to mean anything, there isn't any room in the list for lugs like that. So, because anyone who has worked towards the thing wants the award and list to mean something, the lads who submitted the forged cards, and any subsequent offenders, will be dropped from the list. If there must be DX idols in this game, they aren't going to have feet of clay if it can be helped.

In the past, the responsibility for checking up on the gang lay almost entirely with Bob and then Don. As the use of computers became necessary to handle the huge increase in card volume, it became less likely that a particular card would be scrutinized by a "real DXer at HQ." During his tenure in the DXCC Branch, Bill Kennamer, K5NX, kept a keen eye focused on the cards, and experienced DXers are still available to look into whatever comes up. Staff is also effective at locating irregularities while entering and checking manual applications, as well. Sometimes it's amazing how these things stand out.

At the same time, more modern data-processing techniques have been replacing the tried and true manual procedures. Some creative searches of the DXCC database have already revealed some very interesting results. What few stations are the only ones to claim credit for those very rare ones who have never even been on the Topband? And who has already received DXCC credit for working a really rare one on six bands when the log substantiates QSOs on only one or two bands? Even QSOs made by others are surfacing. There are a number of these situations brewing, and if you look carefully at the standings in the future, you may notice that a few of the "big-gun DX idols" are missing. All in all, however, DXers enjoy the hobby and don't stretch the rules in order to gain their goals. They work their own DX and don't claim credit for bad contacts. I think Bob would be proud of today's DXers and the way the DXCC Branch is helping to maintain the integrity of his beloved DXCC.

TNX K4OJ



Mr DXCC, Bob White, W1CW, of Seffner, Florida, became a Silent Key in late November. Here he's operating at W4FOC, the Highlands First Class CW Operators' Club (FOC) station in Sebring, Florida.

DXCC LEGEND BOB WHITE, W1CW, SK

By Rick Lindquist, N1RL

Former ARRL Headquarters staff member Bob White, W1CW, died November 22 in Florida from complications arising from pneumonia. He was 83. White was an ARRL Life Member and had belonged to the League for 62 years.

Known to many as "Mr DXCC," White was the manager of the ARRL's DX Century Club program from 1952 until 1976, establishing the award—and its stringent standards—as Amateur Radio's premier DX achievement. White codified the rules for the DXCC program and oversaw the checking of some 250,000 QSL cards submitted yearly, often working as many as 90 hours a week to ensure that the job got done right. White also oversaw the ARRL QSL Service from 1976 until 1978.

"Dad was the guy who made DXCC what it was," said White's son, Jim White, K4OJ, in a posting to the CQ Contest reflector. "He didn't cut any corners—everyone was held to the same high standard—and this is what made holding DXCC meaningful."

Introduced to Amateur Radio in his youth by his stepfather, Gordon Brown, W6APG, White was first licensed in 1938. He served as a radio operator in the US Navy during World War II.

White was an avid DXer, contester and CW

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enthusiast whose fist was familiar to thousands of hams. Active in the First-Class CW Operators' Club (FOC), White was inducted into the CQ DX Hall of Fame in 1998. He also was a member of the A1 Operator Club.

White's wife, Ellen, W1YL, says her husband beat out former "How's DX?" Editor Rod Newkirk, W9BRD (now VA3ZBB) in obtaining the first all-Novice Worked All States award in 1954 when he was W1WPO. "Bob and Rod had a wonderful months-long battle to see who would be first," she said. "Bob was very proud of this."

Survivors include Ellen and Jim White, both former ARRL staff members. Per White's request, there was no public service.

Friends may send condolence messages via e-mail to **w1cw@tampabay.rr.com** or to 6607 Flicker Ct, Seffner, FL 33584. The family invites memorial donations to the W1CW Memorial Fund-Florida Contest Group, c/o Frederick M Perkins Jr, 3437 Lake Josephine Dr, Lake Placid, FL 33852.

NORTH KOREA SHUTS DOWN ONLY ACTIVE AMATEUR

By Rick Lindquist, N1RL

The only active Amateur Radio operator in North Korea was ordered off the air in November. Ed Giorgadze, 4L4FN, had operated for about a year as P5/4L4FN from Pyongyang. The ARRL subsequently accredited SSB and RTTY contacts with P5/4L4FN for DXCC.

"This really hits the ham community hard," QSL manager Bruce Paige, KK5DO, said in announcing the development. "I, for one, was looking forward to a satellite contact on AO-40. I know that many of you were still awaiting your first QSO."

Paige said that Giorgadze was summoned without explanation to a meeting November 22 with the "Radio Regulation Board" and politely asked to quit all transmissions and to pack all his radio equipment. Giorgadze spent the next day disassembling his antennas and packing up his gear in boxes, which North Korean government officials later sealed. Giorgadze was supposed to take all amateur gear out of North Korea in December.

Giorgadze had tried for more than two years to obtain permission to operate Amateur Radio in North Korea and finally was given the okay in 2001 to bring an ICOM IC-706MkIIG into the country. In the intervening months, he'd been slowly upgrading his antenna system. He made more than 16,000 contacts during his stint in North Korea and managed to attain the first DXCC ever from that country.

Paige said the P5/4L4FN logs should be complete on his Web site, **www.amsatnet.com/** (click on "P5 North Korea").

Giorgadze, who's from of the Republic of Georgia, had been operating on the basis of oral permission from North Korean authorities, but ARRL Membership Services Manager Wayne Mills, N7NG, said the ARRL was satisfied on the basis of written information submitted that the P5/4L4FN operation conformed with DXCC rules and would continue to be accepted for credit.

DX NEWS FROM AROUND THE GLOBE

DX GATHERING

The British Columbia DX Club (BCDXC) has updated its club Web site. Paul, VE7AVV, says the most notable addition is the series of pages in support of the 2003 Pacific Northwest DX Convention. All current information, registration info, hotel info and the first of the speakers are now posted. Go to **www.bcdxc.org** and click on the 2003 Pacific Northwest DX Convention link.

ST—SUDAN

ST1MN, Marco, will be a new station from Sudan February 28 through next June. The *425 DX News* says he is not used to pileups, so take it easy on him. IV3OWC, Claudio, will join him in mid-March for a month of operating. Claudio previously operated as 9E1C. While in Sudan, Claudio will use the call sign ST1C and he will be in the CQ WPX SSB. QSL either of these via IV3OWC.

V3—BELIZE

DK9GG, Gisela (YL operator) will operate as V31GW from Corozal, Belize, Central America and DJ4KW, Gerd (OM operator) will operate as V31YN from January 9 until February 25. QSL to them via their home calls. Another couple will join them in February. Those call signs are not yet assigned. For IOTA fans, February 21-23 they will be on San Pedro, NA-073, signing V31YN/p.

VP5—TURKS & CAICOS ISLANDS

K3LP called your editor to report he has organized a contest DXpedition to the Turks and Caicos Islands. The group which includes K3LP/VP5, WX3B/VP5, N3SB/VP5 and N7DD/VP5 expect to be QRV February 13-20, including a multi-op effort in the ARRL CW DX Contest. During the Contest they will use VP5LP. Before and after the contest the group plans activity on 10-160 meters, including 10, 18 and 24 MHz, on CW, SSB and satellite. QSL direct only via N4ZH.

VP6—PITCAIRN ISLAND

Ed Madison, W2SN, announced he is scheduled to operate as VP6EM from Pitcairn Island on February 4. Look for him between 1700 and 2359Z on 10, 15 and/or 20 meters SSB, depending on propagation. QSL via W2SN.

YI9—IRAQ

Mike, OM2DX, has taken the place of Peter, OM6TY, as operator at YI9OM in Iraq. Peter left Baghdad late in November. Mike has applied for the YI9DX call sign. He has been spending time on 160 meters and says he made 100 QSOs the week following CQWW CW. He worked most of Europe and Japan as well with just 100 W and longwire that's not very well situated, he says. He will be trying to improve the 160 antenna. He reminds us that the weekend in the Arab world is Friday and Saturday, so Thursday and Friday nights are the ones he is the most active. He tries to operate split, listening up. His home page is **www.qsl.net/om2dx**. He says he will try to update it with Iraq QSO info so you can confirm that you did work him, and he would like you to refrain from calling if you are already in the log so others can work Iraq on 160. For skeds and such you can contact Mike at **kristof@uruklink.net**, which he says he checks often. QSLs for YI9OM contacts starting November 28, 2002 are now via OM3JW. Mike plans to be at the Slovak Embassy in Baghdad for two to four years and plans to be active on CW, SSB, RTTY and PSK31. *425 DX News* says to look for him on 160 between 1832-1833 kHz starting at 2030Z. A late report had YI9OM on 14088 RTTY at 1000Z.

HH—HAITI

Hans, DL7CM, says he's been home too long and it's time to announce some travel (his last operation was H7DX last February). Sid, DM2AYO, will join him for a trip to Haiti January 30-February 16, where they will operate as HH2/DL7CM and HH2/DM2AYO. They will be on all HF bands 160-6, CW, SSB and RTTY. They expect to concentrate on the low bands, 6 meters and RTTY.

WRAP UP

Well that's all for this month. A special thanks to *425 DX News*, KE3Q, N1RL, N7NG and *The Daily DX* for helping to make this month's column a success. Keep sending your pictures, newsletters, stories and DX news. Until next month, see you in the pileups! —*Bernie, W3UR* QST

NEW PRODUCTS

TRANSTENNA TRANSMISSION LINE ANALYSIS SOFTWARE FROM WØJOW

◊ Designed to work with the many popular SWR analyzers, *TransTenna* is a *Windows*-based software package that produces Smith Chart results—without the hassle and complexity. The program allows impedance measurements made at the shack end of the feed line to be transformed to the antenna end of the line, which allows the antenna impedance to be characterized while the antenna is at its normal operating height and position.

The program, available on CD-ROM with a printable PDF user manual, is easy to understand, and a database of typical Amateur Radio feed line characteristics is included to further simplify operation for beginners (users can add transmission lines to the database). Several advanced tools and calculators are also built into the main package.

Price: $13.95 plus $3 shipping and handling. For more information, contact Don Cochran, WØJOW, at 21826 Gardner Rd, Spring Hill, KS 66083; tel 913-856-4075. QST

A Microphone Story

The most popular early microphone was the "carbon" type. Most hams purchased their microphones or adapted older telephone mikes. Carbon mikes were fairly inexpensive. *QST* and other magazines had numerous articles showing how to make mike stands and how to use suspension springs to keep the carbon mike from picking up annoying vibrations from the room.

In 1916 Edward C. Wente (at Western Electric and Bell Labs, 1914-1954) devised the condenser microphone, the first microphone with a flat frequency response suitable for music. With amplification, this microphone was initially used over telephone lines for music.

After 1921 the number of commercial broadcasting stations grew and there was a need for better microphones for use with music and singing. Large companies, such as Western Electric and GE, began developing new types, not using carbon. One type, the condenser microphone, quickly became popular.

At the same time more hams began using microphones to broadcast voice. They too desired to sound better than the carbon type would allow. As commercial condenser microphones were very expensive, hams began to make their own.

Then in the November 1932 issue of *QST* there was an article by Howard Anderson, W1BVS, called "A Sure-Fire Condenser Microphone." Anderson said, "The materials used for this job require a minimum of machine work and are of a type that is generally available, the whole thing being built around an obsolete magnetic loud-speaker unit of a type widely distributed in years past and still to be found kicking around radio shop 'graveyards' in goodly numbers. As an alternative to this unit, the whole head can be machined to the specifications given in the drawings."

Also in the article was a schematic for a one-tube amplifier necessary to make the microphone function well. A small cylindrical case was also shown, to house the microphone and the amplifier as one complete unit.

In the same issue was an ad for "A Real Condenser Microphone with a 2-stage amplifier by Sound Engineering of Chicago for $65." Several pages later there was another ad from United Radiobuilders, a New Jersey firm, saying: "Complete parts for making a condenser mike head, with instructions for $4.50." So if the ham wanted one badly enough to build one, they were now affordable.

In 1934 the Philadelphia M&H Radio Company featured the "Bruno" microphone kit in their catalog. It was really inexpensive, $2.94 in kit form, or $5.88 completely assembled and factory wired.

Condenser microphone from the 1932 *QST* article.

The W6CKF Condenser Microphone

Thomas J. Imler, Jr, of Phoenix, Arizona was first licensed as W6CWI on April 30, 1929. The following year he picked up a second station license, W6EXC, for "Portable operation in the sixth radio district only." (It was common back then to have a second call, good only for "portable" operation. These were issued as a "Station License.") His next call sign was issued in mid-1932, W6CKF. At the same time he dropped the other, older calls, and they were reissued to other

This ad for the Sound Engineering condenser mike is from page 76, Nov 1932 *QST*.

Completely assembled and wired for $5.88!

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

hams. On page 60 of the November 1932 issue of *QST* he is mentioned as helping W6FEA construct a 200-watt c.c. (phone) rig. He held this new call for a few years, and by 1939 his call was no longer listed.

Little else of Imler's ham radio career is known, but his legacy will live on, thanks to one very beautiful microphone he constructed. His family owned the first sign shop in Phoenix, and I'm assuming he was active in the business and familiar with metalworking. The workmanship on the microphone is outstanding.

Not satisfied with the usual cylindrical housing, he constructed an Art-Deco cabinet out of heavy sheet copper. Seventeen inches tall overall, it has a lower compartment for the "Bruno" condenser microphone, a center compartment for the one-tube amplifier, and a third compartment at the top to hold the batteries. The cabinet itself measures 15 inches tall by 6 inches wide and 6 inches deep. "W6CKF" is embossed down the front and his name, "T. Imler" is engraved at the top, into the hanging bracket. The back panel slides up and off to expose the interior; no screws are used. Design wise, I think it has a Southwest look.

There appears to have once been a two-tube amplifier in it, as there are cutouts for two tubes. The knob at the top at one time controlled the gain as well as functioning as an on-off switch for the batteries.

Can you imagine how it must have felt, sitting in front of that microphone, calling CQ? It makes me wonder what the rest of his station looked like. I'll bet it looked just as good.

The microphone came with his two early licenses and his W6CKF logbook. His log covers from August 26 to July 8 with no year shown. I think it's safe to assume it was in the 1933-1934 time frame, consistent with the 1933 and 1934 call book listings.

He worked stations from as far away as Japan and Australia as well as locals from the sixth district, and quite a few QSOs from the fifth, seventh, eighth and ninth call districts. There were just a couple of ones and threes listed. The two bands operated were shown as 40 and 20-meters. Strangely, there were no comments, no operator names, cities, states or times listed in the log.

How I Got the Microphone

This mike was listed on the on-line auction site eBay in 1998. I bid on it, but did not bid high enough to get it. My friend Brad Jones, a microphone collector, was the winning bidder. Realizing what a mistake I made, I contacted him immediately and let him know that I was interested in the microphone, if he ever decided to sell it. Eventually he did decide to get rid of it, and I traded some things for it.

The W6CKF mike is a beautifully crafted instrument.

Rear view of the microphone with cover removed.

To finish the microphone for display, I'm hoping to find a W6CKF QSL card to put with it. And maybe someday I'll find someone who knew him or worked him.

Condenser microphones are still in use and popular in the music industry today. Some recording artists closely guard their own personal mikes and only use them for their own recordings. They feel it provides the sound the artist wants. Good condenser mikes today can cost well over $1000, with many manufacturers producing them.

Hamfest

Weather permitting, I'm planning to be at the Richmond (Virginia) Frostfest on Sunday, February 9. This hamfest always has a good selection of older ham gear and parts, and it's inside and warm. The last time I was there I found a couple of great radios. See their Web page, **www.frostfest.com**.—*K2TQN* QST

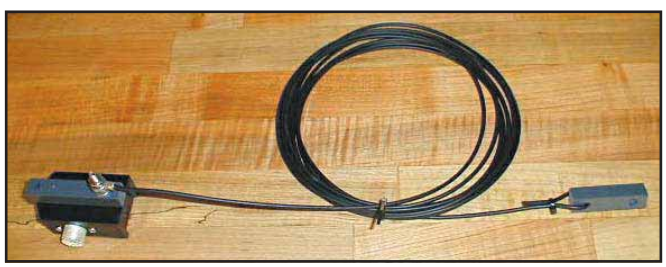
NEW PRODUCTS

END-FEDZ HF DIPOLES FROM PAR ELECTRONICS

◊ Tired of feeding your dipole in the middle? PAR Electronics' new End-Fedz antennas are full-size, half-wave dipoles fed at one end. These wire antennas can be mounted vertically, horizontally or as slopers, without ground planes or counterpoise wires. For portable operation, the far end can be hung from a tree limb or draped from a hotel window—no tuners required.

Features include machined end insulators, UV-resistant ABS enclosures, silver/Teflon SO-239 connectors, stainless steel hardware and coated, 14-gauge Flex-Weave stranded wire elements. The antennas can handle 100 W of RF, and models are available for 20 through 6 meters.

Prices: $41.95 (20, 17 and 15 meters); $40.95 (12 meters); $39.95 (10 meters); $38.95 (6 meters). End Fedz are available direct from the manufacturer or from Universal Radio (**www.universal-radio.com/catalog/hamwire/4456.html**). For more information, contact PAR Electronics at PO Box 645, Glenville, NC 28736; tel 828-743-1338, **par@parelectronics.com**, **www.parelectronics.com**. QST



OP-ED

Are We Really Amateurs?

By Jay Kolinsky, NE2Q
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At the June 25, 2002 meeting of the National Public Safety Telecommunications Council (NPSTC), ARRL President Jim Haynie, W5JBP, said, "It's our goal to increase the credibility of the Amateur Radio Service, especially after 9/11." Right now, Homeland Security is on every public official's lips. *QST* devotes an entire section to Public Service and prints stories of how hams were mentioned in local news reports. Most of us are proud when good publicity shows us in a favorable light. But are we getting enough of it nationally to gain the American people's confidence or even making them aware of our existence?

Over the years hams have been disappointed by the average American's lack of good solid recognition for our public service efforts. Most still think a ham is something one gets from a four-legged animal that waddles around in the mud.

Possibly we are our own worst enemies when it comes to publicity. Look at any radio club that does public service events or takes part in an emergency. You'll observe a "ragtag" assortment of club identifications on hats, jackets, raincoats, Comm-Vans, and so on. Every club has their own individual ID. The Westchester (New York) Amateur Radio Association uses WECA on their clothing. Greater Norwalk (Connecticut) Amateur Radio Club jackets say GNARC and the Stamford (Connecticut) Amateur Radio Association uses SARA windbreakers. This form of identification is in use by most radio clubs in America. It is very counterproductive. The general public is not seeing any uniform national identification regarding hams.

With the government's current strong efforts to get volunteers to help with safety and security in America, maybe this is the opportune time that we "hams" create a new public persona—something more uplifting and easily recognizable by the world at large.

We need something as distinguishable as the DEA, ATF and FBI. All our jackets and hats must look alike.... all over America. Imagine all hams taking part in public service events or actual emergencies wearing a hat or jacket with the same two or three letters, nationwide! The public may not immediately know what *our* letters mean. The curiosity factor will cause people to ask who we are. Eventually our letters will be noticed by the press. News coverage of serious emergencies and disasters will eventually get our ID worldwide circulation.

Now what should we call ourselves that will immediately garner respect by the public? The creation of a national identification is tantamount to developing a name for a new corporation. Maybe we'd get a bit more prestige and recognition for our efforts if we were known as (E C E), Emergency Communications Experts, (A E C), America's Expert Communicators, (E C A), Expert Communicators of America or simply (E C) for Emergency Communications. The simplest ID is the most recognizable. Just two or three bold, black letters on an orange Day-Glo windbreaker will stand out better than any fanciful logo or profusely lettered text.

What is wrong with using the word *amateur* you ask! Our continued use of the word when labeling ourselves and our hobby may be unintentionally degrading in the eyes of non-hams. Showing up at an emergency site with the word *Amateur* boldly emblazoned on one's jacket could be counterproductive. Do we honestly have such low esteem?

The mere mention of the word *Amateur* when associated with any field of endeavor causes an *instant lowering of expectations* as to capabilities. Why should we lower people's anticipations when introducing ourselves and our avocation.

After 44 years as a "ham" I feel more technically competent and more expert at what I do than most professional radio operators. Certainly this feeling exists in many of us. I'm personally embarrassed to describe myself as an *Amateur* Radio operator and always use the term *ham*. Not that *ham* is that much better…

There are many hobbies other than ham radio. Ever hear people refer to themselves as an Amateur Pilot, Amateur Sailor, Amateur Scuba Diver, Amateur Sky Diver, Amateur Boater, Amateur Stamp Collector? Think about it...why do we call ourselves Amateur Radio Operators? Because we don't get paid? Neither do many pilots, race drivers, sky divers, sailors, boaters, stamp collectors, etc, etc.

The word *amateur* has been used so long, it has unfortunately become ingrained into many of our vocabularies. When we describe ourselves as Amateur Radio operators, our emphasis is on radio. But when the public hears Amateur radio operator, their emphasis is usually on the word *Amateur*!

Earlier this year, the ARRL board of directors requested the creation of distinctive clothing for ARES members. In September 2002, the ARRL announced the availability of a new vest and windbreaker. They both show the three words "Amateur Radio Communications." Although this is a welcomed and excellent breakthrough in an approach to a national ID, this 26 letter text is not at all as readable at a distance as a larger two or three letter ID would be.

Most importantly, we should determine through marketing-type surveys which description of us makes the best impression with the general public. Then we should move forward with a two or three letter nationwide ID to be seen on hats, jackets, etc.

It's a new century. Maybe it's time for us to modernize and become better known. Maybe it's time for a change. Maybe we are not really amateurs after all!

QST 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 two-thirds of a *QST* page in length (approximately 900 words).

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.

The Oak Hills Research OHR 100A Transceiver

In the rush to embrace the "digital world," today's QRPers often overlook a selection of analog radios that often outperform their flashier digitized counterparts. One such product line is the Oak Hills Research analog transceivers. These are all "purist" QRP rigs, set up to work exclusively CW. Narrow IF passbands, low noise receivers, smooth break-in (QSK) T/R switching, and ease of construction and maintenance are the big drawing points for this fine series of rigs.

Recently I had the good fortune to acquire an Oak Hills Research OHR 100A monoband transceiver kit for 30 meters. Having never built an OHR kit before, I jumped at the chance to explore their product line. Oak Hills Research was the brainchild of the late Doug DeMaw, W1FB, who started the company in 1987. Doug produced some well designed QRP kits and accessories for a few years, and then sold it to Dick Witzke, KE8KL, around 1990. In 1999, Dick sold the OHR product line to Marshall Emm, N1FN, owner of Milestone Technologies and Morse Express. You can check out the various products in the Oak Hills lineup at **www.ohr.com** or write Oak Hills Research, 2460 S Moline Way, Aurora, CO 80014, tel 303-752-3382; e-mail **qrp@ohr.com**.

Here is a front ¾ view of my 30 meter OHR 100A transceiver. Notice how the controls are all nicely arranged—this is a very "comfortable" radio.

Four Bands/Four Versions

The OHR 100A is a single band (in this case 30 meters) CW transceiver capable of 4 to 5 W output over a 70 kHz tuning range. This kit is offered in 40, 30, 20 and 15-meter versions. Marshall Emm, N1FN, told me that the 40-meter version was a favorite of the foxhunting group on QRP-L (**www.qrp-l@lehigh.edu**), owing to its very quiet receiver section. A quiet receiver is definitely needed for digging out the weak ones from the band noise. The 100A has built-in receiver incremental tuning (RIT) that covers ±1 kHz of receiver tuning range. The superhet receiver features a 9 MHz IF and a local oscillator (LO) running at 14.1 MHz, which places any mixing products well outside the passband of the receiver. The VFO is very tame and runs at 5 MHz. The receiver incorporates a 4-pole Cohn crystal filter; the crystals are hand-matched and the bandwidth is continuously variable from 1200 to 400 Hz. There is no RF amplifier ahead of the first receiver mixer (an SA-602). The bandpass filter feeding this mixer serves to reject unwanted signals.

The OHR 100A also incorporates a very smooth QSK (break-in keying) T/R keying circuit and has a nice sounding sine wave sidetone when keyed. RF power output is adjustable from 0 to full output via an output control on the rear panel. The SA-602 transmit mixer's output is filtered and fed into a 2N5179 buffer amplifier. From there it heads into the 2N3866 driver and finally into the 2SC2078 power amplifier. Front panel controls including RF and AF gain, RIT and IF bandwidth are nicely spaced for those of us with big fingers. The main tuning dial is easy to read. The tuning is a bit fast for my personal taste, but OHR offers an optional 10-turn tuning pot.

My overall impression of this kit was very positive. The large PC board offered plenty of room to work. Silk-screening was very crisp and detailed. The directions are reminiscent of "Heathkit style"—very concise and easy to follow. The case was roomy, offering lots of space for modifications and additions (more on this later). In all, I was well pleased with the ORH 100A kit. One thing I definitely liked were the large pages of the parts inventory, parts placement overlay and schematic diagrams.

The only thing about the documentation I would change would be to have the parts overlay and schematic diagrams of the transmitter and receiver printed on single-sided paper to reduce the constant page flipping when troubleshooting. Incorporating a block diagram of the radio along with an operational description of the various circuits and a listing of the specifications into the manual would be a nice touch for those who want to fully understand the rig's theory of operation. The documentation is stapled together, which is a good thing, as this lets the builder pull the pages apart for easy access on the bench. Once the project is completed, the documentation can be bound or punched and placed in a binder.

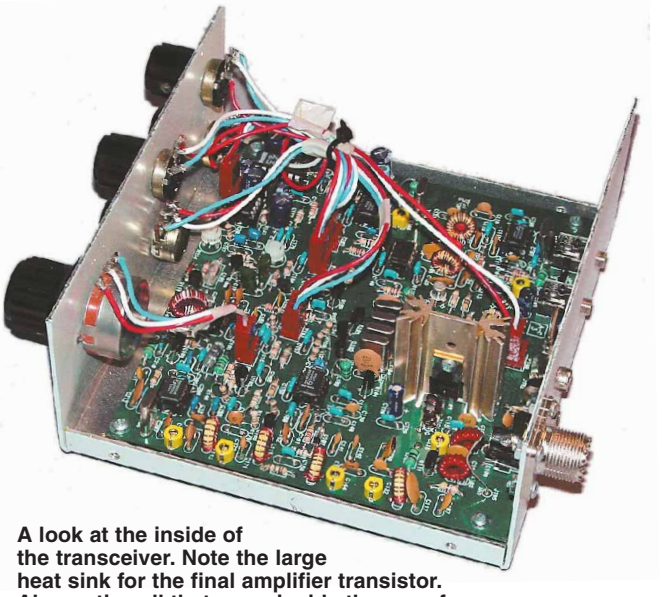
His First Kit

Assembly took about 13½ hours and alignment took about four hours. While I wanted to do the actual construction, I had decided ahead of time to farm this kit out to an Amateur Radio newcomer whom I was trying to entice into the QRP fold. George, while not a QRPer or an active ham, was an experienced electronic technician. He had never built a kit, so he became my guinea pig. I gave the kit to George with specific instructions to document his progress to include the time he spent on the various stages of the project. Here are his findings: 1.5 hours to thoroughly read the manual and inventory all the parts; 2.5 hours to sort and install all the resistors; 2 hours to sort and install the capacitors; 2.5 hours to install transformers, jacks and controls; 2.5 hours to install the 30-meter frequency pack (this includes winding all seven toroidal inductors); and, finally, 2.5 hours for final assembly. The alignment took about 4.5 hours, including some assistance that I provided.

Time from start to finish was about 18 hours—not bad for a first-time kit builder.

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

At the rear are jacks for (l-r) antenna, 12 V power, oscillator output (for frequency counter or digital dial), key line, power adjustment, speaker and headphones.



A look at the inside of the transceiver. Note the large heat sink for the final amplifier transistor. Also notice all that room inside the case for optional accessories and/or modifications.

When I told him about it, Marshall Emm admonished me, saying he usually recommends against a transceiver kit as a "first kit" for the inexperienced builder. George's familiarity with electronics and construction techniques accounts for his lack of problems in building this kit. Incidentally, the radio worked the first time it was fired up—an outstanding testimonial to George's abilities and the excellent documentation.

George brought the OHR 100A to me for final peaking and tweaking. One thing we noticed right from the start was that it produced nearly 4 W at the high end of the dial and less than 1 W at the bottom end. It seemed like no matter how we adjusted C120 and C122 the transmitter output was rolling off the lower edge of the low-pass filter passband, causing attenuation in the lower frequencies. We got the answer after a call to Marshall at Oak Hills: The transmitter output was rolling off the lower edge of the low-pass filter passband, causing attenuation in the lower frequencies. Hmm, where had I heard that before?

Marshall advised us to reposition the turns on inductors L104 and L105 on the output of the NE-602 mixer (U100) going into the base of Q103, a 2N5179. This is usually enough to get the proper power output. We tried this but still could not obtain maximum output (4-5 W) from the low to high end of the tuning range of the VFO. Then I decided to have George lift L104 and L105 from the PC board, remove all 21 turns and rewind the coils using 23 turns. My thinking was that I would be able to remove one turn if needed. With 23 turns on both cores, we got obligatory 5 W output across the entire tuning range of the VFO. The added inductance widened the passband enough to allow the proper output. A check of the transmitter on a spectrum analyzer showed a nice clean output with no nasty spurs or harmonics.

Testing the Transceiver

On-air tests revealed a very quiet receiver. Keeping the IF filter at about 700 Hz bandwidth allowed me to hear stations slightly off frequency while concentrating on the station I was in communication with. All too often we QRPers tend to cinch the IF bandwidth way down, really narrow, in hopes of attenuating all the signals to each side of our target station. When the IF is this "tight" we can't hear stations that are not quite zero-beat with our radio, and thereby miss out on possible contacts. I prefer to leave the IF opened up a bit (600-700 Hz) and let my brain become the CW filter, which allows me to hear off-frequency stations. This technique is especially helpful in QRP contests where congestion around the QRP calling frequency is very dense and an extremely narrow IF filter would be more of a hindrance than a help.

The transmitter sounded very clean, according to the operators I contacted while using the OHR 100A. The QSK circuitry worked great, and there was no thumping as the rig was keyed at speeds in excess of 20 WPM. Tuning was a bit sharp and could benefit from an addition of the optional 10-turn pot offered by OHR. While dial markings are approximate, one worthwhile modification would be the inclusion of a Small Wonder Labs FreqMite audio frequency counter/digital dial (**smallwonderlabs.com/swl_frq.htm**). For $20 (as this is written) you can't go wrong. One touch of a button and your operating frequency is read out in Morse code. If you prefer, the OHR rigs all offer an oscillator output jack on the back where you can plug in a frequency counter or digital dial similar to the OHR DD-1 to give an accurate frequency readout. The DD-1 is an external digital dial and standalone frequency counter in a matching OHR enclosure featuring bright red LEDs.

And in Sum...

How do I like the OHR 100A for 30 meters? It is a superbly capable kit radio that plays very well. The extremely quiet receiver in the 100A is a wonderful departure from its noisier digital counterparts. One thing I *really* like about it is its size. Over the last six or seven years we have been treated to a number of really small, compact, highly portable rigs that defy easy modification or internal add-ons. Thankfully, Oak Hills Research has not succumbed to this packaging trend—you can actually work on this radio! What a pleasure. Cost of an OHR 100A kit (in your choice of bands) is $129.95 plus shipping. Don't forget the host of other available OHR products, including the OHR 500 five-band transceiver kit, the DD-1 digital dial, the WM-2 QRP wattmeter and the OHR dummy load. Oak Hills Research is in the business of providing serious gear for the serious CW operator. All the OHR rigs are optimized for ease of construction, operator comfort features and performance. When you talk to Marshall don't forget to tell him where you read about his great little radio. QST

YL DXpeditions

You'd never think YLs were in a minority in ham radio from the recent DXpedition activity on the air by many YLs all over the world. Last October Ann Santos, WA1S, was in Ogasawara where she operated with Noriko, 7K3EOP. Another YL heard was Vicki Luetzelschwab, AE9YL, who gave many YL chasers their first YL DXCC QSO from Market Reef (OJØ), part of the Aland Islands in Finland. Afterwards she went to the World Radiosport Team Championship 2002 in Helsinki. Ann, WA1S, returned to the US from Ogasawara just in time to leave for Grenada, where she was part of the J3A team operating the CQ World Wide CW contest. Joining her there was Cheryl Muhr, NØWBV, who enjoyed operating SSB almost every day. Cheryl is also the new YL columnist for *Worldradio* magazine.

DXpeditions, whether to a tiny atoll or an island paradise like Grenada in the southern Caribbean have unique challenges. Language, customs, cuisine are some of the things you can research and know about before you leave home. The others—especially, for example the type of operating situation you will be presented with once you get there—are often unpredictable. It could be anything from a tent or abandoned building with no bathing facilities (or hot water) to a four-star hotel. One thing you can be sure of is that it will be a memorable experience. All the YLs I've spoken to who have been on a DXpedition also agree on one thing: be prepared for the unexpected and have fun in the pileups!

Ann, WA1S, has been all over the world on many DXpeditions and was looking forward to visiting her friend Noriko who lives in Shinjuku, Tokyo, Japan. It was the first time Ann was travelling to the Far East, and when she left her home in New Hampshire in early October it wasn't without some trepidation. "It was going to be my first experience in a country where the primary language was not English," she said. The trip was long, but all went well. She felt at home when they approached Noriko's house and the first thing she saw was a big cubical quad mounted on a tower on the roof.

Before leaving on their trip to Ogasawara, Noriko took her on a tour of Tokyo. Ann was very impressed by Akihabara, also known as "Electronic City." "It's definitely a must see for anyone traveling in that area because of the incredible array of electronics, cameras, computers, Amateur Radio equipment, etc there," she said.

Both Ann and Noriko were going to Ogasawara to be part of the 8N1OGA team, a special event station established to celebrate 75 years of the Japan Amateur Radio League (JARL). "Nori and I were the only ones scheduled to operate the station from October 8-16," Ann said. Ogasawara (also known as the Bonin Islands) is an archipelago of over 30 large and 217 smaller islands located in the Pacific Ocean about 600 miles (and a 25-hour boat ride) south of Tokyo. Their final destination was Chichijima, a subtropical inhabited island of approximately 15 square miles characterized by sharply rising cliffs and sandy beaches where temperatures average a moderate 73ºF.

The station they would be operating from was housed in a Community Center set back from the road, with two 30-foot towers (one with a 5-element, 6 meter beam with a 4-element tribander below it). At the top of the second tower were a 30/40 meter rotatable dipole and a 4-element beam for 12 and 17 meters. There were three complete stations, each with a Yaesu Mark-V FT-1000MP transceiver, VP1000 power supply and a VL1000 amp so they were able to operate 1 kW on all HF bands.

A small cottage about 100 feet up a steep embankment served as their accommodations. It had a main room about 10×12 feet with a stove/sink/microwave/refrigerator and a small bathroom with a shower. Sleeping accommodations were two small rolled mattresses.

Ann and Noriko were anxious to get on the air and everything went well except for local interference from some large mice who took a liking to their cables (especially Ann's Heil headset). Ann used *CT* as her logging software on a laptop she had brought from home, including a CW keying interface, which allowed her to send from the keyboard. She noticed that the computer was much slower than usual and, after checking everything, determined that it was probably because the local power was only 100 V. During the week they operated daily from the Community Center, but also took time to do some scuba diving and touring around the island. They worked all the bands (except 80 or 160), with Ann on CW and Noriko on SSB. Conditions were not always the best, and halfway through their week they encountered a sudden storm which, they were told, could possibly turn into a typhoon! It just turned into normal wind and rain, but another emergency had taken their attention. Noriko came down with severe laryngitis and had to be taken to the hospital. Luckily she recovered and they were able to continue.

"It was very exciting operating as 8N1OGA," Ann said. They hope many hams had the chance to work some of the team members. The station was active until the end of January by other hams. For on-line logs and information about their operations visit **www.fivenine.com/8n1oga/eng/**. QST

WA1S

Noriko, 7K3EOP, at one of the operating positions at the Community Center (8N1OGA).

Ann, WA1S, in front of the Community Center in Ogasawara.

Diane P. Ortiz, K2DO ♦ PO Box 296, Bellport, NY 11713 ♦ k2do@arrl.org

COMING CONVENTIONS

TENNESSEE SECTION CONVENTION

February 8-9, Memphis

The Tennessee Section Convention, sponsored by the DixieFest Committee, will be held at the Shelby County Building, Mid-South Fairgrounds, 955 Early Maxwell Blvd. Doors are open Saturday 9 AM to 5 PM, Sunday 9 AM to 2 PM. Features include flea market, dealer booths ($60), special forums (Digital Modes, ARRL and TN Section, FCC Rules Enforcement with Riley Hollingsworth, MARS, ARES and Emergency Communications), VE sessions (both days; registration 8 AM, testing begins at 8:30 AM prompt), Special Event Station, DXCC QSL card checking, camping, refreshments. Talk-in on 146.82, 146.88. Admission is $5, under 12 free. Tables are $20 (power $10 extra). Contact Ben Troughton, KU4AW, 3144 Ingleside Dr, Bartlett, TN 38134-3610; 901-372-8031; **bktrough@bellsouth.net**; or Melinda Thompson, KE4DXN, 901-743-1949; **www.dixiefest.org**.

VERMONT STATE CONVENTION

February 22, Milton

The Vermont State Convention, sponsored by the Radio Amateurs of Northern Vermont, will be held at Milton High School, Rte 7, 5 miles N of I-89, Exit 17. Doors are open 8 AM to 1 PM. Features include flea market, vendors (please call for setup information), dealers, book sales, demonstrations, forums (ARRL, QRP, Contesting, Microwave, Antennas), VE sessions (9AM and 1 PM), commercial radio exams, refreshments. Talk-in on 145.15, bulletins on 146.67. Admission is $5/$3, under 18 free. Tables are free while they last. Contact Mitch Stern, W1SJ, 802-879-6589; **w1sj@arrl.net**; **www.ranv.org**.

WESTERN WASHINGTON SECTION CONVENTION

March 8, Puyallup

The Western Washington Section Convention, sponsored by the Mike and Key ARC, will be held at the Western Washington Fairgrounds Pavilion Exhibition Hall, 9th Ave S and S Meridian; Hwy 512 to Meridian St South Exit, go N on Meridian to NE corner (Gold Gate) of Fairgrounds. Doors are open for setup on Friday 2-7:30 PM, Saturday 5:30-8:30 AM; public 9 AM to 3 PM. Features include 22nd Annual Electronics Show and Flea Market, commercial booths, vendors, computers, parts, radio gear, club info, consignment area, VE sessions (206-824-9039; **k7yh@worldnet.att.net**), free parking, overnight SC/RV camping available, refreshments. Talk-in on 146.82 (103.5 Hz), 146.58. Admission is $6, under 16 free with adult. Tables are $22, seller registration $5, helper registration $7. Contact Michael Dinkelman, N7WA, 22222 148th Ave SE, Kent, WA 98042; 253-631-3756; **mwdink@eskimo.com**; **www.mikeandkey.com/flea.htm**.

January 19
New York City/Long Island Section, Oyster Bay*

January 31-February 1
Mississippi State, Jackson*

February 1-2
Florida State, Miami*

February 7-9
Northern Florida Section, Orlando*

February 9
Virginia Section, Richmond*

March 14-15
Oklahoma Section, Claremore

March 21-22
Nebraska State, Norfolk

March 28-29
Maine State, Lewiston

March 29-30
Maryland State, Timonium

***See January *QST* for details.**

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262. **Note:** Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **February 1** to be listed in the **April** issue. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

†Arkansas (Harrison)—Mar 8; set up Friday 7-9 PM; Saturday 6 AM; public 8 AM to 2 PM. *Spr:* North Arkansas ARS. Northwest Arkansas District Fairgrounds, S Main St; Hwy 62/65 to the Kum & Go, turn N on 65B, go approximately ¾ mile, turn right onto Fairgrounds Rd, go to top of hill, turn right into Fairgrounds. Commercial dealers, forums, tailgating (requires admission ticket), VE sessions (9 AM, no reservations needed), foxhunt (tentative, noon), handicapped accessible, free parking, refreshments. *TI:* 147.0. *Adm:* $5, under 16 free. Tables: $15 (for first table; Bill Rose, N5VKF, 870-741-7074; **billrose@cox-internet.com**); $10 (for each additional table). Bill Carlton, KD5HBM, 7221 Hwy 62 E, Harrison, AR 72601; 870-743-6211; **kd5hbm@alltel.net**; **vistaeng.homeip.net/naars/hamfest/index.html**.

†Arkansas (Russellville)—Mar 1. *Spr:* Arkansas River Valley AR Foundation. Hughes Community Center, Parkway and Knoxville; from Hwy 7 turn E on Parkway, go E on Parkway to junction of Parkway and Knoxville. ARRL forum. *TI:* 146.82. *Adm:* $5. Tables: $10. Margaret Alexander, KC5MCS, 1511 N Jackson, Russellville, AR 72801; 479-968-7270; **ealexand@cswnet.com**; **www.cswnet.com/~arvarf/hamfest.htm**.

†California (Monterey/Seaside)—Feb 22, 7 AM to 3 PM. *Spr:* Naval Postgraduate School ARC. General Stilwell Community Center, Ord Military Community (old Fort Ord), 4260 Gigling Rd; take CSU Monterey Bay Exit from Hwy 1, go right at first traffic light, go left at next stop sign, Center on right. This year's theme is "To Serve Your Community." Flea market, numerous dealers, vendor booths, seminars, demonstrations, VE sessions (free), guest speakers, free parking. *TI:* 146.97 (94.8 Hz). *Adm:* Free. Tables: inside, first $35, each additional $30; outside, first $25, each additional $20. Brian Broggie, W6FVI, Box 7368, Carmel, CA 93921-7368; 831-626-1501; **w6fvi@arrl.net**; **www.radiofest.org**.

†Colorado (Brighton)—Feb 16, 9 AM to 2 PM. *Spr:* Aurora Repeater Assn. Adams County Fairgrounds, 9755 Henderson Rd; US 85 to 124th Ave, go W on 124th Ave, which becomes Henderson Rd, continue W to the Fairgrounds Complex on N side of road. VE sessions (10 AM). *TI:* 147.15. *Adm:* $4. Tables: advance $10, door $15 (plus admission). Wayne Heinen, NØPOH, c/o ARA, Box 471802, Aurora, CO 80047-1802; 303-699-6335; **n0poh@arrl.net**; **www.qsl.net/n0ara/**.

Florida (Brooksville)—Feb 15. John Nejedlo, WB4NOD, 727-856-2568.

†Florida (Sebring)—Feb 15, 7 AM to 2 PM. *Spr:* Highlands County ARC. Highlands Shrine Club Main Building, 2604 State Rd 17S (Avon Park); from Sebring downtown traffic circle go N on Hwy 17 for 5 miles, just N of the railroad tracks, on W side of Hwy 17. Free tailgating (with admission), VE sessions. *TI:* 147.045. *Adm:* $4. Tables: $10 (includes 1 admission). Ben Wilbanks, KA6R, 2003 Flower Terr, Sebring, FL 33875; 863-314-0963; **benw01@earthlink.net**.

†Florida (Zephyrhills)—Feb 23. *Spr:* Zephyrhills

†ARRL Hamfest

Gail Iannone ♦ Convention Program Manager ♦ giannone@arrl.org

Area ARC. Zephyrhills Lions Den, 5827 Dean Dairy Rd; N of SR 54, between I-75 and US Rte 301. Ron Russell, N8VFE, 38545 Goodland Dr, Zephyrhills, FL 33540; 813-782-1602; **ron301@aol.com**.

†Indiana (LaPorte)—Feb 22, 7 AM to 1 PM. *Spr:* LaPorte ARC. Civic Auditorium, 1001 Ridge St; from Courthouse, go E on Lincolnway to Tipton, turn S, follow signs. Refreshments. *TI:* 146.52. *Adm:* $5. Tables: $10 (free admission with advanced reservation). Neil Straub, WZ9N, Box 30, LaPorte, IN 46352; 219-324-7525; **tables@k9jsi.org**; **www.k9jsi.org**.

†Kentucky (Cave City)—Mar 1; set up 6 AM; public 8 AM. *Spr:* Mammoth Cave ARC. Cave City Convention Center, Hwy 70; I-65, Exit 53, go to first light and turn left, Convention Center is ¼ mile on left, signs posted. Dealers, vendors, tailgating, ARRL forum, VE sessions (9 AM), 3.960 MHz Meeting, free coffee. *TI:* 146.94. *Adm:* $6. Tables: $7. Larry Brumett, KN4IV, 108 Withers Dr, Glasgow, KY 42141; 270-651-2363; **lbrumett@glasgow-ky.com; www.geocities.com/ky4x**.

†Louisiana (Rayne)—Mar 7-9; Friday 4 PM, Saturday 8 AM to 3 PM, Sunday 8 AM to noon. *Spr:* Acadiana ARA. Rayne Civic Center, 300 Frog Festival Dr, just S of I-10 at Exit 87; go S on LA 35, go to first traffic light and turn right onto Oak St, go to the second street and take a right onto Gossen Memorial, follow the street to the end. Flea market, commercial dealers, forums (ARRL, AMSAT, MARS, LCARC), VE sessions (Sunday, 9 AM), on-site RV parking (with power and water, $10 per night), Crawfish Boil (Friday, 4 PM, $10 per person, advanced reservations required by Feb 15), Fais Do Do (Cajun Dance, Friday, 7 PM), refreshments. *TI:* 146.82. *Adm:* advance $3, door $4. Tables: $20 (6-ft). Contact Al Oubre, K5DPG, 3011 Sugar Mill Rd, New Iberia, LA 70563; 337-367-3901; **k5dpg@w5ddl.org**; **www.w5ddl.org**.

†Massachusetts (Marlborough)—Feb 15; set up 7 AM; public 9 AM to 1 PM. *Spr:* Algonquin ARC. Marlborough Middle/Intermediate Elementary School, Thresher Dr (off Union St) or off Bolton St (Rte 85). Flea market, dealers, VE sessions (9-11 AM; walk-ins for all AR exams welcomed). *TI:* 146.61, 233.94, 449.925 (103.5 Hz). *Adm:* $3. Tables: advance $12 (before Feb 7), $15 (Feb 7 and after); includes 1 admission. Ann Weldon, KA1PON, c/o AARC, Box 258, Marlborough, MA 01752; 508-481-4988 (before 9 PM); **ka1pon@amsat.org; www.n1em.org**.

†Michigan (Farmington Hills)—Feb 16, 8 AM to 12:30 PM. *Spr:* Livonia ARC. Costick Activities Center, 28600 Eleven Mile Rd; E of Middlebelt Rd. Swap-n-Shop. *TI:* 145.35. *Adm:* $5. Tables: $16. Bruno Walczak, WA8DHP, 16601 Golfview Dr, Livonia, MI 48154; 734-464-8928; **wa8dhp@arrl.net**; **www.larc.mi.org**.

†Michigan (Traverse City)—Feb 8, 8 AM to noon. *Spr:* Cherryland ARC. Immaculate Conception Middle School, 218 Vine St; from US 31 turn W on Randolph St, first street on left is Vine, turn left and go 1 block to school. Swap-n-Shop, VE sessions (pre-register or register at the Swap). *TI:* 146.86. *Adm:* $5. Tables: $8. Joe Novak, W8TVT, 231-947-8555; **w8tvt@arrl.net**.

Minnesota (St Cloud)—Feb 8. John Maus, WØMBD, 320-685-8295.

†New Jersey (Parsippany)—Mar 1; sellers 6:30 AM, buyers 8 AM. *Spr:* Splitrock ARA. Parsippany PAL Building, Smith Field, Rte 46 and Baldwin Rd; I-80, Exit 45 Eastbound or Exit 47 Westbound. Vendors, VE sessions (registration 8:30 AM, exams 9 AM sharp), DXCC QSL card checking, plenty of parking, refreshments. *TI:* 146.985 (131.8 Hz). *Adm:* $6. Tables: $18 (includes 1 admission). Bonnie Greenfeld, KC2JVS, Box 610, Rockaway, NJ 07866; 866-457-6687; **hamfest@splitrockara.org**; **www.splitrockara.org**.

†New York (Hicksville)—Feb 23; set up 8 AM; public 9 AM to 3 PM. *Spr:* Long Island Mobile ARC. Levittown Hall, 201 Levittown Pkwy; located E of Wantagh Pkwy (Exit W2 E), ½ mile S of Old Country Rd. Hamfair and Electronics Show, flea market, vendors, parts and equipment, computers, accessories, antennas, VHF tune-up clinic, ARRL info, VE sessions (10 AM prompt $12; Al Bender, W2QZ, 516-623-6449; **w2qz@limarc.org**), free parking, refreshments. *TI:* 146.85 (136.5 Hz). *Adm:* $6, under 12 free when accompanied by paying adult. Tables: $25 (advanced registration only, includes 1 admission). Diane Ortiz, K2DO, c/o LIMARC, Box 392, Levittown, NY 11756-0392; 631-286-7562 or 516-520-9311; **hamfest@limarc.org**; **www.limarc.org**.

†New York (Horseheads)—Feb 22, 8 AM to 3 PM. *Spr:* ARA of the Southern Tier. NYS National Guard Armory, Colonial Dr; from NY Rte 17 W, take Exit 51A, turn right at light, proceed straight for 0.1 mile, Armory on left. Huge indoor flea market, dealer displays of new and used equipment, vendors, VE sessions (9 AM, walk-ins; John, 607-565-4020), pancake breakfast, refreshments. *TI:* 147.36, 146.7, 444.2. *Adm:* advance $5, door $6; under 11 free. Tables: $12 (1-5), $11 (6-9), $10 (10 or more). Elliott Blauvelt, N2OJM, Box 44, Elmira, NY 14902-0044; 607-739-5626; fax 607-739-4469; **winterfest2003@arast.org**; **www.arast.org**.

†New York (Williamsville)—Feb 23. *Spr:* Lancaster ARC. Main Transit Fire Hall, 6777 Main St (Rte 5); 1/16 mile W of Transit Rd (Rte 78); I-90, Exit 49 (Depew/Lockport Exit). Greater Buffalo Winter Hamfest and Computer Show, all-you-can-eat pancake breakfast. *TI:* 147.255 (107.2 Hz). *Adm:* advance $5, door $6. Tables: $10. Luke Calianno, N2GDU, 1105 Ransom Rd, Lancaster, NY 14086; 716-634-4667; **n2gdu@arrl.net**; **larc.hamgate.net**.

†North Carolina (Elkin)—Feb 23, 8 AM to 3 PM. *Sprs:* Briarpatch and Foothills ARCs. Elkin National Guard Armory, Exit 85 off I-77 to Elkin to Business 21, N to Armory. Tailgating, VE sessions (walk-ins only). *Adm:* $5. Tables: $10. Robert Waller, AC4SS, 42 Hidden Pines Ln, Hillsville, VA 24343; 276-728-3432; **rgwaller@psknet.com**.

†North Dakota (Bismarck)—Feb 22, 8 AM to 3 PM. *Spr:* Central Dakota ARC. St Mary's Elementary School, 807 E Thayer Ave; located between Medcenter One Health Systems and St Alexius Hospitals; I-94, S to State St, turn off State St to 7th St S (one way), turn left onto Thayer Ave. VE sessions (9 AM), refreshments. *TI:* 146.94. *Adm:* advance $6 (by Feb 14), door $7. Tables: $5. Robby Heupel, NØXLZ, 4330 Drake Dr, Bismarck, ND 58503; 701-224-1209; **rheupel@riverjordan.com**.

†North Dakota (Grand Forks)—Feb 8, 9 AM to 3 PM. *Sprs:* Forks and Sioux ARCs. UND Memorial Union, University Ave; 1 block W of Columbia. Commercial vendors, speakers, VE sessions. *TI:* 146.94. *Adm:* $5. Tables: Free. Gary Garritson, KCØJPP, 2828 B 22nd Ave S, Grand Forks, ND 58201; 218-791-3616 (cell) or 701-335-2969 (home); **kc0jpp@wiktel.com**.

†North Dakota (West Fargo)—Mar 8. *Spr:* Red River Radio Amateurs. West Fargo Fairgrounds Ag Building, W Main Ave; from I-94, Exit 343, E on Main, right onto Cass 28 by Church, S ¼ mile, right into Fairgrounds. Seminars, ARRL speaker, VE sessions, free parking, refreshments. *TI:* 147.255. *Adm:* advance $5, door $7.50. Tables: $8. Jody Kruft, KCØHIG, 1220 Monte Carlo Dr, Fargo, ND 58102; 701-280-0700; **grannyj91@hotmail.com**; **www.rrra.org**.

†Ohio (Cuyahoga Falls)—Feb 23; set up Saturday 3-5 PM; public Sunday 8 AM to 2 PM. *Spr:* Cuyahoga Falls ARC. Emidio and Sons Party Center, 48 E Bath Rd, at corner of State Rd; State Rte 8 N to Graham Rd Exit, travel 1.2 miles W on Graham Rd, turn right onto E Bath Rd and go W for 1 mile. Hamfest and Electronics/Computer Show, vendors, free parking. *TI:* 147.27. *Adm:* $5. Tables: advance first table (8-ft) $15, additional $10; door first table $17, additional $12 (includes 1 admission). Ted Sarah, W8TTS, 239 Bermont Ave, Munroe Falls, OH 44262; 330-688-2013; **w8tts@arrl.net**; **www.cfarc.org**.

†Ohio (Elyria/Lorain)—Feb 2; set up 6 AM; public 8 AM to 1 PM. *Spr:* Northern Ohio ARS. Gargus Catering Hall, 1965 N Ridge Rd; follow I-90 or I-80 to Rte 57, go N for ½ mile, turn W at Detroit/N Ridge Rd, proceed ½ mile to driveway of Hall. All indoor commercial space (reservations required), vendors, free pancake breakfast (8-11 AM). *TI:* 146.7 (110.9 Hz), 444.8. *Adm:* $5. Tables: $10 (6-ft). Clark Beckman, N8PZD, 3407 W 135th St, Cleveland, OH 44111; 216-671-8795; **electro7@apk.net**; or Tom Porter, W8KYZ, 440-930-9115; **www.apk.net/noars/winterfe.htm**.

†Oklahoma (Elk City)—Mar 1, 8:30 AM to 5 PM. *Spr:* West Central Oklahoma ARC. Howard Johnson, at the intersection of I-40 and Rte 66; Exit 41 off I-40. VE sessions. *TI:* 146.76. *Adm:* advance $5, door $8. Tables: $5. Earl Bottom, N5NEB, Box 2023, Elk City, OK 73644; 580-821-0633; **n5neb@logixonline.net**.

†Oregon (Rickreall/Salem)—Feb 15, 9 AM to 2 PM. *Spr:* Salem Repeater Assn. Polk County Fairgrounds, 520 S Pacific Hwy W; W of Salem where Hwy 22 meets 99W; take Exit 260A (the Salem Parkway Rte from I-5 S); Mission St Exit from I-5 N, follow signs to Hwy 22/Ocean Beaches. Computer/Electronics Swapmeet, commercial vendors, swap tables, Country Store (Dan Bathurst, WA7ABU, 503-364-3672; **danbath@attbi.com**), ARRL and ARES/RACES meetings, self-contained RV camping ($10 per night), refreshments. *TI:* 146.86 (186.2 Hz), 146.46. *Adm:* advance $6, door $7; under 13 free. Tables: swap $19 (no power), $21 (with power); commercial $40 (2 tables). Denis Miller, WC7M, Box 17803, Salem, OR 97305; 503-585-5338; **wc7m@arrl.net**; **www.qsl.net/w7sra**.

†Pennsylvania (Castle Shannon/Pittsburgh)—Feb 23, 8 AM to 3 PM. *Spr:* Wireless Assn of South Hills. Castle Shannon VFD Memorial Hall, 3600 Library Rd (State Rte 88); Rte 51 to Rte 88, 1¼ miles to Grove Rd. DXCC Field Checking, free coffee. *TI:* 146.955, 443.65 (131.8 Hz). *Adm:* $5. Tables: $10 (no power), $15 (with power). Steve Lane, W3SRL, 897 Lovingston Dr, Pittsburgh, PA 15216; 412-341-1043; **washarc@yahoo.com**; **www.washarc.org**.

Tennessee (Memphis)—Feb 8-9, Tennessee Section Convention. See "Coming Conventions."

†Texas (Orange)—Feb 22, set up 7 AM; public 8 AM to 3 PM. *Spr:* Orange ARC. VFW Hall, Hwy 87 N; Exit I-10 at Hwy 87, go N for approximately 1 mile, VFW on left. Flea market, swap tables, tailgating (allowed after all tables are sold), new equipment dealers, VE sessions (10 AM, no pre-registering), plenty of paved parking, refreshments. *TI:* 147.18. *Adm:* None. Tables: individuals $10, dealers $15. Joan Lexa, WA5LFT, Box 232, Orange, TX 77630; 409-886-1892 (after 5 PM); **WA5LFS@pnx.com**.

Vermont (Milton)—Feb 22, Vermont State Convention. See "Coming Conventions."

†Virginia (Annandale)—Feb 23, 8 AM to 3 PM. *Spr:* Vienna Wireless Society. Northern Virginia Community College, 8333 Little River Turnpike; I-495 (Capital Beltway) to Exit 52, then westbound on Rte 236 (Little River Turnpike), NVCC campus is 1 mile on left. Ham Radio, electronics, and computer parts; paved tailgating ($15 per space, includes 1 admission), guest speakers (ARRL Roanoke Division Director Dennis Bodson and RFI expert Mike Martin); VE sessions (Saturday, Feb 22, 9 AM at the same site, walk-ins accepted); free parking; refreshments. *TI:* 146.91. *Adm:* $6. Tables: $20 (Dave, K3MV, 703-925-0584; **tablesales@viennawireless.org**). Jim Richey, AG4MA, 4402 Roundhill Rd, Alexandria, VA 22310; 703-971-4812; **jimrichey2@juno.com**; or Jim Parsons, W4JTP, 703-392-0150; **winterfest@viennawireless.org**; **www.viennawireless.org**.

Washington (Puyallup)—Mar 8, Western Washington Section Convention. See "Coming Conventions."

SILENT KEYS

It is with deep regret that we record the passing of these amateurs:

W1COJ, Owen J. McCabe, Farmington, CT
*W1CW, Robert L. White, Seffner, FL
N1DAY, N. Steven Hubbard, Lenox, MA
NQ1D, George R. Holzman, Vernon Rockville, CT
W1EOO, Anthony F. Sorrentino, Winsted, CT
W1HND, Howard S. Fish, Shelburne Falls, MA
KC1HY, Stanley C. Dickinson, Springfield, VT
WA1RIY, Frank J. Carp, Peabody, MA
K1RSC, John E. Johnston, Rye, NH
KA1RTE, Douglas H. Armstrong, Plymouth, MA
N1SCC, William J. Campbell, Shelburne Falls, MA
W2AFN, Albert Newman, Tupper Lake, NY
K2DBL, Gene F. Smith, Whiting, NJ
WA2DEF, Per Svendsen, Schenevus, NY
K2FJ, Kenneth Palmer, East Aurora, NY
W2FLK, Sol Weinstein, Woodbury, NY
W2GPY, Allen E. Hall, Dover, DE
N2KPR, Lloyd T. Kennedy, Milford, NY
W2KTX, Lawrence J. Caneel, Edison, NJ
WB2LEG, Donald P. Collins, Rochester, NY
‡ex-KK2R, Richard Ayrovainen, Piermont, NY
KB2UHY, Fred Hartman, Roselle Park, NJ
W2YMB, William J. Garrecht, Horseheads, NY
K2YUD, Arthur J. Jarvis, Pluckemin, NJ
W3BM, Carl G. Slutter, Tucson, AZ
WA3EFG, Thomas E. Rea Jr, Oil City, PA
K3WUR, C. J. Arcilesi, Silver Spring, MD
N3ZKD, Charles J. Hilzinger, Akron, PA
W3ZKL, Robert E. Wech, Mechanicsburg, PA
K4BCC, Giles F. Copening, Dunedin, FL
WA4BDN, Robert J. Seabolt, Centerville, GA
K4BEC, Henry G. Withers Jr, Salisbury, NC
W4BEF, Hubert Turner, Middlesboro, KY
W4BOZ, Hugh J. Leblanc, Milton, FL
KK4CW, George Henf, Sebastian, FL
WA4DJF, Maitland H. Carey, Pulaski, TN
KC4GRM, Claude S. Stringfellow, Mobile, AL
W4HXB, Richard E. Rush, Winchester, VA
K4KFG, Thomas G. Braswell, Shepherdsville, KY
W4LHJ, Wilburn E. George, Tullahoma, TN
WA4LUQ, Clarence A. Lemmons, Greer, SC
WB4MNU, Clarence R. Murphy, Mobile, AL
W4NBD, Arthur H. Elliott, Russellville, KY
WD4NUN, Vincent Ott, N Charleston, SC
KA4NYG, Forest P. McCarty, Stephens City, VA
N4PES, Alexander M. Boysen, Bogart, GA
W4PTI, Walter C. Morris, Crossville, TN
W4SLP, Blaine Merritt, North Augusta, SC
K4TWE, Tommy W. Ellison, Easley, SC
*N4TZP, Jean R. Cebik, Knoxville, TN
K4VFA, Heard S. Lowry, Manchester, TN
K4WKH, Robert M. Shackelford, Richmond, VA
KT4XC, Ernest A. Harris Jr, Fairfax, VA
K4YPO, Forrest K. Haynes, West Palm Beach, FL
*W5APX, Arthur P. Kay Jr, Jasper, TX
KC5BCO, Allen A. Mills, Forest, MS
WA5CRE, Bill Vining, Helena, AR
KD5CO, Edward L. Marzuki, San Antonio, TX
WB5CXK, Teresa M. Riviere, Lacombe, LA
N5ELY, Robert H. Hileman Sr, Temple, TX
W5ETA, Grady A. Payne, Cleveland, TX
WA5FFQ, Albert S. Todd, Universal City, TX
KC5GQC, M. Wade Douglas, Cedar Crest, NM
W5HDN, George Hicks, Blytheville, AR
W5IHY, Lou Kronberg, Houston, TX
N5JGD, Ernest J. Landry, Vinton, LA
KD5SPS, Donald D. Elliott, Deming, NM
W5UKY, Thomas L. Patterson, Chaparall, NM
KD6ACE, Richard W. Langley, Culver City, CA
W6AI, Winfred H. Wileman, Downey, CA
KB6CKG, Wallace I. Glavich, Eureka, CA
*K6DGN, Keith A. Wester, Studio City, CA
WA6DPJ, John E. Anslow, Martinez, CA
W6FF, George A. Karavantes, El Cajon, CA
WB6FWO, Walter Willms, Fresno, CA
W6FXL, Albert L. Goeppinger, Escondido, CA
W6HD, Tay Howard, San Andreas, CA
K6IJ, Ed J. Schneider, Rancho Palos Verdes, CA
KE6IKD, T. Geoffrey Cook, Foster City, CA
K6JZK, Richard F. Duffy, Cypress, CA
*W6KVA, James L. Jensen, San Carlos, CA
N6LYH, R. vanBenthuysen, Lake Isabella, CA
KB6LY, Everett A. James, Lakeport, CA
KB6MOK, Charles D. Ewing, Wofford Heights, CA
WA6RNS, Gordon W. Johnson, Riverside, CA
W6SKK, Wilbur R. Zimdars, Mountain View, AR
K6TCZ, Vernon F. Sprague, Freeport, IL
W7ACA, Cormac C. Thompson, Prosser, WA
*W7AEA, Max H. Bice, Gig Harbor, WA
WA7BLE, Joseph H. Bushnell, Pacific Beach, WA
WB7BZG, Calvin G. Jackson, Zillah, WA
KC7DHR, Sidney L. Body, Wittmann, AZ
W7DWW, Frank I. Moorhead, Tacoma, WA
KB7EHE, Ed J. Swenson, Salem, OR
W7FYE, Herbert E. Brown, Ogden, UT
KB7JRC, Robert M. Brier, Orangevale, CA
W7KBC, John Kepus, Camano Island, WA
W7KSL, Robert L. Schoettler Sr, Port Angeles, WA
W7LCS, Toddy Nye, Seattle, WA
KA7NEN, Ruth A. Revoir, Oregon City, OR
KH7RS, Richard I. Senones, Mililani, HI
WB7SWH, Edward W. MacClean, Hardin, MT
KR7W, Eldon R. Fredericks, Edmonds, WA
*KL7Y, Daniel K. Robbins, Wasilla, AK
N8FMY, Earle Williams, Saint Marys, OH
KR8G, Robert F. Kleiber, Kenneth City, FL
W8IIO, Walter E. Keck Jr, New Richmond, OH
W8JEG, Ron Boughton, Hesperia, MI
W8KTE, Phillip M. Kay, Vassar, MI
WB8WEZ, Andrew A. Pitt, Middlesboro, KY
W8YLJ, Delmer L. Carlin, Bryan, OH
WA8ZVA, Frank Miller, Cincinnati, OH
W9EXR, Robert E. Brown, Hartwell, GA
W9FAC, Paul J. Belland, Eau Claire, WI
K9FYM, Lawrence M. Curtis, Mauston, WI
N9KJB, Sherald Sherman, Springfield, IL
W9LTZ, Howard W. Pearson, Los Angeles, CA
W9LUO, Robert F. Tschannen, Fort Collins, CO
W9NDL, Walter A. Schroeder, Cape Girardeau, MO
K9OE, Richard L. Drollinger, Gulf Shores, AL
WA9QBE, Edwin Rathbun, Pekin, IL
AA9QO, Dan T. Hisle, Muncie, IN
N9SQW, Richard H. Hoppe, Almond, WI
KB9TIW, Carl M. Baumgardner, Bryant, WI
KØBTE, David E. Harrell, Cottage Grove, MN
WDØDAV, Richard Alberts, Cozad, NE
NØPKP, Leroy F. Molitor, Cedar Rapids, IA
WØSDK, Burdette C. Aughenbaugh, Iroquois, SD
*VE7DMQ, John M. Mann, Alberta, BC, Canada
PJ2WG, Willy Gravenhorst, Curacao, Netherlands Antilles
SM5KP, Victor Persson, Vallingby, Sweden

*Life Member, ARRL
**Charter Life Member, ARRL
‡Call sign has been re-issued through the vanity call sign program.

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

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator ♦ n1gzo@arrl.org

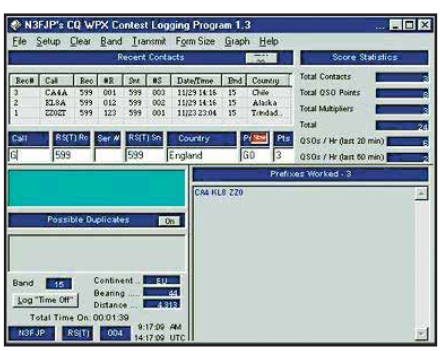
NEW PRODUCTS

ARRL LOGO CHARM NECKLACE

◊ Perfect for club members or as a gift, this pewter ARRL logo charm from Fun and Shine Creations is an inch long and comes with a black and gold finish. It hangs on an 18-inch gold-tone ball chain. Price: $8.95 plus shipping and handling. For more information about the logo charm and the company's complete line of club-related custom jewelry, contact Fun and Shine Creations at 46 Moosewa Tr, Otisfield, ME 04270; tel 800-510-4215. Allow three to five weeks for delivery.

LOGGING SOFTWARE FROM N3FJP

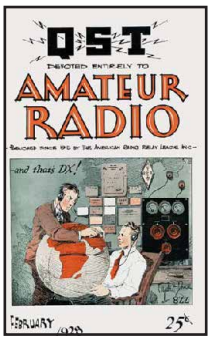
◊ Whether you need a general logging package or something contest-specific, N3FJP's extensive line of logging software has something for almost every occasion. New additions include *CQ WPX* (network version 1.1), *CQ 160-Meter* (version 1.2) and *Amateur Log* (version 2.2). Each of the dozen-plus programs is designed to be complete, feature-rich, affordable and easy to use. You can see and download demo versions of all N3FJP offerings at **www.n3fjp.com**. Future software includes packages for various state QSO parties.



Prices: Registration costs for individual programs start at $6. You can register all present and future ham-related products for $39 (no CD) and $49 (with CD). For more information, contact Scott, N3FJP, at **www.n3fjp.com**, or e-mail **snkdavis@aol.com**. QST

75, 50 AND 25 YEARS AGO

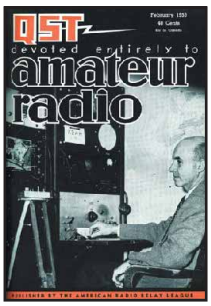
February 1928



♦ The cover art by Clyde Darr, 8ZZ, shows two hams in a typical shack, one pointing to a distant location on a world globe and saying, "and that's DX!" The editorial takes a view of the recent International Radiotelegraph Conference, and discusses the recent changes in ham phone privileges, which rescinded the use of phone on the lower 100 kc. of 80 meters.

Beverly Dudley, 9BR, describes "A Low-Power Master-Oscillator Transmitter." In "MacMillan and Party in Labrador," Clark Rodimon, 1SZ, reports the latest information on the schooner *Bowdoin* and its arctic adventures. F. S. Huddy, 1II, discusses "Cheap 'Neon' Lamps and How to Use Them." Ralph Mason presents information on "The Shielding Efficiency of Metals." "Extracts from the Washington Convention" points out the new radio regulations for hams. Ed Handy, 1BDI, tells about the "Prizes for International Test Winners," with over $4000 in prizes waiting to be won. In the "Experimenters' Section Report," a photo shows the antenna of 5-meter experimental station 9EHT—a vertical wire dipole at the focus of a parabolic reflector made of 21 vertical wire elements. The entire antenna is mounted on a huge turntable atop a garage so it can be rotated! "6AM," a 10-page article by Don Wallace and Robert Kruse, tells about and show photos of that state-of-the-art station.

February 1953



♦ The cover photo shows George Rose, K2AH, with his new rig, which was the *first* use of a transistor as a transmitter. The editorial reports that the FCC has spoken: Effective February 18, any amateur (except Novices and Technicians) may now use phone on all HF phone bands.

John Kaye, W6SRY, describes "The 'Ultimatic'–The Key with a Memory," which uses three dual triodes and seven relays. Rex Cassey, ZL2IQ, explains the series-tuned Colpitts oscillator circuit, in "The Clapp Oscillator–and How!" Ben Roberts, WØIEU (of Collins Radio), tells about "Mechanical Bandpass Filters for I.F. Ranges." Gil Countryman, W3HH, shows how to build "A Self-Contained VFO Rig" that provides 50 watts of CW on three bands. Lew McCoy, W1ICP, describes "An 80- and 40-Meter Antenna System for the Novice." Full details of the new phone privileges for General and Conditional hams are reported in "Happenings of the Month." "Happenings" also reports other historic changes: the opening of the 40-meter phone band, and Novice privileges on 40-meter CW. Clyde Norton, WØELA, tells about his "Expedition to Brunei." In "The World Above 50 Mc.," Ed Tilton, W1HDQ's, column, details are provided on K2AH's first-ever transistor transmitter, which transmits on 2 meters.

February 1978

♦ The cover artwork shows a colorful sunset—with a nice multiband vertical antenna in the foreground. The editorial discusses "Ham Activity and Solar Activity: Going UP!"

The lead article, by Chet Opal, K3CU, describes "The Micro-TO Message Keyer." Fred Brown, W6HPH, tells about a weekend project, "A Universal Crystal Oscillator." Dick Simpson, W6JTH, presents "More Reflections on LDEs," those mysterious long-delayed echoes that hams sometimes hear. Wayne Overbeck, N6NB, tells about his 15-element, 432-MHz antenna, "The Long-Boom Quagi." D. W. Conover, WA6MJZ, became deaf recently, so he developed "A Spectacle-Mounted Code Blinker" to stay active on CW. One of the "Strays" tells about a proud new Novice, Red Dozier, WD4JDL, a 79-year-old ham who was a Western Union telegraph operator in the 1920s. Another "Strays" item shows the FCC building in Gettysburg, Pennsylvania, where our license applications and renewals are processed. The building formerly housed an Edsel dealership. Joel Kleinman, WA1ZUY, reports on amateurs who helped during last summer's New York City blackout, in "Blackout Spawns Amateur/Police Emergency Network." Joel also presents Part 1 of "The Lure of 2 Meters." QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW Schedule

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	TELEPRINTER 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	TELEPRINTER 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	10PM	11 PM	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ **Morse code transmissions:**
Frequencies are 1.818, 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 practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 2001 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. See "Contest Corral" in this issue. At the beginning of each code practice session, the schedule for the next qualifying run is presented. 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 fee structure is $10 for a certificate, and $7.50 for endorsements.

♦ **Teleprinter transmissions:**
Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz. Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ **Voice transmissions:**
Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ **Miscellanea:**
On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 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.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day. QST

CONTEST CORRAL

Feedback

In the 2002 Field Day Results, **KM4FO** should be listed in category 1E from KY with a score of 400 points. The **Barry Amateur Radio Association** should be shown in the MI section in category 6A with a final score of 2964.

In the 2002 June VHF QSO Party, the photo of **N5QYC** was mislabeled as N5QYX.

W1AW Qualifying Runs are 7 PM EST Tuesday, Feb 4, and 4 PM EST Wednesday, Feb 19. The K6YR West Coast Qualifying Run (10-40 WPM) will be at 9 PM PST Wednesday, Feb 12. Check the W1AW Schedule for details.

Abbreviations

SO—Single-Op, M2—Multiop—2 Transmitters, MO—Multi-Op, MS—Multi-Op, Single Transmitter, MM—Multi-Op, Multiple Transmitters, AB—All Band, SB—Single Band, S/P/C—State/Province/DXCC Entity, HP—High Power, LP—Low Power, Entity—DXCC Entity, HP—High Power >150 W, LP—Low Power >5 W and <150 W, QRP is <5 W.

No contest activity on 30, 17, 12 meters. Refer to the contest Web sites for information about awards. Unless stated otherwise, regional contests only count QSOs with stations in the region. Publication deadline for Contest Corral listings is the first of the second month prior to publication. In order to publicize the maximum number of contests, readers will be referred to an earlier issue of *QST* if the rules have been published within the past year.

Feb 1-4

Vermont QSO Party—CW/Phone—sponsored by the Central Vermont Amateur Radio Club, 0000Z Feb 1-2400Z Feb 2. Frequencies: 160-10 meters and VHF/UHF, CW—40 kHz up from band edge (20 kHz Novice/Tech bands), Phone—lowest 25 kHz of the General privileges and entire Novice/Tech 10-meter band, VHF SSB—50.200 and 144.200 MHz, FM—146.49 and 146.69 MHz. Categories: SOAB, MO, Club, and Rover. Exchange: RST and SPC, Vermont stations send RST and county abbr. QSO Points: CW or digital—2 pts, phone—1 pt, work each station once per mode. Score: QSO points × total counties in VT/NH/ME + SPC + Vermont club stations, multipliers count only once. For more information and list of club stations—**www.ranv.org/vtqso.html**. Logs due Mar 1 to Bob DeForge K1HKI QSO Party Coordinator, Vermont QSO Party, Central Vermont Amateur Radio Club, 1607 East St, Brookfield, VT 05036.

New Hampshire QSO Party—CW/Phone—sponsored by the ARRL of New Hampshire, 0000Z Feb 1-2400Z Feb 2. Operate 24 hours max. with off times of at least 15 minutes marked in log. Frequencies (MHz): CW—1.810, 3.535, 7.035, 14.035, 21.035, 28.035, Phone— 1.875, 3.935, 3.950, 7.235, 14.280, 21.380, 28.390 and VHF. SOAB and MM-QRP (<5W), -LP (<150W), -HP. Exchange: RST and NH county or SPC (DX stations send RST and serial number). QSO Points: CW or digital—2 pts, phone—1 pt. Score: QSO Points × NH counties (NH stations add SPC, only 1 DX mult allowed). For more information and NH-QSO Party software—**www.nhradio.org/nh-qso**. Logs due Mar 31 to **nhqso@nhradio.org** or NH-ARRL, POB 119, Goffstown, NH 03045-0119.

Minnesota QSO Party—CW/Phone—co-sponsored by several groups, 1400-2359Z Feb 1. Frequencies (MHz): CW— 1.810, 3.550, 7.050, 14.050, 21.050, 28.050, SSB—1.870, 3.890, 7.230,14.290, 21.390, 28.420. Categories: QRP, SOLP, SOHP, VHF and MN stations add Mobile/Portable and MS. Exchange: Name and MN county or SPC. QSO Points: SSB—1 pt, CW—2 pts. Score: QSO points × MN counties (87 max, MN stns add States and Provinces, count all only once). For more information and MN QSO Party software—**www.w0aa.org**. Logs due Mar 15 to **WA0MHJ@arrl.net** or MNQP, 4745-170th Ln NE, Ham Lake, MN 55304-5233.

Ten-Ten International Winter Phone QSO Party—sponsored by Ten-Ten, International, from 0000Z Feb 1 until 2400Z Feb 2, 10 meters only. Exchange: call/name/state and 10-10 number (if a member). QSO Points: nonmembers—1 pt, members—2 pts. Score: total points. For more information—**www.ten-ten.org**. Send logs by Feb 17 to Steve Rasmussen, NØWY, #68684, 312 N. 6th St, Plattsmouth, NE 68048.

North American Sprint—Phone—sponsored by the *National Contest Journal*, from 0000Z-0400Z, Feb 2 (CW is Feb. 9). Frequencies (MHz)—3.850, 7.225, 14.275, work stations once per band. North American stations work everyone, others work NA stations only. Exchange: other station's call, your call, serial number, name, SPC. QSY rule: Stations calling CQ, QRZ, etc, may only work one station in response to that call; they must then move at least 1 kHz before working another station or 5 kHz before soliciting another call. Once you are required to QSY, you may not make a new QSO on the previous frequency until you have made a contact at least 1 or 5 kHz (as required) away. (see **www.contesting.com/articles/198** for beginner's guide) Score: QSOs × SPC (count each only once). For more information—**www.ncjweb.com**. Logs due 30 days after the contest to **ssbsprint@ncjweb.com** or Jim Stevens, K4MA, 6609 Vardon Ct, Fuquay-Varina, NC 27526.

XE International RTTY Contest, sponsored by FMRE, from 1800Z Feb 1 to 2400Z Feb 2. Frequencies: 80-10 meters. Categories: SOAB only. Exchange: RST and serial number or XE state/district. QSO Points: within own country—2 pts, DX—3 pts, XE stations—4 pts. Score: QSO points × XE states + DXCC entities from each band. For more information—**www.fmre.org.mx**. Logs due 30 days after the contest to **xe1j@ucol.mx** or Jose Levy, XE1J, Dirección de Concursos FMRE, Clavel 333, Colima, Col 28030, Mexico.

Delaware QSO Party—CW/Phone/Digital/RTTY—sponsored by the First State ARC (FSARC), 1700Z Feb 1 to 0500Z Feb 2 and 1300Z Feb 2 to 0100Z Feb 3. Frequencies (MHz): CW—1.825, 3.550, 7.050, 14.050, 21.050, 28.050, Phone—1.860, 3.960, 7.260, 14.260, 21.360, 28.360, Novice and Technician—25 kHz above the subband edge. One class for all entries, no time limit. CW/Digital/RTTY count as separate modes. Exchange: RST and SPC, Delaware stations send RST and county. QSO Points: CW/RTTY/digital—2 points, phone—1 pt, work each station once per band and mode (CW/RTTY/digital are separate modes). Score: total of QSO points (no multiplier). For more information—**www.fsarc.org**. Logs due Mar 11 to **QSOparty@fsarc.org** or Contest Chairman—FSARC, Inc., PO Box 1050, Newark, DE 19715.

Classic Exchange—CW/Phone—from 2000Z Feb 2 to 0600Z Feb 3. Frequencies (MHz): CW—1.810, 3.545, 7.045, 14.045, 21.135, 28.180, Phone—1.890, 3.880, 7.290, 14.280, 21.380, 28.320, 29.000. Exchange: Name, RST, SPC, and mfr/model of transmitter and receiver. Work stations again with different radios. Score is determined by the age of your equipment. For complete information—**qsl.asti.com/CX**. Send logs and comments to **WQ8U@arrl.net** or J. D. "Mac" MacAulay, WQ8U, 6235 Wooden Shoe Ln, Centerville, OH 45459.

Spartan Sprint—CW—sponsored by the Adventure Radio Society, 0200Z – 0400Z Feb 4 (Monday). Frequencies (MHz): 3.560, 7.040, 14.060, 21.060. Categories: SOSB, SOAB. Exchange: RST, SPC, and power output. For more information—**www.natworld.com/ars/**. Logs due Wednesday afternoon to **russ@natworld.com** or via automated scoring system on ARS Web site.

Feb 8-9

North American Sprint—CW—from 0000Z-0400Z, Feb 9 (see Feb 2). Frequencies (MHz): 3.540, 7.040, 14.040. Logs due 30 days after the contest to **cwsprint@ncjweb.com** or Boring ARC, 15125 Bartell Rd, Boring, OR 97009.

RSGB 1.8 MHz Contest—CW—sponsored by RSGB, 2100Z Feb 8 to 0100Z Feb 9. Frequencies (MHz): 1.820 – 1.870. Categories: SO only. Exchange: RST + serial number and UK district. QSO Points: 3pts/QSO + 5 pts for first QSO with a UK district. Score: QSO points. For more information—**www.rsgbhfcc.org**. Logs due 16 days after the contest to **1st160.logs@rsgbhfcc.org** or RSGB-G3UFY, 77 Bensham Manor Rd, Thorton Heath, Surrey, CR7 7AF, England.

Asia-Pacific Sprint—CW—sponsored by the AP Sprint Contest Committee, 1100Z-1300Z Feb 8. Frequencies: 20 and 40-meters, NA stations work Asia-Pacific countries only. Categories: SO only, 150 W max. Exchange: RST and serial number. Score: total QSOs × WPX prefixes (counted once). For more information—**jsfc.org/apsprint/aprule.txt**. Logs due 7 days after the contest to **apsprint@kkn.net** (no paper logs).

FISTS CW Winter Sprint—CW—sponsored by FISTS International CW Club, 1700Z until 2100Z Feb 8. Frequencies: 80-10 meters, work US/VE stations. Categories: SOAB-QRP (<5W), SOAB-QRO, Club. Exchange: Name, RST, SPC, members send FISTS number, nonmembers send power output. QSO Points: FISTS members—5 pts, nonmembers—2 pts. Score: QSO points × SPC (count each only once). For more information—**www.FISTS.org**. Logs due 30 days after the contest to **W8PIG@yahoo.com** or Dan Shepherd, N8IE, 1900 Pittsfield St, Kettering, OH 45420.

QRP ARCI Winter Fireside SSB Sprint, sponsored by the QRP ARCI, 2000Z-2400Z, Feb 9. Frequencies (MHz): 3.865, 7.285, 14.285, 21.385, 28.385. (See Dec *QST*, p 93 for QRP ARCI Sprint information.)

Winter 6-Meter Contest—CW/Phone—sponsored by the Six Club, from 2300Z Feb 8 to 0300Z Feb 10. Exchange: RST and grid square. QSO Points: 1 pt in same country, DX (incl. KL7 and KH6)—2 pts. Score: QSO points × grid squares. For more information—**6mt.com/contest.htm**. Logs due Mar 15 to **w4wrl@aol.com** or Wayne Lewis, W4WRL, Six Club Contest Director, 3338 S Cashua Dr, Florence, SC 29501-6306.

OMISS QSO Party—SSB—Sponsored by the Old Man International Sideband Society, 1700Z Feb 8-0500Z Feb 9. Frequencies (MHz): 3.9405, 7.2635, 14.290, 21.360, 28.665. Categories: SOAB only. Exchange: RST, SPC and OMISS # (DX stations send "DX"). QSO Points: OMISS members—2 pts, non-members—1 pt. Score: QSO points × States + Provinces + 1 DXCC entity, counted only once. For more information—**www.omiss.net**. Logs due Mar 15 to Don Banta, K5DB, 3407 Diana St, Springdale, AR 72764.

Feb 15-16

ARRL International DX Contest, CW, 0000Z Feb 15-2400Z Feb 16. See Dec *QST*, p 95.

YL International QSO Party—CW—sponsored by YL International SSB System, 0000Z Feb 15 through 2400Z Feb 16, two 6-hr off times required. Frequencies: 160-10. Categories: CW, SSB, or mixed mode, SOAB, YL/OM Team, DX/US Team. Exchange: Call sign, RST, State, County, YLISSB member number. QSO Points: YLISSB members on own continent—2 pts, on other cont—6 pts, DX members—3 pts, non-members—2 pts. QSO party points may *not* be made on the YL net frequency

H. Ward Silver, NØAX ♦ 22916 107th Ave SW, Vashon, WA 98070 ♦ n0ax@arrl.org

of 14.332 MHz. Score: QSO Points × SPC +Teams. For more information—**www.qsl.net/yl-issb/**. Logs due Apr 30 to **2hamsrus@comcast.net** or to N4KNF/N4ZGH, 2160 Ivy St, Port Charlotte, FL 33952.

Feb 22-23

CQ WW 160-meter SSB Contest, 2200Z Feb 22-1600Z Feb 24. See Jan *QST*, p 97.

REF French Contest—Phone—from 0600Z Feb 22-1800Z Feb 23. See Jan *QST*, p 97.

UBA Contest—CW—from 1300Z Feb 22-1300Z Feb 23. See Jan *QST*, p 97.

FYBO (Freeze Your Butt Off) Winter QRP Field Day—CW—sponsored by the AZ ScQRPions from 1600Z-2400Z Feb 22. Use QRP calling frequencies on HF bands, work stations once per band. Categories are SO, MO, and Novice/Tech—indicate home or field. Exchange: RST, SPC, name, power, and temperature in degrees F at operating position. Score: total QSOs × SPC (counted only once) × Temperature multiplier × 4 (if field location) × 2 (if alternative power) × 2 (if QRP). Temp mult—65+ ×1, 50-64 ×2, 40-49 ×3, 30-39 ×4, 20-29 ×5, <20 ×6. Add 10,000 points for a QSO with NQ7RP. For more information—**www.extremezone.com/~nk7m/fybo2003.htm**. Logs due 30 days after the contest to **nk7m@extremezone.com** or Bob Hightower, Att: FYBO, 1905 N Pennington Dr, Chandler, AZ 85224.

CQC Winter QSO Party—CW/Phone—sponsored by the Colorado QRP Club, 2200Z Feb 22 to 0359Z Feb 23. Frequencies (MHz): CW—1.825, 3.560, 3.710, 7.040, 7.110, 14.060, 21.060, 21.110, 28.060, 28.110, SSB—1.910, 3.985, 7.285, 14.285, 21.385, 28.385. Categories are SOAB, SOSB, SO-Homebrew. Exchange: RST, SPC, name, CQC member number or power output (5W max). QSO Points: CW—CQC member—6 pts, non-member—4 pts, Phone—members—3 pts, non-members—2 pts. Score: QSO Points × SPC (count once per band) × names (one name from each letter of the alphabet) + 1000 pts for QSO with WØCQC. For more information—**www.mtechnologies.com/cqc/.** Logs due 30 days after the contest to **contest@cqc.org** (ASCII text only) or Colorado QRP Club, Box 371883, Denver, CO 80237-1883.

North Carolina QSO Party—CW/Phone—sponsored by the Forsyth Amateur Radio Club, 1700Z Feb 23 – 0300Z Feb 24. Frequencies (MHz): CW—3.540, 3.740, 7.040, 7.140, 14.040, 21.040, 21.140, 28.040, 28.140, Phone—3.860, 7.260, 14.260, 21.360, 28.360 and any VHF/UHF, note no 160-meter QSOs. Categories: SO, Mobile, Club, all stations 100W max. output. Mobiles may be worked again as they change counties. Exchange: RST and NC county, ARRL/RAC section, or DX prefix. QSO Points: phone—2 pts, CW—3 pts, NC mobile—3 pts (either mode). Score: NC stations—QSO points × NC counties + ARRL/RAC sections + 1 DXCC entity, others—QSO points × NC counties (max 100). 50 bonus points for working Cherokee or Dare counties (150 for working both) and 50 points for working W4NC or W4WS (150 points for both). Mobiles add 100 bonus points for each NC county activated. For more information—**www.w4nc.com**. Logs due April 1 to **henry@summitschool.com** or NC QSO PARTY c/o W2DZO, 934 Franklin St, Winston-Salem, NC 27101

Grupo Argentino De CW Key Day—CW—from 1800Z Feb 22-0600Z Feb 23. Frequencies (MHz): 3.530, 7.030, 14.030, 21.030, 28.030. Exchange: RST and GACW number. For more information—**gacw.no-ip.org**. Logs due Mar 15 to **gacw@lan.no-ip.org** or GACW, PO Box 9, B1875ZAA—Wilde, Buenos Aires, Argentina. QST

SPECIAL EVENTS

East Tawas, MI: Iosco County Amateur Radio Enthusiasts, W8P. 1200Z **Feb 1**-2000Z **Feb 2**. Perchville 2003. 28.350 21.250 14.250 7.040. QSL. Dennis Ponsness, 509 First St, Oscoda, MI 48750.

Punxsutawney, PA: Punxsutawney Area Amateur Radio Club, K3HWJ. 1400Z-2100Z **Feb 1**. Commemorating Groundhog Day 2003. 14.240 7.240 7.125. Certificate. Sherman Hollopeter, W3QOS, Box 20 216 E Main St, Big Run, PA 15715.

Orlando, FL: Orlando Amateur Radio Club, K4H. 1600Z **Feb 5**-1700Z **Feb 9**. Celebrating 56 years of Orlando Hamcation. 28.405 21.275 14.280 7.275. Certificate. Quentin Jones, KU4WD, 1802 Colleen Dr, Orlando, FL 32809.

Washington, PA: Washington Amateur Communication, W3C. 1700Z **Feb 5**-2300Z **Feb 9**. Washington County Sports Show. 21.325 14.270 7.270 3.960. QSL. Ed Oelschlager, N3ZNI, 60 Carl Ave—B-2, Eighty Four, PA 15330.

Greenville, NC: Brightleaf ARC, W1VOA. 1300Z-2200Z **Feb 8**. 40th Anniversary of Voice of America, Greenville, NC station. 28.340 14.240 14.040 7.240. Certificate. W1VOA, PO Box 8387, Greenville, NC 27835.

Chicago, IL: Metro Amateur Radio Club, K9Y. 1600-2400Z **Feb 8** and **Feb 9**. Chicago Harbor Southeast Guidewall Light (USA 930). 28.370 21.370 14.270 7.270. QSL. Bill Borgstrom, N9TN, 1330 W Columbia Ave, Chicago, IL 60626. **www.qsl.net/mac**.

Memphis, TN: Delta Club ARC, W4D. 1300Z **Feb 8**-2300Z **Feb 9**. DixieFest Hamfest. 14.250 28.450 50.150 21.325. QSL. Peter Baskind, AG4KI, 2471 Lennox Dr, Germantown, TN 38138.

Ft Myers, FL: Fort Myers Amateur Radio Club, Inc, W4LX. 1500Z **Feb 10**-2100Z **Feb 14**. The Edison Festival of Light & Thomas Edison's Birthday. 28.430 21.330 14.230 7.230. Certificate and QSL. Ft Myers Amateur Radio Club, PO Box 61183, Ft Myers, FL 33906.

Prescott, AZ: Granite Mountain Middle School YARC, K7A. 1700Z-2300Z **Feb 14**. Commemorating Arizona's Birthday from Sharlot Hall Museum. 28.575 21.375 14.275 7.275. QSL. Terry Pemberton, KB7TRE, Granite Mountain Middle School, 1800 Williamson Valley Rd, Prescott, AZ 86305.

Lake City, FL: Columbia Amateur Radio Society, K4O. 1400Z-2000Z **Feb 15**. Olustee Civil War Battlefield Reenactment. 21.325 14.250. QSL. Efrain Bonilla, KP4CW, 586 NW Palm Dr, Lake City, FL 32055.

Alexandria, VA: Mount Vernon Amateur Radio Club, K4US. 1600Z **Feb 15**-2100Z **Feb 16**. Commemorating George Washington's Birthday. 28.415 14.240 10.110 7.240. Certificate. Mount Vernon ARC, PO Box 7234, Alexandria, VA 22307.

Centralia, IL: Centralia Wireless Association, W9CWA. 0001Z **Feb 15**-2359Z **Feb 16**. Wishing 73 to all on CWA's 73rd anniversary. 21.323 18.133 14.253 7.253. Certificate. Centralia Wireless Association, PO Box 1166, Centralia, IL 62801.

Rapid City, SD: QCWA Dakota Chapter 102, WØDAK. 1500Z **Feb 22**-0300Z **Feb 23**. 26th anniversary of Chapter 102. 28.400 21.775 14.275 7.240. Certificate. Frank Shaw, WØDAK, 118 E Van Buren, Rapid City, SD 57701.

Baton Rouge, LA: USS *Kidd* ARC/Baton Rouge ARC, W5KID. 1500Z-2300Z **Feb 28**. 60th anniversary of the launching of USS *Kidd*, DD-661. General class bands, 14.250-14.320; CW QRP subbands. QSL. W5KID, c/o USS *Kidd* Museum, 305 S River Rd, Baton Rouge, LA 70802.

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.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), or for an SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Events Form" in the lower left-hand corner). You can also submit your special event information on-line at **www.arrl.org/contests/spevform.html**. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; that is, a special event listing for **Apr** *QST* would have to be received by **Feb 1**. Submissions may be mailed (Attn: Maty Weinberg), faxed (860-594-0259) or e-mailed (**events@arrl.org**) to ARRL HQ. QST

Maty Weinberg, KB1EIB ♦ events@arrl.org

VHF/UHF CENTURY CLUB AWARDS

Compiled by Eileen Sapko Awards Manager

The ARRL VUCC numbered certificate is awarded to 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 are the assigned award numbers, issued in order of date received. The numbers following the call signs indicate claimed endorsement levels. The totals shown are for credits given from October 10 to December 6, 2002.

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/awards/vucc**. A self-addressed, stamped envelope to ARRL is required if you cannot download these forms. If you have questions relating to VUCC, send an e-mail to **vucc@arrl.org**.

50 MHz

100

1264	KC8NAH
1265	K6GXO
1266	W2JLK
1267	W7MEM
1268	WB2SIH
1269	K5RLA
1270	NS7K
1271	K5KR
K1WVX	425
K1TEO	750
W2GKR	400
WA2BKN	200
K2CS	300
K2NJ	375
W3EP	875
W4PRZ	150
AB4OO	250
W4DR	950
K5UR	975
K5CZD	350
AE5B	400
WA5KBH	275
K5GMX	250
W5TFW	225
W5WP	300
N6JV	525
K6HEW	300
N6ZE	200
KB6NAN	600
WA8RJF	450

144 MHz

100

608	AB4OO
609	W7MEM
610	WB2SIH
611	WW2R

222 MHz

50

N9LR	120

432 MHz

50

300	W3EP
K1TEO	100

902 MHz

25

K1TEO	45

1296

25

137	W1AIM
K1TEO	45

2.3 GHz

10

K1TEO	30

3.4 GHz

5

K1TEO	15

10 GHz

5

125	K6RRA
126	WA2IID
127	W3HMS
128	WØAUS
129	WØ/GØRYR
130	WW2R
K1TEO	15
N1JEZ	10

24 GHz

5

16	W1FKF

Satellite

100

121	KØRFD
122	CYØTP
123	KO4MA
N5AFV	425
KK5DO	700
N5ZNL	325
N7SFI	800

QST

By Carl Luetzelschwab, K9LA

2002 IARU HF World Championship Results

For those of you in the northern hemisphere, how did you spend your summer vacation last year? More specifically, how did you spend the weekend of July 13 and 14?

Were you enjoying outdoor activities? Or were you like the other participants in the 2002 running of the IARU HF World Championship—sitting at your radio(s) making contest QSOs with other competitors all around the world? I hope you were doing the latter!

Whether a seasoned veteran or relative neophyte, this contest has the potential for fun at almost any level. Consider these comments from Janez, S51JM: "This was my first IARU-HF contest. I worked with an FT-840 and ECO multiband vertical antenna. I made 300 QSOs from all over the world. Conditions from my location were a bit frightening with several thunderstorms, including one with hail. I had to disconnect power a few times and had a "rescue operation" for my car during the hailstorm. But as I always say: HAM is fun!"

Franki, ON5ZO, echoed Janez's sentiments when he said, "I've been into CW contesting for 15 months now, and every time I find it more and more fun! This time I participated 20 hours out of 24, and broke my personal QSO-record: 550. Mind you I did it with very limited antennas: an inverted V for 20m and delta loop for 40m. I had a blast working familiar calls and finding OJ-stations. Activity was good and I can't wait for the next one to enter."

Perhaps the enthusiasm for this event is best displayed by then 14-year-old Christopher, KC9AZL (now N9QS). Christopher stated that this was the "first time I ever tried contesting and I made 105 QSOs. I worked 12 new countries and had a lot of fun. I am looking forward to the next contest." (To see more comments from competitors, please visit the ARRL Contest Online Soapbox at **www.arrl.org/contests/soapbox**.)

Contest Summary

This year's contest resulted in 1682 logs received (not including the WRTC2002 competitors' logs). Fifty of the 90 ITU zones were activated. This isn't bad considering that roughly 30 of the ITU zones are open water and Antarctica. Indeed, the IARU HF World Championship is a blessing to stem our summer contest-withdrawal symptoms.

Joel, LX1ER, operating the 20-meter station at LXØHQ.

Expanded Results, Line-Score Printout Available

For complete contest results on-line please visit **www.arrl.org/contests/results**.

ARRL members without Internet access may obtain a printout of the complete line scores by sending a self-addressed, stamped envelope to ARRL Contest Results, 225 Main St, Newington, CT 06111. Please be sure to include the contest name and year.

The HF World Championship contest is sponsored by the International Amateur Radio Union (IARU). The IARU has been the watchdog and spokesman for the international Amateur Radio community since 1925. It is organized into three Regional Organizations that correspond to the three administrative regions of the ITU (International Telecommunication Union). These three regions are further broken down into 90 zones.

While most contesters are familiar with the 40 CQ Zones, the ITU Zones are somewhat lesser known. In addition to there being 90 of them, their boundaries are quite different from the CQ Zones. Table 1 shows the top participation by Zones. The IARU Zone map may be found on-line at **www.iaru.org/ituzonesc.gif**.

The top participating ITU zone, in terms of the most logs received, was Zone 28 (central and southern Europe). The top participating country, again in terms of the most logs received, was the US.

Top Scores

From the US and Canadian "good news-bad news" department, the bad news is that only one US station won any of the four

Top Ten

World Scores
Mixed Mode

HG6N (HA2RX,op)	2,794,930
UA9AM	2,604,090
RK4FF	2,545,193
UA9CDV	2,281,292
UXØFF	2,260,713
K3ZO	2,154,880
XM3AT	2,100,644
VY2SS	2,079,648
9A5K	2,054,790
LY9A	2,034,672

Phone Only

KH6ND	2,257,190
P4ØB	2,182,664
ZX2B	1,471,977
WB9Z	1,415,460
9QØAR	1,238,832
UV7D	1,138,500
LU1NDC	1,124,400
K6NA	1,110,604
RX9SR	1,108,898
W7EJ	1,073,995

CW Only

P3F	3,114,887
KL9A	2,603,000
HGØD	2,361,967
YT6A	2,202,034
W1KM	2,091,012
RA9JR	2,069,388
W4AN	1,982,512
K7GM	1,981,738
UT7QF	1,950,210
PJ2E	1,927,464

Multioperator

P3A	4,986,042
RT9W	3,883,200
RF9C	3,167,080
CT9M	2,757,652
ZX5J	2,346,994
HG1S	2,343,900
S53Ø	2,082,296
RL3A	2,006,599
RF3A	1,906,320
RK9CZO	1,890,268

W/VE Scores
Mixed Mode

K3ZO	2,154,880
XM3AT	2,100,644
VY2SS	2,079,648
N2NU	2,011,994
W9RE	1,969,480
N9AG	1,649,730
NØAV	1,510,515
K4AB	1,294,656
VA3NA	1,178,520
K6XX	967,575

Phone Only

KH6ND	2,257,190
WB9Z	1,415,460
K6NA	1,110,604
W7EJ	1,073,995
VE1JX	1,040,221
WS1A	736,278
W4WTB	563,085
WA4TII	555,744
N4UH	508,800
AH8DX/W7	508,508

CW Only

KL9A	2,603,000
W1KM	2,091,012
W4AN	1,982,512
K7GM	1,981,738
K3CR	1,801,234
KT1V	1,705,848
W1WEF	1,704,880
K5GN	1,656,393
K9NW	1,541,592
WØUA	1,496,560

Multioperator

NØNI	1,423,845
KB1H	1,421,638
W4G	1,421,469
N3ME	1,359,314
N5YA	1,120,482
AA5NT	1,093,750
K9SD	1,009,424
K1TTT	992,333
NO9Z	972,096
WC4H	715,260

Headquarters Stations

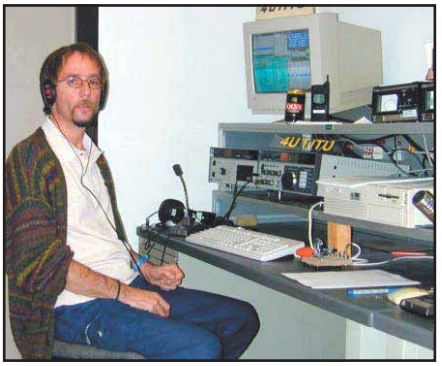
DAØHQ	18,880,296
OI2HQ	16,693,712
SNØHQ	16,514,800
R3HQ	15,914,955
OE1XHQ	13,452,122
PA6HQ	13,082,520
YTØHQ	12,555,062
LYØHQ	12,204,192
YL4HQ	11,210,040
EW5HQ	10,530,375
S5ØHQ	10,250,408
NU1AW/4	9,624,420
HGØHQ	9,344,377
EMØHQ	8,658,950
YRØHQ	8,501,555
W1AW/5	7,917,068
ES9A	7,324,348
T9ØHQ	6,715,840
ER7HQ	5,867,077
SK2HQ	5,256,980

categories this year, compared to last year when two US stations won their category. The good news, though, is that three more North American stations made it into the Top Ten boxes this year compared to last year—11 this year versus 8 last year. More good news is that 4 of these 11 NA stations in the Top Ten boxes were on the West Coast (or even farther West)—KH6ND in Hawaii (extreme West Coast!), K6NA in California, W7EJ in Oregon, and KL9A in Alaska (another extreme West Coast).

One of the hardest-fought battles in the IARU HF World Championship is the race for top honors among the IARU Headquarters stations. The IARU Headquarters category is a true multi-transmitter category, in that signals may be transmitted simultaneously on all band-modes. When the competition was over, the DAØHQ team ended up on top with a score of 18,880,296. The OI2HQ team made a good run at them with a score of 16,693,712. Rounding out the top three was the team at SNØHQ with 16,514,800. Good job, gentlemen!

Headquarters stations operate under a slightly different set of rules for this contest. Unlike the multi-single category, they operate as true multi-multi stations. Most operate with a station on each band-mode (CW and Phone) during the contest. They are also allowed to operate from more than a single location. They count as only 1-point QSOs in your log, but they also are an additional multiplier per band. This explains why you always seem to find a large pile-up trying to work the HQ multipliers during the contest.

Jacobo, P43P, ready to have some fun as P40B.



A very tired HB9DTM at 4U1ITU, the IARU HQ station in Geneva.

Enthusiasm is always high among the HQ stations, as is the competition. Congratulations to the hundreds of operators who particiapte from HQ stations. In 2002, a total of 241,393 QSOs were completed with the 46 HQ stations on the air.

Bringing home the World Single Op Mixed Mode trophy this year was Yuri, UA9AM. Second place went to Vlad, RK4FF, only 59 kilo points behind Yuri. Oleg, UA9CDV, took third place.

In World Single Op Phone Only, Mike piloted KH6ND to the top spot. He had a comfortable margin over the second place finisher, Jacobo, P43P, at P4ØB. Third place went to Wanderley, PY2MNL, at ZX2B.

Bob, 5B4AGN, at P3F claimed top honors in Single Op CW Only while setting a new category record with 3,114,887 points. Chris, KL9A, keyed his way to second place. Laszlo, HAØNAR, at HGØD finished in third place.

In the Multioperator category (identical to the ARRL International DX Contest multi-single category—only one transmitted signal allowed at any given time), the

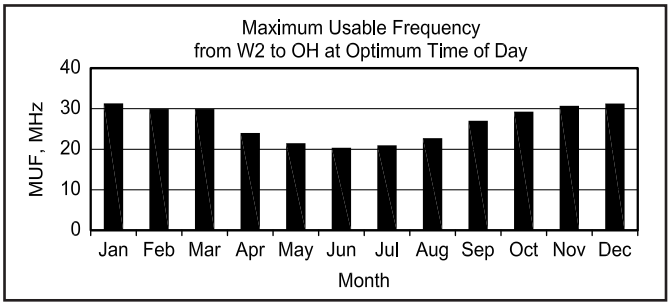


Figure 1—The high band issue.

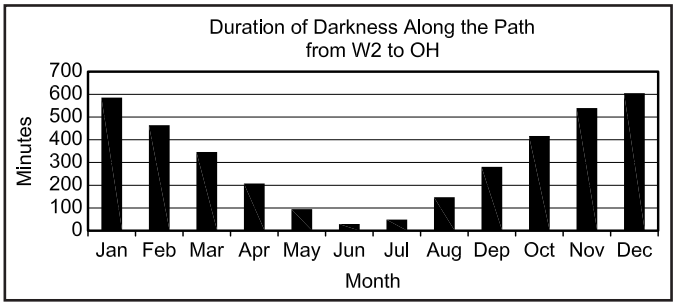


Figure 2—The low band issue.

IARU HF World Radio Championship 2002 at ORARI Lokal Penjaringan—YBØZBC

The members of ORARI Lokal Penjaringan (one of the club stations in Jakarta affiliated with the Indonesian IARU member-society Organisasi Amatir Radio Indonesia) arranged for Amateur Radio friends around Jakarta to conduct what they called an *ORARI Lokal Penjaringan 160 Meter Band Antenna Experiment and IARU HF World Radio Championship 2002*.

With more than 80 guests on the spot, they were able to place all antennas around a field, including a 160 meter Delta loop, 80 meter log periodic, 40 meter Lazy Quad, 20 meter 2 element Delta loop, 15 meter/3 element Delta loop and a 10 meter/3-element beam. The antennas were built by YBØFEX, YBØJAX and YCØLOW. We used the call sign YBØZBC, issued to the ORARI Lokal Penjaringan.

The committee worked hard to make this their best ever entry into the IARU HF World Radio Championship. With a full month of background preparation and a week of field preparation, they seemed happy with the result (well, actually not everybody because propagation on some bands wasn't great.

The operators included YBØAZ, YBØLBK, YBØECT, YBØDPO, JA8VE, YBØGN, YBØLOG, YBØCA, YCØEHN, YCØLOW, YBØJAX, JE1ATW, YCØIEM, YBØQO, YBØAVR, YBØAVK, YBØWWW, YB7YB, YCØLCJ, YBØFEX, YBØSKI, YBØJHH and YBØGCV.

Table 1
Top Participation by Zones

Zone	*Entries*	*Zone*	*Entries*
28	433	7	93
8	293	27	84
29	160	18	56
45	118	30	33
6	110	37	26

Table 2
Top Participation by Country

Entity	*Entries*	*Entity*	*Entries*
US	489	Czech Republic	41
Germany	214	Canada	40
Japan	118	Brazil	39
Poland	113	Finland	36
European Russia	87	Netherlands	30
Asiatic Russia	61	Sweden	26
Ukraine	49	Romania	25
Italy	44		

P3A team (RA9JX, RK3AD, RZ9UN, RN3BZ, and packet) fought their way to the top. The group at RT9W placed second. And another Russian crew, RF9C, came in third.

Among US/VE competitors, Fred, K3ZO, won Single Op Mixed Mode, beating Ron, VE3AT, at XM3AT, by only 2.6%. Mike, KH6ND, took top honors in Single Op Phone Only, beating Jerry, WB9Z, by a good margin. Chris, KL9A, easily took first place over Greg, W1KM, in Single Op CW-Only with a W/VE record setting score of 2,603,000. And the team at NØNI (WOØV, WØFLS, KØKD, NØNI, and NØAC) came out on top in the Multioperator category, edging out the KB1H team (K1EBY, N1XS, NB1U and KB1H) by just over one-tenth of one percent. The W4G multioperator team (N4PN, N4OX, KB4ET, and NF4A) ended up in third place in Multioperator, only 169 points (out of roughly 1.42 M) behind KB1H. Talk about a close US/VE Multioperator race!

Participation by Country

Table 2 lists the Top 15 participating countries in terms of the number of logs received. The OH logs do not include the WRTC2002 team logs (see the "WRTC2002 Competitors" section on the ARRL Web). If these were to be added, OH would move up to fifth place.

Propagation in July

Due to the contest being held in July, two important propagation issues surface for participants in the Northern Hemisphere (the bulk of the participants).

First, due to a lower atom-to-molecule ratio giving fewer ionization targets, maximum usable frequencies (MUFs) in summer are decreased from winter maximums. This results in spotty or non-existent East-West 10 and 15 meter propagation at the higher northern latitudes (North America to Europe and Japan, for example). As an example, Figure 1 shows the highest maximum usable frequency (MUF) during the day on the W2-to-OH path by month. The MUFs are monthly median values, indicating that the predicted value in the plot should occur on at least half the days of the month. Thus, in July there's not much of a chance that 10 meters will be open, and about a 50% chance that 15 meters will be open.

Second, with the Sun in the Northern Hemisphere, the duration of darkness along paths in the Northern Hemisphere is minimal, resulting in few (if any) long distance openings on the lower bands. Figure 2 shows the duration of darkness along the same W2-to-OH path mentioned in the previous paragraph. During July, the entire path is in darkness for just under an hour. Due to D region absorption, it is highly unlikely that any 160 or 80 meter openings will occur on this path, and even 40 meters will be tough.

Space weather affecting propagation was for all intents and purposes not much of a factor during the contest period. Geomagnetic field activity was active the day before the contest due to some coronal hole activity, with high latitude K-indices increasing to 5 and 6 during the 0900-1800 UTC period on July 12. The first day of the contest, July 13, brought quieter conditions, with high latitude K-indices running between 2 and 3. The second day of the contest, July 14, was the quietest, with the K-indices running between 0 and 1. There were no proton events (which could cause polar cap absorption on paths on the Europe to North America West Coast path or the Japan to North America East Coast path) during the contest period.

The largest solar flare during the contest period was a C1.5 X-ray flare just before 0700 UTC on July 14. This low level of solar flare activity did not produce any blackouts on paths on the sunlit side of the Earth (due to increased D region absorption).

2003 Contest

The 2003 IARU HF World Championship will be held the weekend of July 12-13. The announcement will be published in the April 2003 issue of *QST* (and the full rules will be found on-line at **www.iaru.org/contests**). Hope to see you in the fray in July! QST

NEW PRODUCTS

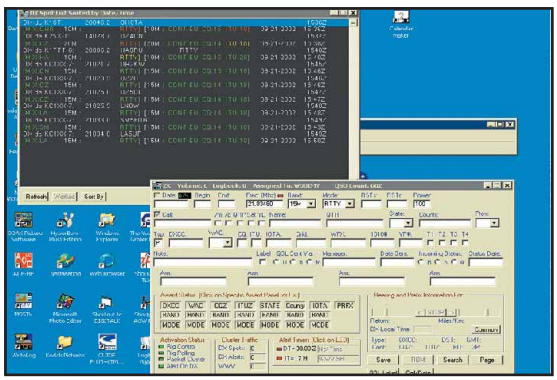
PROLOG2K

ProLog2K is full-featured logging software for *Windows* PCs. *ProLog2K* centralizes all of the information about the contact in a single window. When you type in a call sign and hit the ENTER key, *ProLog2K* automatically inserts the date and time, gives you the short- and long-path bearing information and displays the local time at the station's location. If you've installed a QSL route database on your computer, *ProLog2K* will also pull up the address information. In the logging window, you'll see how the contact (or potential contact) affects the status of various awards. You can examine and sort your awards totals according to the information you need to see. You can set up as many as 36 different logbooks in *ProLog2K*.

If you have an interface that allows your computer to control your radio, *ProLog2K* will exploit this capability to make your logging experience even easier. *ProLog2K* will track the frequency and mode of your transceiver as you tune through the bands. When you log a contact, those fields will be filled in automatically. You can even control your radio from the logging window. *ProLog2K* also provides a memory channel function where it stores your favorite frequencies along with the mode and a label of your choice (30 channels total). *ProLog2K* will interface with either your packet radio TNC for over-the-air PacketCluster monitoring, or with Internet-based clusters using *DXTelnet*. As the DX spots appear in the *ProLog2K* window, they are color-coded according to your award needs. You can also sort and filter spots for specific bands. *ProLog2K* even allows you to set up audible alarms to alert you to the presence of a contact you need.

The latest version of *ProLog2K* (3.98.0) includes the addition of a logging interface between *ProLog2K* and the *MixW/Digipan* digital mode programs. This new feature permits you to take advantage of all the features of *MixW* or *Digipan* while transferring your contact information directly to your *ProLog2K* logbook in real time as you log each contact from either program.

For more information, contact Datamatrix, 5560 Jackson Loop NE, Rio Rancho, NM 87124; tel 800-373-6584; **www.prolog2k.com**. $49.95; $64 with QSL route database. System requirements: *Windows 95/98/2000/NT/XP* on a 100-MHz Pentium PC (minimum) with a CD-ROM drive.



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Price: $293. For more information or to download the Model 517's user manual in PDF format, contact TDL Technology, 5260 Cochise Tr, Las Cruces, NM 88012, tel 505-382-3173, fax 505-382-8810; **www.zianet.com/tdl**. QST

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- Enhanced Rx performance
- SSB/CW Syncronous tuning
- Multiple DSP controlled AGC loops
- Advanced CW functions
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- Selectable IF filter shapes for SSB & CW
- 102 alphnumeric memories
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- 12V Operation
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- CW Keyer Built-in
- One Touch Band Switching
- Direct frequency input
- VOX Built-in
- 101 alphnumeric memories

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IC-T7H 6W, Dual Band Transceiver

- 2M/70CM
- 70 alphnumeric memories
- 6W output
- CTCSS encode/decode w/tone scan
- Auto repeater
- Easy operation!
- Mil spec 810, C/D/E*1

LOW PRICE

IC-V8 2M Transceiver

- 5.5W output
- 107 alphnumeric memories
- Customizable keys
- Auto repeater
- PC Programmable
- CTCSS encode/decode w/tone scan
- Drop-in trickle charger included

IC-W32A Dual Band Transceiver

- 2M, & 70CM @ 5W
- V/V, U/U, V/U
- Independent controls for each band
- 200 alphnumeric memories
- Auto repeater
- CTCSS encode/decode w/tone scan
- IRLP compatible

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- Weather Alert

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- Cool dual display
- 50 watts
- CTCSS encode/decode w/tone scan
- Backlit remote control mic
- Mil spec 810, C/D/E*1
- Auto repeater
- 113 alphnumeric memories

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- 2M/70CM
- VV/UU/VU
- Wide band RX inc. air & weather bands
- Dynamic Memory Scan (DMS)
- CTCSS/DTCS encode/decode w/tone scan
- Independent controls for each band
- DTMF Encode
- 212 memor y channels
- Remote Mounting Kit Included

LOW PRICE!

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- 75 watts
- ICOM DMS scanning
- CTCSS/DCS encode/decode w/tone scan
- Weather alert
- Weather channel scan
- 200 alphanumeric memories
- Backlit remote control mic

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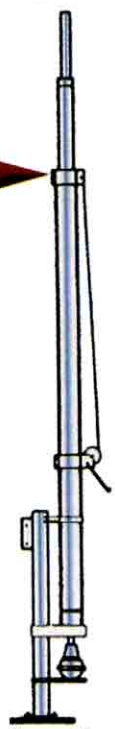

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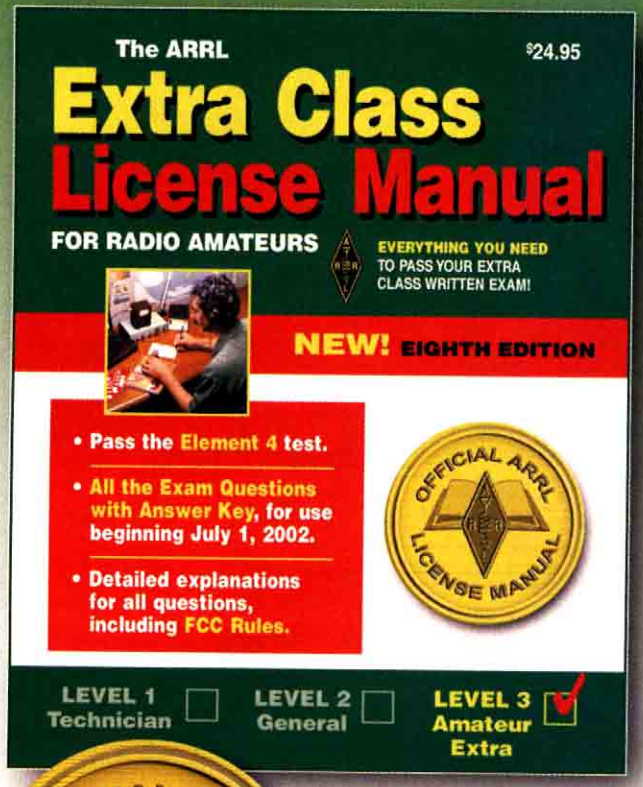

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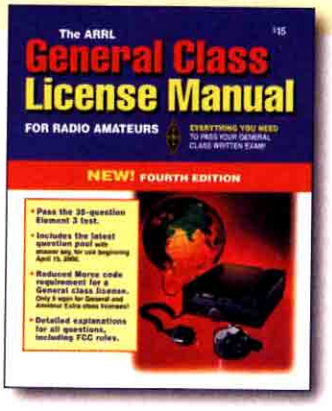

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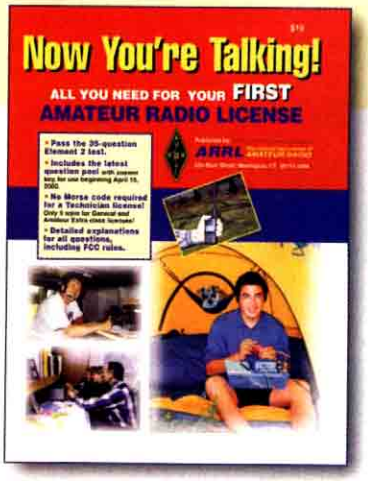

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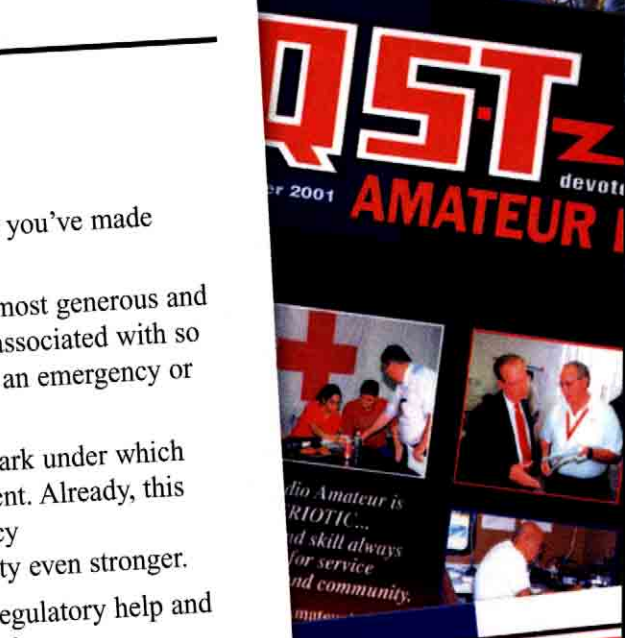

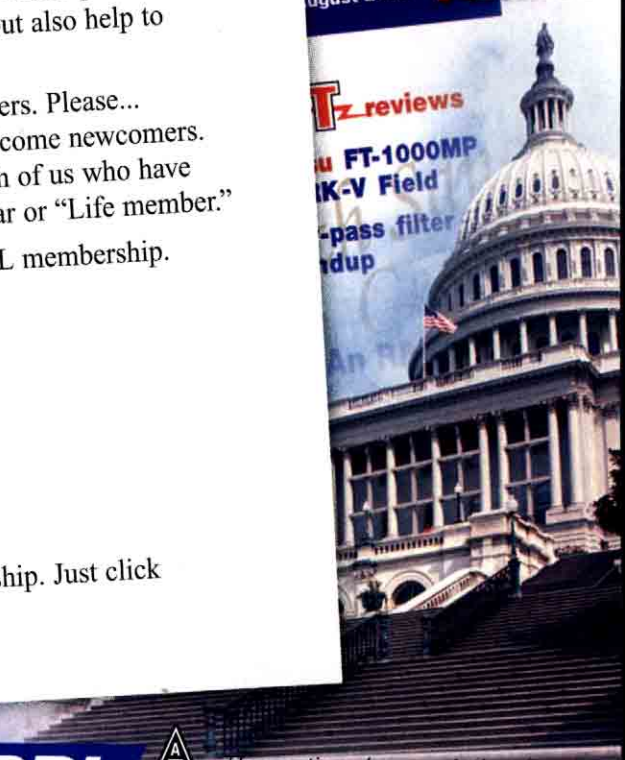

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Thanks to your membership, ARRL is able to call upon the talents of a staff whose collective skills far exceed the sum of their individual parts. Their dedication helps make every membership dollar count. They are working with each of us to make a difference in Amateur Radio–making it better, every day.

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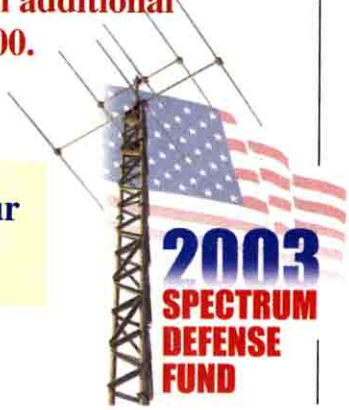

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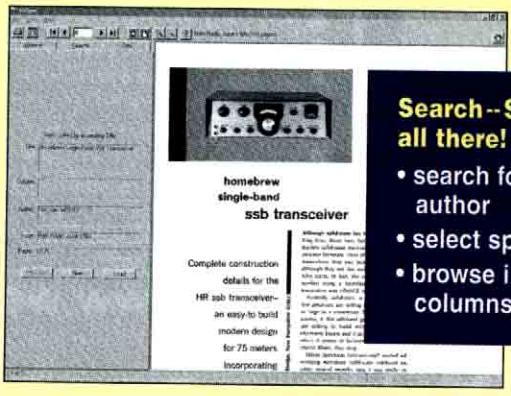

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RC-1, $45, remote controls most MIRAGE amps. Check with Mirage for compatibility. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). Tiny 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all mode FM/SSB/CW repeater amps for 6, 2, 1¼ Meters, 70 cm, 450 MHz, ATV.

Low noise GaAsFET preamps

High gain ultra low noise GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 100 Watts.

Choose *In-Shack* model or *Mast Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 Watts out for 2 to 50 Watts in, $169 to $739.

Commercial Amps ($159 to $429)

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Commercial Amps for 150-174, 450-470 MHz and VHF marine bands, 70-130 Watts out.

Accurate SWR/Wattmeters

Read SWR directly and Forward/Reverse, Peak/Average power. Remote coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

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SWR Analyzer MFJ259B

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$209.95

Special price good through 2/15/03 or until stock is depleted, Limit 2

SWR Analyzer MFJ269

Covers 1.8 to 170 MHz and 415 to 470 Mhz – an MFJ-269 Exclusive! It includes all the features of the MFJ-259B, the world's most popular SWR Analyzer plus much more! Large easy-to-read two line LCD display and side-by-side meteres clearly display your information Built-in Ni-Cad/Ni-MH charger circuit, battery saver, low battery warning, smooth reduction drive tuning.

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MFJ TUNERS

MFJ-989C *Legal Limit* Antenna Tuner

MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

MFJ-989C **$359.95**

The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

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You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).

MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

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Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

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MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

MFJ-986 **$329.95**

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. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

MFJ-962D **$269.95**

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. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

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. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E **$119.95**

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 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$109.95**

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, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

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 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

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-16010 *random* wire Tuner

MFJ-16010 **$49.95**

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 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921 or MFJ-924 **$69.95**

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 *artificial* RF Ground

MFJ-931 **$89.95**

Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

New MFJ-259B reads antenna 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 . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . and much more!

The world's most popular SWR analyzer just got incredibly better and gives you more value than ever!

MFJ-259B gives you a complete picture of your antenna's performance. You can read antenna SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open in feet.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously at a single glance.

You can also read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance over the entire spectrum 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 approximate 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 much more!

Call your favorite dealer for your best price!

MFJ-259B **$259.95**

Call or write for *Free* Manual

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, $14.95. Its rugged all metal cabinet is a compact 4x2x6¾ inches.

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, $229.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $139.95. Like MFJ-249B but reads SWR only on meter and has no LCD or frequency counter.

MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312D, $14.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the 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*™.

Genuine MFJ Carrying Case

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

Made of special foam-filled fabric, the MFJ-29C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case. *Look for the MFJ logo for genuine authenticity!*

MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1312D 110Vac adapter. ***Save $5!***

New! ***Tunable Measurement Filter***™

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MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

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MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

More hams use MFJ SWR Analyzers™ than any others in the world!

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Use sound card and rig for all digital modes!

Plug and Play -- includes software, all cables, AC power supply . . . RFI-proof . . . Isolation transformers -- no hum, noise, distortion . . . Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, Meteor Scatter, others . . . Use as Voice Keyer, CW Contest Memory Keyer . . . Monitor On/Off Switch . . .

MFJ1275/M/T
$99.95

New! *Includes AC power supply, RS-232 cable!*

Plug this new MFJ-1275/M/T sound card interface between your transceiver and computer and enjoy operating all digital modes.

Everything you need is included -- software, audio cables, RS-232 serial cable and AC power supply.

Provides fully automatic operation with audio and push-to-talk control. It matches sound card audio, eliminates ground loops and provides microphone override.

Models available for all transceivers with 8-pin round, 8-pin modular (RJ-45) or 4-pin round microphone plugs.

Operate PSK-31, packet, APRS, AMTOR, RTTY, SSTV, CW, high speed CW Meteor Scatter and many others. Also use as Contest Voice Keyer and CW Contest Memory Keyer.

Digital Modes or Normal Operation

Select the ON digital mode -- all connections are made between your rig and computer for instant digital operation.

Select BYPASS normal mode -- your transceiver and computer connections are restored for their normal operation.

Audio Isolation Transformers

Audio isolation transformers and relay eliminate ground loops, audio hum, noise and distortion.

RFI-Proof

Extensive RF suppression and line isolation eliminates RF feedback problems.

Automatic Microphone Override

Transmit mic audio at any time by pressing PTT to override digital modes -- great for SSTV and Contest Voice Keyer.

More Impressive Features

Serial port -- lets computer control radio to override/interrupt digital transmissions.

VOX Control -- lets you use VOX control when not using computer serial port control.

Level Controls -- for transmitter drive and for receiver-to-sound card drive level. No need to adjust microphone gain or sound card level when you change modes.

Stereo or Mono Audio Input -- A front panel switch selects left, right, or both sound card audio output channels to accommodate various programs.

Off-the-air recording -- for replaying or for use with spectrum analyzer programs.

Monitor on/off switch lets you have a normal QSO and receive SSTV pictures at the same time in the *"monitor on"* position. This is great for modes like SSTV and Voice Keyer operation that may require listening to receive audio during operation.

Rugged Construction -- All aluminum cabinet and surface-mount construction gives you years of trouble-free service.

Use any Transceiver

Internal jumpers program microphone wiring for any brand or model radio -- no soldering required. Order **MFJ-1275** for 8-pin *round* mic plug. Order **MFJ-1275M** for 8-pin *modular* mic (RJ45) plug.

NEW! Order MFJ-1275T, for *4-pin round* mic plug, for Ten-Tec and others.

Plug and Play!

Everything you need is included --audio and RS-232 cables, AC power supply and a CD with a collection of the most popular amateur radio software to operate PSK-31, RTTY, SSTV, PACKET, AMTOR, CW, HSCW Meteor Scatter, Contest Voice Keying and other modes. Use 12 VDC or 110 VAC.

No Matter What™ Warranty

Protected by MFJ's famous *No Matter What™* one year limited warranty. MFJ will repair or replace (at our option) your MFJ-1275/M/T *no matter what* for one full year.

Try it for 30 Days

Order from MFJ and try it -- no obligation. If not delighted, return it within 30 days for refund less shipping.

New! *Super* Sound Card Interface

MFJ-1279/M/T
$129.95

This *super* sound card interface has all of the features of the MFJ-1275 ***plus . . .***

- **Auxiliary Input Jack:** Lets you switch your sound card from MFJ-1279 so you can use your sound card for something else. No more plugging/unplugging!
- **Direct CW/FSK Keying Jack:** Allows direct CW or FSK keying operation.
- **Headphone Jack:** Use your stereo headphones so you won't disturb your XYL (also turns off external speaker).
- **Footswitch:** Use footswitch or other for PTT (push-to-talk) when not using VOX.

Plug and Play! Includes software CD, RS-232 and audio cables, AC power supply.

Order MFJ-1279 for 8-pin round mic, MFJ-1279M for 8-pin modular (RJ-45) mic, MFJ-1279T for 4-pin round mic.

Add "X" suffix for 220VAC.

New! *Basic* Digital Interface

MFJ-1273B
$59.95

Plug and Play! Has sound card, radio, speaker, RS-232 jacks. Includes: software CD and RS-232, audio, mic cables. No external power needed. Has no mic jack or mic switch. **Order** MFJ-1273B for 8 pin round mic, MFJ-1273BM for 8-pin modular (RJ-45) mic, MFJ-1273BT for 4-pin round mic.

DSP Sound Card Programs

MFJ-1296, $129.95. *RadioCom4* integrates PSK31, SSTV, FAX/Sat FAX, RTTY, SITOR, DSP audio filters and radio control.

MFJ-1298, $199.95. *RadioCom5* -- all features of *RadioCom4* plus DSP Audio Filter analyzer, Spectrum Analyzer, Dual Scope Display, Sound Recorder, Time and Frequency Management, Frequency Analyzer, 3D Scanner, Satellite tracking, Rig Control for over 80 radios, more! **Free demo at:** ***www.mfjenterprises.com/freedemo.php***

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THE ARRL LETTER — The League's news digest for active amateurs, professionally produced and edited and available in a weekly electronic edition via the World Wide Web at http://www.arrl.org/arrlletter

THE Veteran Wireless Operators Association, a 74-year old, non-profit organization of communications professionals invites your inquiries and application for membership. Write VWOA, Edward Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863. Visit our web site for activities, history, membership: http://www.vwoa.org

WORK GEORGIA'S 159 COUNTIES: New award, with progress certificates for 50 and 100 counties. Atlanta Radio Club, http://www.w4doc.org

PROPERTY/ VACATION/RENTALS

A BERMUDA HAM QTH awaits you. Email edkelly@ibl.bm or phone VP9GE 1-441-293-2525.

AFRICAN DX SAFARIS Led by ZS6WPX. Check out www.dxsafari.s5.com

Arizona Golf Course Ham Home. Three bedroom, two bath, 2000+ sq. ft. golf course home with a 40' Tri-Ex tower & 3 band Yagi in Sun City, AZ. Double fairway lot, upgraded kitchen, fruit trees, quiet neighborhood, 2 car garage + golf cart "barn". $193,500. Listing details emailed on request. - Richard Haworth, W7MDQ, CB Success Realty, 800-967-0383, www.azhomesite.net, email: rhaworthaz@aol.com

BLUE RIDGE MT. VA. - Beautiful mountain top location - Floyd, VA. www.va-mountainland.com KK4WW 1-540-763-2321

BORNEO/9M6AAC - http://www.qsl.net/9m6aac

CARIBBEAN FAMILY HAM VACATION: Curacao PJ2T station and house; two bedrooms, 100 foot oceanfront, SCUBA, beach, snorkeling nearby; three kW stations, 11 Yagis, three towers. ghoward@kent.edu, WØCG http://asgard.kent.edu/ccc

COLORADO CHALET with ham gear, www.lostcreekcabin.com. WØLSD Buena Vista, CO.

DALLAS AREA: 2500 square foot two story, nice floor plan, great shape, 220 and 25A 11(in shack, tribander. $179K. K5QT 972-691-0822

DXshack FG, J6, 3W, XU, XW TRX+kW AMP+Beam ANT & Bed. URL: //qth.com/dxshack email: xu2a@fsinet.or.jp

FOR SALE SOUTH FLORIDA Custom 4BDR / 2 ½ bath on lake, pool, US Tower 433/HD KLM KT34A. $224,000. Call ON4TZ (954)749 7746. Details see www.voyage-magazine.com/guy/selling.html

GEORGIA: 4 acres, pine forest, 7 mi. from ocean, 250 ft. HD tower, building included. Bring your camper, quiet, relaxed getaway. $49,900. Call Jim at 419-782-8591

KH6SQ - http://www.seaqmaui.com

NICE HAM RADIO LOCATION approx. 2 miles off I-77, about 35 miles north of Charlotte, NC. 1296sf upper: 3 bedrooms, bath, kitchen, dining room, living room, large family room. 986sf daylight basement: finished bedroom, bath. Security system, deck, partial fenced yard on 2.31 acres. $131,900. NO ANTENNA RESTRICTIONS. Above average terrain, approx. 900' amsl. Details: Patti Fox 704-873-6816 (after 6PM—EST)

MFJ DX Beacon Monitor

Get *up-to-the-minute* worldwide DX band conditions in *minutes* on 14, 18, 21, 24, 28 MHz bands using the International Beacon Network of 18 worldwide beacons!

MFJ DX Beacon Monitor lets you instantly see on world map which beacon you're hearing on your transceiver . . . No need to copy 22 wpm CW . . . Positively identify beacons even if CW is weak, fluttery or distorted . . . Tells you where to point your antenna . . . Fascinates visitors . . .

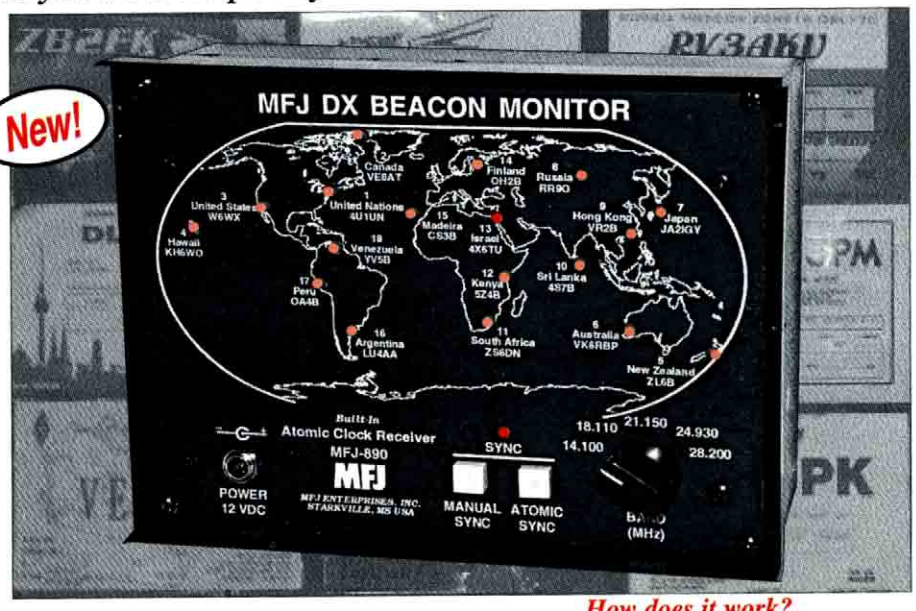
MFJ-890 **$99.95**

Get up-to-the-minute worldwide DX band conditions in minutes on 14, 18, 21, 24, 28 MHz bands using the International Beacon Network of 18 beacons throughout the world!

MFJ's new* DX Beacon Monitor *lets you instantly see which beacon you're hearing on your transceiver -- an LED lights up on its world map to show you the beacon location and where to point your antenna.

It's fascinating to hear and watch each beacon location light up as they become active across the world.

It's great for DXers, contesters, ragchewers and SWLers.



The International Beacon Network

The *International Beacon Network* provides a reliable source of signals for determining HF propagation 24 hours a day.

It consists of 18 beacons evenly located throughout the world.

Each beacon transmits on 14.1, 18.11, 21.150, 24.93 and 28.2 MHz.

The transmit sequence moves westward from New York across North America, Asia, Pacific to Africa, Europe and South America.

On each frequency, each beacon transmits for ten-seconds -- its call sign at 22 wpm CW and a one-second dash at 100 Watts and three one-second dashes at 10, 1, 0.1 Watts.

When each beacon completes a transmission it goes silent on that band and switches to the next higher band.

For more information see Oct/Nov, 1994, Sept, 1997 *QST* and Jan 1999, Sept/Dec 2001, Jan 2002 *Practical Wireless* of U.K.

How are band conditions?

Tune to a beacon frequency. If band conditions are good, you'll hear each beacon identifying in Morse and four dashes each at a lower power level.

The more beacons you hear, the more open the band is to different parts of the world.

The more dashes you hear per beacon, the better the quality of propagation and the more robust the band is. If you hear the 100 milliwatt dashes from many beacons you know *the band is wide open!*

In just three minutes you'll know how band conditions are worldwide.

It's interesting to see how propagation vary from day to day -- what beacons you can hear and at what power level.

You may find that the band is wide open but nobody is on.

Which band is best to reach a particular part of the world?

By storing the beacon frequencies in your transceiver's memory, you can quickly check all five bands to see which band has the best propagation to a particular part of the world.

MFJ DX Beacon Monitor lets you instantly see on world map which beacon you're hearing

You don't have to copy CW at 22 wpm to identify a beacon.

When you *hear* a beacon, an LED instantly lights up on a world map to show you its location. **You** can positively identify each beacon -- even if the signal is weak, and the CW is fluttery or distorted.

The world map display also tells you where to point your antenna.

How does it work?

The transmit sequence of the beacons are precision timed using GPS (Global Positioning Satellites).

The *MFJ DX Beacon Monitor* duplicates this precision timing sequence and lights an LED to show which beacon is transmitting. A microprocessor and a *built-in WWVB atomic clock receiver* provides ultra precise synchronization. Has manual sync for use *anywhere* in the world. MFJ-890 is not a beacon receiver that receives beacons directly.

The MFJ-890 is a self-contained stand-alone unit. It requires no antenna and no connection to your transceiver or receiver. 6¾Wx5¼Hx3D inches. Uses 12 VDC or 110 VAC with optional MFJ-1315, $14.95.

Free MFJ-890 Instruction Manual

Visit *http://www.mfjenterprises.com*

No Matter What™ Warranty

Protected by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your MFJ-890 *no matter what* for one full year.

Try it for 30 Days

Order from MFJ and try it -- no obligation. If not delighted, return it within 30 days for refund less shipping.

MFJ-464 CW Reader with built-in Keyer

MFJ-464 **$179.95**

(Keyboard, paddle not included.)

Plug this new MFJ CW Reader with built-in Keyer into your transceiver's speaker/phone jack and key jack.

Now you're ready to compete with the world's best hi-speed CW operators -- and *they won't even know you just passed the code test!*

Sends and Reads 5-99 WPM. Automatic speed tracking. Large 2-line LCD shows send/receive messages. Use single or iambic paddle or computer keyboard. Easy menu operation. Front panel speed, volume controls. 4 message memories, type ahead buffer, read again buffer, adjustable weight/sidetone, speaker. RFI proof.

Free MFJ Catalog
Visit: http://www.mfjenterprises.com or call toll-free 800-647-1800

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http://www.mfjenterprises.com for instruction manuals, catalog, info

QTH of KW5V on 1+ acre of rural Texas hill country subdivision just outside Austin. 70' guyed tower with 204BA plus vertical and wire antennas. All underground feeds to 3/2/2 1640 sq. ft. house with huge shaded patio and hot tub. Separate ham shack/hobby room with 220v. $160,000. Pictures at TexasDiscountRealty.com or email to sbosbach@austin.rr.com

Sun City AZ: Charming smaller home, 2 bedrooms, 1 bath. All appliances, single carport, yard fenced for pet. Antennas allowed. Great value at $69,900. Taxes $371. Info VE3PFC@azqth.com. Don Steele, Ken Meade Realty, 1-800-877-1776.

TURKS AND CAICOS: 3br/2 bath; pristine beach; XYL approved deluxe accommodations; rigs; amps; antennas. www.qth.com/vp5 270-259-4530; k4isv@kih.net **For rent or sale**

TURKS AND CAICOS "HAM-LET" VACATION: House with station located **Providenciales** hillside above ocean. Jody Millspaugh, 649-946-4436 or Box 694800, Miami, Florida 33269 USA. **E-mail: jody@tciway.tc**

W4UFO QTH: Lake Norman (35K acres, 520 miles shoreline) 153' waterfront 35 miles north of Charlotte, NC. 2400sf, 8 rooms — 3 bedrooms, 2 baths, office/shack, hot tub/wet bar, 60X12 deck, 2 car+ finished garage. Beautiful sunsets, heavily wooded, deep water dock/boat-slip. Custom-built rustic contemporary. Many extras: burglar/fire alarm, automatic lawn sprinkler, storage shed, massive rock fireplaces. $399,900. Good DX location, CDXA PacketCluster, 100' 25G, antennas: ALL bands 160m-70cm. NO ANTENNA RESTRICTIONS. Adjoining 134' waterfront lot available for additional towers, verticals. $99,990. Pictures, broker info: Nobby Mills, email: w4ufo@aol.com; phone: 704-528-5013.

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ANTIQUE WIRELESS ASSOCIATION. The organization for all enthusiasts of antique and historical radio! Publishes OLD TIMER'S BULLETIN, covering vintage ham gear, keys, telegraphy, contests, broadcast receivers, vacuum tubes, historical, technical articles, restoration, and much more. AWA produces the famous annual Rochester, NY meet. Maintains world-famous historical radio-electronics communications museum. Membership only $20/year USA, $25 elsewhere. Antique Wireless Association, Box E, Dept. 1, Breesport, NY 14816. Check our Website: http://www.antiquewireless.org

BROADCAST MICROPHONES and accessories (call letter plates, stands) wanted: early carbon, condenser, ribbon, dynamic models. Cash or trade. James Steele, Box 620, Kingsland, GA 31548. 912-729-6106. jsteele@k-bay106.com; http://www.k-bay106.com/mics.htm

CLASSIC RADIOS — www.radiofinder.com finder@radiofinder.com

CODE PRACTICE OSCILLATOR MUSEUM: http://www.n4mw.com

COLLINS REPAIR - Specializing in S-Line and KWM2. Precision Collins Services, N6HK 661-822-6850. n6hk@csurfers.net

MFJ *Pocket size* Morse Code Reader™

Hold near your receiver -- it instantly displays CW in English!

Automatic Speed Tracking . . . Instant Replay . . . 32 Character LCD . . . High-Performance Modem . . . Computer Interface . . . Battery Saver . . .

MFJ-461
$79.95

Is your CW rusty?

Relax and place this tiny pocket size MFJ Morse Code Reader near your receiver's speaker . . .

Then watch CW turn into solid text messages as they scroll across an easy-to-read LCD display.

No cables to hook-up, no computer, no interface, nothing else needed!

Use it as a backup in case you mis-copy a few characters - - it makes working high speed CW a breeze - - even if you're rusty.

Practice by copying along with the MFJ-461. It'll help you learn the code and increase your speed as you instantly see if you're right or wrong.

Eavesdrop on interesting Morse code QSOs from hams all over the world. It's a universal language that's understood the world over.

Automatic Speed Tracking

MFJ *AutoTrak*™ automatically locks on, tracks and displays CW speed up to 99 Words-Per-Minute.

Simply place your MFJ-461 close to your receiver speaker until the lock LED flashes in time with the CW.

Four Display Modes

1. Bottom line scrolls and fills with text, then that entire line is displayed on top line until bottom line refills -- makes reading text extra easy! Automatically displays speed in WPM.

2. Same as **1**, without speed display -- gives you maximum text display.

3. Top line scrolls, bottom line displays speed in Words-Per-Minute.

4. Both top and bottom lines scroll.

Two-line LCD display has 32 large 1/4 inch high-contrast characters.

MFJ Instant Replay

The last 140 characters can be instantly replayed. This lets you re-read or check your copy if you're copying along side the MFJ-461.

High Performance Modem

Consistently get solid copy from MFJ's high performance *PLL* (*phase-lock loop*) modem. Digs out weak signals. Even tracks slightly drifting signals.

Of course, nothing can clean up and copy a sloppy fist, especially weak signals with lots of QRM/QRN.

Computer Interface

The MFJ-461's serial port lets you display CW text full screen on a bright computer monitor -- just use your computer serial port and terminal program.

More Features

When it's too noisy for its microphone pickup, you can connect the MFJ-461 to your receiver with a cable.

Battery saving feature puts MFJ-461 to sleep during periods of inactivity. It wakes up and decodes when it hears CW.

Uses 9 Volt battery (not included).

True Pocket Size

Fits in your shirt pocket with room to spare - smaller than a pack of cigarettes. Tiny 2¼x3¼x1 in. 5½ ounces.

No Instruction Manual needed!

Super easy-to-use! Just turn it on -- it starts copying instantly!

Accessories

MFJ-26B, $4.95. Soft leather protective pouch. Clear plastic overlay for display, push button opening, strong, pocket/belt clip secures MFJ-461.

MFJ-5161, $14.95. MFJ-461 to computer serial port cable (DB-9).

MFJ-5162, $5.95. Receiver cable connects MFJ-461 to your radio's external speaker 3.5 mm jack.

MFJ *Pocket* Morse Tutor

MFJ-418
$79.95

Learn Morse code anywhere with this tiny *MFJ Pocket-sized Morse Code Tutor*™! Practice copying letters, numbers, prosigns, punctuations or any combination or words or QSOs. Follows ARRL/VEC format. Start at zero code speed and end up as a high speed *CW Pro!* LCD, built-in speaker.

MFJ Code Oscillator

MFJ-557
$29.95

MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base -- stays put on your table! Portable. 9-Volt battery or 110 VAC with MFJ-1312, $14.95. Earphone jack, tone and volume controls, speaker. Adjustable key. Sturdy. 8½x2¼x3¾ in.

MFJ *Pocket* CW Keyer

MFJ-403P
$69.95

Built-in Iambic Paddle. Thumbwheel speed control. Adjustable weight. Adjustable sidetone with speaker. Iambic modes A or B. Fully automatic or semi-auto "bug" mode. Reversable paddle. Tune mode. RF-proof. Battery Saver. Tiny 2¼x3¼x1 in.

MFJ *miniature* Travel Iambic Paddle

MFJ-561, $19.95. 1¾Wx1¾Dx¾H in. *Formed* phosphorous bronze spring paddle, stainless steel base. 4 ft. cord, 3.5 mm plug.

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and Nearest Dealer . . . 800-647-1800

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KWM-2/KWM-2A Manual covers all versions	$ 35
312B-4 / 312B-5 Manual	$ 19
5" x 7" 4Ω Replacement Speaker	$ 24
Collins Spray Paint, All Colors	$ 10
#557 Ceramic Trimmers, 3-12, 5-25, 8-50 pF	$ 5
Tube Kit - KWM-2/A With 6146W Finals	$135
Tube Kit - KWM-2/A WITH OUT 6146W Finals	$110
Tube Kit - 51S-1	$137
Tube Kit - 75S-1	$ 90
Tube Kit - 75S-3 / A / B / C	$ 95
Tube Kit - 32S-1 or 32S-3 / A please specify	$105
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SPLIT BEADS for Radio Frequency Interference

1/4" Bead with**OUT** Cage	$2 ea	(10+) $1.50
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3/8" Bead WITH Cage	$2.50 ea	(10+) $2
1/2" Bead WITH Cage	$6.50 ea	(10+) $6
1/2" Bead with**OUT** Cage	$5.50 ea	(10+) $5

Surplus Sales recently acquired 500,000 vacuum tubes including new RCA Sweep Tubes. Limited quantities at introductory sale prices!

6JB6	$29 ea.	$65/ matched pr.
6JE6	$39 ea.	$85/ matched pr.
6KD6	$39 ea.	$85/ matched pr.
6JS6C	$39 ea.	$85/ matched pr.
6LB6	$24 ea.	$55/ matched pr.
6LQ6	$39 ea.	$85/ matched pr.
6MJ6	$59 ea.	$125/ matched pr.

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Surplus Sales recently purchased HI-Manuals of Council Bluffs, Iowa. Priority Mail included in our manual price + we will ship most manuals within 24 hours. Give us a shot the next time you need a quality book quickly.

811A CETRON, US MADE. Matched sets of 4 now only $105
6146W Replaces 6146, 6146A, 6146B. By GE. $19 6+ $18
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(Phillips Brand) 6AZ8JAN ... $8 6BA6-5749 .. $6

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HI-MANUALS WAS RECENTLY ACQUIRED BY SURPLUS SALES OF NEBRASKA. Our combined library of 7000 manual originals, 50+ years service to the Amateur Radio Community and superior quality make us the best choice for your hard-to-find manuals. FREE PRIORITY MAIL IN THE U.S. Visit our website **www.surplussales.com** or call orders in at 800-286-5701, inquiries at 402-346-1315.

TELEGRAPH KEYS wanted by collector. Bugs and unusual or unique straight keys or sounders, and tube electronic keyers. Also pre-1950 callbooks. Vince Thompson, K5VT, 3410 N. 4th Ave., Phoenix, AZ 85013. 602-840-2653.

TELEGRAPH MUSEUM / COLLECTOR'S INFORMATION: http://w1tp.com

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WANTED: pre-1925 battery radios, crystal sets, and vacuum tubes. Also early telegraph keys and pre-1900 electrical apparatus. Jim Kreuzer, N2GHD, 1541 Bronson Road, Grand Island, NY 14072. 716-773-4999. wireless@pce.net

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100 QSL CARDS $9.50 postpaid. We also print Color QSL cards, Eyeball cards ETC. Send stamp for Sample. Vaso Nagl, KD4WVK, 832 Woodcraft Drive, Nashville, TN 37214.

AFFORDABLE QSL CARDS, available in small quantities with lots of options. Parma Graphics, K2BKA, 5 Rondout Harbor, Port Ewen, NY 12466. 845-339-1996.

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Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up our power supplies!

No RF Hash!

MFJ-4225MV
25 Amp
$149.95
plus s&h

MFJ-4245MV
45 Amp
$199.95
plus s&h

No RF Hash!

They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¾Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

NEW! 25 Amp MightyLite™

Super light, super compact switching power supply delivers 25 Amps maximum/ 22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. ***No RF Hash!*** Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 3.5 lbs. 5½Wx2½Hx10¾D in.

MFJ-4125
25 Amp
$109.95
plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ-4035MV
$149.95
plus s&h

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

New!
MFJ-1117
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MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

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MFJ-1622 **$99.95** *New!*

New MFJ-1622 Apartment Antenna lets you operate 40 thru 10 Meters on HF and 6 and 2 Meters on VHF with a single antenna!

Its universal mount/clamp lets you easily attach it to window frames, balconies and railings. It also works great indoors mounted to a bookshelf, desk, or table. It's not a 5 element yagi, but you'll work your share of exciting DX!

Highly efficient air wound "bug catcher" loading coil and telescoping 5½ foot radiator lets you really get out! Radiator collapses to 2½ feet for easy storage and carrying.

It includes coax RF choke balun, coax feed line, counterpoise wire and safety rope. Handles 200 Watts PEP.

Operating frequency is adjusted by moving the "wander lead" on coil and adjusting counterpoise for best SWR.

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Provides effective RF ground and stable mount for vertical antennas . . . Antennas radiate well with low SWR

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The base can support a lightweight multiband vertical antenna -- like the all band Hy-Gain 18AVS and the bandswitching MFJ-1795 -- and provide a semi or permanent installation.

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The MFJ-1904 is a 2x2 foot *stainless steel* square with reinforcing bends that greatly strengthens it. Folded and tapered six-inch *stainless steel* legs firmly anchor the MFJ-1904 into the ground.

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HF mini-Bugcatcher

Highly efficient 40 - 6 Meter base-loaded 5½ foot Bugcatcher mobile antenna . . . Use light duty mounts

Become an *"HF Mobileer"* almost instantly with this *new* MFJ high-efficiency *mini-bugcatcher* mobile antenna! Have tons of fun rag-chewing and DXing on the HF bands. Turn boring drives into fun-filled ham adventures. MFJ-1624 **$79.95** *New!*

Attach a simple mount to your vehicle (*mounts*: trunk lip, MFJ-347, $39.95; mirror or luggage, MFJ-342, $9.95; tri-magnet, MFJ-338T, $19.95) . . . **Screw** in your MFJ *mini-bugcatcher* . . . **Throw** your rig into your car, plug into cigarette lighter and turn power down to 20 Watts (to avoid overloading your cigarette lighter; MFJ-1624 handles 300 Watts PEP). **Operate!**

Bugcatcher design uses large highly-efficient *air-wound* inductor -- far out performs other compact HF antennas. *Exclusive* built-in inductive matching network keeps SWR low. 5½ foot whip collapses to 2½ feet for easy storage and low garages. Base loaded for minimum wind load and light duty mounts. Change band by moving *wander lead*. 3/8x24 in. mount.

MFJ Portable Antenna

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MFJ's *tiny* 36 inch diameter *high-efficiency* loop antenna performs like a *full-size* dipole! Operate 10 thru 30 MHz *continuously* -- including WARC bands! MFJ-1786 **$379.95**

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Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

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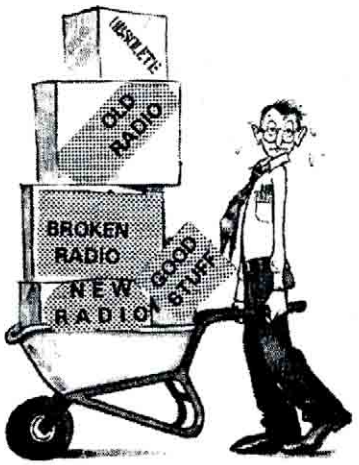

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TECH TALK

IC-746PRO - How to tweak your DSP

Ready for new radio thrills and excitement? Gear up with Icom's new IC-746PRO and experience a totally new dimension in amateur radio enjoyment!

This new generation transceiver delivers unsurpassed DSP performance on all bands and modes, it is affordably priced, and it can also be tweaked to fit your particular operating needs or band conditions at the time. This Tech Talk overviews that concept.

Receive DSP Tweaks. First, you can select a built-in filter bandwidth that is fully adjustable from 3.0kHz to 50Hz for superb sounding SSB audio, copying weaker stations and dodging QRM or working CW in high style, as desired. Second, you can use the Twin PassBand Tuning controls to further tweak a selected filter's center frequency and width. By adjusting the concentric controls together, a received station's bass, mid range or treble tones can be emphasized. By adjusting them separately (one up, one down), a chosen filter's bandwidth can be sharpened to eliminate "side QRM" lower and/or higher in frequency. You can also menu-adjust the upper edges or shoulders of a filter's response curve and tweak the receiver's bass/treble equalization to mate with your hearing preference. Add in multiple AGC loops which, combined with the IC-746PRO's excellent DSP system, prevent strong adjacent frequency interference from reducing receiver sensitivity or causing "pumping" of receive audio, and you have new millennium performance supreme!

IC-746PRO
Supercharged Performance!

As Ray Novak, Icom's National Amateur Sales Manager, discovered during DXpedition operations from A52RN/Bhutan, copying a weak (S3) signal only 200Hz from a strong (S9+) signal is a cinch with the IC-756PROII... which uses the same DSP engine as the IC-746PRO. Now that is impressive!

SSB Transmit Tweaks. Three choices of transmit filter bandwidths, 2.8, 2.4 and 2.2 kHz plus adjustable microphone equalization let you custom-tailor the IC-746PRO's transmit audio to match your particular voice characteristics. By selecting a wide filter and boosting bass, mid range and/or high tones in that chosen bandwidth, your voice can sound extra-rich and full-bodied – even better on the air than "in person." By selecting a narrow filter and emphasizing upper range/treble tones, you can produce a remarkably strong signal with maximum "talk power" for DXing or communicating under adverse band conditions. Additionally, all filter and equalizer settings are easily changed so the IC-746PRO "has a different face to fit every need."

The Digital Difference. Some amateurs may understandably question how the IC-746PRO's performance is superior to other transceivers of similar power and bandwidth. The answer is using IF level DSP plus ultra-steep skirted filters. Combined, they ensure you hear good and sound great yet stop interference and "splatter" like a brick wall. That is the PRO's advantage and it is terrific! Test-tune an IC-746PRO at your favorite dealer and see for yourself!

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TECH TALK

If you can't hear 'em, you can't work 'em!

Whether DXing from the home QTH, operating portable or communicating while mobile, the classic expression of "If you can't hear 'em, you can't work 'em" always reigns supreme. That philosophy was also a special design consideration in Icom's development of the incredibly popular IC-706MKIIG transceiver. In particular, Icom focused on three interrelated areas: receiver sensitivity, selectivity, and noise reduction. This Tech Talk overviews those areas.

SENSITIVITY. The first and foremost requirement for top-notch receiver performance is high "front end" sensitivity with a low noise floor and wide dynamic range. Realizing that fact, the IC-706MKIIG's most important first mixer stage employs double balanced inputs and outputs for both weak signal amplification and common mode reduction of extraneous noise. The design concept here is simple but most effective: boost signals more than noise and you can hear what others miss!

IC-706MKIIG

Since signal levels vary from day-to-day and band-to-band, the IC-706MKIIG's panel-selectable receive preamp and attenuator also let you step up or reduce front end gain to fit needs at the particular time. This overall combination yields the unique ability to "pull weak stations out of the mud" and it is amazing! Even with a dual balanced first mixer and panel-selectable RF preamp and attenuator, weaker signals can still become masked by external noises. That is no problem for an IC-706MKIIG however. The transceiver's built-in noise blanker stops intermittent/pulse-type noise while its built-in DSP system reduces constant/band-type noise to noticeably improve copy under all conditions.

SELECTIVITY. Equally important for copying signals of all types and levels is sharp IF filtering. Icom's IC-706MKIIG really stands tall here, as its standard/included SSB filter is wide enough to yield full-bodied audio yet steep-skirted enough to cut QRM like a knife. Lacking such steep-skirted selectivity, strong signals can "blast through" or appear to widen a filter's bandwidth, and reducing receiver sensitivity is necessary to avoid that scenario. Comparatively, the standard/included SSB filter in '706MKIIG exhibits a better average signal or –6dB to strong signal or –60dB shaping factor than optional "SSB Narrow" filters from some other manufacturers. Surprising? Not really. Icom always delivers top performance in amateur radio gear!

HEARING IS BELIEVING! Thinking about a new transceiver for home, portable or mobile use? Great idea! Before selecting a particular rig however, remember to compare vital specs. Notice the IC-706MKIIG is first class in sensitivity (0.15µV in the 1.8 to 30MHz range) and selectivity (2.4kHz at the –6dB level, widening to only 4.8 kHz at the strong signal/-60dB level). Factor in initial cost or investment, years of enjoyable use, and later resale/trade value and you will agree that the IC-706MKIIG is today's best buy in an ultra compact transceiver!

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B10NMO, 2m/70cm Mobile	$36
SBB224NMO, 2m/220/70cm	$69
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$55
SBB7NMO, 2m/70cm Mobile	$75
Z750, 2m/70cm Mobile	$55
Z780, 2m/70cm Mobile	$69

Much more Comet in stock–call

M2 ANTENNAS

50–54 MHz

6M5X/6M7	$209/299
6M7JHV/6M9KHW	$259/469

HO LOOPS

6M/2M/222/432	$95/45/45/45

HF ANTENNAS

10/15M4DX, 4 Element	$389/439
20M4DX, 4 Element 20m	529
KT36XA, Triband Beam	$1249

More M2 models in stock–please call

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$239
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$519
RT2632, 26 Foot, 9 sq ft	$869

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$539/769/1089
7-50'/60'/70'	$979/1429/1869
9-40'/50'/60'	$759/1089/1529
12-30'/40'	$579/899
15-40'/50'	$1019/1449
23-30'/40'	$899/1339
35-30'/40'	$1019/1569

Bold in part number indicates windload capacity. Please call for other Universal models. Shipped factory direct to save you money!

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X3200A	$129/210
X500HNA/X700HNA	$229/369
X510MA/X510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ

259B, Antenna Analyzer	$219
269, Antenna Analyzer	$299
941E, 300W Antenna Tuner	$109
945E, 300W Antenna Tuner	$99
949E, 300W Antenna Tuner	$139
969, 300W Antenna Tuner	$169
986, 3KW Antenna Tuner	$289
989C, 3KW Antenna Tuner	$309
1798, 80–2m Vertical	$249
1796, 40/20/15/10/6/2m Vert.	$189

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
8X-MINI, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$11/12
1/2"x9"EE / EJ Turnbuckle	$16/17
1/2"x12"EE / EJ Turnbuckle	$18/19
3/16" / 1/4" Preformed Grips	$5/6

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FT x .12" / 5 FT x .18"	$35/59
10 FT x .18" / 11 FT x .12"	$129/80
16 FT x .12" / 16 FT x .18"	$119/179
20 FT x .25	$315
22 FT x .12" / 21 FT x .18"	$149/235

GAP ANTENNAS

Challenger DX	$289
Challenger Counterpoise	$29
Challenger Guy Kit	$19
Eagle DX	$299
Eagle Guy Kit	$29
Titan DX	$329
Titan Guy Kit	$29
Voyager DX	$409
Voyager Counterpoise	$49
Voyager Guy Kit	$45
Quick Tilt Ground Mount	$75

LAKEVIEW HAMSTICKS

9106 ... 6m	9115 ... 15m	9130 ... 30m
9110 ... 10m	9117 ... 17m	9140 ... 40m
9112 ... 12m	9120 ... 20m	9175 ... 75m

All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/199
G6-270R, 2m/70cm Vertical	$169
G6-144B/G7-144	$109/179

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800PDC	$1249
Yaesu G-450A	$249
Yaesu G-800SA/DXA	$329/409
Yaesu G-1000DXA	$499
Yaesu G-2800SDX	$1089
Yaesu G-550/G-5500	$299/599

ROTATOR CABLE

R62 (6, #18)	$.32/ft.
R81/82	$.25/.39
R84	$.85/ft

PHILYSTRAN GUY CABLE

HPTG1200I	$.45/ft
HPTG2100I	$.59/ft
PLP2738 Big Grip (2100)	$6.00
HPTG4000I	$.89/ft
PLP2739 Big Grip (4000)	$8.50
HPTG6700I	$1.29/ft
PLP2755 Big Grip (6700)	$12.00
HPTG11200	$1.89/ft
PLP2758 Big Grip (11200)	$18.00

Please call for more info or help selecting the Phillystran size you need.

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HUGE ICOM DEALS ★ HUGE YAESU DEALS

IC-756PRO2 ..... In Stock!

The Icom IC-756 PRO2 is an all mode HF and 6m transceiver featuring 32-bit digital signal processing, automatic antenna tuner, 100 watts RF output, digital twin PBT, 5" multifunction color TFT LCD display with band scope function, built-in CW and SSB memory keyers, and more. Supplied with a hand mic and DC power cord.

PW-1 ..... New Lower Price!

The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

IC-746PRO ..... In Stock!

The Icom IC-746PRO is an all mode HF/6m/2m trasceiver with 32-bit IF level DSP. The radio features a built-in auto tuner, built-in RTTY demodulator and decoder (reads out on the radio's LCD display), auto notch, digital twin PBT, and more. Supplied with up/down hand mic and DC power cord.

IC-910H ..... In Stock!

All-mode 2m/70cm dual band transceiver, featuring dual data inputs, CTCSS encode/decode, CW keyer, satellite mode, scan, sweep display function, optional 23cm module, optional DSP, and more. Supplied with up/down hand mic and DC power cord.

FT-1000MP-V ..... Yaesu Special!

Competition class HF DSP transceiver with auto tuner, 200 Watts RF output, and more!

FT-1000MP-V Field ..... New!

Low power (100W) version of the FT-1000MP-V, with built-in power supply.

FT-920 ..... Yaesu Special!

All mode HF/6m XCVR featuring DSP, auto tuner, built-in power supply, and more. With up/down hand mic and DC power cord.

Quadra System ..... Lower Price!

Solid state 1 kW autotuning amplifier.

FT-897 ..... Now In Stock!

"Backpack" all-mode HF/6m/2m/70cm XCVR offering 100 watts of output power! The radio can be run from optional internal batteries with reduced output of 20 watts, or an optional internal power supply can be installed instead. An optional bolt-on external auto tuner is also available. The FT-897 is a truly self-contained portable!

FT-847 ..... Yaesu Special!

Great all-mode XCVR covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features DSP, CTCSS tone encode/decode, and more. Supplied with up/down microphone and DC power cord.

IC-706MK2G ..... Icom Special!

The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718 ..... New Lower Price!

The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

IC-2720H ..... New!

Dual band 2m/70cm FM XCVR. Features removeable control panel, CTCSS tone encode/decode/scan, cross band repeat, 1200/9600 bps data jack, dual RX, extended RX, 212 memory channels, and more. Supplied with DTMF hand microphone, mounting brackets, and power cord.

IC-V8000 ..... New, In Stock!

Great 75W 2m mobile XCVR. Features CTCSS tone encode/decode/scan, 207 memories, front panel mounted speaker, and more. Supplied with a DTMF hand mic, mounting bracket, and DC cord.

FT-8900R ..... New, In Stock!

Quad band mobile XCVR covers 10m/6m/2m/70cm, with cross-band repeat.

FT-90R ..... Great Low Price!

Ultra-compact 2m/70cm mobile XCVR.

FT-2600M ..... New Lower Price!

Rugged 2m mobile, built to MIL-STD 810.

FT-7100M ..... Great Low Price!

Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-100D ..... Yaesu Special!

Ultra-compact all mode XCVR for HF/6m/2m/70cm.Features DSP, CW memory keyer, tone encode/decode, 200 memories, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-817 ..... Now In Stock!

A truly tiny self-contained all mode HF/6m/2m/70cm QRP XCVR featuring tone encode/decode, 200 memories, VOX, and more! With hand mic, DC cord and bracket.

IC-T7H ..... Icom Special!

Small 6W 2m/70cm, with full CTCSS tone.

IC-T2H Sport ..... Great Price!
IC-Q7A ..... Icom Special!
IC-V8 ..... New!
IC-W32A ..... In Stock!

IC-207H ..... Great Low Price!

A great 2m/70cm dual band mobile XCVR, featuring CTCSS tone encode/decode, 182 memories, removable control panel, and more. With a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-2100H ..... Great Low Price!

Rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, and more.

IC-PCR1000 ..... Icom Special!
IC-R8500/R75 ..... In Stock!
IC-R2/R3/R10 ..... In Stock!

G-2800DXA $1089

Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $499
G-800SA/DXA $329/409
G-450A $249
G-5500 ..... $599
G-550 ..... $299

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Blending leading-edge technologies developed on the FT-897 and MARK-V FT-1000MP transceivers, the FT-857 is the world's smallest HF/VHF/UHF Multimode Transceiver, and it's available now!

FT-857 DESIGN HIGHLIGHTS

The FT-857 is a high-performance, ultra-compact transceiver operating on the 160-10 meter HF bands, plus the 50, 144, and 430 MHz VHF/UHF bands. Providing 100 Watts of power on HF/6 meters, 50 Watts on 2 meters, and 20 Watts on 70 cm, the FT-857 is ideal for mobile, vacation, DX-pedition, or home use when space is at a premium.

Utilizing the renowned receiver performance of the FT-897 and MARK-V FT-1000MP, the FT-857 features wide dynamic range, Digital Signal Processing, and outstanding audio.

The wide array of convenience features includes a 32-color display; Spectrum Scope; built-in keyer with memory and beacon mode; U.S. Weather Band reception; 200 memories with Alpha-Numeric labels; AM Aircraft reception; detachable front panel (optional YSK-857 required); and much, much more.

You've asked for it, and it's here today: the FT-857 Mega-Mobile. . .from the engineers at Yaesu!

Actual Size

HF EXCITEMENT

FT-857

Ultra-Compact HF/VHF/UHF 100 W* All-Mode TRANSCEIVER
(HF/6 m 100 W, 2 m 50 W, 70 cm 20 W)

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Specifications subject to change without notice. Some accessories and/or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.

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TM-331A
220 MHz

TM-742AD/642AD
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TM-G707A
2 meters & 440 MHz

TM-V7A
2 meters & 440 MHz

TM-D700A
2 meters & 440 MHz

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HF All Mode

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