45241

Amateur Radio

http://www.cq-amateur-radio.com

COMMUNICATIONS & TECHNOLOGY

JUNE 2007

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On the Cover: ARRL Field Day is 75 years old! Hams around the country will operate from makeshift stations such as this one near Pritchard, Idaho, put together by the Kootenai Amateur Radio Society. Details on page 70.

KENWOOD

Listen to the Future

That's how easy it is to flip your radio!

NEW TM-V71A

With the **NEW** Kenwood TM-V71A you have a choice of where you want your speaker, on the top or on the bottom of the radio. Simply remove the faceplate and flip the main body, then reattach the face, it's that simple! Yet another Kenwood **1st**, this dual band transceiver has ten dedicated EchoLink® memory channels as well as EchoLink sysop-mode operation. EchoLink connection to your PC via the optional PG-5H cable kit is easy with no expensive interface needed.

EchoLink® is a registered trademark of Synergenics, LLC. For more information please see: www.echolink.org

Large dual color amber or green thirteen segment LCD.

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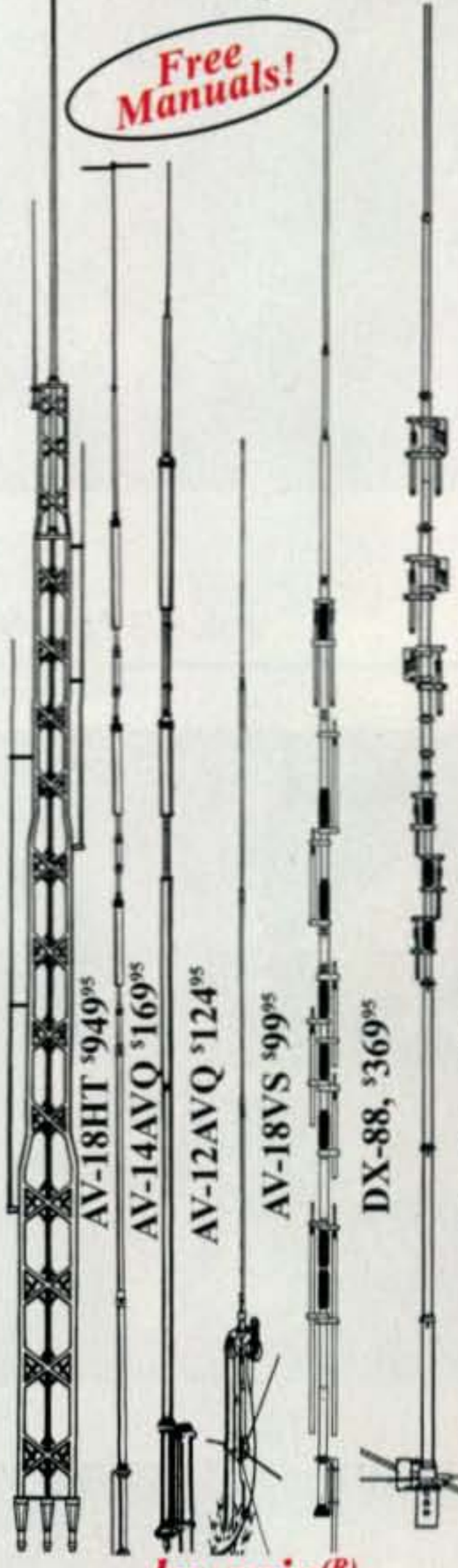
Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . Handles 1500 Watts . . . Low SWR . . . Automatic band switching . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connector . . . Two year limited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



hy-gain(R)

Classics

All hy-gain multi-band vertical antennas are entirely self supporting -- no guys required.

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

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

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

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

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

AV-14AVQ, $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. **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, $99.95. (10,12,15,17,20,30,40,80 Meters). 18 ft., 4 lbs. **High** quality construction and low cost make the AV-18VS an exceptional value. Easily tuned to any band by adjusting feed point at the base loading coil. Roof mount with Hy-Gain AV-14RMQ kit, $89.95.

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

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

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

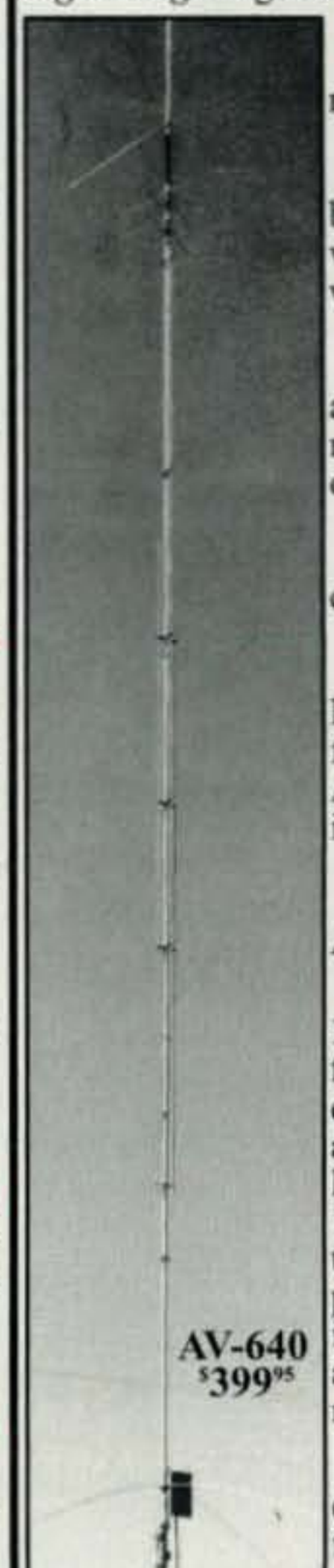
***No** ground radials required!* Off-center-fed Windom has 55% greater bandwidth than competitive verticals. Heavy-duty tiltable base. Each band independently tunable.

Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$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	**$99.95**	**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*® insulated wire. Aircraft quality aluminum tubing, stainless steel hardware.

hy-gain® warranty

Two year limited warranty. All replacement parts in stock.

AV-640, $399.95. (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, $299.95. (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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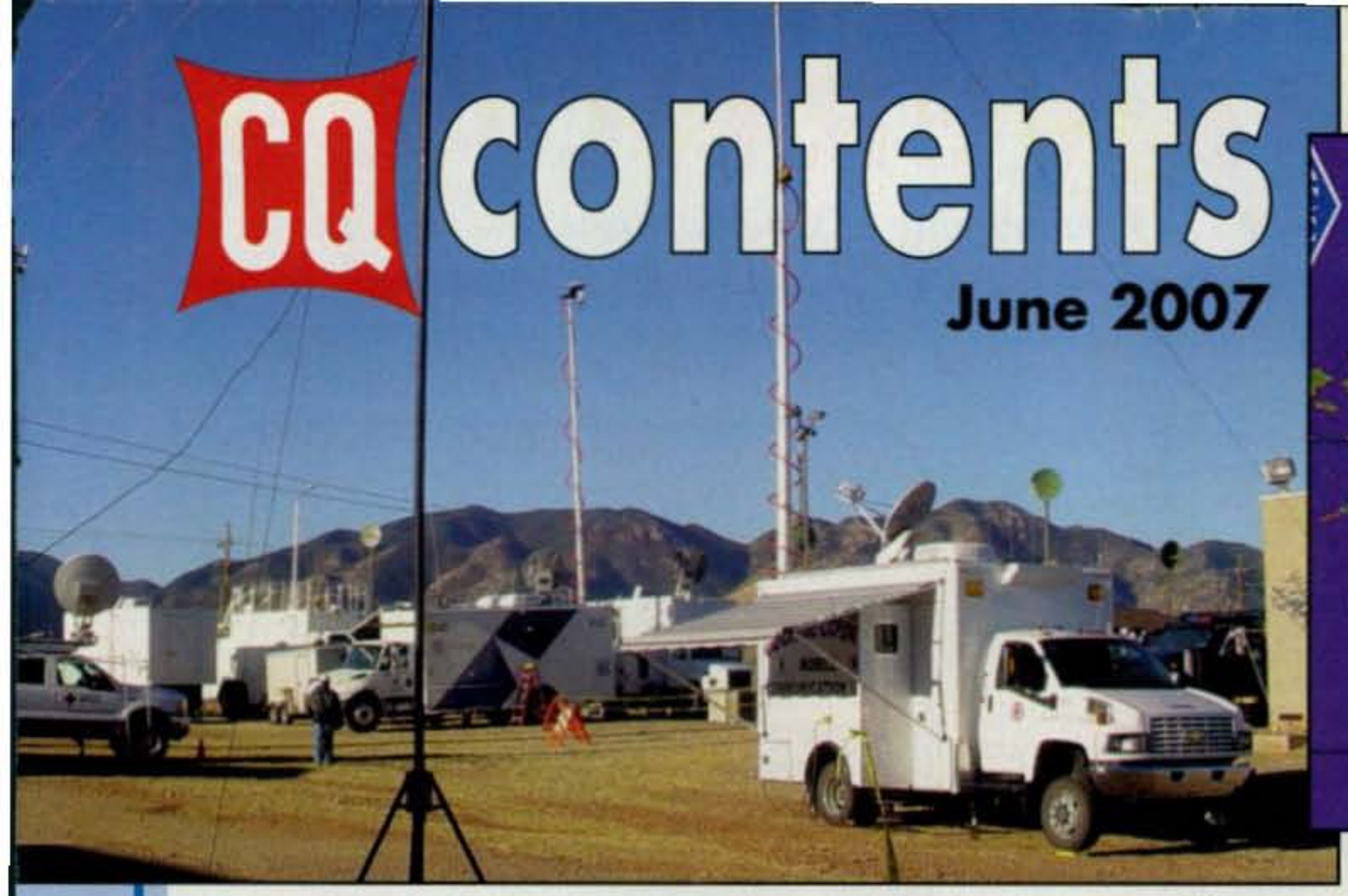
June 2007



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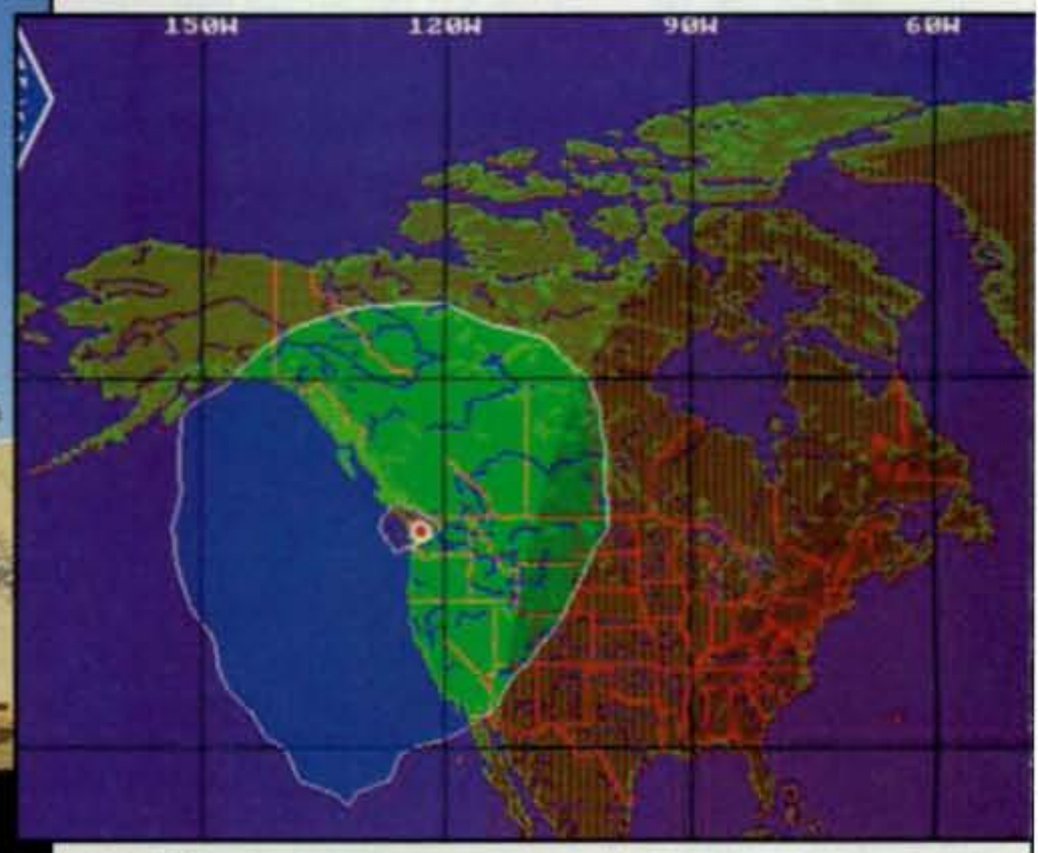

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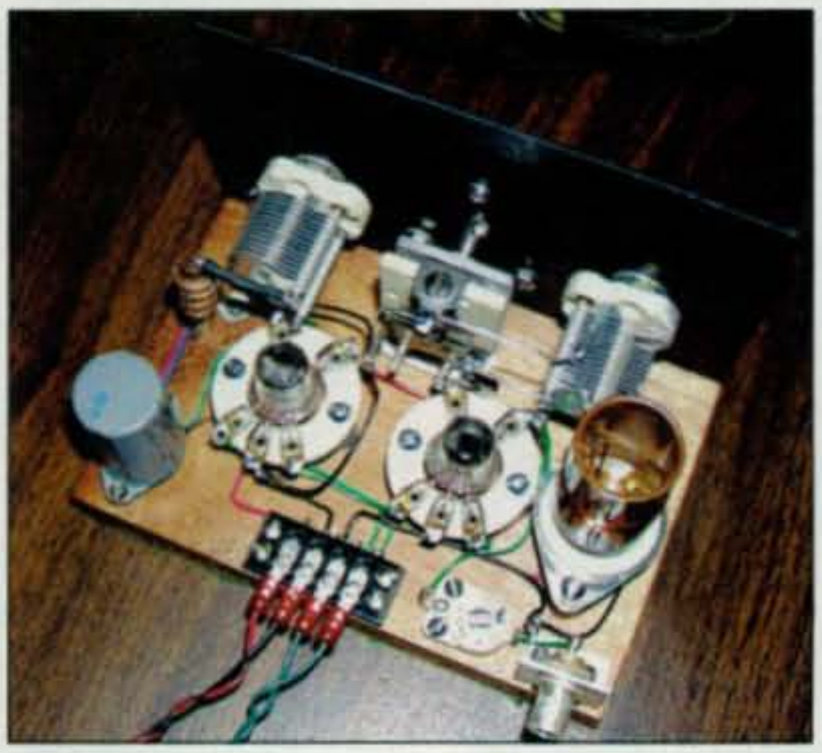

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TOKYO HY-POWER

Complies with New FCC Rules.

Available Now with 12m and 10m Built-in!

HL-1.5KFX

HF/50MHz Linear Power Amplifier

Auto Band Set

This compact and lightweight 1kW desktop HF/50MHz linear power amplifier has a maximum input power of 1.75kW. Our solid-state broadband power amp technology makes it **the smallest and lightest self-contained amplifier in the industry**.

Typical output power is 1kW PEP/SSB on HF and 650W on 6m band with the drive power of 85-90W. Bands set automatically with the **built-in band decoder**. You can forget about the band setting when the amplifier is connected to your modern radio through **supplied band data cables for ICOM CI-V, DC voltage (ICOM, Yaesu), and RS-232C (Kenwood)**. Manual band setting selectable as well.

All these data cables are included with the amplifier.

Features

- Lightest and most compact 1kW HF amplifier in the industry.
- The amplifier's decoder changes bands automatically with most ICOM, Kenwood, Yaesu.
- The amp utilizes an advanced 16 bit MPU (microprocessor) to run the various high speed protection circuits such as overdrive, high antenna SWR, DC overvoltage, band miss-set etc.
- Built in power supply.
- AC (200/220/235/240V) and (100/110/115/120V) selectable.
- Equipped with a control cable connection socket, for the HC-1.5KAT, auto antenna tuner by Tokyo Hy-Power Labs.
- Two antenna ports selectable from front panel.
- Great for desktop or DXpedition!

Specifications

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

Mode:
SSB, CW, RTTY

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

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

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

Drain Voltage:
53V (when no RF drive)

Drain Current:
40A max.

Input Impedance:
50 OHM (unbalanced)

Output Impedance:
50 OHM (unbalanced)

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

Circuit:
Class AB parallel push-pull

Cooling Method:
Forced Air Cooling

MPU:
PIC 18F452 x 2

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

Input/Output Connectors:
UHF SO-239

AC Power:
AC 240V default (200/220/235) – 10 A max.
AC 120V (100/110/115) – 20 A max.

AC Consumption:
1.9kVA max. when TX

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

Weight:
Approx. 20kgs. or 45.5lbs.

Accessories Included:
AC Power Cord
Band Decoder Cables included for Kenwood, ICOM and Yaesu
Spare Fuses and Plugs
User Manual

Optional Items:
Auto Antenna Tuner (HC-1.5KAT)
External Cooling Fan (HXT-1.5KF for high duty cycle RTTY)

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World Class Tuning Speed!

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HL-1.2KFX
HF amp 750W out*

HL-2.5KFX
HF amp 1500w out*

HC-1.5KAT
HF 1.5KW Auto Tuner*

*These devices have not been authorized as required by the rules of the FCC. These devices are not, and may not be, offered for sale or lease, or sold or leased until authorization is obtained."

HC-200AT
HF/50MHz 200W Auto Antenna Tuner

HC-200AT works with a variety of antennas such as short whip, vertical, half lamda dipole, random length dipole with ladder type open feeder and so on.

- Tunes with lightning speed
- Works with any HF/6m radio with output of up to 200W
- Tunes random length long wire antenna of 25 feet minimum
- Large analog SWR meter
- Two coax antenna terminals and one wire antenna port.

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a CQ editorial

zero bias

BY RICH MOSESON,* W2VU

Secret Society

The ARRL appears to be coming down with a case of "federalitis," mimicking the federal government's love of as much secrecy as possible as often as possible, revealing information only when absolutely necessary, and saying one thing while doing another. Two events of recent months illustrate this trend, although the ARRL has long been somewhat of a secret society.

Regulation by Bandwidth

About a year and a half ago, in November, 2005, the ARRL petitioned the FCC to change from subdividing amateur bands on the basis of operating mode to the basis of maximum permitted bandwidth. This was the culmination of a multi-year process—ironically, one of the most open in memory—in which the ARRL repeatedly sought input from members before drafting the petition. The FCC assigned rule making number RM-11306 to the petition in January, 2006, and opened a one-month comment period. Many comments were filed on both sides of the question. *CQ* was among the commenters, agreeing in principle with the League's proposal but differing on some specifics.

In February, 2007, ARRL officials quietly met with FCC staffers to propose changes to the original petition, supposedly to "align" the details with the intervening rule changes, including the elimination of HF Novice bands, expansion of certain HF phone bands and the granting of limited HF privileges to all Technicians with the elimination of the Morse code exam requirement for amateur licenses. Even though this meeting was approved by the League Board of Directors at its January meeting, it was apparently done when the board met as a "Committee of the Whole to discuss regulatory matters," and its discussions were not reported in the minutes.

The League properly filed the required notice of an "Oral Ex-Parte Presentation" in the online comment file, but did not publicly announce the meeting to its members or the amateur community at large. About a month later, someone in FISTS, the CW promotion organization, caught wind of the proposed changes, saw something he/she didn't like, and raised the alarm. Only then did the ARRL make a public statement, and only then did the League file an erratum with the FCC, claiming that the section that had gotten FISTS members up in arms was nothing more than a clerical error.

Plus, while the changes needed to "align" the proposal with the new rules would have been minor, what the ARRL proposed in that meeting was to virtually abandon the entire petition, limiting regulation by bandwidth only to frequencies above 28 MHz, where there's plenty of space for all sorts of activities. Why the secrecy? Why not be above-board and simply withdraw the petition? And why, when news of the meeting was finally reported, did the League assure supporters that the board continues to stand behind the concept which it had just essentially abandoned? (For more on this issue, see our new online commentaries, called "For What it's Worth..." on the *CQ* website.)

Red Cross Wrangling

Another matter in which the ARRL has been heavily involved recently is the ongoing dispute with the American Red Cross over the breadth of its new requirement that all volunteers submit to a background check in order to work with the organization in a disaster. At first, it was not clear whether hams working with ARES (the ARRL's Amateur Radio Emergency Service) were subject to the requirement, since they were formally ARES volunteers, not Red Cross volunteers; plus there was the ongoing matter of the consent form providing permission for not only a criminal background check (to which virtually no one in the ham community objected) but also credit and "mode of living" checks.

A couple of months ago, the Red Cross appeared to back off on that requirement (see our April issue), stating that no mode of living checks would be conducted and that credit checks would be limited and require a separate consent form. However, the ARRL quickly pointed out to its members that the consent forms never changed to reflect the new policy and that anyone signing them was still authorizing the full battery of investigations. The League got word of this inconsistency out quickly in early March, ahead of the Red Cross's self-imposed March 31st deadline for all volunteers to agree to the background checks.

Two ARRL officials then met with Red Cross leadership in mid-March, clarifying the requirements as they applied to hams and determining that there were apparently no plans to change the consent forms (see this month's Public Service column for a report on that meeting). Inexplicably, though, it was not until mid-April, nearly a month after the meeting and two weeks after the March 31 deadline, that the League notified its members of the meeting and its outcome. Certainly, having this additional information would have been helpful to individuals in deciding whether to agree to the checks and continue as Red Cross volunteers or to say, "Sorry, I'll be volunteering my services elsewhere." Again, why the secrecy?

In truth, secrecy is nothing new for the ARRL. Its board meetings are open only to directors, vice directors, selected staff members and invited guests. Back when I was Northern New Jersey Section Manage—an ARRL *elected official*—I asked whether I might attend a board meeting as an observer and at my own expense. The request was denied quicker than I could blink. Regular members? Don't even think about it. This is a membership organization in which the members have very little impact on policy beyond electing board members every two years.

The big problem with all this secrecy is the impression that inevitably develops that there is something to hide. Questions are asked and doubts arise. Is there something going on behind the scenes (or under the table) that "they" don't want "us" to know about? Let me be clear that I am not suggesting that anything improper is actually going on, just that this sort of secrecy provides ammunition for those who are suspect of the League's motives to begin with. The ARRL is a membership organization that claims to be The National Association for Amateur Radio, even though it actually represents fewer than one in five licensed amateurs in the U.S. Nonetheless, it owes it to its members and the general ham community to be as honest, open and transparent as it possibly can.

We recognize that there are certain situations in which confidentiality is important, but as a general rule, there is no place in an organization such as the ARRL for secrecy and subterfuge. It needs to stop.—*W2VU*

*e-mail: <w2vu@cq-amateur-radio.com>

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HAM-IV

HAM-IV
$559.95

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

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

TAILTWISTER SERIES II

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

T-2X
$649.95

T-2XD
$1079.95
with DCU-1

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

CD-45II

CD-45II
$389.95

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

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

HAM-V

HAM-V
$949.95
with DCU-1

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

ROTATOR OPTIONS

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

AR-40

AR-40
$289.95

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

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

HDR-300A

HDR-300A
$1379.95

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

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

Digital Automatic Controller

DCU-1
$699.95

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

AR-35 Rotator/Controller

AR-35
$79.95

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

RBD-5
$34.95

NEW! Automatic Rotator Brake Delay

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

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Great new features to support outdoor motor sports activities
Mobile Transceiver... Great appearance ...Easy to Operate

Actual Size

144/430 MHz FM DUAL BAND TRANSCEIVER
(144 MHz 50 W/ 430 MHz 40 W)

FTM-10R

■ Compact Version (main body and front panel may be separated)
144MHz 10W/ 430MHz 7W

FTM-10RS (available May, 2007)

- The keys and indicators are illuminated with high brightness LEDs. The bright ocean blue negative type LCD display is easy on the eyes and adjustable for day or nighttime viewing.
- The Front panel meets the IP57 standard. (Waterproof at 3 feet for 30 minutes, and protection against dust)
- The main body of FTM-10R is a solid die-cast aluminum sandwich structure. The compact size is: 4.48" W x 1.50" H x 7.12" D, Including the detachable front panel (The Panel is only 1.64" D.)
- The microphone and PTT button are built into the front panel. No external microphone is needed for operation.
- Completely hands free operation is possible using the optional wireless Bluetooth function and a headset.

The detachable Control Panel is shown here mounted on a motorcycle handlebar using the optional MMB-M11 multi-angle bracket.
The body section is not a waterproof structure (FTM10R).
The FTM-10RS compact Version (front panel and body) meets IP57 waterproofing standards.

- It is Equipped with a high power 8-watt audio amplifier and a PA function. When combined with the moisture and dust protected MLS-200-M10 optional loudspeaker, there is plenty of loud audio for a noisy outdoor environment.
- AM/FM radio is built in. Listen to your favorite AM or FM stereo station, and at the same time monitor the amateur band.
- Loaded with many functions for your convenience at outdoor motor sports activities.

●Includes event timer stopwatch, with an interval function ●With the intercom, you can communicate with a fellow passenger ●Tone Control ●Automatic Volume Control can adjust the speaker volume compared to nearby noisy environment ●External audio input is available to connect your iPod® ●Wireless cloning allows transfer of memory information without any cable ●The Control Head may be separated from the main body with the 10 feet cable and attached with a magnetic mount to a flat metal surface. Quickly put the radio in your vehicle or take it out with one touch release ●The simple hanger type bracket may be attached to the top or bottom, and the front may be tilted up or down 20 degrees with an adaptor bracket ●The message function can transmit alphanumeric messages you have entered beforehand ●The VOX function includes automatic audio delay on transmit, so the start of your message is not missing

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

Specifications subject to change without notice. Some accessories and/or options may be standard in some areas. Frequency coverage may differ in some countries. Check with your local Yaesu dealer for specific details.

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NEW COMPACT HF TRANSCEIVER WITH IF DSP

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

HF/50 MHz 100 W All Mode Transceiver

FT-450 Automatic Antenna Tuner ATU-450 optional

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

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

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

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

Handy Front Panel Control of Important Features including:

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

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

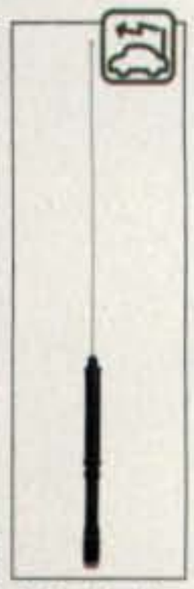
MOS FET RD100HHF1

The rugged aluminum die-cast chassis with cooling fan

■ Operate anywhere using optional internal or external antenna tuning systems

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

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



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

More features to support your HF operation

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

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

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ham radio news

Iraq Ham Shutdown Continues

Ham radio in Iraq remains shut down indefinitely, and early optimism by Iraq Amateur Radio Society President Diya Sayah, YI1DZ, that he might persuade officials to change their minds has not panned out so far. According to the *ARRL Letter*, Sayah has not been able to meet with either Defense Ministry officials or Prime Minister Nouri al-Maliki, although efforts are ongoing. Sayah also says the IARS refused a government request to warehouse all ham radio equipment in the country, citing the danger involved in going out to pick up gear. Meanwhile, Sayah reports that many Iraqi hams continue to be active via Echolink and other Voice-over-Internet ham connections.

The ARRL notes that the ham radio shutdown in Iraq does *not* apply to MARS stations, which operate on military frequencies.

ARRL Does "180" on Regulation by Bandwidth

The ARRL has significantly backed off its 2005 petition for the FCC to regulate amateur subbands by signal bandwidth rather than by operating mode. In a meeting with FCC officials in February, the League asked for its proposal to apply only to amateur bands above 28 MHz. The request, and the manner in which it was made, have caused significant controversy among various groups of hams. (See this issue's "Zero Bias" for more on this topic.)

Worldwide Ham Allocations Proposed

The draft text of a technical report to the World Radiocommunication Conference (WRC) includes proposals for worldwide allocations on three amateur bands that are currently authorized in some countries but not in others. The ITU-R study group recommends a worldwide secondary amateur allocation at 135.7–135.8 kHz, a primary worldwide allocation at 7.2–7.3 MHz, and a worldwide secondary allocation at 5.26–5.40 MHz.

IEEE Develops Worldwide BPL Standard

The Institute of Electrical and Electronics Engineers (IEEE) has developed a set of requirements for a worldwide standard for Broadband over Power Lines (BPL) systems. According to "Newsline," it is hoped that the new standard, when finalized (possibly as early as next year), could help reduce or eliminate some of the current problems with interference to radio communications, including HF and VHF amateur radio.

Meanwhile, proponents of a bill in Congress that would mandate an FCC study of BPL interference issues are worried that the advent of an IEEE standard will reduce chances of getting the bill passed. HR-462, the Emergency Amateur Radio Interference Protection Act of 2007, is currently in the House Energy and Commerce Committee. Proponents are concerned that the IEEE is giving a level of respectability to BPL that they feel it does not deserve.

Buy Your Project Parts From Warren Buffett

What does Warren Buffett, one of the world's richest men, have to do with electronic parts? Well, his company, Berkshire Hathaway, now owns the company that owns Mouser Electronics, a major supplier of parts to hams who like to build. Mouser is part of TTI, Inc., which was purchased March 30 by Berkshire Hathaway. According to a company news release, TTI's and Mouser's management will remain in place and the change of ownership "should be invisible to customers and suppliers." (So does this mean we *won't* be seeing Warren Buffett roaming the flea market at Dayton?—ed.)

California Ham Honored by President

Randy Hatfield, AG6RH, of Victorville, California, was presented with the President's Volunteer Service Award by President Bush on April 4. Hatfield is the second amateur so honored. For more details and a photo, see this month's "Public Service" column, beginning on page 56.

State Ham Legislation Not Faring Well

A controversial bill affecting hams in Maine is dead. The *ARRL Letter* reports that the bill, which would have required hams to meet certain training requirements in order to receive state credentials as emergency communications volunteers, received an "ought not to pass" recommendation from a state Senate committee. The bill was *not* supported by the majority of hams in Maine.

Meanwhile, a bill in the Arizona legislature to apply federal "reasonable accommodation" standards to ham antennas in areas covered by homeowner's association rules has effectively been killed after the chairman of the state Senate Government Committee refused to release the bill for consideration. Similar bills in Maryland and Oklahoma also failed for the current legislative sessions.

"High" Praise for Ham Radio

Space tourist Charles Simonyi, who was licensed as KE7KDP before his trip to the International Space Station, reportedly was quite active on ham radio during his brief visit, conducting general QSOs from the ISS ham station. AMSAT News Service reports that Simonyi at one point said, "I think amateur radio was the beginning of the internet ... I never thought I would do either amateur radio or space flight, but both of them are a lot of fun."

Meanwhile, Astronaut Suni Williams, KD5PLB, "ran" the Boston Marathon in orbit, completing the requisite 26.2 miles on the ISS treadmill in four hours, 23 minutes and 10 seconds, according to NASA. She was probably the only runner in the race to stay dry, as the weather in Boston was rainy and windy. A Massachusetts native and accomplished marathoner, Williams made the run—circling the Earth at least twice in the process—"to encourage kids to start making physical fitness part of their daily lives."

"Hybrid" QSL Cards

You've heard of hybrid cars, but what about hybrid *cards*? A pair of Israeli hams, Azar Hami, 4X6MI, and Paul Gross, 4X6UU, have developed something called "Global QSL," which is a mix between traditional and electronic QSLing. According to "Newsline," registered users can design their own cards, then upload QSO information either manually or through the standard ADIF format used by most logging programs. Global QSL will then print out "real" cards, sort them and mail them to incoming QSL bureaus around the world. Basic rates are 100 cards (including distribution) for $9.90 US, or 1,000 cards (including distribution) for $82 US. For more info, see <www.globalqsl.com>.

ARRL Loosens Up Field Checking

The ARRL is now permitting its volunteer DXCC field checkers to certify cards for contacts more than ten years old (which previously had to be sent to ARRL headquarters), and to check cards for the Worked All States (WAS) and VHF/UHF Century Club (VUCC) awards as well. Field checkers still may not certify cards for contacts on 160 meters or with entities that have been deleted from the DXCC list.

Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.

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Family of ALL NEW HF-6m Software Defined Radios (SDR)

High-Performance Radio at its Best!

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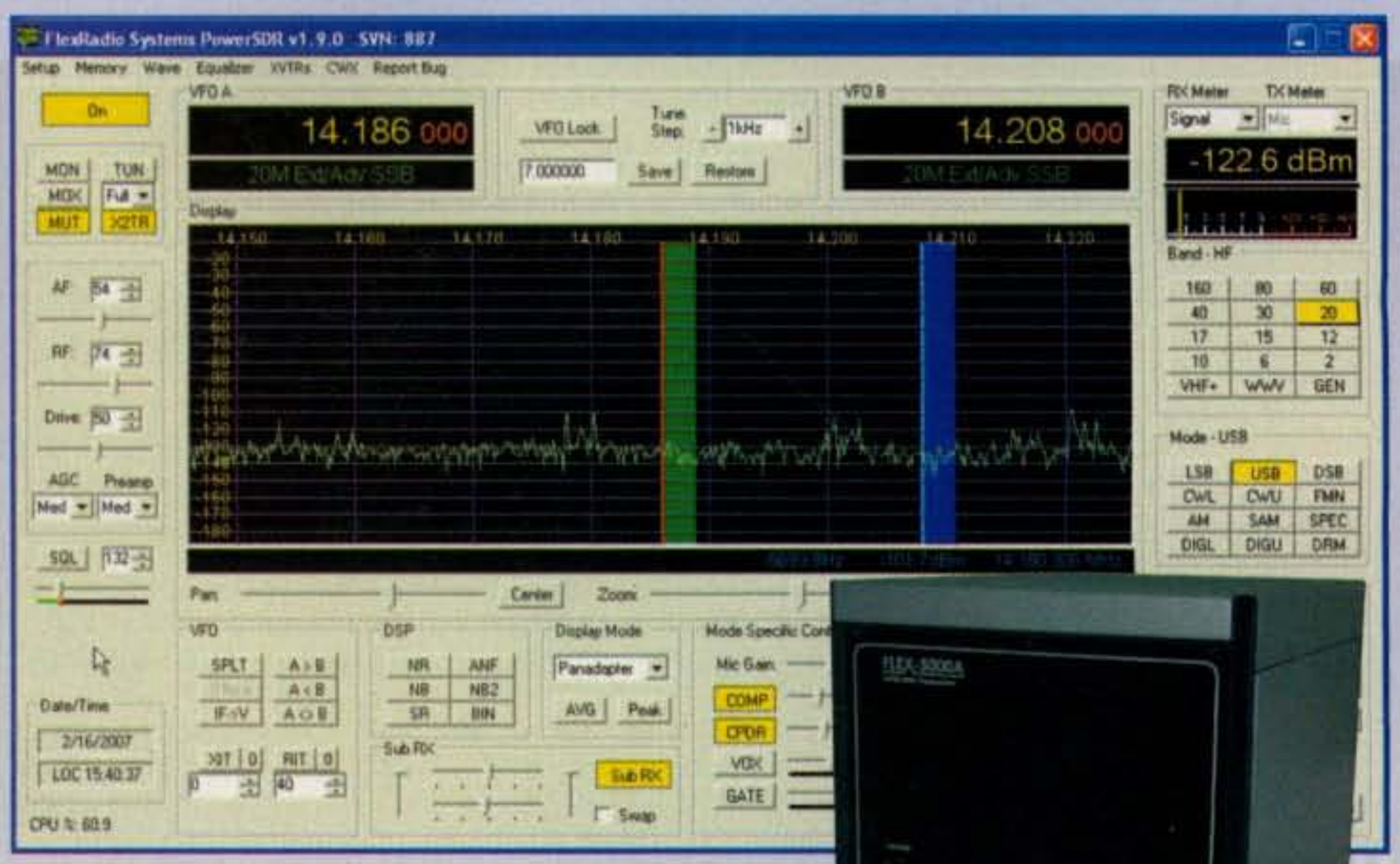
Bob, K5KDN – I just wanted to say thanks for all your efforts in making the FlexRadio (SDR-1000) the greatest radio on the planet. I've spent a lot of time the last week just using the radio in various situations and am continuously amazed at the performance

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



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- >105 dB two-tone 3rd order dynamic range at 2 kHz spacing – *best selectivity in the industry!*
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FLEX-5000A™ – $2499 Introductory Price

- 100 watts output 160-6 meters
- General coverage receiver
- Separate RX antenna connectors for optimal reception
- Optional full performance second receiver (dual watch is standard)
- Single cable connection to computer
- Full Duplex transverter ready
- Fully automatic internal test/calibration. No external calibration equipment necessary
- Standard input/output jacks. Internal antenna switching for up to 3 antennas plus receive only antenna
- Balanced TRS line/microphone input
- Full QSK
- Quiet high volume fan keeps unit cool
- Optional full featured ATU 160-6m

FLEX-5000C™ – $4499

- Integrated Intel Core2 Duo processor with 1 GB RAM, 160 GB hard drive
- Windows XP operating system
- Internet connectivity standard
- Built-in 7 watt speaker
- Wireless keyboard and mouse

FLEX-5000D™ – $TBD

- Second receiver and ATU installed
- 9" LCD touch screen display on front panel
- Large main tuning knob
- Oven controlled frequency reference

Just Some of the Highlights that Make FlexRadio THE World Class Performer

- PowerSDR™ - The open sourceDSP software that allows continuous evolution of unmatched radio performance and functionality. PowerSDR™ is the brains of the radio where the FLEX-5000™ is the brawn. You get a "new radio" every time you download the latest version.
- 192 KHz real-time, high resolution spectrum display/panadapter.
- Brick wall filters!! - Fully adjustable and mode specific. Bandwidth entirely under operator control from 10 Hz to 16 kHz.
- No additional hardware filters required. With Digital Signal Processing there is nothing to add.
- Highest audio quality available at any price. With full control of transmitted bandwidth, graphical EQ, balanced mic input and digital compression you are in full control. All settings savable in multiple memories for easy recall.
- Point and click tuning instantaneously puts you on frequency. See a station on the display-"click"- you're there! The watch receiver makes busting pileups a breeze.
- Outstanding CW and Digital Mode performance: incredible no ring, razor sharp filters, silky smooth QSK
- Spectrum display averaging resulting in lifting extremely weak signals out of the noise. You'll definitely see them before you hear them.
- No external sound cards required.
- Unparalleled support network; a company that cares and a support group ready to offer a hand whenever needed.

The radio that just keeps getting better... because it's software defined!

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announcements

• The following Special Event statiuons are scheduled for June:

N2UL, from "CQ Memorial Day," Nutley, New Jersey; Robert D. Grant United Labor ARA; 1200–2400Z May 28 on 28.420, 14.260, 449.975 MHz (±2 kHz). For certificate send QSL and SASE to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

W2W, to commemorate the use of electronics during the D-Day invasion, Baltimore, Maryland; Historical Electronics Museum ARC (W3GR/W3HEM); 0900 EDT June 2 to 1500 EDT June 10 on 7.241 and/or 14.241 MHz SSB, and possibily 7.041 and/or 14.041 MHz CW. For certificate send QSL, $1.00 US postage, and $8^1/2 \times 11$ envelope to HEMARC W2W D-Day Event, P.O. Box 746, Mail Stop 4015, Baltimore, MD 21203. (W2W will be open for guest ops on June 2 and 9 from 0900–1400 EDT; <www.hemarc.us>.)

NC4ZO, from the North carolina Aviation Museum Annual Fly-In, Ashboro, North Carolina; Randolph ARC; 1300–1800Z June 2 on SSB 21.350, 14.260, 7.250 MHz (±QRM). For certificate send QSL and $1.00 (no SASE required) to Randolph ARC, 6747 King Mtn. Rd., Ashboro, NC 27205. (DX and VE stations send QSL and 1 IRC via WS4H. Bureau cards OK for an event QSL via WS4H.)

N5R, to commemorate the National Safe Boating Week, from Arkansas Inland Maritime Museum and the submarine *USS Razorback* (SS-394), North Little Rock, Arkansas; 1300–2200Z June 2 and 3 on 7.267, 14.267, 21.367, 28.367 MHz. For certificate send QSL and 9 ×12 SASE to Donald Stark, N3HOW, 65 Stark Spur, Eighty Four, PA 15330-2547. (For more info see the US Power Squadron website: <www. USPS.org>; for the museum: <www.aimm.museum>.)

KH6BB, from Museum Ships Weekend, Aiea, Hawaii; Battleship Missouri ARC; 0000–2359Z June 9–10 on "OPENIRLP" and HF 14.263, 18.163, 21.363, 28.463 MHz. For QSL send QSL and SASE to Battleship Missouri ARC, 98-1547 Alaaka St., Aiea, HI 96701. (http://www.kh6bb. org> and <http://users.tellurian.com/freddie/nj2bb/ship-event.html>)

NI6IW, from 65th anniversary of the Battle of Midway, Main Comm. *USS Midway*, San Diego, California; 1600–2300Z June 2 on 18.142, 14.242, 7.242 MHz. QSL with #10 SASE to USS Midway Museum, 910 Harbor Dr., San Diego, CA 92122.

W6P, from Hale Telescope on Palomar Mountain dedication anniversary, San Diego, California; sponsored by KI6FDN and W6NWG; 1300–0700Z on 14.260, 7.260 MHz. QSL with SASE to Michelle, 5379 Carmel Knolls Drive, San Diego, CA 92130. (www.palomararc.org/special-event.htm)

W6Y, from Yolo Boy Scout Radio Daze, Nelson's Grove, near Woodland, california; Yolo District Boy Scouts and Yolo ARS; 1800Z June 23 to 0600Z June 24 on SSB14.290, 7.190, 3.940 MHz, plus IRLP 5750 or Echolink 107315. For QSL send QSL and SASE to Bill Ragsdale, K6KN, P.O. Box 1500, Woodland, CA 95776. Skeds may be arranged by e-mail to: <K6KN@arrl.net>. (http://yolobsa.editme.com/W6Y)

WØS, from commemoration of 146 years of *Stars & Stripes* newspaper, Bloomfield, Missouri; Bootheel ARC and SEMO ARC; 2300Z June 8 to 2300Z June 9 on 3.950, 7.260, 14.260 MHz. For certificate send QSL and SASE to Stars & Stripes, P.O. Box 98, Jackson, MO 63755.

• The following hamfests, etc., are slated for June:

June 2, **Grand Rapids IRA Hamfestival**, Hudsonville Fairgrounds, Grand Rapids, Michigan.Contact Kathy, 616-698-6627 (after 4 PM EDST); e-mail: <ira@w8hvg.org>; <www.w8hvg.org>. (Exams 10:30 AM)

June 3, **Long Island Mobile ARC Hamfest**, Briarcliffe College, Bethpage, New York. Contact Richie, K2KNB, e-mail: <hamfest@ limarc.org>, 516-694-4937; <http://www.limarc.org> or <http://www. limarc.org/fest.htm>. (Talk-in 146.85 [136.5 PL])

June 9, **Knoxville Hamfest & Electronics Exposition & ARRL Tennessee State Convention**, Kerbela Temple, Knoxville, Tennessee. Contact David Bower, K4PZT, e-mail: <d.bower@ieee.org> or Lou Dreinhoefer, WB3JKQ, e-mail: <lou.dreinhoefer@ieee.org>; <http://www.W4BBB.org>. (Talk-in 147.300, 224.500, 444.575; exams)

June 9, **Pikes Peak RAA Megafest**, Lewis Palmer High School, Monument, Colorado. Full details: <www.ppraa.org>. (Talk-in 146.97–, 100 HZ tone, or 146.52 simplex; exams 10 AM)

June 10, **Six Meter Club of Chicago Hamfest**, DuPage County Fairgrounds, Wheaton, Illinois. Information call 708-442-4961; e-mail: <WA9RIJ@mc.net>. (Talk-in 146.52, 146.37/97 [107.2 Hz]; exams 9–11 AM, e-mail: <ak9y@arrl.net to preregister)

June 10, **Hall of Science ARC Hamfest**, NY Hall of Science parking lot, Flushing Meadow Corona Park, Queens, New York. Contact Stephen Greenbaum, WB2KDG, 718-898-5599 (evenings only), e-mail: <WB2KDG@arrl.net; <www.hosarc.org>. (Talk-in 444.200, PL 136.5, 146.52 simplex; exams 10 AM, info W2LJM, 718-835-1548)

June 15–17 **Central Alberta ARC Picnic & Hamfest**, Pine Lake Agricultural Campground, Pine Lake, Alberta, Canada. Information: <www.caarc.ca>. (Talk-in 147.150 +600, 146.52 simplex)

June 17, **Monroe Hamfest**, Monroe County Fairgrounds, Monroe, Michigan. Contact Fred VanDaele, KA8EBI, 734-242-9487 (after 5 PM), e-mail: <ka8ebi@yahoo.com>; <http://www.mcrca.org/hamfest.htm>.

July 26–29, Central States VHF Society Conference, see <www.csvhfs.org/conference> for details.

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AL-811H
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You get a quiet desktop linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet -- no special wiring needed.

You get all HF band coverage (with license) -- including WARC and most MARS bands at 100% rated output. Ameritron's *Adapt-A-Volt*™ hi-silicon core power transformer has a special buck-boost winding that lets you compensate for high/low power line voltages.

You also get efficient full size heavy duty tank coils, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual illuminated meters, QSK with optional QSK-5, pressurized cooling that you can hardly hear, full height computer grade filter capacitors and more. 13¾Wx8Hx16D inches.

AL-811, $699. Like AL-811H, but has three 811A tubes and 600 Watts output.

AMERITRON *no tune* Solid State Amplifiers

ALS-500M 500 Watt Mobile Amp

ALS-500M
$849
Suggested Retail

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

ALS-600 Station 600 Watt FET Amp

ALS-600
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***No tuning**, no fuss, no worries -- just turn on and operate.* 600 Watts PEP/500W CW, 1.5-22 MHz, instant bandswitching, SWR protected, extremely quiet, SWR/Wattmeter, ALC control. 120/220 VAC. Inrush protected. 9½Wx6Hx12D in. **ALS-600S, $1428,** ALS-600 with 10 lb. switching power supply.

AL-80B . . . *Desktop Kilowatt* 3-500G Amp

AL-80B
$1399
Suggested Retail

AL-80B kilowatt output *desktop* linear amplifier doubles your average SSB power output with high level RF processing using our exclusive *Dynamic ALC*™!

You get cooler operation because the AL-80B's exclusive *Instantaneous RF Bias*™ completely turns off the 3-500G tube between words and dots and dashes. Saves hundreds of watts wasted as heat for cooler operation and longer component life.

You get a full kilowatt PEP output from a whisper quiet desktop linear. Compact 15½Wx8½Hx14D inches. Plugs into your nearest 120 VAC outlet. Covers 160 to 15 Meters, including WARC and MARS (user modified for 10/12 Meters w/license).

You get 850 Watts output on CW, 500 Watts output on RTTY, an extra heavy duty power supply, genuine 3-500G tube, nearly 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, multi-voltage transformer, dual Cross-Needle meters, QSK compatability, two-year warranty, plus much, much more! Made in U.S.A.

Near Legal Limit ™ Amplifier

AL-572
$1495
Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *60%* of price of a full legal limit amp! 4 rugged 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 14½Wx 8½Hx15½D inches fits on desktop. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

HF Amps with Eimac *3CX800A7*

AL-800
$1825
Suggested Retail
1 tube, 1250 W

AL-800H
$2695
Suggested Retail
2 tubes, 1.5 kW *Plus*

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

AMERITRON *full legal limit* amplifiers

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

Most powerful -- *3CX1500/8877*

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Ameritron's *most powerful* amplifier uses the herculean *Eimac*® 3CX1500/8877 ceramic tube. It's so powerful that 65 watts drive gives you full legal output -- and it's just loafing because the power supply is capable of 2500 Watts PEP.

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Get ham radio's *toughest* tube with the Ameritron AL-1200 -- the *Eimac*® 3CX1200A7. It has a 50 Watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 Watts PEP two tone output for a half hour.

Classic -- *Dual 3-500Gs*

AL-82
$2645
Suggested Retail

This linear gives you full legal output using a *pair* of *genuine* 3-500Gs. Competing linears using 3-500Gs *can't* give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential.

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Last summer saw massive DX openings on 6 meters despite being at the bottom of the sunspot cycle. Well-known Japanese DXers JA1ELY and TZ6JA offer a theory of what was behind the openings—a previously unrecognized propagation mode they call "Guided Sporadic-E" or "Whispering Gallery" propagation.

"Whispering Gallery" Propagation

Explaining the 2006 Worldwide Band Openings on 6 Meters

BY TOSHIKAZU (TOSHI) KUSANO,* JA1ELY, AND MAKOTO (MAC) OBARA, TZ6JA

Many Japanese 6-meter operators were delighted last May, June, and July by huge band openings, despite being at the solar minimum for Cycle 23. It was one of the biggest sporadic-*E* openings since the 1970s, from Japan to the Atlantic coast of North America and western Europe over a distance of 6800 miles. What were the mechanics behind these openings?

During the 1960s and '70s intensive study and experiments were conducted for both the *E* and *F* regions of the ionosphere, but there was no specific study of E_s and the collected data were left behind in mothballs. Multi-hop sporadic-*E* (E_s) propagation on 6 meters beyond the distance of a double hop (approximately 4000 km, or 2400 mi.) is unrealistic because of heavy ionospheric attenuation, the f/f_o E_s ratio, and the incidence angle to the ionosphere. The propagation mode is thought not to be a multi-hop mode, but a sporadic-*E* duct mode called *Whispering Gallery*, without intermediate ground reflections. This mode has no solar cycle dependence.

Contrary to the conventional wisdom of E_s propagation, this unusual mode works best if the antenna is manipulated to a forced high elevation angle focusing toward DX stations, while a flat antenna is best for working local stations. In this case, the forced elevated angle of the antenna is justified as the

Photos A & B– JM1DTF's 10-element, long-boom 6-meter Yagi at a "standard" 0-degree elevation in photo A (left) and rotated up to a 30-degree elevation in photo B (right).

*e-mail: <ja1ely@bb.mbn.or.jp>

Behind the Conventional Wisdom Comes New Wisdom

Will the same openings we experienced last year be repeated this summer?

This type of propagation has been occurring almost every year, mostly around the summer solstice, with varying levels of intensity. Sporadic-*E* is an annual summer phenomenon, mostly from May to July, centered at the summer solstice when the Earth receives less solar energy at the most distant position of its orbit. A weaker sporadic-*E* season occurs around the winter solstice.

Sporadic-*E* has no solar cycle dependence. Based on the statistics data of f_oE_s for the past 33 years (1972–2005/Rika Nenpyo 2006, Tokyo), the average monthly mean value centered at 1200 local times from May to July varies from 5.2 to 7.8 MHz in a range of ratio 1.0 to 1.5. We can see neither any positive rhythm nor coincidence with statistics related to this type of propagation.

The opening of this season seems to be erratic and limited to a short period in the summer. It is recommended to wait and watch so as not to miss the rare chance with an improved antenna system, as well as changing a concept of propagation as demonstrated last year.

In conclusion, we cannot at present foresee exactly when the same phenomenon will cyclically occur in coming years. It is worth anticipating the chance, however, and to stand by with new tools and a new concept. Behind the conventional wisdom comes new wisdom. Be sensitive to the chance that what is happening goes beyond old assumptions.

right way for working DX with this mode. Thus, behind the conventional wisdom comes new wisdom. You have to be sensitive to the possibility that what is happening is beyond whatever previously has been assumed.

One of the co-authors of this article, Toshikazu (Toshi) Kusano, JA1ELY, the editor of *59 magazine* of Japan, has 151 entities confirmed on 6 meters, and co-author Makoto (Mac) Obara, TZ6JA, has approximately 7000 QSOs via ionospheric ducting and its hybrid mode on the HF path between West Africa and Japan.

The authors wish to express their deep appreciation to Yoshi Miyamoto, JM1DTF, and Hide Koga, JR6EXN, for providing us with logs and valuable comments. We also would like to express our sincere thanks to Yuzo Goto, an antenna engineer at Creative Design Co., Ltd. Japan, for his valuable suggestions and advice.

JM1DTF and JR6EXN had very different experiences. Yoshi, JM1DTF, of Saitama, had excellent conditions this season. He made contacts on 6 meters with more than 120 overseas stations in Europe and North America (Table I), covering 33 new entities. He suggested that controlling the elevation angle of the antenna is indispensable for this type of 6-meter propagation, increasing signal strength, decreasing TV buzz and urban noise, and optimizing the signal-to-noise (S/N) ratio.

By contrast, Hide, JR6EXN, had poor propagation, as his QTH in Fukuoka is believed to be out of the loop. His results are shown in Table II.

How JA Signals were Heard in North America

The propagation path last year between Japan and North America opened for the first time on May 26, with NL7Z being the first station heard, and it finally faded out on July 21. During this period we very frequently heard NL7Z's signal as if it were a reliable beacon station for North America.

The opening for inland North America was limited, peaking only on May 29 and June 4–6, and consequently it was a very short and erratic opening. Some

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Table 1 Logsheet of JM1DTF PM95 SAITAMA.

callsign	date(GMT)	time(GMT)	HisRST	MyRST	state	GridLocator	mode
NL7Z	2006/5/26	0614	559	599	AK	BP51en	CW
NL7Z	2006/5/26	0630	59	59	AK	BP51en	SSB
NL7Z	2006/5/26	0704	59	59	AK	BP51en	SSB
NL7Z	2006/5/29	0533	599	599	AK	BP51en	CW
VE7DAY	2006/5/29	0547	599	559	CANADA	CO70ia	CW
VE7DAY	2006/5/29	0556	59	57	CANADA	CO70ia	SSB
K7CW	2006/5/29	0604	599	559	WA	CN87lj	CW
KE7V	2006/5/29	0614	579	579	WA	CN88jb	CW
W7FI	2006/5/29	0626	599	599	WA	CN87ws	CW
KL7NO	2006/5/29	0659	59	59	AK	BP54xw	SSB
NL7OW	2006/5/29	2253	59	59	AK	BP40he	SSB
KL7CDG	2006/5/29	2259	59	59	AK	BP51cb	SSB
KL1SF	2006/5/29	2318	59	54	AK	BP53mu	SSB
KL8DX	2006/5/29	2325	599	599	AK	BP53lu	CW
WQ5W	2006/6/4	2244	599	599	TX	EM12fw	CW
WG5B	2006/6/4	2247	559	559	OK	EM14lj	CW
KY5N	2006/6/4	2251	559	559	TX	EM12qw	CW
N5AU	2006/6/4	2254	559	559	TX	EM12sw	CW
N5JEH	2006/6/4	2258	559	559	NM	DM65rd	CW
W5UN	2006/6/4	2304	559	579	TX	EM23mg	CW
NI5M	2006/6/4	2306	559	579	TX	EM23fs	CW
K5SW	2006/6/4	2309	559	549	OK	EM25hr	CW
K5XX	2006/6/4	2311	559	599	TX	EM21es	CW
W7CNK	2006/6/4	2347	559	559	OK	EM15fi	CW
K5SW	2006/6/4	2349	599	559	OK	EM25hr	CW
KB0HH	2006/6/4	2350	599	579	KS	EM06vu	CW
N8CJK	2006/6/4	2355	559	559	MI	EN84fg	CW
KM0A	2006/6/4	2359	449	559	MO	EM48uu	CW
W5UN	2006/6/5	0006	559	519	TX	EM23mg	CW
KA9CFD	2006/6/5	0019	599	599	IL	EN40om	CW
W5OZI	2006/6/5	0039	579	559	TX	EM00cl	CW
N4BAA	2006/6/5	0051	449	519	VA	FM16wu	CW
WD5K	2006/6/5	0118	559	549	TX	EM12nr	CW
W5LUA	2006/6/5	0121	559	559	TX	EM13qc	CW
KOGU	2006/6/5	0155	579	559	CO	DN70mq	CW
W6OAL	2006/6/5	0200	559	599	CO	DM79ql	CW
W3UUM	2006/6/5	0202	559	559	TX	EL29pw	CW
KL7IKV	2006/6/5	2249	559	559	AK	BP51cc	CW
KY5R	2006/6/5	2320	559	559	AL	EM64hu	CW
KL7IKV	2006/6/5	2335	59	57	AK	BP51cc	SSB
KM0A	2006/6/5	2350	559	579	MO	EM48uu	CW
W5ZN	2006/6/6	0002	599	559	AR	EM45dh	CW
K1MOD	2006/6/6	0014	559	559	IL	EN40ql	CW
K4XR	2006/6/6	0032	559	599	AL	EM64nl	CW
N9LAG	2006/6/6	0038	559	559	IL	EM57mx	CW
K5UR	2006/6/6	0041	599	599	AR	EM35	CW
W0VD	2006/6/6	0049	599	599	MO	EM27ud	CW
K1MOD	2006/6/6	0052	599	599	IL	EN40ql	CW
K0GU	2006/6/6	0055	599	559	CO	DN70mq	CW
W5KI	2006/6/6	0114	599	599	AR	EM36cl	CW
WA0KBZ	2006/6/6	0130	559	559	MO	EM48hb	CW
AG4V	2006/6/6	0136	559	559	TN	EM55	CW
VE7AG	2006/6/16	2323	539	539	CANADA		CW
NL7Z	2006/7/1	2348	559	599	AK	BP51en	CW
NL7Z	2006/7/19	0635	599	599	AK	BP51en	CW

Table I– Log extract from Yoshi Miyamoto, JM1DTF, of Saitama, Japan (PM95) of 6-meter contacts in the U.S. and Canada in May, June, and July of 2006.

examples of QSOs to North America are shown in Tables I (JM1DTF) and II (JR6EXN). These tables suggest that the former (JM1DTF) was located in the loop for propagation to North America and the latter was located outside of the loop.

The opening to Europe began on June 8 after the North American opening and continued intermittently almost every afternoon until July 20. The openings covered the entire European continent up to EA and GW on the west end. The openings to Europe were progressive from east to west and covered wide areas, including the Middle East and the Persian Gulf area.

The paths to North America and Europe were essentially daylight propagation via the *E*-layer, with noontime located in the center of the path.

Looking at the map of distribution of the stations worked in North America (fig.1), Europe, and Asia, we can rec-

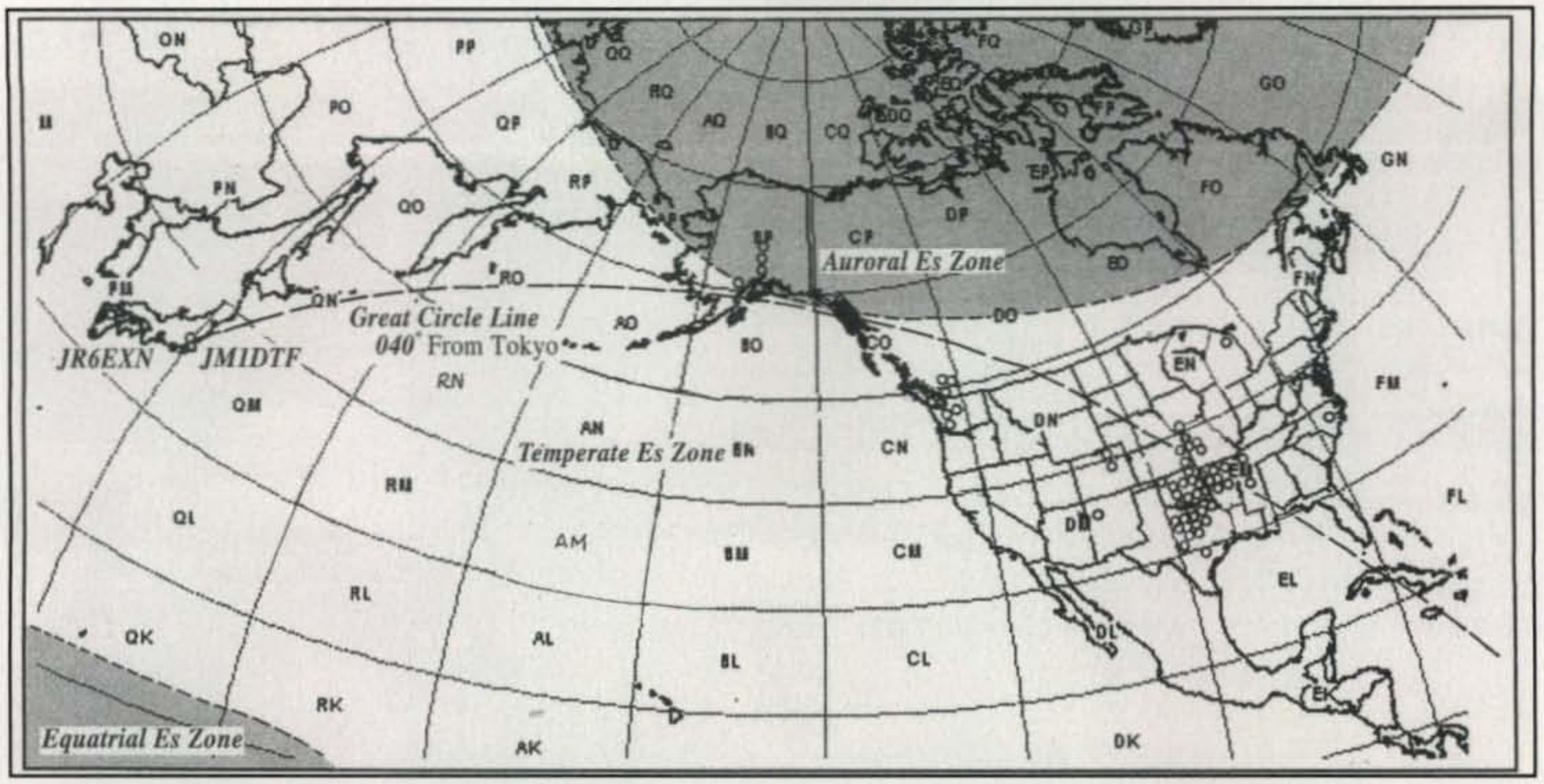

Fig. 1– Six-meter trans-pacific sporadic-E propagation in summer 2006. (Grid locator map courtesy CQ VHF, *Summer 2006; "o" indicates a station worked.)*

ognize the zonal distribution around the world, along the mid-temperate zone of the Northern Hemisphere. This distribution is concordant with the line of 5% of probability of time as f_0E_s>7 MHz (CCIR Report 534-1/Rika Nenpyo 2006). Also, it is obvious that these distributions are also approximately concordant with a line of equal geomagnetic latitudes.

Multi-Hop E_s Propagation is Unrealistic

As noted above, multi-hop sporadic-*E* (E_s) propagation on 6 meters over the distances covered is unrealistic because of heavy attenuation, considering the following (Miya et al., 1978):

• Simple calculation indicates that with an elevation angle of 10 degrees and a sporadic-*E* propagation formula of h = 100 km, surface distance of one hop is 930 km, or 578 mi. (Table III); therefore, to travel 11,000 km as many as 12 hops would be required.

• In the case of low f_0E_s (E_s vertical incidence critical frequency of the ordinary wave), ionospheric E_s attenuation is very high. The strength of the E_s signal with a certain probability is predicted as a function of the ratio of the signal frequency (f) to the foE_s (fig. 2 and Table III).

• If the f/f_0E_s ratio is 2~4, the least attenuated mode can travel a single-hop distance of 1400–2000 km (870– 1250 mi.) with the elevation angle of the antenna between 1 and 5 degrees (see fig. 3).

• Ionospheric attenuation in double-hop E_s propagation can be approximately 2.6 times that of a single hop.

• There is no applicability of antenna height gain for long distance, because the ground reflected signal is considerably attenuated by obstacles on the ground well in front of the antenna site.

• Effects of tropospheric reflection— such as scattering, trapping, and ducts —must be considered.

• High ground reflection loss of VHF signals (8 dB/hop) must also be considered.

• Attenuation due to the shielding effect of the Earth is also a factor. Sporadic-*E* appears frequently and predominantly at a height of about 100 km (62 mi.) and extends over a broad range from 85 to 135 km (50 to 85 mi.). From these facts, it is obvious that for distances beyond 2200 km (1300 mi.), the

(Continued on page 104)

Callsign	Date (UTC)	Time (UTC)	His RST	My RST	State	Grid Locator	Mode
NL7Z	2006 5/29	0507	559	589	AK	BP51en	CW
NL7Z	2006 5/29	2246	59	59	AK	BP51en	SSB
KL7CDG	2006 5/29	2256	59	59	AK	BP51cb	SSB
NL7OW	2006 5/29	2305	49	59	AK	BP40hc	SSB
KL1SF	2006 5/29	2313	59	57	AK	BP53mu	SSB
KL8DX	2006 5/29	2325	579	559	AK	BP51se	CW
KL7NJ	2006 5/29	2348	55	55	AK	BP54xw	SSB
KA9CFD	2006 6/06	0002	559	559	IL	EN40om	CW
K5UR	2006 6/06	0011	559	599	AR	EM35	CW
K5EJ	2006 6/06	0105	559	599	AR	EM45es	CW
NL7Z	2006 6/16	0628	599	599	AK	BP51en	CW
NL7Z	2006 6/21	0526	559	579	AK	BP51en	CW

Table II– Log extract from Hide Koga, JR6EXN, of Fukuoka, Japan (PM53gh) of his trans-pacific 6-meter contacts in the same timeframe as JM1DTF's. Hide appeared to be "out of the loop" for the biggest openings.

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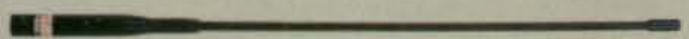
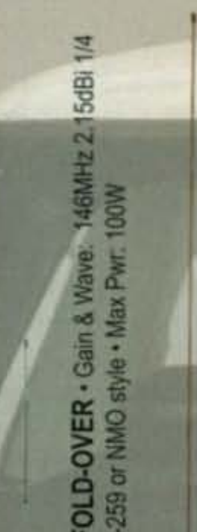
Maldol MH-511 TRI-BAND 6M/2M/70CM HT ANTENNA • Length: 4" • Conn: Male SMA

Maldol MH-510 TRI-BAND 6M/2M/70CM HT ANTENNA • Gain: 0/0/3.2dBi • Length: 20.75" • Conn: Male SMA



COMET HT-224 TRI-BAND 2M/220/70CM HT ANTENNA • Gain: 1.3/1.4/1.8dBi • Length: 11.5" • Conn: Male SMA

Maldol MH-610 TRI-BAND 2M/220/70CM HT ANTENNA • Gain: 0/1.8/3.2dBi • Length: 14" • Conn: Male SMA



COMET SBB-224 / SBB-224NMO TRI-BAND 2M/220/440MHz WITH FOLD-OVER • Gain & Wave: 146MHz 2.15dBi 1/4 wave • 220MHz 3.5dBi 5/8 wave • 446MHz 6dBi 5/8 wave x 2 • Length: 36" • Conn: PL-259 or NMO style • Max Pwr: 100W

Maldol EX-510B / EX-510BNMO TRI-BAND 6M/2M/440MHZ WITH FOLD-OVER • Gain & Wave: 52MHz 1/4 wave • 146MHz 2.15dBi 1/2 wave • 446MHz 5.5dBi 5/8 wave x 2 VSWR • Length: 37" • Conn: PL-259 or NMO style • Max Power: 50W FM

COMET SB-15 TRI-BAND 6M/2M/440MHZ WITH FOLD-OVER • Gain & Wave: 52MHz 0dBi 1/4 wave • 146MHz 4.5 dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Length: 58" • Conn: PL-259 • Max Pwr: 120W

COMET UHV-4 QUAD-BAND 10M/6M/2M/440MHZ WITH FOLD-OVER • Gain & Wave: 10M & 6M 1/4 wave
- 2M 2.15dBi 1/2 wave • 70cm 5.5dBi 5/8 wave x 2 • Length: 55" • Max Power: 10M 120W SSB 6M2M/70cm 100W FM • Conn: PL-259
- 10M and 6M bands have individual tuning stubs

COMET UHV-6 HF/6M/2M/440MHZ MOBILE ANTENNA *80"/20"/17/40/15/10/6/2M/70cm Mobile antenna with fold-over hinge• Gain & Wave: 2M 2.15dBi 1/2 wave • 70cm 5.5dBi 5/8 wave x 2 • VSWR: HF 1.6:1 or less, 6M-70cm 1.5:1 or less • Length: 44" (min), 78"(max) • Max Pwr: HF 120W SSB, 6M 200W SSB/100W FM, 2M/70cm 100W FM • **"L-14 optional 20M coil **L-18 optional 17M coil **L-3.5 optional 80/75M coil** • Features: • 6M/2M/ 70cm operation is constant. You CHOOSE the HF coils you want to add, up to four stock or optional. One vertical, the rest horizontal. • Easily mounts to standard trunk/door mount in minutes • Economical • Fold-over hinge built in• Select the duplexer or triplexer for your specific radio(s). CF-706A, CF-530, CFX-514N • Conn: PL-259

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A string of "little things" was giving K1GQ some doubts about Ten-Tec's new Orion II transceiver … that is, until he put it on the air in a couple of contests.

CQ Reviews:

Ten-Tec Orion II HF Transceiver

BY BILL MYERS,* K1GQ

Photo A– Ten-Tec's Orion II features 63 buttons and 8 knobs on the front panel, as well as 22 connectors on the back, but the well-written manual takes away any confusion over what does what. (Photo courtesy Ten-Tec)

I own two original Ten-Tec Orions, so when I got the Orion II to review, I was comparing it to its predecessor as well as evaluating its general performance. The Orion II (photo A) is a better radio. "Better" means different things to different people, of course. To me, the most important feature in an HF transceiver is receiver performance, and here the Orion family is unmatched at any price point.

This is a high-end radio with many features, and I can't hope to cover them all without reproducing the Operator's Manual. Instead, I'll describe my experiences in using the radio, both at my own small station and at a world-class multi-multi contest station. The technical details are available in several documents archived at the Ten-Tec website, and independent measurements of receiver characteristics by Rob Sherwood, NCØB, are posted at <http://www.sherweng.com/table.html>.

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e-mail: <k1gq@kc1xx.com>

For the record, the review radio came with all three optional roofing filters installed. Roofing filters are one of three factors that make the receiver so outstanding (the other two are dynamic range and low phase noise). The radio is packaged in one box, and all listed external items (connectors, cables, wrenches, and such) were in the box.

As you read through this review, you'll find that I have a rather long list of small complaints. To keep things in perspective, you should know that I really like this radio, I plan to buy one, and none of these complaints is close to a show-stopper issue.

Documentation

I'm the sort who opens the box, finds the manual, and reads it front-to-back before unpacking anything else. The manual is pretty good. I found a few typos and a few statements that aren't quite right, but nothing serious.

Studying the manual isn't essential for the Orion II, but you do want to read the first part to learn the basics about the connections. You'll need a 12-volt, 25-amp DC power supply and an antenna with a male UHF plug; everything else is optional. Well, if you actually want to transmit, you'll probably want a key or paddle for CW, or a microphone for voice modes.

For logging and such, connect the Orion II to your computer with the supplied cable. You'll need a serial port on your computer, or a USB-to-serial adaptor. This connection is also used to update the firmware in the Orion II.

Here's another good reason to read the manual: There are 63 buttons and eight knobs on the front of the Orion II and you aren't going to learn what they all do by trial-and-error. Many of them have multiple functions; indeed, one of the most important is labeled MULTI.

The back of the radio has 22 connectors. Keep page 24 of the Operator's Manual handy while you're trying to make blind connections by feel. One of them, the AUX I/O connector, is the key for getting at some of the more advanced capabilities of the Orion II, including audio in and out, CW sending via computer, and direct FSK. This is one of those 8-pin DIN connectors that is a challenge to wire yourself. The Orion II includes a breakout cable with a DIN connector on one end and four female phono plugs at the other end, simplifying access to the AUX I/O functions. Strangely, the DIN connector on this cable has 5 pins, and it is rather too easy to plug it into the jack with the wrong orientation.

Setting Up At Home

My home station is rather modest; presently half of a G5RV wire antenna remains in the trees behind the house.

Photo B– Bob Raymond, WA1Z, operating the Orion II at KC1XX in the 2007 CQ 160 Meter CW contest. The spotting position is to his right, and the second transmit position to his left, operated by John Kaufmann, W1FV. The two beady red eyes atop the amplifier to Bob's left are indicators on the transmit interlock switch. (Photo courtesy of K1GQ)

It took me all of 5 minutes to set up the Orion II. Full-disclosure: Half of that time was spent in moving an Orion I out of the way. Everything Just Worked.

My first reaction on turning on the radio was ick, I hate those colors. The default color scheme for the large LCD display in the center of the front panel is reminiscent of early computer operating systems that used saturated primary colors for everything. The Orion II has eight color scheme choices, in addition to black with white background and white with black background. I'm not entirely happy with any of them, but this is one of those non-essential characteristics where compromise is quite reasonable.

I use a Bose headset for CW and SSB. Wiring it up to work with the Orion II was simple. The Mic connector on the front panel has all the connections needed for an electret microphone, with both microphone lines properly isolated from chassis ground. The Operator's Manual does not discuss the bias provided at the Mic connector for the electret element, but it does show the voltage (10V) to the Mic jack and explains that it should be used only for electret microphones. The transmit audio sounds like me, and the extensive selection of audio tailoring options does a pretty good job of changing that to something more intelligible. The setting of the Speech Processing (SP) level is touchy at the high end.

I've never operated any digital modes, so I thought it might be interesting to see if I could get FSK working with the Orion II. Step 1: Get software to demodulate FSK. Step 2: Hook up audio (AUX I/O) to computer. Step 3: Tune in a signal (no challenge there, as a RTTY contest was under way). Done; It Just Works. For extra credit, I managed to get the radio to receive and transmit in AFSK. The direct FSK mode is more convenient, because the Orion II automatically sets up the right bandwidth and passband center and offsets the frequency readout.

If I could change one thing about the Orion II, it would be the spot function. To spot means to locate the transmit frequency. We want to locate the transmit frequency at a particular place in the band—usually where the station we want to work is listening. To do that we need the spot function to switch the receiver frequency to the transmit frequency so we can hear where we're going to transmit. The Orion II SPOT button doesn't do that; instead you have to monkey around with multiple buttons scattered across the front of the radio. For CW, the spot function also needs to emit a sidetone with frequency equal to the offset between the transmit frequency and the center of the receiver passband. This the Orion II does perfectly.

Menu System

I like the menu system in the Orion II, because it's shallow and consistent. Press the MENUS button and press one of the seven buttons arrayed vertically at the right side of the display screen to choose a menu set; there is no further nesting. This makes it easy to find an option that you know is there when you don't remember the path to the option (ever try to do that in Microsoft Word®?).

Once you've found the option, you change it in the same way for all options: Spin VFO A to move the highlighted choice up and down the list of options, and then spin the MULTI knob to change the option value. The choices for values for each option are all explained in the manual, although they are shown as words (few obscure abbreviations) and numbers on the screen so you don't need to keep the manual handy.

The menu system isn't entirely consistent. Sometimes spinning the MULTI knob changes values in the opposite direction from what you might expect: For example, you need to turn it counter-clockwise to increase the encoder rates in the Other menu screen. Also, setting the AGC parameters requires a preliminary step: Set the radio to use the AGC choice (slow, med, fast, prog) that you want to modify before entering the menu system. This compromise is necessary, because there isn't enough room on the screen to show four sets of three parameters for two receivers. Some designers might have added a nested screen to handle this case; I'm glad Ten-Tec didn't.

CW Characteristics

CW is my favorite mode, so I'm rather more picky than others might be. Ten-Tec has a long reputation of delivering excellent QSK (break-in) CW transceivers, yet the Orion family has a somewhat murky reputation in this regard. I do have a few problems here, although as noted above, none are "show-stoppers."

First, QSK is pretty much gone at speeds above about 20 WPM, because the receiver is muted well beyond the end of the key-down period. There is an option in the CW menu called CW QSK Delay which affects how long the receiver is muted; reducing it below 10% at 26 WPM introduces annoying transients in the monitored audio when there is any signal (or noise) in the passband. With the delay at the default of 20%, the monitored CW is exceptionally clean and easy to listen to, with no clicks or thumps, but you can only hear in the spaces between words.

Second, the "CW Rise/Fall" setting, which varies between 3 ms and 10 ms, has been criticized on two counts: that the values do not correspond to the actual RF envelope rise times, which is of no operational consequence, and that the low end of the range is considered by some to cause key clicks. This radio does *not* generate key clicks, although some (including me) feel that CW sounds too "hard" with settings less than 5. I rather like the sound of the CW at the high end of the range, but this is a matter of personal preference, not a "problem." What I *do* have a problem with here is the apparent change in CW weighting when the rise-time setting is changed. There is debate over how best to define and measure weighting changes, which I won't get into here. The bottom line for me,

though, is how your code sounds on the air. I find that a setting at the low end of the range makes it sound choppy, while a setting at the high end makes it sound mushy. Again, perhaps I'm being too picky as a long-time CW enthusiast, but I would recommend sticking to the middle ranges.

Third, while the Orion II has built-in ASCII to Morse conversion, the converter does not recognize the ASCII space character. Thus, it is pretty much impossible to send computer-generated messages containing more than one word with proper spacing between words, using the converter. Also, a possibly related mis-feature: The Orion II can record CW messages sent with the internal keyer and play them back at any speed, but the duration of the spaces between words doesn't change when you change the speed! That severely limits its usefulness.

Fourth, pressing certain buttons while sending distorts the CW timing, even with an external keyer. With some buttons the effect is subtle, but with a few it can turn an entire Morse character into a long dash. Pressing MENUS and B>A are major offenders that I trip over quite a bit during contests.

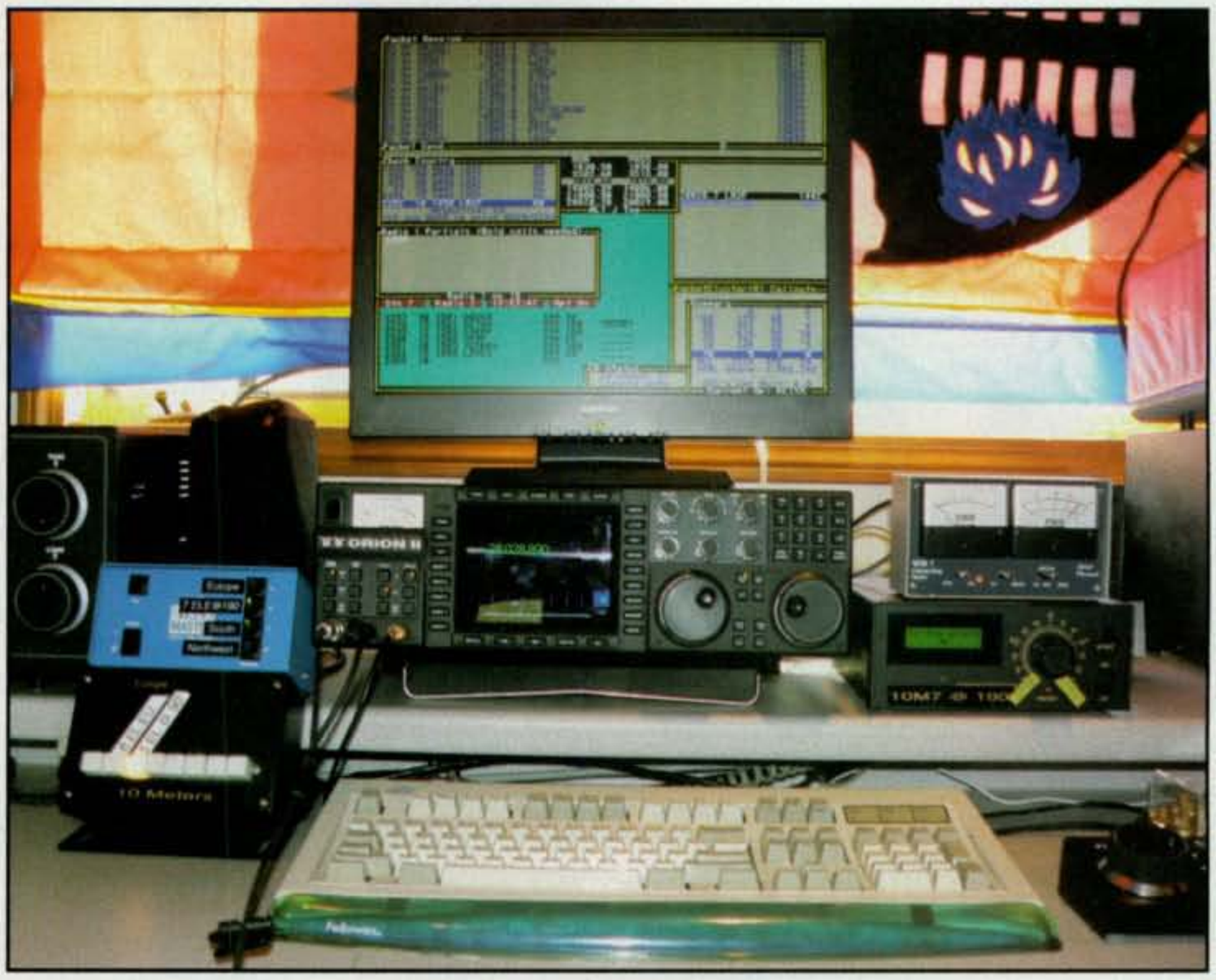

Photo C– The Orion II at the KC1XX 10-meter operating position. The switch-boxes to the left of the keyboard select various transmit antennas. The window behind the radio is oriented to highlight sunrise, normally indicating that 10 is about to come alive. (Photo courtesy of K1GQ)

Receive Audio

Receive audio in the Orion II has none of the annoying and tiring hiss that has bothered me in every other rig I've owned. Plug in high-fidelity headphones, turn the RFGAIN all the way down and the MAIN AF gain all the way up, and you hear nothing! Why would anyone turn the RFGAIN all the way down and the MAIN AF gain all the way up? While this is a complicated topic that cannot adequately be explained in a couple of paragraphs, suffice to say that there is a "magic" setting for RF gain at which weak signals seem to just pop out of the noise. When you find that point—generally just below the spot where the background noise begins to decrease—you will want to turn up the AF gain to improve readability. The Orion II DSP filtering really works; you can crank the bandwidth down to 100 Hz with no ringing or other filtering artifacts. On a quiet band, like 10 meters these days, cranking up the audio gain doesn't blow the headphones off your head, and you can dig out very low-level signals once you master the technique of finding the RFGAIN "sweet spot."

Depending on the impedance of your headphones, you may find that maximum audio output isn't quite enough; that's true for the three sets that I've tried. The maximum audio level is higher at the rear-panel speaker jack, but you'll need a stereo-to mono-adaptor, and you'll give up some features such as binaural receive that rely on stereo. At this audio port, there is some hiss in high-fidelity headphones, unaffected by the RX-EQ settings. The hiss is there but quite acceptable in my preferred headset, which has audio response tailored for voice communications.

Service

There is no service manual for the Orion II, nor are there any user adjustments or alignment procedures, and Ten-Tec does not usually publish information about factory modifications (it did document how to modify the Orion I to accommodate optional SWEEP function changes). Your only option for updates and repairs is to send the unit back to Tennessee. However, there is a complete set of schematics available online, and the innards of the radio are rather less dense than you might expect, so it is possible to work on the radio yourself if you have the right set of skills and tools.

I've left out one very important item: Anyone with internet access can update the radio's firmware themselves. This allows Ten-Tec to make a remarkable range of "adjustments" available to all owners, with no cost, delays, or shipping hassles. For example, Ten-Tec could probably address my lament about the spot function using a firmware update; to get it I'd just download the updater from the Ten-Tec website and follow the instructions. The updater runs only on Windows®, and you will need a serial connection between the computer and the Orion II. The updater runs rather slowly and is sometimes a bit twitchy; be patient, and if it reports a failure just run it again.

On the Air: 2007 CQ 160 CW Contest

I'm addicted to HF DX contesting, which is why receiver performance is important to me. For the past 10 years or so, I've been involved in multi-transmitter operations at stations with large antennas. This is the most stressful environment imaginable for a receiver, and being able to hear well is arguably the most important competitive factor.

For the past several years, a small team led by John Kaufmann, W1FV, has operated the KC1XX station in the multi-transmitter category in the CQ WW 160 Meter CW Contest held at the end of January. The station has one transmit antenna system—a linear

array of three full-size verticals—and several receive-only antennas. We set up three operating positions. Two of them shared the amplifier and transmit antenna through an interlock, and the third was receive-only for spotting. The receive antennas are within one to two wavelengths of the transmit array, so receivers really get hammered when transmitting. We've found that the second and third positions are pretty much useless due to receiver blocking and phase noise unless we use Orions at all positions. With Orions, we can easily copy louder stations while CQing and can often dig out DX stations as well.

This year we used the review Orion II at one of the two transmit positions (see photo B). I noticed that both John and our third operator, Bob Raymond, WA1Z, were immediately comfortable with the radio, although they preferred different color display schemes. We expected the radio to perform well, and it did. By the way, you really want to install the optional fan on the heat sink if you intend to call CQ on 160 meters all day long.

The Orion II was set up at a position in the KC1XX radio room that is notorious for electrostatic discharge events that routinely crash sensitive electronics. We've had a lot of trouble with this using older Orions, and it was impressive that the Orion II did not crash even once.

There are many very loud closely spaced signals on 160 meters during this contest. The Orion II handles them well, especially when you learn to adjust the RFGAIN level down to the best operating point. That point is slightly above the level where band noise moves the S-meter. This is the most important thing to learn about using the Orion II. The digital signal processing, and especially the AGC system, make this radio act differently than analog radios, and the old ways of gain adjustment do not apply.

The latest version of the Orion II firmware includes a new feature labeled "AGC Slope." This item has three choices—Flat, 1:10 dB, and 2:10 dB—and its function is to make strong signals sound louder by making the AGC less stiff. This is a very good thing for contesters trying to pick out one caller among many. However, the 2:10 setting, and the 1:10 setting to a lesser extent, introduce audio distortion when there are extremely loud signals in the passband. "Extremely loud" means above 50 dB over S9, near the level where the analog AGC loop starts trying to help out the digital AGC loop. We had to leave this feature at the Flat setting throughout the night during the contest.

2007 ARRL CW DX Contest

I set up the Orion II at the KC1XX 10-meter position for the ARRL CW DX contest in mid-February (photo C). It was paired with a Titan III amplifier, using the keying loop to support full break-in. KC1XX has quite a few antennas on this band, totaling 49 elements. Propagation during the contest was dismal, with only a short period Sunday afternoon when some DX stations moved the S-meter off the pin. A majority of my roughly 50 QSOs, spread out over the daylight hours of Saturday and Sunday, were close to the noise level. Although I generally knew what callsigns I might hear, many of the QSOs were with stations I found by tuning carefully up and down the band, rather than stations identified by packet spots or attracted by CQing. There are two reasons this happened: (1) KC1XX hears better than most stations, and (2) propagation generally was very focused; stations 10 to 50 miles away often couldn't hear what I could hear, and vice-versa.

There was one other reason it was possible to achieve essentially the same result as the K3LR team, which had the best 10-meter line-score in this contest: The Orion excels at digging out very weak signals. Varying the bandwidth with automatic roofing filter selection had no discernible effect on signal level, and cranking it all the way down to 100 Hz helped greatly in digging out the really tough ones by increasing the signal-to-noise ratio.

The DSP-based noise blanker works remarkably well on fairly high-level line noise received on one of the antennas, without adding spurious signals from the other transmitters. The hardware noise blanker is somewhat more effective than the DSP blanker on low-level line noise. On the other hand, it was somewhat more prone to generating extraneous signals in the receiver. I did not experiment with the DSP noise-reduction function.

Summary

The Orion II has many capabilities that I haven't mentioned, including remarkable audio flexibility, diversity reception, and DSP-based algorithms for things such as "noise reduction" and multiple-notch filtering. Discussing each of them in reasonable depth would extend the length of this article beyond acceptable limits. If you find yourself wanting more details, sending a message to the Ten-Tec group (http://lists.contesting.com/mailman/listinfo/tentec) is certain to produce what you need.

In my opinion, the Orion II feels somewhat unpolished, as indicated by the number of "issues" that I've mentioned in this article. Still, none of these items is a fatal problem, and the beauty of today's technology is that it is possible to add or modify features through firmware updates. This ability to make significant improvements to a product in the field is remarkable, but it will pay off only if Ten-Tec has the resources to collect and digest input from users, design and implement software changes, and test that the changes haven't accidentally broken anything. Still, we all should be excited at the opportunity to interact with an equipment manufacturer and actually see improvements in the product that we can apply ourselves in this age of micro-miniature electronics.

Bottom line: The fantastic receiver in the Orion II outweighs any and all of my little quibbles. Should you buy this radio? As always, the answer depends on what you want, such as "buy American" or "the best receiver money can buy." These are important considerations for me, and Ten-Tec's Orion II satisfies both. ■

With the largest number of hams ever at the "Top of the Honor Roll," holding 5-Band Worked All Zones and 5-Band DXCC, CQ magazine decided to motivate all of us to be more active and to try to work all countries every year!

Results of the 2006 CQ DX Marathon

BY JOHN SWEENEY,* K9EL

Back in 1947, as ham radio was coming back to life after World War II, *CQ* magazine tried to encourage a return to DXing by sponsoring the first-ever CQ DX Marathon. This year-long competition quickly morphed into the CQ World-Wide DX Contest. Jump forward nearly 60 years and from January 1 to December 31, 2006, the CQ DX Marathon was reborn—a challenge to all DXers, big guns and beginners alike, to work as many countries as possible each calendar year. Of course, like other projects, we had a few challenges for the first year of the renewed Marathon and some bugs to work out. We listened to your comments and suggestions, though, and 2007 promises to be an even more exciting year for the CQ DX Marathon!

In 2006, the "WARC bands" (30, 17, and 12 meters) were not included for Marathon scoring because we respect the gentlemen's agreement for no contesting on these bands, and we weren't sure whether activity patterns would more closely resemble a traditional contest or a limited-period award. This limitation affected many of your scores, as the low sunspot count made the 30- and 17-meter bands very effective for DXing, but those contacts didn't count. Many of those who submitted logs missed the WARC exclusion, so some logs had to be rescored. Some participants reported having problems with downloading the score sheets, although the majority of you had no problems. The early versions of the score sheets had a number of errors, which didn't help either. Hopefully all of these bugs have been worked out, and some creative hams have written conversion programs for the popular logging programs. For example, Jim, AD1C, has created an easy procedure for users of DX4Win. Check it out at <http://dx4win.ad1c.us/marathon.htm>.

Pete Meyer, NØFW, at one of his operating positions. Pete won the Unlimited class by contacting 286 countries in all 40 CQ zones.

Pete, NØFW, with one of his 4-square antenna arrays. He has one each for 160 and 80 meters!

Impressive Scores

Considering the low sunspot activity, some of the actual scores are very impressive! Pete Meyer, NØFW, worked an amazing 286 countries and all 40 zones in the Unlimited class. Close at Pete's heels were runners-up OM3EY with 283 countries and W1JR with 279 countries, both with all 40 zones. In the Formula class, Drago Grabner, T94GB, outpaced everyone with 193 countries and 35 zones—all with

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Winner Profiles

Drago Grabner, T94GB
Formula Class Winner

Drago Grabner is 59 years old and is a professor of pedagogy and psychology. His QTH is in the town of Jajce (JN84PI) in the central part of Bosnia-Herzegovina, about 120 km west of Sarajevo. In 1963, as a primary school pupil, Drago started to practice ham radio. He passed the examination for ham radio operator "C" class in June 1965 and became quite active in the local radio club, YU4EDV. In 1968, he passed the examination for "B" class operator and received the callsign YU4VGD. Drago really began DXing in 1994 when he received his current callsign, T94GB. He is active on all HF bands, mostly CW, with some SSB operation. Drago currently has 303 DXCC countries confirmed, including 301 on CW and 178 on SSB. For the last 10 years and for the 2006 DX Marathon, he used a Yaesu FT-757 transceiver with matching power supply and tuner. Drago uses only wire dipole antennas and a G5RV. This year he purchased a new ICOM IC-706MkIIG. As of March, his 2007 DX Marathon score was already 162. Drago says, "I believe that the DX Marathon is an excellent idea and it offers an opportunity to all real DXers to prove themselves."

Pete Meyer, NØFW
Unlimited Class Winner

Pete Meyer was first licensed 35 years ago as a young lad in northern Minnesota, where he lived on a dairy farm. Pete has always enjoyed contesting, DXing, and Field Day. After graduating from the University of Minnesota, Pete spent time "pulling high Gs" with the US Air Force. After his military service, he became an environmental engineer in the Los Angeles area. He had a modest station in Whittier that he says, "would get consistently whooped on by the likes of W6AM, W6EA, and others in the pile-ups. It was a truly humbling experience, but they would always encourage me to keep trying and be patient and persistent."

Pete first got a taste for DXpeditioning by operating in Thailand in 1992. Then he participated in the FOØCI Clipperton Island DXpedition and really caught the "bug." The next year, Pete joined the team that activated KH5K and KH5 simultaneously, and followed up in later years with trips to V5, 5Z, 5N, VO2, J6, J8, J7, VP2M, KP2, KP4, PJ2, PJ4, J3, FM, FG, VP2V, KH2, KH3, KH4, KH6, KH8, KH9, KHØ, 3D2, A3, and others.

After a career change in the late '90s (he's now an attorney), Pete set up shop near the city of Ross, Ohio, northwest of Cincinnati. Pete's current station is located on eight acres in a building remote from the main house, enabling 24/7 radio DXing. His station includes two FT-1000Ds with Ameritron and Alpha amplifiers. The station is set up for Single Operator, Multi-Single, or Multi-2 contesting in CW, SSB, and RTTY. Pete's antenna farm includes full-size 4-square arrays on 160 and 80 meters, four elements on 40 meters, two elements on 30 meters, five elements on 20, six elements on 15, ten elements on 10, and a 12/17 Hy-Gain interlaced duo-bander.

Pete is also active on 6 meters, the satellites, and EME. He holds the 5BWAZ award, CQ DX awards (337 SSB/336 CW), plus 362 countries worked and confirmed all time. Pete has over 300 worked and confirmed on every band from 160–10 meters. He is past president of the Southern California DX Club (1992) and the Southwest Ohio DX Association (2004/2005).

100 watts and wire antennas! Runners-up included K8ZT with 158 countries and 36 zones and JA7OXR with 144 countries and all 40 zones.

The 20-meter band produced the highest number of contacts, with 40 meters not far behind; 80 and 15 were about even for contacts, but some logs included multiple 160-meter QSOs as well. DX contacts were reported on all bands from 2 through 160 meters. A few hams, including W4VQ and WA6JRZ, made all of their QSOs on CW, proving that this "old fashioned" mode is not dead! VK2KRM, EC8AFM, and KE4MBP submitted all-SSB logs. GUØSUP submitted an all-RTTY log, while KØARY/VP9 submitted his log with only 20-meter QSOs. Activity was highest in the USA, although quite a few logs were received from Europe. No single area seemed to have an advantage, as poor band conditions affected everyone!

For 2007 we have added the WARC bands, since activity in '06 was spread out through the year rather than being bunched into one or two weekends, as a contest would be, so we expect to see even higher scores this year. If you haven't already started, it's not too late! Every contact you have made since January 1, 2007 counts! For this year's complete rules, go to either the *CQ* website at<http://www.cq-amateur-radio. com/DX_Marathon_Jan07.pdf> or the official DX Marathon website at <http:// www.dxmarathon.com>.

Special thanks go to the Northern Illinois DX Association for its generous donation to sponsor the plaques for the "reborn" CQ DX Marathon.

QRM

Thanks *CQ* for bringing the DX Marathon back to life in 2006, which was a year in the bottom of the solar cycle but proved to be quite interesting for DX. You have certainly rekindled my interest in operating . . . **N1AM.** I do have a friendly wager with a friend in our club.

Drago Grabner, T94GB, used this modest station and wire antennas from Bosnia-Herzegovina to capture the top spot in the Formula class.

Scores 2006 CQ DX Marathon

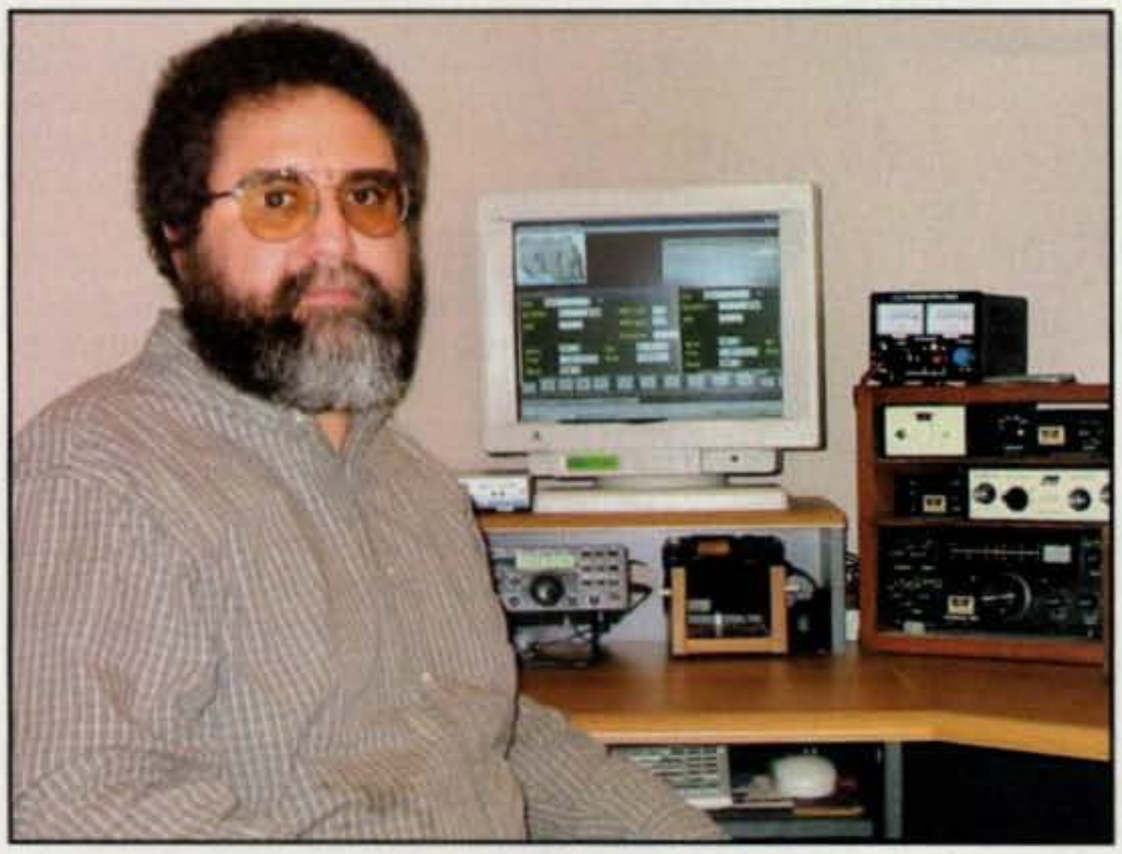
Callsign	Class	Score	Zones	Countries	Callsign	Class	Score	Zones	Countries
NØFW	**U**	**326**	**40**	**286**	AB4IQ	U	176	36	140
		(Winner Unlimited Class)			KE4MBP	U	176	33	143
OM3EY	U	323	40	283					(All SSB)
W1JR	U	319	40	279	EB1EWE	U	175	28	147
N4MM	U	309	40	269	KØARY/VP9	U	174	30	144
K4SAV	U	301	40	261					(All 20 meters)
RU6YY	U	301	40	261	SV1CQN	F	173	35	138
W4VQ	U	294	40	254	VK6HG	F	169	35	134
				(All CW)	K9DDO	U	167	32	135
WT8C	U	284	39	245	PAØMIR	F	167	30	137
PT7VB	U	280	36	244	PR7AF	U	167	33	134
SM6CNN	U	279	40	239	LU3JVO	F	160	38	122
DL5NAM	U	273	40	233	N1AM	F	160	28	132
LU2NI	U	268	40	228	WF4W	U	158	32	126
SV1DPIU	U	257	40	217	OK1BLU	F	156	30	126
KØDEQ	U	256	40	216	GUØSUP	U	154	33	121
N4BAA	U	256	40	216					(All RTTY)
W6RLL	U	255	39	216	TA3J	U	152	31	121
LZ3FN	U	254	38	216	NU4B	F	148	28	120
PS2T	U	249	40	209	NTØF	U	145	31	114
W4CU	U	248	40	208	DJ6JH	F	144	32	112
AD1C	U	244	39	205	N8IW	U	144	30	114
SM7CQY	U	240	38	202	WA6JRZ	U	140	31	109
F1JKJ	U	239	40	199					(All CW)
N6NG	U	238	40	198	JH7RTQ	F	137	33	104
SM7BHM	U	236	38	198	JA1NLX	F	136	32	104
F5CQ	U	231	40	191	KA8PTT	U	135	28	107
VE3ZZ	U	231	37	194	VE4EAR	F	130	29	101
T94GB	**F**	**228**	**35**	**193**	KG1V	U	126	28	98
		(Winner Formula Class)			W8WT	U	126	27	99
UA3QUO	U	227	39	188	EC8AFM	F	122	24	98
W2QO	U	221	37	184					(All SSB)
G1VDP	U	218	36	182	SM7CQY	U	119	22	97
W8AV	U	217	38	179	G6OKU	F	115	23	92
NI5F	U	216	38	178	SP5CGN	F	114	25	89
K7EG	U	211	38	173	KA5EYH	U	113	29	84
W9IL	U	210	39	171	IW5EIJ	F	111	21	90
K8AJS	U	209	37	172	MØOKT	F	106	22	84
WA1Z	U	208	36	172	WB4DNL	F	105	27	78
VK3FM	U	204	38	166	TA3YJ	U	95	18	77
WØVX	U	203	36	167	KI4LTP	U	93	18	75
I2WIJ	U	202	38	164	KØPK	U	92	23	69
WD4DDU	U	199	35	164	VA3RNJ	F	75	20	55
SV1CIB	U	196	39	157	W2VU	F	74	17	57
K8ZT	F	194	36	158	K8CQ	F	72	17	55
AA4FU	F	190	33	157	VK2KRM	F	58	18	40
N7BF	U	186	39	147					(All SSB)
JA7OXR	F	184	40	144	K5PDR	F	24	10	14

I hope to break the 300 confirmed DXCC this summer . . . **KA9WAR.** If possible, and as an incentive for 2007, I'd appreciate it if there was some way to designate this score was indeed CW-only . . . **W4VQ.** I know that I am late joining this event but would like to give it a try during the remaining 9 months of this year . . . **AD5RC.** In the last 30 years I have never done any CW QSOs, so I started DXCC hunting as newbie in CW at level zero . . . **DL5NAM.** The Marathon is a very good idea! I will participate with 100W or less and dipoles, as a "Formula"! Good luck to all the contestants! . . . **LU3JVO.** Based on experience of running such schemes in the UK can I suggest that regular updating of scores as the year progresses is the name of the game. The final result is also important, of course, but enthusiasm builds as the year unfolds. Therefore, the web-page with scores is very important. Thanks for the programme; good luck with it . . . **G3SXW.**

The more I play around with this the more fun it is. This year I'm keeping up with it and have worked 100 countries/zones. I running 5 watts output to a Carolina Windom. Seems like a great concept and really have enjoyed it . . . **NU4B.** I think the Marathon is a great idea and helps encourage activity for those of us who have worked most of what is out there. Thanks again! . . . **VE3ZZ.** CC&R restrictions can be limiting, but I do have fun. My best so far this year is VQ9LA on 3.5 MHz CW with the gutter. It continues to surprise me how well it works. One must be patient, although I worked Larry on the first call both on 80m a week ago and again last night on 40m, but most pile-ups are not that easy . . . **K8CQ.** A lot of my contacts are on the WARC bands and notice they don't count. Probably won't send in this year but will keep in mind next year. Should have started earlier . . . **W9IXX.** Just found out about the score sheet today. It is going to be a big job going back through all my logs in 2006 to look up all this info. Glad to see all amateur bands added for 2007 . . . **N4MM.**

Seventeen and 30 meters are two very reliable bands these days. Is there a particular reason they are off limits? I certainly understand why for a "real" contest like CQWW and WPX, but I seriously doubt one would ever see the bands loaded up with guys calling "CQ DX Marathon." The ARRL dropped the WARC band DXCC restriction long, long ago. Just curious . . . **K9NW.** Worked 176 countries and 39 zones. Mexico, zone 6, did not show up on the right band. Worked it however on 17m. Was fun anyway to take part in the competition and not the least to see what I was good for myself. Am now in for 2007 participation and so far worked 33 countries in 17 zones, which means I have not yet started collecting all the different countries within one single zone, as western Europe. 73 from Norway . . . **LA6CF.** I have to correct my claimed score, since I didn't carefully read the rules, and I now see that WARC bands don't count . . . **K4SAV.**

I really like the CQ Marathon concept. I am participating this year (2007). For my own use I made a variation to the score



Anthony Luscre, K8ZT, has worked nearly 300 countries on QRP and was runner-up in the Formula class with a total score of 194.

sheet. I made a second instance of the "Total Score" cells and placed them up inside the frozen pane so it is always visible regardless where a person is scrolling in the score sheet. This might be something you wish to add to the official score sheet. Thanks for promoting DX. I have been talking up the Marathon with our club group . . . **K8AO.** It should be fun this year having all countries and zones to go after, like when I first started DXing . . . **N3XX.** Thank you for clarifying the point of SSTV being counted as a mode for the CQ DX Marathon. I am glad to say I am currently using PSK, SSTV, and some other digital modes as well as phone to make my contacts. I hope that I can now make a better score than 2006 even though I only operated for five months. Take care and happy DXing . . . **VK2KRM.**

Please note this is an all-CW entry. The mode's not dead yet! I lost a couple of countries because of the non-WARC band requirement for 2006 entries. Glad you fixed that for 2007 . . . **W4VQ.** Enjoyed the challenge. Didn't realize it didn't include the WARC bands last year, but then my score wasn't hurt too bad. Here's to 2007, and a new challenge to beat this last year's score . . . **G1VDP.** Tnx for a nice challenge, and I am on 99 already for 2007 . . . **SM7BHM.** I guess it pays to read the rules before you enter a contest. I thought I had 10 more countries until I read the rules and found out that WARC bands don't count. Some of those I could have gotten on the other bands if I had known I needed them . . . **K4SAV.** Most of the contacts during contests and on 40 meters. The inclusion of WARC is fine, as my score would have been boosted by another 20–30. Cheers and 73 . . . **VK6HG.** All QSOs were done in the mobile environment with 50W, a mobile whip antenna, and a car battery. I very enjoyed this contest even if the propagation conditions were bad . . . **JA7OXR.** Thanks. It really caused me to be more active at the bottom of the cycle . . . **N6NG.** Here's my entry for 2006. Too bad the WARC bands were excluded; worked a lot of good DX there! Glad they're included for 2007 . . . **KØPK.**

Looks like I missed a few of the easy ones during 2006! I will have to try harder in 2007, and see if I can make a higher score . . . **GUØSUP.** Here is my score sheet with a claimed score of 254. I used my new call, many contests, and all modes to get the countries I did . . . **W4CU.** A fantastic Idea to hold it through the year. I have adopted it for my club and I have some local friends who are all having a go. It has lots of locals on the bands and working the DX. I look forward to seeing the updates on the web page . . . **G1VDP.** At the moment it's not a high score cause I'm a little busy with school things (I'm 17 years old! hi hi) . . . **LU3JVO.** ■

Announcing:

The 2007 CQ World-Wide VHF Contest

Starts: 1800 UTC Saturday, July 21, 2007
Ends: 2100 UTC Sunday, July 22, 2007

I. Contest Period: 27 hours for all stations, all categories. Operate any portion of the contest period you wish. (*Note:* Exception for QRP Hilltopper.)

II. Objectives: The objectives of this contest are for amateurs around the world to contact as many amateurs as possible in the contest period, to promote VHF, to allow VHF operators the opportunity to experience the enhanced propagation available at this time of year, and for interested amateurs to collect VHF Maidenhead grid locators for awards credits.

III. Bands: All authorized amateur radio frequencies on 50 MHz (6 meters) and 144.00 MHz (2 meters) may be used as authorized by local law and license class.

IV. Class of Competition:

For all categories: Transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee's address, whichever is greater. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant. Only the entrant's callsign may be used to aid the entrant's score.

For the four single-op categories: A single-op receives no operating help either on or off the air.

1. Single Op—All Band. Only one signal allowed at any one time; the operator may change bands at any time.

2. Single Op—Single Band. Only one signal allowed at any one time.

3. Single-Op All-Band QRP. There are no location restrictions – home or portable – for stations running 10 watts output or less.

4. Hilltopper. This is a single-op QRP portable category for an all-band entry limited in time to a maximum of 6 continuous hours. Backpackers and portables who do not want to devote resources and time to the full contest period are encouraged to participate, especially to activate rare grids. Any power source is acceptable.

5. Rover. A Rover station is one which is manned by no more than two operators, travels to more than one grid location, and signs "Rover" or "/R" with no more than one callsign.

6. Multi-Op. A multi-op station is one with two or more operators and may operate 6 and 2 meters simultaneously with only one signal per band.

Stations in any category, except Rover and QRP Hilltopper, may operate from any single location, home or portable.

V. Exchange: Callsign and Maidenhead grid locator (4 digits, e.g., EM15). Signal reports are optional and should not be included in the log entry.

VI. Multipliers: The multiplier is the number of different grid locators worked per band. A "grid locator" is counted once per band. *Exception:* The rover who moves into a new grid locator may count the same grid locator more than once per band as long as the rover is himself or herself in a new grid locator location. Such change in location must be clearly indicated in the rover's log.

A. A rover station becomes a new QSO to the stations working him or her when that rover changes grid locator.

B. The grid locator is the Maidenhead grid locator to four digits (FM13).

VII. Scoring: One (1) point per QSO on 50 MHz and two (2) points per QSO on 144 MHz. Work stations once per band, regardless of mode. Multiply total QSO points times total number of grid locators (GL) worked.

Rovers: For each new grid locator visited, contacts and grid locators count as new. Final Rover score is the sum of contact points made from each grid locator times the sum of all grid locators worked from all grids visited.

Example 1. K1GX works stations as follows:

50 QSOs (50 × 1 = 50) and 25 GL's (25 multipliers) on 50 MHz

35 QSOs (35 × 2 = 70) and 8 GL's (8 multipliers) on 144 MHz

K1GX has 120 QSO points (50 + 70 = 120) × 33 multipliers (25 + 8 = 33) = 3,960 total points.

Example 2. W9FS/R works stations as follows:

From EN52: 50 QSOs (50 × 1 = 50) and 25 GL's (25 multipliers) on 50 MHz

From EN52: 40 QSOs (40 × 2 = 80) and 10 GL's (10 multipliers) on 144 MHz

From EN51: 60 QSOs (60 × 1 = 60) and 30 GL's (30 multipliers) on 50 MHz

From EN51: 20 QSOs (20 × 2 = 40) and 5 GL's (5 multipliers) on 144 MHz

W9FS/R has 230 QSO points (50 + 80 + 60 + 40) × 70 multipliers (25 + 10 + 30 + 5) = 16,100 total points

VIII. Awards: Certificates suitable for framing will be awarded to the top-scoring stations in each category in each country. Certificates may also be awarded to other top-scoring stations who show outstanding contest effort. Certificates will be awarded to top-scoring stations in each category in geographic areas where warranted.

Geographic areas include states (U.S.), provinces (Canada), and countries, and may also be extended to include other subdivisions as justified by competitive entries.

Unique, handsome plaques will be awarded to the highest scoring stations. For more information on plaque sponsorship, click on "Plaque Program" on the contest website at <http://www.cqww-vhf.com>.

IX. Miscellaneous: An operator may sign only one callsign during the contest. This means that an operator cannot generate QSOs by first signing his callsign, then signing his daughter's callsign, even though both callsigns are assigned to the same location.

A station located exactly on a dividing line of a grid locator must choose only one grid locator from which to operate for exchange purposes.

A different multiplier cannot be given out without moving the complete station at least 100 meters.

Making or soliciting QSOs on the national simplex frequency, 146.52 MHz, or your country's designated national simplex frequency, or immediately adjacent guard frequencies, is prohibited. Use of commonly recognized repeater frequencies is prohibited. Recognized FM simplex frequencies such as 146.49, .55, and .58, and local-option simplex channels may be used for contest purposes.

Aeronautical mobile contacts do not count.

Contestants should respect use of the DX window, 50.100–50.125 MHz, for intercontinental QSOs only.

UTC is the required logging time.

X. Log Submissions: Log entries must be submitted by September 1, 2007 to be eligible for awards. Submit your electronic log in the Cabrillo format created by all major logging programs. Send via e-mail attachment to <cqvhf@cqww-vhf.com>. Subject line: Callsign [used in the contest] only.

Entrants are reminded to be sure their log indicates their grid location. For USA/VE stations operating away from their home address, be sure to indicate the state or province location of operation.

It is strongly recommended that paper logs be entered on-line for automatic Cabrillo submission. Click on the "CQ WW VHF Web Form" link on the contest website at <http://www.cqww-vhf.com>. Computer-generated logs must be e-submitted. Callsigns of electronic logs received are posted and updated regularly on the website.

For those without web access, paper logs may be submitted to: CQ VHF Contest, 25 Newbridge Road, Hicksville, NY 11801 USA. Questions may be sent to <help@cqww-vhf.com>.

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At LDG Electronics we have always been the innovators in the automatic tuner industry. We built the first desktop switched-L tuner, the first automatic tuner for QRP radios, the first automatic tuner with a remote control head, and the first automatic tuner with 3-D memories. We were also the first manufacturer with a two year warranty on all of our products. **Now we are including all of the necessary interface cables with every tuner we sell.** No more getting your new tuner home and not having the right interface cable—**everything you need is included in the box!**

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The original portable Z-11 was one of LDG's most popular tuners, accompanying adventurous hams to their backyards, or to the ends of the earth. Now meet the Z-11Pro, everything you always wanted in a small, portable tuner designed from the ground up for battery operation.

Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters.

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Ready to go right out of the box!
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The AT-200 features LDG's new "3-D memory system" allowing up to eight antenna settings to be stored for each frequency. Handles up to 250 watts SSB or CW on 1.8 – 30 MHz, and 100 watts on 54 MH **(including 6 meters)**.

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List Price $219

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propagation

BY TOMAS HOOD,* NW7US

Basics, Part II: The Antenna – Where You Gain the Field Day Edge

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, March 2007: 5
Twelve-month smoothed, September 2006: 16

10.7 cm Flux
Observed Monthly, March 2007: 72
Twelve-month smoothed, September 2006: 80

***Ap* Index**
Observed Monthly, March 2007: 7
Twelve-month smoothed, September 2006: 9

Last month we took a look at some of the "components" of a radio circuit, and one of the measurable influencing solar phenomena that is out of your control. Sunspots and the ionosphere are one part of a radio circuit that is out of our control. This month, we're going to look at that part of the radio circuit that is directly under your control and is a critical "component" of the radio circuit. This basic building block is the antenna. All successful radio signal propagation starts at the point where the radio signal "leaves" the transmitting end of the circuit, and ends at the receiving end of the circuit.

This is the month I usually focus on the ARRL Field Day event. This year our examination of the basics of propagation will equip you for gaining a competitive edge in your Field Day adventure. Why? Armed with the knowledge of how to maximize your radio signal's ability to propagate to the remote station, you can operate more effectively in the 24-hour rush to reach as many of those stations as possible, competing for the top spot. Let's explore how important an antenna is in radio signal propagation, and how the right antenna during Field Day operation can make or break you.

Antennas are the Key!

How do we make our HF ham stations work more effectively? If you are new to ham radio—or a Technician class ham planning to venture into HF under the new rules—you want to talk to as many stations as you can. If you are seasoned operator, you perhaps want a higher score in that contest. Either way, you really don't want to waste time calling CQ. That's fun the first time or so, but isn't it better to know in advance how you can quickly make your contacts? To develop that confidence, one must understand the radio system in its entirety.

Factor	Typical Effect	Power Increase
Propagation Loss	60 dB	×1,000,000
Antenna Gain	20 dB	×100
Transmit Power	10 dB	×10

Fig. 1– HF system operational priorities.

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <nw7us@hfradio.org>

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for June 2007

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-13, 15, 18-21, 25-30	A	A	B	C
High Normal: 16-17, 24	A	B	C	C-D
Low Normal: 14, 22-23	B	C-B	C-D	D-E
Below Normal: None	C	C-D	D-E	E
Disturbed: None	C-D	D	E	E

Where expected signal quality is:
A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.
E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing in *The New Shortwave Propagation Handbook* by George Jacobs, W3ASK; Theodore J. Cohen, N4XX; and Robert B. Rose, K6GKU.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 1 will be fair on June 1–13, poor or not usable on June 14, poor to fair on June 16–17, and so forth.

3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed will be riddled with geomagnetic storms. Propagation of radio signals in the HF spectrum will be affected by these conditions. In general, when conditions are High Normal to Above Normal, signals will be more reliable on a given path, when the path is ionospherically supported.

HF ionospheric propagation is the main variable that permits (or denies) radio communication. The principal HF system factors—propagation, antenna gain, and transmit power—are the major factors in system effectiveness, and fig. 1 shows the relative effect of these variables.

There's not much we can do about propagation loss, except to use a software program to predict its effect. Also, we know that we can increase transmit power, within limits, to talk farther. However, antenna gain is a factor we *can* control, and look at the possibilities. As much as 20 dB is available to us! And with a cooperative buddy at the receive end of the circuit, that's as much as 40 dB! Just think what that means: If we change to an antenna with 20 dB more gain, our 100-watt transmitter would operate with the equivalent power of 10,000 watts! Is it any wonder that hams spend a good part of their time selecting and optimizing their antennas? Clearly, having the right antenna is *key* to good station performance.

How Do Antennas Work?

Selecting your antenna is perhaps the most difficult task in constructing a ham station. However, antenna type, site, and gain variations can influence station performance more than any other parameter. When we first studied for our ham licenses, we learned about isotropic antennas, those imaginary point

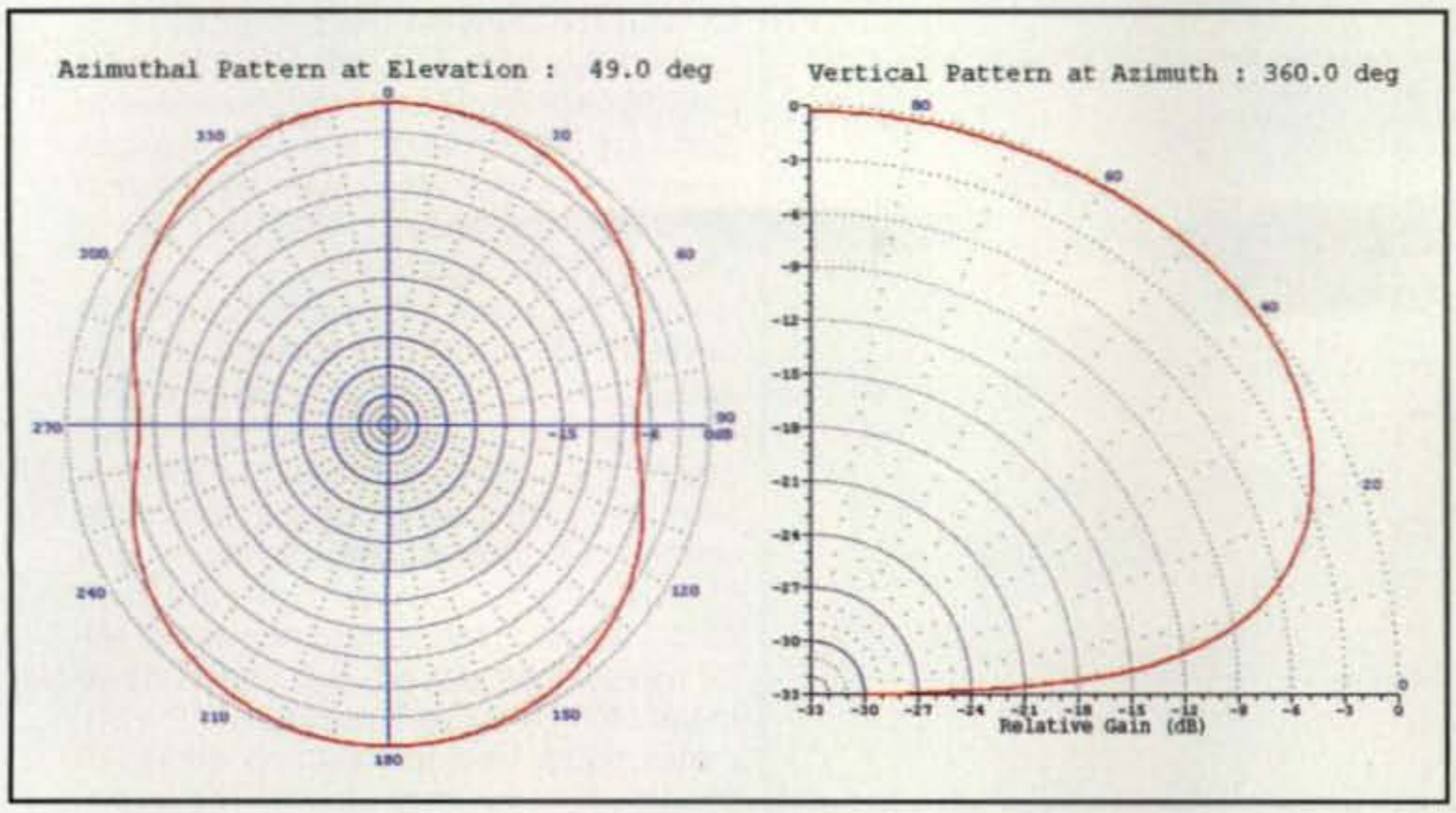

Fig. 2– 80-meter horizontal dipole at 3.75 MHz.

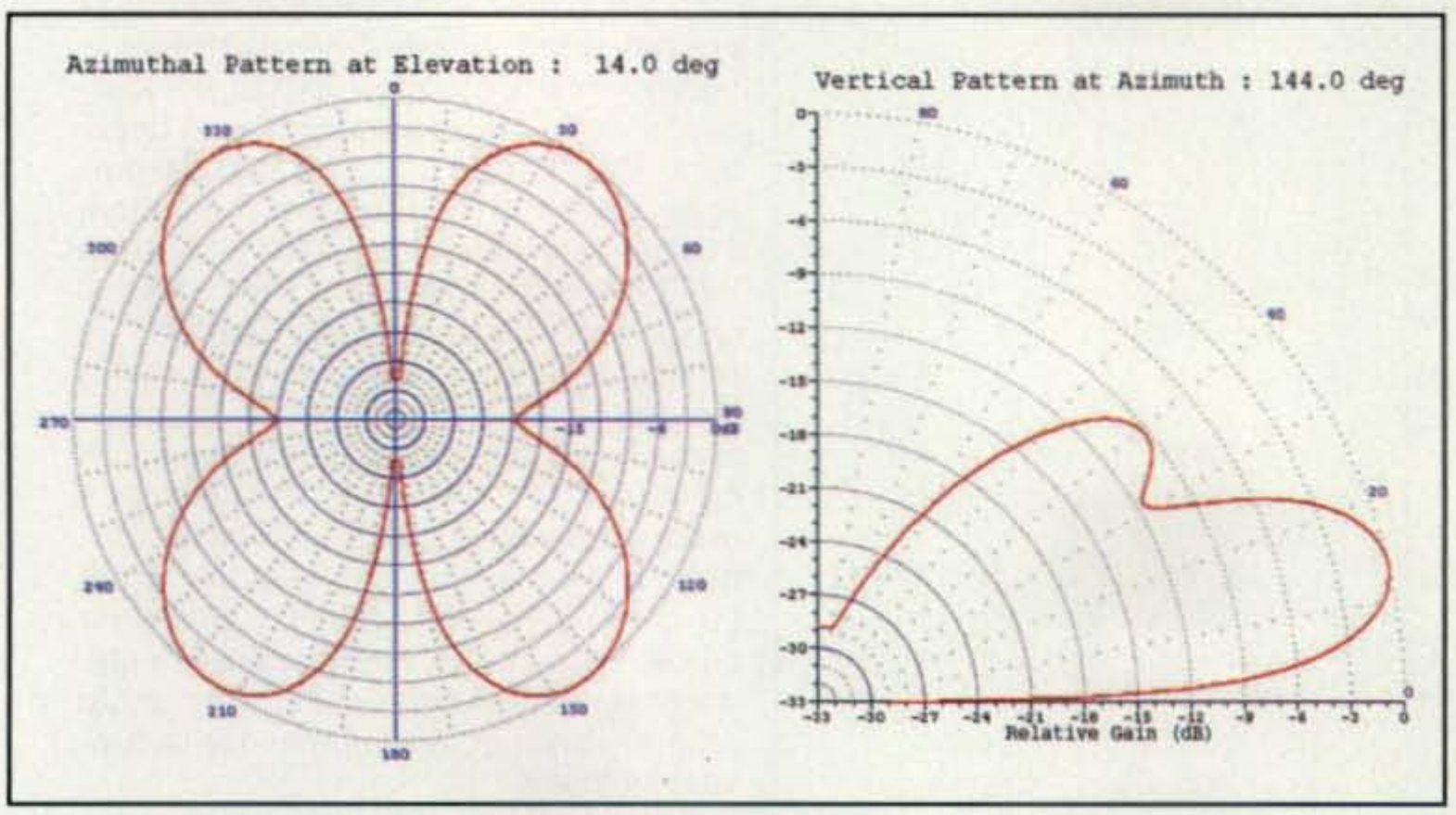

Fig. 3– 80-meter horizontal dipole at 14.2 MHz.

sources floating out there in free space. Isotropic antennas are wonderful, as they emit equal amounts of radiation in all directions and we can specify their gain. Wow! Just what we need! Unfortunately, they don't exist, and we are constrained by real-world constructs that we erect somewhere near our ham shack.

There are, however, many antennas from which to choose, and we can examine the ways in which practical antennas really work. Let's begin by conducting a *gedanken* experiment—a thought experiment. Imagine that we take an isotropic antenna and bring it down to Earth. We see a large sphere resting on the ground with an energy source, our transmitter, at its center point with radiation going out in all directions.

Real antennas don't work that way, though. They sit on the ground (or on a tower close to the ground) and radiate in directions above ground. (In theory, certain antennas, such as short verticals, form an *image antenna* below ground, but let's skip that refinement for now.) Thus, in our experiment let's change to a hemisphere resting on the ground with a transmit source at the center, also on the ground. Now imagine our hemisphere is a rubber balloon with gas inside. A giant comes along and pokes his big finger into the side. What happens? The balloon depresses under his finger and expands everywhere else. The transmit power remains constant, but the radiated power decreases under the giant's finger and increases in other directions.

Let's continue our experiment. Imagine a giant with lots of fingers and maybe many hands. If he is smart, he can poke and squeeze the balloon in ways that will concentrate the radiation in only one direction. Presto! We have a directional antenna! However, we see that to get more gain in one direction, the main beam,

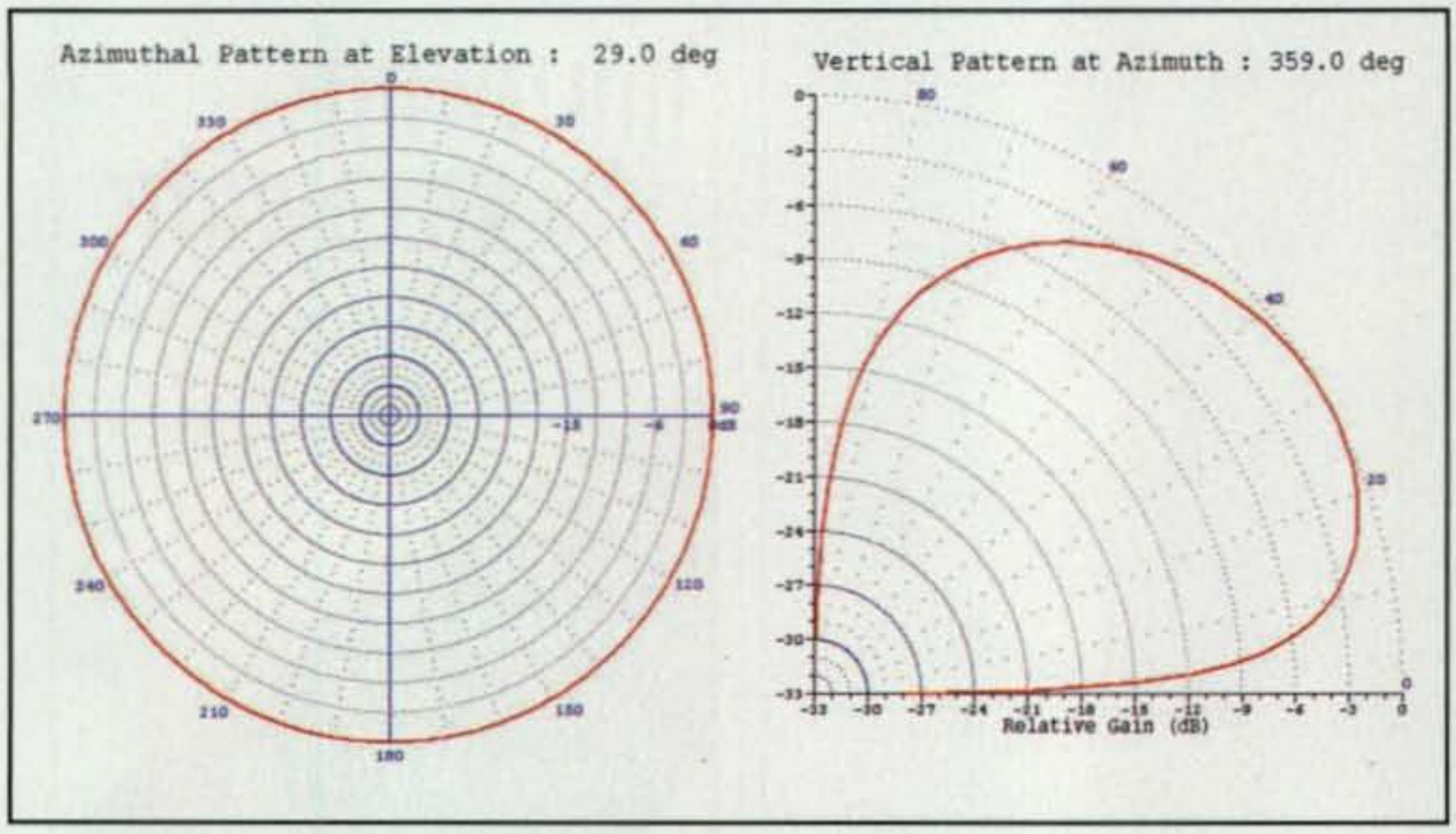

Fig. 4– 80-meter vertical antenna at 3.75 MHz.

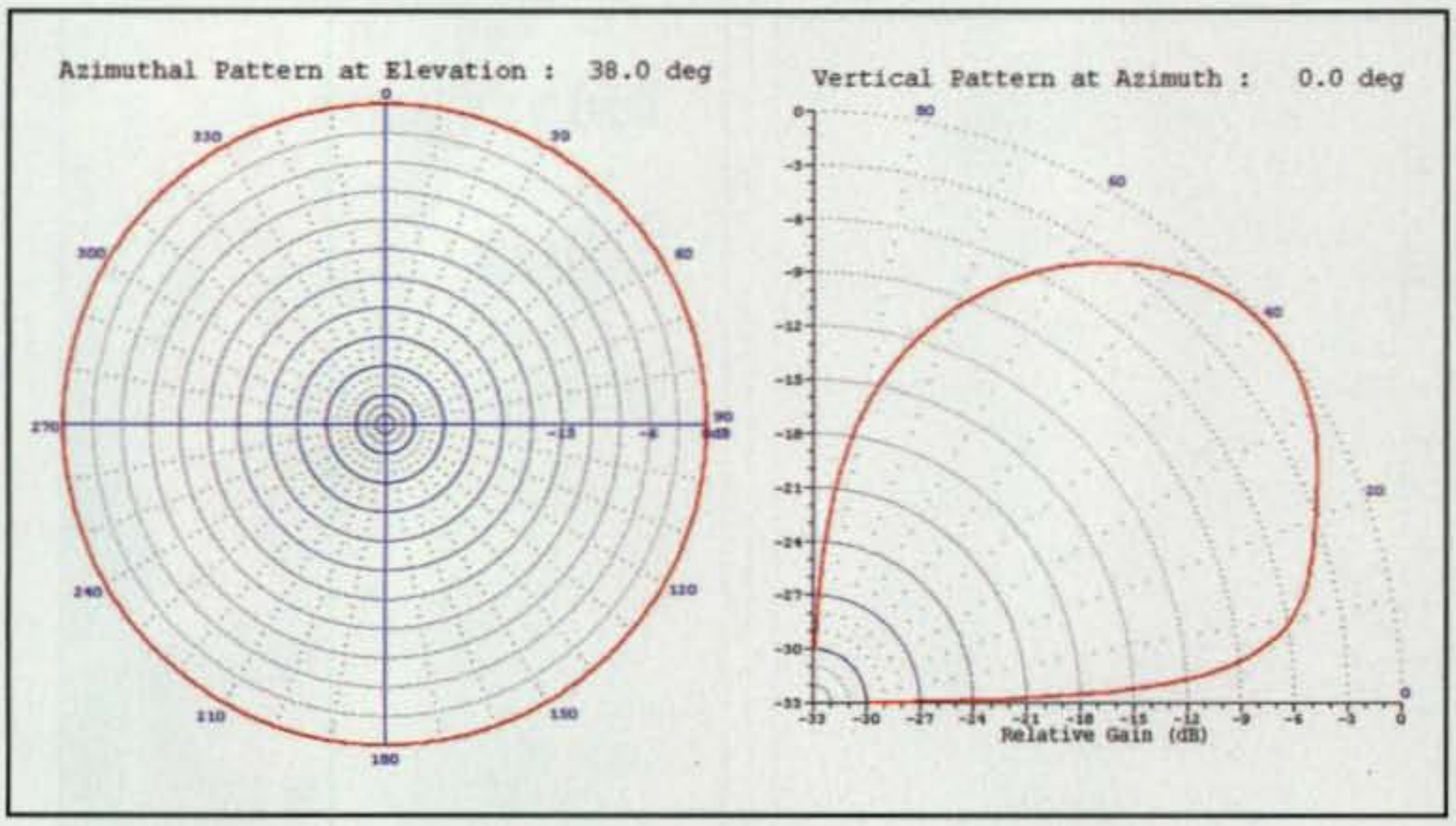

Fig. 5– 80-meter vertical antenna at 14.2 MHz.

we must sacrifice gain in other directions. Sometimes that is an intentional advantage, as in the case of a log periodic antenna that emits most of its energy in the main beam while it suppresses unwanted signals in the backward direction.

What have we learned so far? Well, our unmolested balloon antenna has equal gain in all directions, and it will expand—have greater gain—only if we increase transmitter power. If we want more gain in a given direction, we must poke and squeeze the hemisphere. That is, we must construct a more complex antenna that will concentrate power in one direction at the expense of radiation elsewhere, and it's tough to make a truly omni-directional antenna. There will always be some compromise.

Also, we haven't yet talked about broadband operation. Most antennas work best over a limited frequency range. If we design a simple antenna, such as a horizontal dipole, it is usually cut for the lowest band we wish to use. At higher frequencies it will work, but our giant starts poking his fingers again and the radiation patterns are anything but uniform and omni-directional.

Analyzing Antennas

To make sense out of this mess, we would really like to have a tool that helps us visualize the antenna's performance. Fortunately, such tools exist and usually focus on two parameters: *radiation pattern* and *gain*. Since patterns are seldom omni-directional in all planes, we speak of *directivity*—the direction in which the antenna's radiation is concentrated. Directivity gain usually refers to maximum relative gain, G_{max}—the gain in the direction of maximum radiation valued with respect to that of an isotropic radiator, stated in dBi.

I like to use my ACE-HF PRO software to visualize antenna performance. (I reviewed the new ACE-HF PRO Version 2.05 System Simulation and Visualization Software in this column last year. You can read that review along with others that show different uses of ACE-HF PRO at <http://hfradio.org/ace-hf/>.)

Over the years standards have been developed for visualizing antenna patterns and gain. ACE-HF PRO includes an antenna analysis program called HFANT which graphs the antenna's radiation pattern in two views. For example, fig. 2 shows the azimuthal (horizontal) and elevation (vertical) patterns for a typical half-wave horizontal dipole antenna mounted one-quarter wave above ground. The antenna is 40 meters long, making it resonant in the 80-meter band, and is mounted about 20 meters above average ground. The antenna has a maximum gain (G_{max}) of 5.7 dBi. (The charts show relative gain patterns drawn with respect to G_{max}.)

In the dipole example, the azimuthal pattern when viewed from overhead is nearly omni-directional. That is, the radiated energy is nearly the same in all directions. This makes it a good general-purpose antenna for 80-meter operation. Physically, the antenna wire runs between the 90° and 270° angles of the azimuthal chart and the maximum emission is broadside to the antenna. In the end-fire directions, emission is seen to be down about 7.5 dB with respect to the maximum gains at 0° and 180°. The convention is to always draw such charts with their maximum azimuthal gain at 0°—at the top of the graph. Of course, you may erect your dipole antenna at any physical angle, which is usually constrained by available property limits or by the presence of convenient trees!

In the ACE-HF PRO software, the azimuthal angle of maximum emission—at 0° in fig. 2—is assumed to point at a 0° bearing—i.e., at true north. Thus, one can think of the azimuthal graph as being laid out at the four compass angles, where 90° is east, etc. However, in the software the user can specify the antenna azimuth at both ends of a circuit. For example, if you have a directional antenna such as a Yagi, you can rotate the antenna's azimuth in the software just as you would when operating your station. In effect, that points the 0° angle of the azimuthal chart to a specified bearing angle. Also, to make things easier, there is a *point at* button you can check which automatically points the antenna at the distant station. If you have a fixed antenna, then the software's azimuth angle should be set in the physical direction of maximum emission. For the dipole, that would be the broadside angle.

Let's continue with our antenna analysis. Fig. 3 shows patterns for the same dipole antenna, except that we changed the driving frequency to 14.2 MHz. The

antenna still works, but the patterns are rather different, and the maximum gain at this frequency has fallen to –1.2 dBi.

The first thing to notice is the deep nulls in the four azimuthal directions. (The G_{max} angle is oriented to the top of the chart at its design frequency, which in this case was 3.75 MHz.) The nulls are an important finding, because they can explain why we might have problems with circuit paths oriented along the null directions. This *multi-lobing,* as it is called, is caused by the multiple wavelengths that can exist on a dipole antenna that is resonant at a lower frequency. All antennas exhibit variable patterns as frequency changes, which explains why it is so difficult to design a truly wide-band antenna.

Now let's look at the right-hand charts of the figures. In fig. 2, the vertical (elevation) pattern shows a slice of the pattern from horizontal (0° on the circular elevation axis) to 90° at the zenith. This chart shows why horizontal dipoles are good choices for NVIS (Near Vertical-Incidence Skywave) circuits, where the circuits are very short and the ionospheric reflection angles are close to the zenith. In fig. 3, however, the maximum radiation occurs at a low (14°) angle, so this dipole operated in the 20-meter band would be a poor NVIS antenna.

Analyzing another simple antenna, the vertical monopole, fig. 4 shows the patterns for a quarter-wave, base-insulated vertical where height depends on the lowest frequency of operation. The lowest practical frequency for such designs usually depends on one's property size, because tall masts must be guyed. In this case, we specified a 20-meter height (about 66 feet), which is about right for operation on 80 meters.

As expected, this is an omni-directional antenna. That is, radiation is uniform in all horizontal directions. In this example, G_{max} is –2.5 dBi at 3.75 MHz when the antenna is installed over poor ground. When erected over wet ground, G_{max} increases to +0.9 dBi, but the antenna is still not very efficient. It is for this reason that vertical monopoles are usually equipped with a copper ground plane—a series of copper wires radiating from the base and extending, ideally, to a length equal to the antenna's height. When higher powers are involved, as with AM broadcast antennas, a copper-mesh screen is usually added at the base to further reduce ground losses, and the radial ground wires are brazed to the edge of the ground screen. The need for a good, high-conductivity ground system is common to all vertically polarized antennas. However, in this example the copper ground system is omitted and only the earth's conductivity and permittivity values were specified.

Note that the vertical pattern shows essentially zero emission at the zenith,

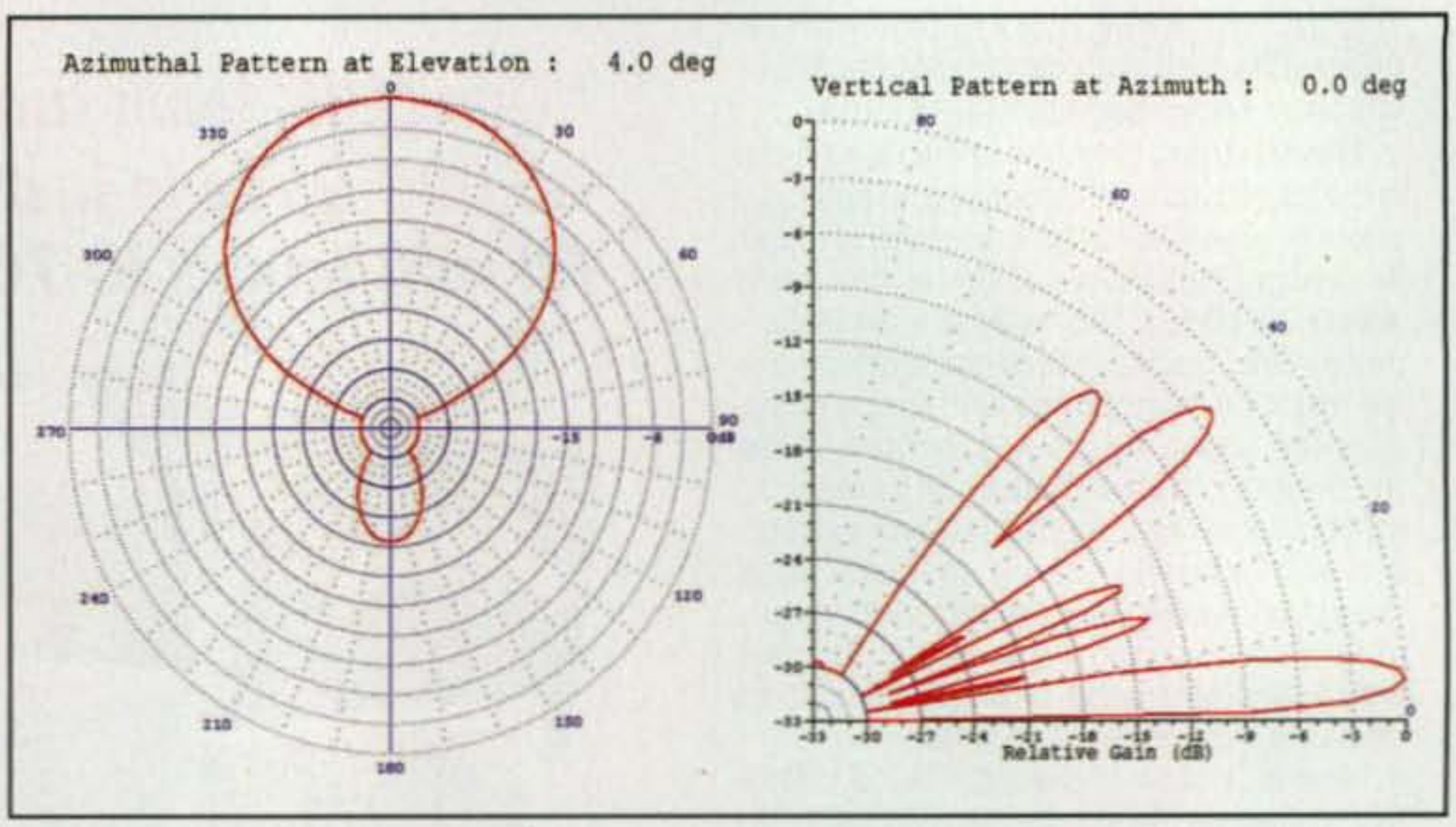

Fig. 6– 10-meter OptiBeam Yagi stack antenna at 28.4 MHz.

indicating that this design would be poorly suited for NVIS communications. The position of G_{max} at 29° in elevation shows that the vertical would best be used in medium- to long-distance circuits.

Fig. 5 repeats the patterns for a 20-meter high vertical monopole, except that in this case the antenna is driven at 14.2 MHz. The azimuthal pattern is still omnidirectional; it could hardly be anything else with a single vertical element. The elevation pattern has changed slightly, but is still essentially the same. The electrical length has increased from 1/4-wavelength to nearly a full wavelength at 14.2 MHz, and as a result G_{max} has risen to 1.9 dBi over poor earth and 4.5 dBi over wet earth. However, driving-point impedance and VSWR may oscillate over an excessive range as frequency increases, which is why some proprietary verticals add traps and other lumped-constant components to smooth their wide-band performance.

Verticals that are less than a quarter-wavelength in height at the lowest frequency are termed *electrically short* antennas. Short verticals erected in limited spaces, and the whips we mount on our cars, usually are less efficient. (Remember the old guide: "Antennas that stick out work better!") Their driving-point impedances are also capacitive, so to tune the antennas, series inductors called *loading coils* are often added at the base. Such coils increase the antenna's effective length, lower the feed-point impedance, and thus reduce the high voltages that can exist with such whips. *(Nevertheless, touching an energized whip can result in a nasty shock!)* Modeling such antennas is more difficult, because the model should include the orientation of the antenna (some mobile operators tie down the tips to avoid breaking them off in tunnels), lumped-constant components such as loading coils, and the presence of the vehicle's metallic body.

It is important to know that the figures just illustrated show only the *best-case* radiation patterns. Let's go back to our *gedanken* experiment and look again at our hemisphere of radiation. Imagine that there are 360 planes of radiation emerg-

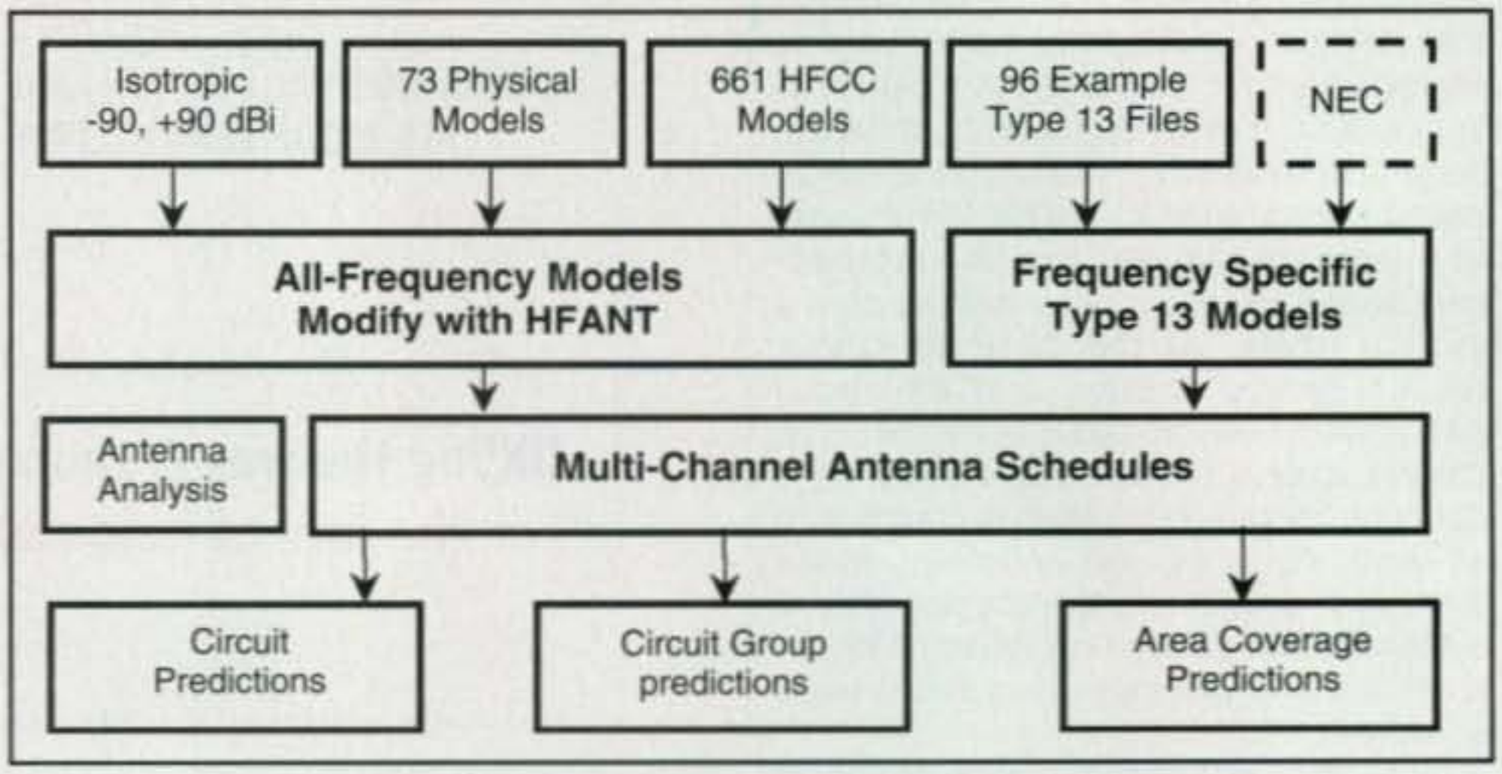

Fig. 7– Antenna modeling methods.

ing at horizontal intervals from the energy center. Assume that these radiate out at one-degree intervals and each plane covers angles from 0° to 90° in elevation. Along each of these 360 *slices* we can designate 91 incremental points in elevation. We can think of each of the points as the end of an energy vector, and the ends of all those vectors form the extent of radiated energy in three-dimensional space. Thus, there are 360 × 91 = 32,760 points of gain along a 3D surface if we limit ourselves to one-degree intervals in both dimensions. The surface is an undulating, irregular connection of gain values, the maximum of which is called G_{max}.

The patterns produced by HFANT show only a single pattern among those that actually exist. The software first finds the G_{max} value out of 32,760 possibilities. It flags that point and reports that G_{max} exists at a certain azimuthal and elevation angle. Fig. 2 shows that the azimuthal pattern is drawn at a 49° elevation angle, and the vertical pattern is drawn for an azimuth of 360°. This convention of drawing relative gain patterns with respect to G_{max} is a powerful method for comparing antennas and has become an industry standard. However, there are many, many other patterns that could be drawn if we have the right tools. (See the 3D antenna charts near the end of this article.)

Fig. 6 shows the radiation-pattern charts for a 10-meter OptiBeam three-stack Yagi array with a gain of 19.6 dBi at 4° elevation. The Yagis of the stack are set at 150, 100, and 50 feet above ground and rotate together to specified azimuths.

This antenna has a very high directional gain and the main beam is set at a low elevation angle. It also has an exceptional beamwidth (the angular azimuthal width of the pattern at the –3 dB points) of nearly 60°. This antenna is ideally suited for worldwide DX operation.

Antennas in System Simulations

As you can see, one can create an entire hobby out of looking at different antenna models. It's fun and instructive, and there are a lot of models to look at. Why do we do it? First, we want to see how effective our existing antenna might be. Or, we may be considering another antenna, and modeling it in software is a *try-before-buy* method that doesn't cost much. Also, if we have ACE-HF PRO, we are interested in simulating our HF system to find best frequencies, to determine our coverage areas, and to optimize our operation in general. Having the correct antenna model is key to all those needs.

ACE-HF PRO comes with more than 800 different antenna models, and many of these may be modified using the HFANT program. Fig. 7 shows how those models are used in the software.

If nothing else is known about a contact's antenna, use an isotropic antenna with an assumed gain. If the antennas are of common types, you can use physical (i.e., mathematical) models that may be modified using HFANT. More accurate models may be made using NEC[1] software such as NEC Win PLUS+, and saved as ACE-HF Type 13 gain-table files. Type 13 files are frequency-specific, and for best accuracy a separate file should be generated for each frequency. ACE-HF automatically runs ten frequencies for each prediction. When separate Type 13 files are used, they may be individually specified for different bands with user-made multi-channel antenna schedule files.

Don't worry about all those complex pattern lobes and nulls when you make a system simulation. ACE-HF will account for them automatically, and will compute the right signal strength at the receiver.

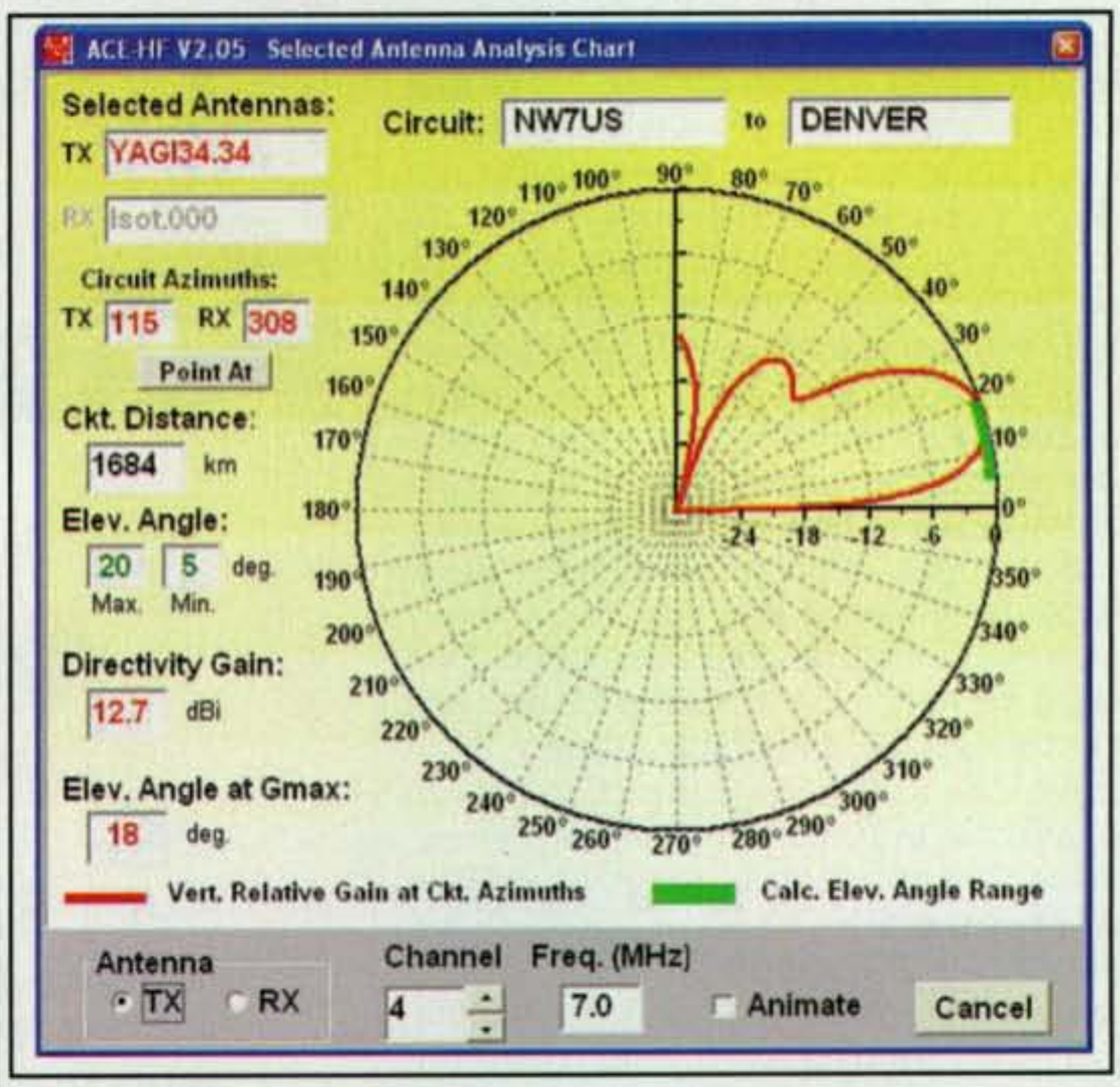

Fig. 8– 40-meter Yagi launch vs. MRM elevation angles.

Optimizing Antenna Launch Angles

A special ACE-HF chart may be used to be sure your antenna is appropriate for a particular circuit. For maximum effectiveness, the launch (take-off) angle of your antenna's main beam should coincide with the elevation angle of the Most Reliable Mode (MRM) of the propagation path. An example chart is shown in fig. 8, where I analyzed a circuit from my station near Seattle to Denver, Colorado.

There is a wealth of information in such analysis charts. The circuit path is shown at the top, along with the antennas that were selected at both ends of the circuit. The antenna azimuth settings are given next, along with the circuit distance. The range of the MRM elevation angles throughout a 24-hour day are also given, together with the directivity gain (G_{max}) and the elevation angle at G_{max}.

This figure compares the elevation-angle range (in green) of the MRM vs. the antenna's main beam launch angle (in red) at 7.0 MHz. It is surprising how much insight one gains when the chart is animated through the 2–30 MHz frequency range.

Type 13 Antenna Model Analysis

Although mathematical antenna models are easy to modify and use, the most accurate system simulations result when NEC Type 13 models are used. Mathematical models are somewhat generic, and it would be nearly impossible to generate such models for every conceivable case. NEC models, on the other hand,

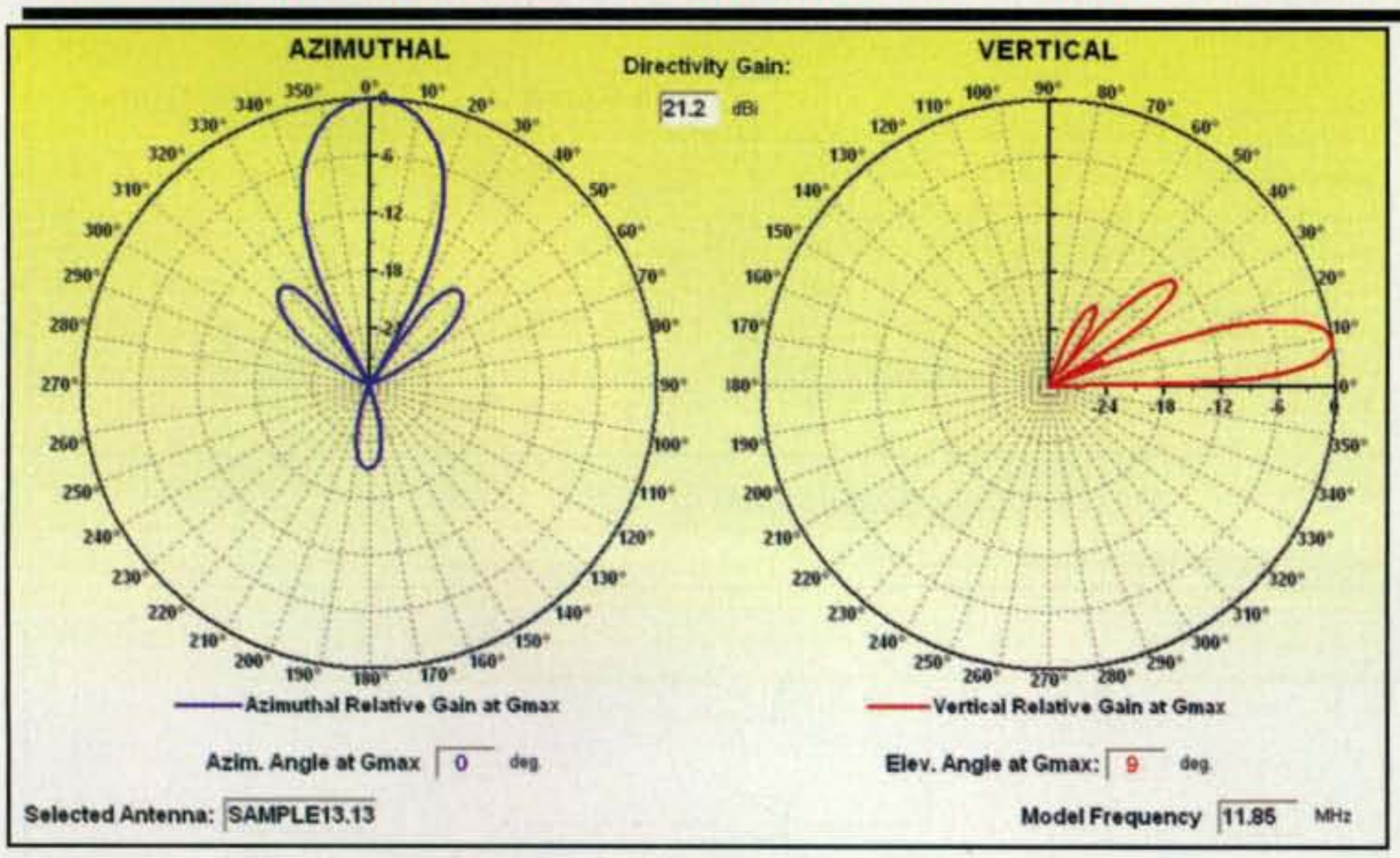

Fig. 9– HF curtain array antenna for 11.85 MHz.

can be tailored by the user for one's particular situation. As a simple example, perhaps a ham erects a simple long-wire antenna having a dogleg and sloping down from a treetop to his house. Such an unusual arrangement would be unlikely to be found in the model list; a custom antenna model is needed and a Type 13 file could be produced.

ACE-HF contains a special set of charts to illustrate patterns from Type 13 antenna models. Patterns for a *really good* directional antenna, the Sample13.13 model included with the software, are shown in fig. 9. This model is for a large fixed antenna used in HF broadcasting service, and is a periodic dipole array with a reflecting curtain, mounted vertically and suspended between towers. The array consists of four rows of elements in four stacks mounted 0.5 wavelength high. Phased feeds to various elements can slew the main beam to different azimuths, although the antenna is fixed.

This example is shown to suggest what beautiful and well-controlled patterns one can achieve when the antenna design is complex. (Compare it with the Yagi array in fig. 6.) It is unlikely that an amateur operator would erect such a huge array, but wouldn't it be fun?[2]

The ACE-HF chart shows a directivity gain of 21.2 dBi at an elevation angle of 9° for this antenna. A set of 1-MHz interval gain-table files are included with the ACE-HF PRO V2.05 installation CD. The selected antenna was a terminated folded-dipole antenna 50-feet long elevated 15 meters above ground. Fig. 10 shows a sampling of these Type 13 analysis charts in 4-MHz steps. (In the software, the series can be animated in 1-MHz steps from 2 through 30 MHz.)

While these charts are fascinating, each pair still represents a single slice through our imaginary antenna balloon. Wouldn't it be nice if we could create a three-dimensional figure, as we did in our *gedanken* experiment?

3D Antenna Charts

For centuries cartographers have sought to illustrate a three-dimensional, spherical globe on two-dimensional paper. (See

(Continued on page 108)

math's notes

BY IRWIN MATH,* WA2NDM

Free Power? Almost

After reading an interesting application for the new ultra-high-capacitance capacitors related to obtaining power from a telephone line, we thought we'd pass along a couple of interesting ideas in this same vein. For those who are not familiar with them, a series of capacitors with values greater than 1 Farad (1,000,000 microFarads) has been available for some time. These are not exceptionally large physically and usually have voltage ratings of only about 2 to 3 volts maximum. However, the extremely high capacitance has very interesting applications for power sources that are only needed for short periods of time. Also, in terms of recharging, like almost all capacitors, the number of times these can be charged or discharged is almost infinite.

Reviewing basic electrical characteristics, the formula for the energy stored in a capacitor is: $E = {}^1/_2\ CV^2$, where C is expressed in Farads and V in volts. E, the actual potential energy stored in the capacitor, is expressed in the total number of watts that can be delivered in one second, either "instantaneously" or along the standard logarithmic R/C discharge curve. For values with which we are familiar (such as a few hundred microFarads) this is usually a very small amount. However, when one considers capacitance values of millions of microFarads, it suddenly becomes quite significant. For example, a 1-Farad capacitor charged to 2 volts has a potential energy of $1 \times 4 \div 2$, or 2 watts. This is, according to Ohm's Law, 2 volts at

*c/o CQ magazine

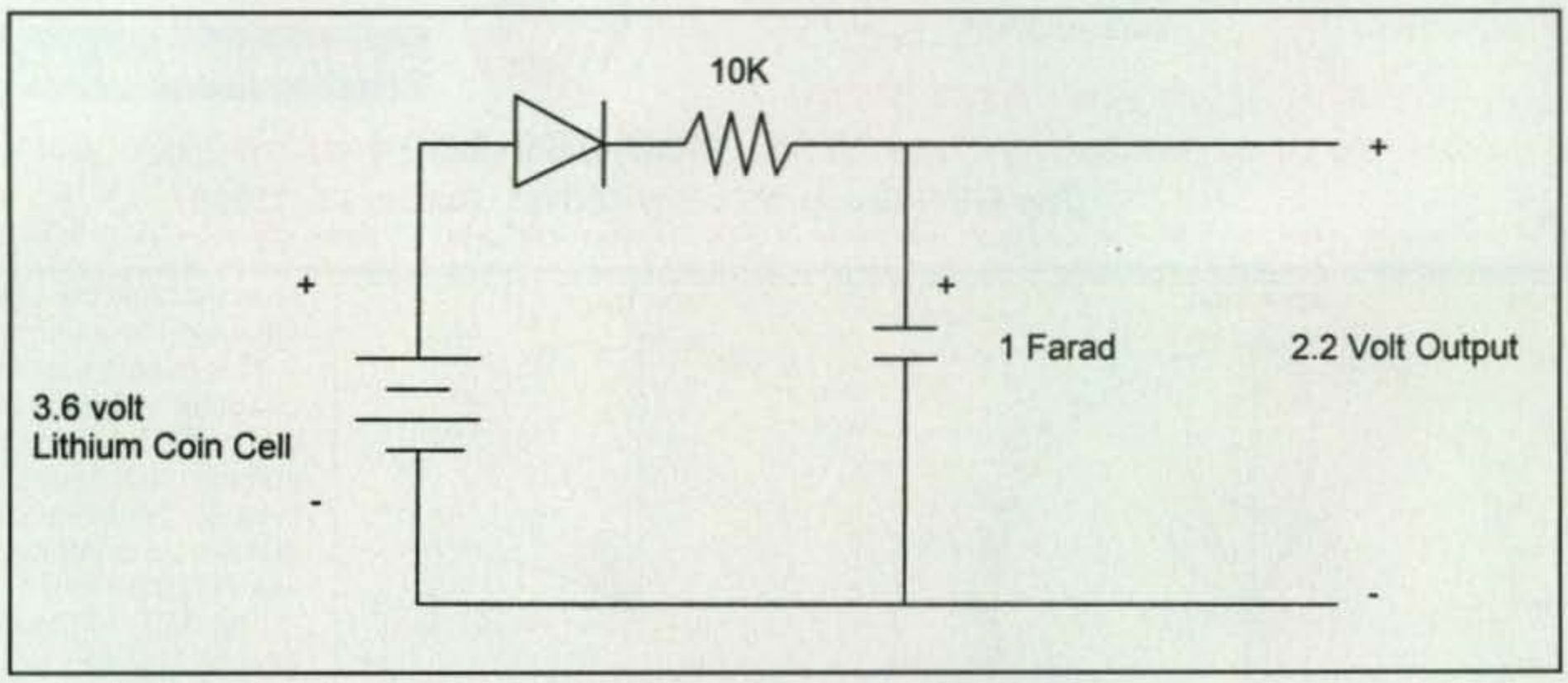

Fig. 1– A simple super-capacitor power-supply circuit.

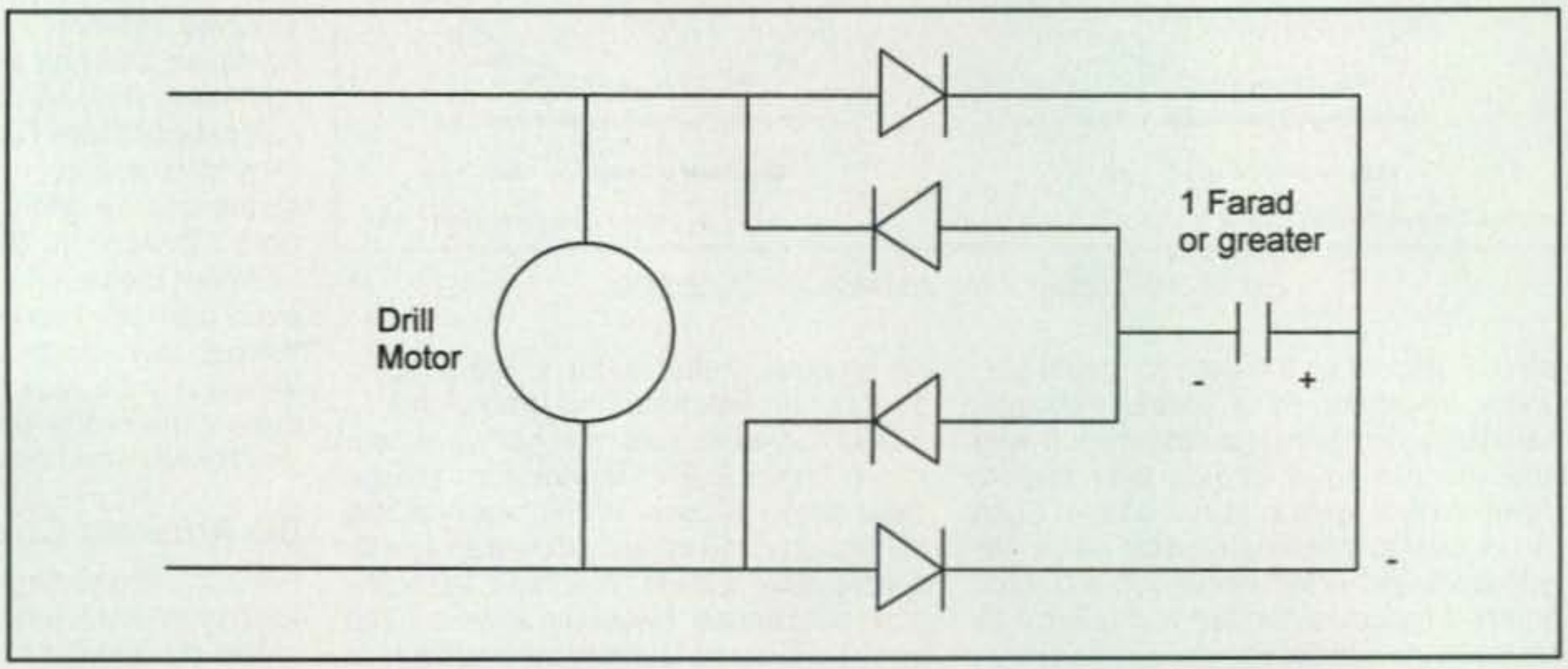

Fig. 2– A super-capacitor "boost" for a cordless drill.

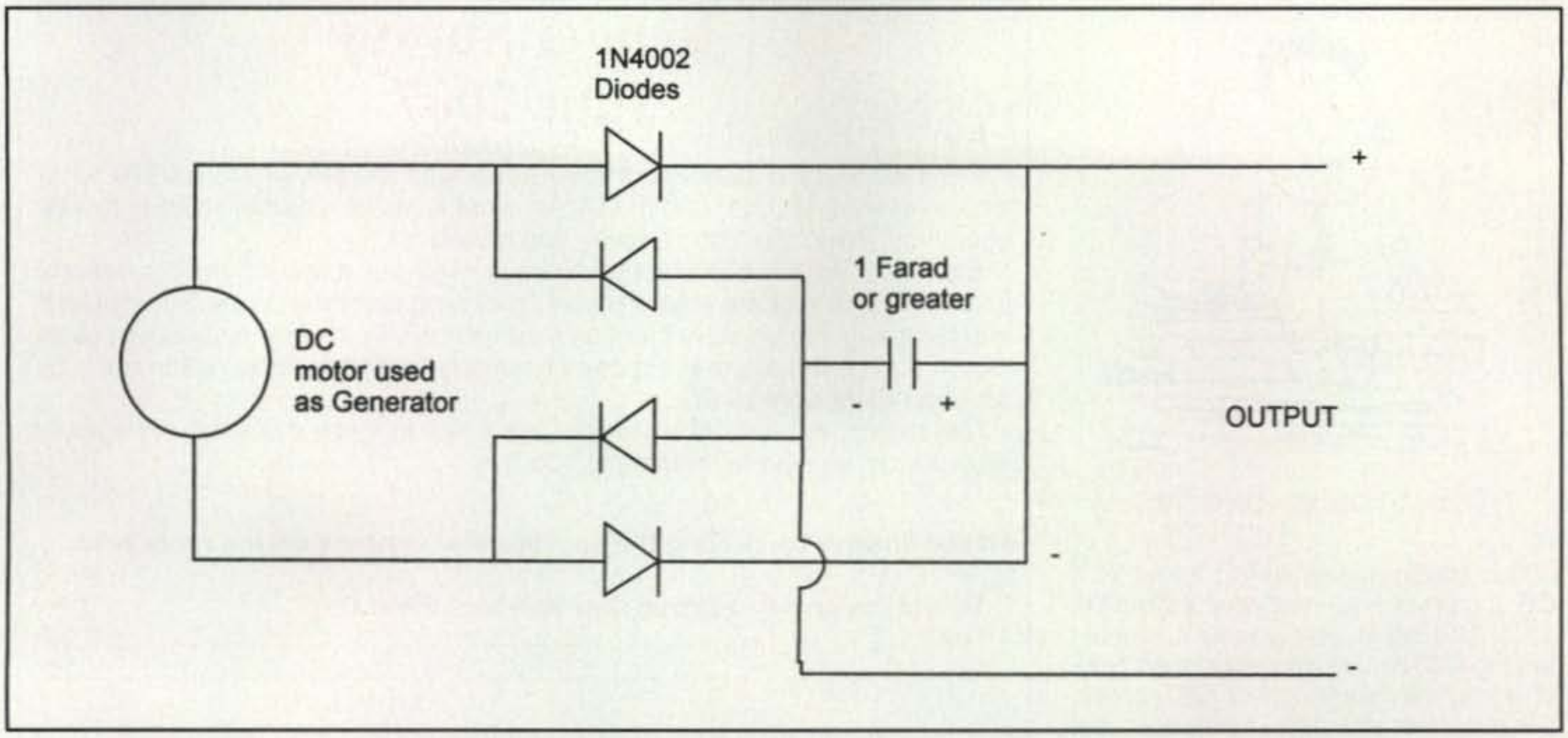

Fig. 3– A super-capacitor emergency power supply.

1 ampere! Now imagine 10 or even 100 Farads. "My God," you exclaim. "This is not a capacitor; it's a battery!" Well, you are almost right. Using this example we will now look at how to use these "super-capacitors," as they are called.

Fig. 1 is a schematic of a power supply that will deliver 1.5 to 2 volts to an intermittent load such as a momentary flashlight, emergency radio, etc. The source is a 3.6-volt lithium coin cell, which usually does not possess a very high current capacity. When not driving the lamp, the capacitor charges to approximately 2.2 volts (the battery voltage—two diode drops). Now when the switch is turned on, the energy stored in the capacitor is delivered to the load. Until the capacitor discharges, far more power is available than from the coin cell alone.

This type of scheme is also ideal for loads that need short bursts of power. Consider a portable electric drill or screwdriver. When starting a hole or turning a screw, initially the power needed from the drill often is less than when actual resistance is encountered. Then, the momentary higher current requirements to overcome this resistance discharges the battery sooner. Add a 10- or 20-Farad capacitor across the drill motor as shown in fig. 2, and you suddenly lengthen battery life (before recharging) quite significantly, not to mention the surge of additional power available. By the way, the bridge is used for motors that are reversible.

Fig. 3 is a possible circuit for a manual-labor power source. A small DC motor is attached to a crank handle and used to provide voltage for a super-capacitor. In the example shown, a diode bridge is included to make sure that the capacitor will charge no matter which way the crank is turned. A minute or so of manual turning results in enough charge in the capacitor to power low-current loads for a significant amount of time. This is similar to the scheme used in emergency radios with manually operated crank handles. You might have to try different motors to see which produce the most output per turn. You might also try a gear arrangement to speed up the crank-to-motor rpm.

All of the above examples are really given to whet your appetite to experiment with these unique devices. As most super-capacitors are only rated at 2.5 to 5.5 volts or so, they must be put in series for higher voltages. If you choose to do this, remember that the effective capacitance will be half of one capacitor alone. When you series connect super-capacitors, you should also provide equalizing resistors such as shown in fig. 4. These will tend to equalize the voltage across the two capacitors.

Finally, don't forget that a charged super-capacitor is a reservoir of a great deal of potential energy. *Never short the terminals or you will be in for a real surprise. The sudden energy released can take a chunk out of a screwdriver and scare the wits out of you!*

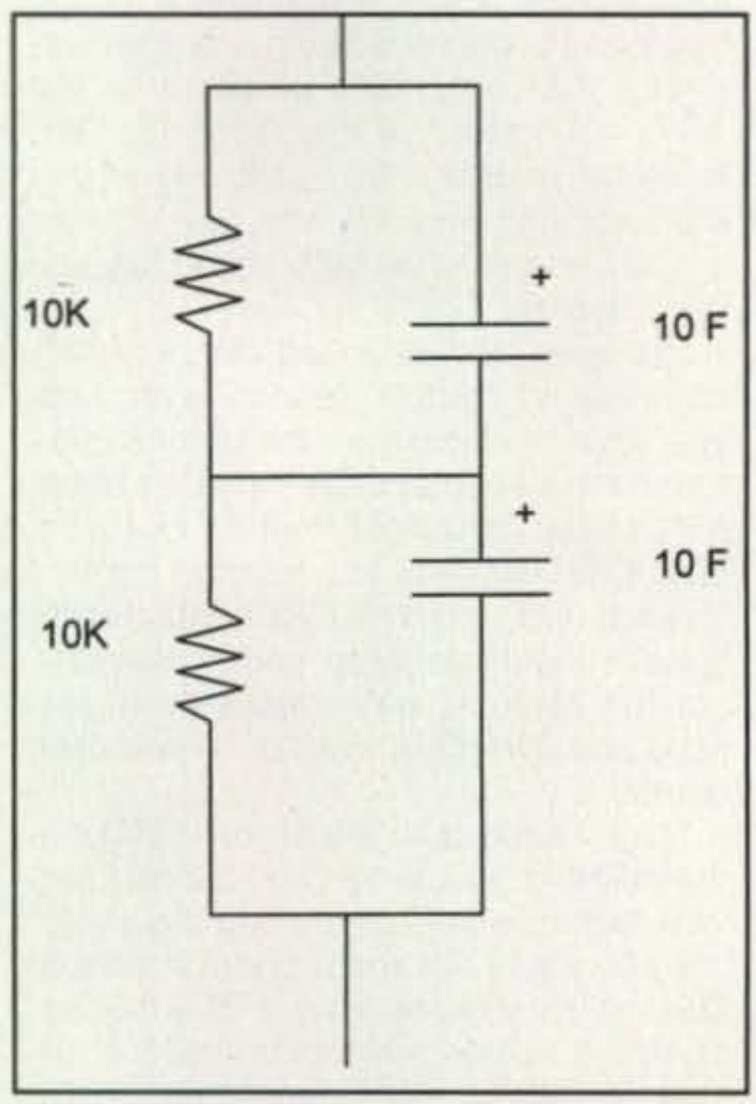

Fig. 4– Connecting super-capacitors in series.

Super-capacitors can be purchased from most regular parts distributors such as Mouser Electronics (www.mouser.com), DigiKey (www.digikey.com), and many others, and they range in price from a dollar or two to tens of dollars, depending on capacitance and voltage ratings. Do not be afraid to do an internet search if these are of interest to you.

73, Irwin, WA2NDM

What You've Told Us...

Our March survey asked about your QSLing practices, and it appears that the art of QSLing is alive and well, at least among *CQ* readers who responded, 93% of whom say they collect QSL cards. Even more of you (96%) have cards that you send out—68% buy them from commercial QSL card printers, 20% print them yourselves, 11% get them from a local printer and 4% use online QSLs. Speaking of online QSLing, we were surprised that only 22% of you use the ARRL's Logbook of the World (LoTW), followed closely by 21% who use eQSL.cc and only 8% who use another online service, while 60% of you say you don't use any online service.

We were also surprised that only 64% of you send cards in response to cards you have received from the other station for an on-air contact. On the other hand, 55% of you QSL most or all DX contacts, 52% QSL contacts you need to confirm for an award, and 51% QSL contacts with special significance to you, while 31% confirm contacts with special event stations and 24% QSL most or all domestic contacts.

Nearly three-quarters of you (73%) use the ARRL's incoming QSL bureau service, but only 61% of you use the outgoing service. Your most popular way of QSLing DX stations is via a QSL manager with a self-addressed stamped envelope, or SASE (69%); while 60% QSL directly to the DX station with International Reply Coupons (IRCs), 21% send cards to the DX station's QSL bureau, 10% use another organization's QSL bureau, and 8% don't QSL DX stations.

Finally, we asked how you store and organize your received cards, and shoeboxes (and similar) came out as the big winner, accounting for 63% of readers, while 36% use albums, 25% use hanging displays, and 12% have some other way of storing and organizing their cards.

This month's free subscription winner is Tim Connor, KA2VEG, of Syracuse, New York.

Reader Survey June 2007

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

This month, in honor of Field Day, we'd like to know a little bit more about many hams' second-favorite topic: food!

Please answer by circling the appropriate numbers on the reply card.

1. Do you belong to a group that operates Field Day?
- Yes 28
- No 29

2. How is the food at your FD site prepared? (Circle all that apply)
- On site by one or more club members 30
- Off site by one or more club members 31
- On site by an outside caterer 32
- Off site by an outside caterer 33
- Purchased from local restaurant 34
- Donated by local restaurant 35
- Operators bring their own food 36
- Other 37
- Do not belong to group that operates Field Day 38

3. Generally speaking, how is your Field Day food?
- Gourmet quality 39
- Pretty good 40
- Nothing to write home about 41
- Pretty bad 42
- Awful 43
- Varies from year to year 44

4. How is the food at your local hamfest prepared? (Circle all that apply)
- On site by one or more club members 45
- Off site by one or more club members 46
- On site by an outside caterer 47
- Off site by an outside caterer 48
- Purchased from local restaurant 49
- Donated by local restaurant 50
- Other 51
- No food served 52

5. Overall, how would you rate the food served at your local hamfest?
- Gourmet quality 53
- Pretty good 54
- Nothing to write home about 55
- Pretty bad 56
- Awful 57
- Varies from year to year 58
- No food served 59
- Do not attend hamfest/no hamfest in my area 60

Thank you very much for your replies. We'll be back next month with more questions.

The Open Road is Calling

From Stormtracker to commuting roundtable, Alinco makes a great impression!

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- Optional internal 1200/9600 packet TNC, rear panel serial port
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- Theft alarm feature
- H/M/L power output selection
  DR-135 50/10/5w
  DR-235 25/10/5w
  DR-435 35/10/5w
- MARS capability
- AM Airband RX on DR-135
- Extended receiver on all models
  DR-135 136 ~ 174 MHz (FM) + AM Airband
  DR-235 216 ~ 280 MHz (FM)
  DR-435 350 ~ 511 MHz (FM)
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- CTCSS, DCS encode/decode and DTMF encode functions plus European Tone Bursts
- Multiple scan modes and extended receive capabilities including broadcast FM
- Backlit DTMF microphone allows direct frequency entry and more
- VHF: 50/20/5, UHF: 35/20/5 watt power output settings
- 200 Memory channels that can operate in splits of 80ch/VHF, 80ch/UHF and 40ch freely programmable with 1 call channel for each band
- Cross-band repeat capability
- Extended receive from 108.000 ~173.995MHz 335.000 ~ 479.995MHz 87.5 ~ 107.995MHz, transmits from 144.000 ~ 147.995MHz 430.000 ~ 449.995MHz, plus AM aircraft band RX and MARS capability
- Can also operate with Alinco's optional EJ-50U digital data packet board that fits inside or the EJ-47U digital voice board

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This is not your father's antenna analyzer ... or, for that matter, yours five years ago. If you're used to taking single-frequency measurements, check out the swept-frequency readout of the Array Solutions AIM 4170.

CQ Reviews:

The Array Solutions AIM 4170 Antenna/Lab RF Analyzer

BY PHIL SALAS,* AD5X

Along with SWR meters and VOMs, I'll bet that one of the most-commonly owned and used accessories in the ham shack is the antenna analyzer. Antenna analyzers have revolutionized our way of measuring and adjusting antennas and related components. Since purchasing an MFJ-207 in the early '90s, I haven't been without one of these pieces of equipment. Over the last several years, antenna analyzers have started evolving from analog, manually tunable fixed-frequency measuring devices to DDS (direct digital synthesis) software-controlled swept-frequency devices. One of the newest antenna analyzers on the market is the Array Solutions AIM 4170, designed by Bob Clunn, W5BIG. Since Bob lives just one mile from me, I ran over to his house to pick up a unit for this review.

Photo A– The AIM 4170 is packaged with everything necessary for operation. (Photo courtesy Array Solutions; all other photos by the author)

Basic Description

The AIM 4170 antenna analyzer covers 100 kHz to 170 MHz using DDS technology. A 12-bit analog-to-digital converter digitizes the raw data for processing, thereby avoiding diode-detector non-linearities. This results in excellent dynamic range and linearity for accurate magnitude and phase measurements. Impedance measurements can range from 1 ohm to 10K ohms, and true phase angle is measured so there is no ambiguity when measuring inductive or capacitive reactance. Internal bandpass filters reject out-of-band high-power interfering signals, which makes the unit very robust in the presence of broadcast transmitters or other high-power signals near the measuring frequency. Also, since the internal RF generator is very stable and can be calibrated to WWV, the AIM 4170 can easily be used as a signal source for testing receivers.

The AIM 4170 is very compact at just 5" × 4" × 1.5" and weighs only 9.6 ounces (see photo A). This compact size comes with a bit of a penalty, though, as you do need a PC in order run the unit and display the results. However, the AIM 4170 is quite portable even with a laptop computer. It can be mounted remotely at your antenna feed point if desired, with power supplied through a user-provided internal battery. As an alternative, you can read the antenna impedance with the AIM 4170 located in the shack using the "Refer to Antenna" function. Here the software guides you through a cable calibration procedure, after which AIM 4170 essentially subtracts-out the feedline, thereby providing the actual antenna impedance data as if the AIM 4170 were located directly at the antenna.

RF parameters that are measured,

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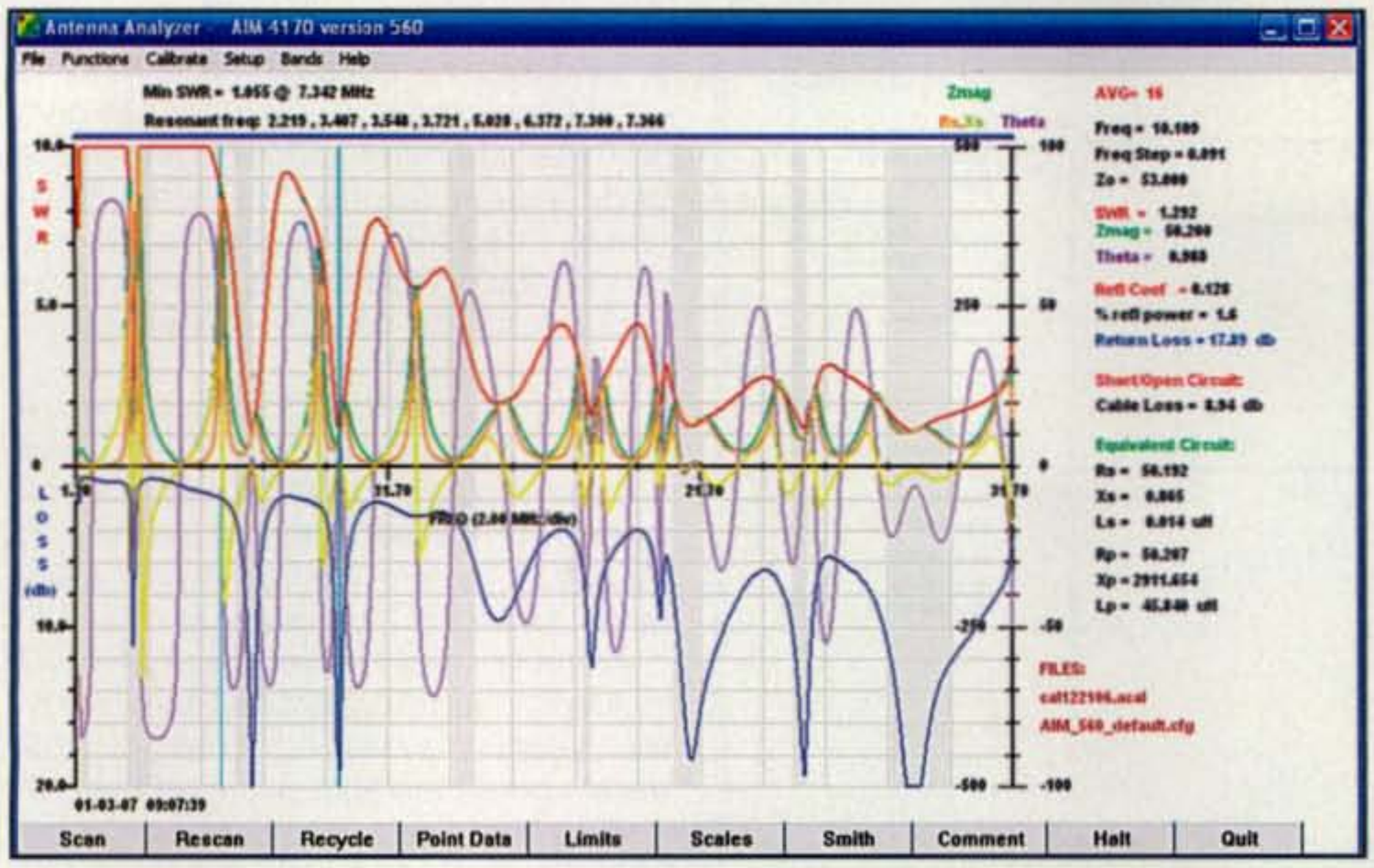

Photo B– Massive amounts of data can be plotted. The user can decide what is important and turn off the undesired plots.

calculated, and displayed include the following:

- SWR referenced to any impedance (1:1 to 20:1)
- Impedance at the cable input or at the antenna terminals
- Return loss
- Reflection coefficient
- Cable length, impedance, and loss
- Distance to fault (open or short)
- Smith Chart display
- Resistance and reactance of discrete components at the operating frequency
- Quartz-crystal parameters

All measured and calculated information can be saved to disk or printed in order to compare before and after results. The data saved to disk includes a .csv file that can be imported into a spreadsheet program for additional analysis off line. Finally, too, the software has been tested with Windows® 95, 98, 2000, and XP and does not even require an installation procedure; it will run directly from the included CD if desired!

Using the AIM 4170

The AIM 4170 comes with pretty much everything you need (see photo A). There are three standard calibration loads (open, short, and a standard resistor), a "wall-wart" power supply, and an RS-232 computer-interface cable. Since the AIM 4170 uses a BNC connector, a BNC-to-UHF adapter is also included.

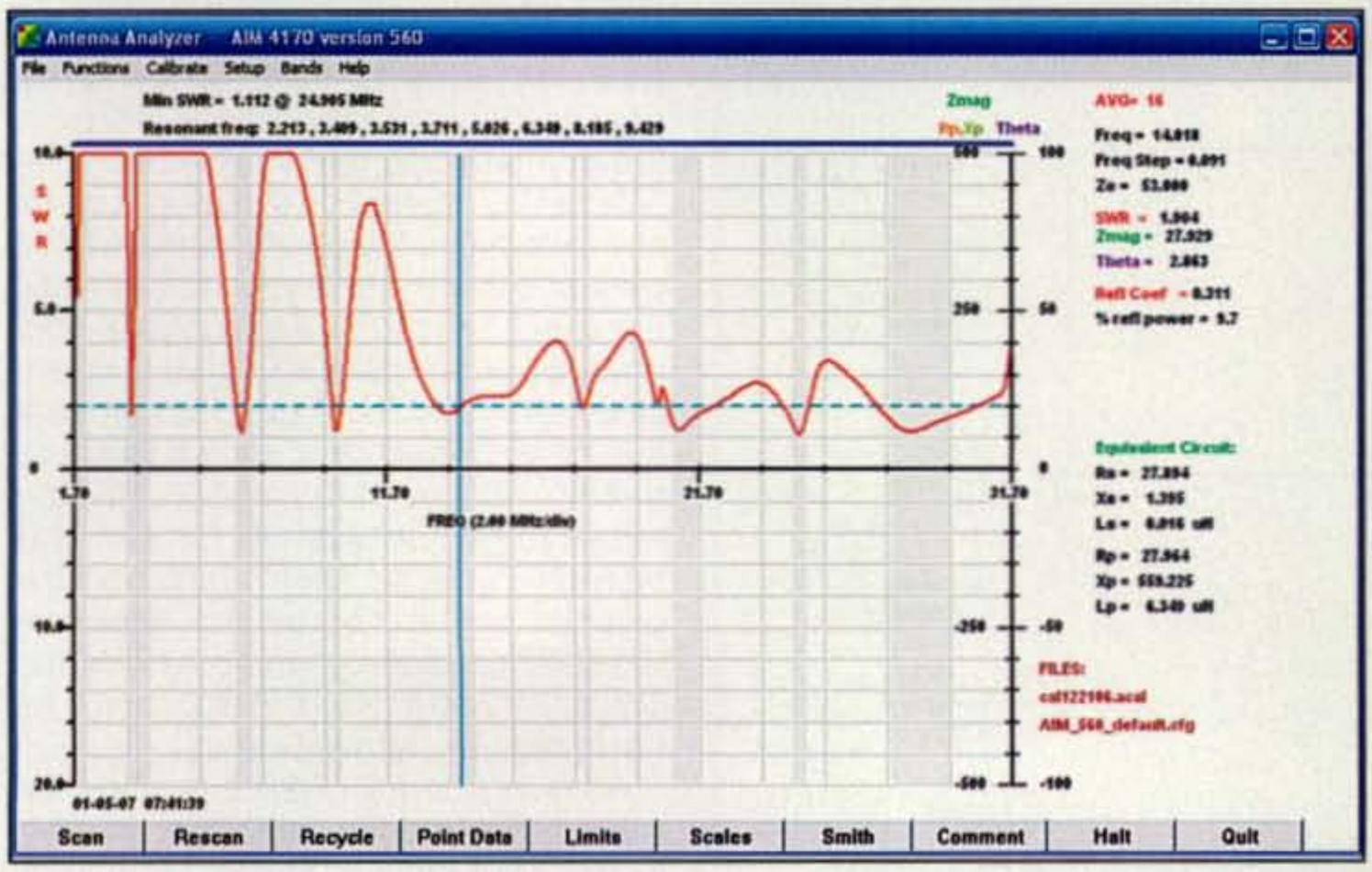

Photo C– The 1.7–29 MHz SWR swept response of the Butternut vertical.

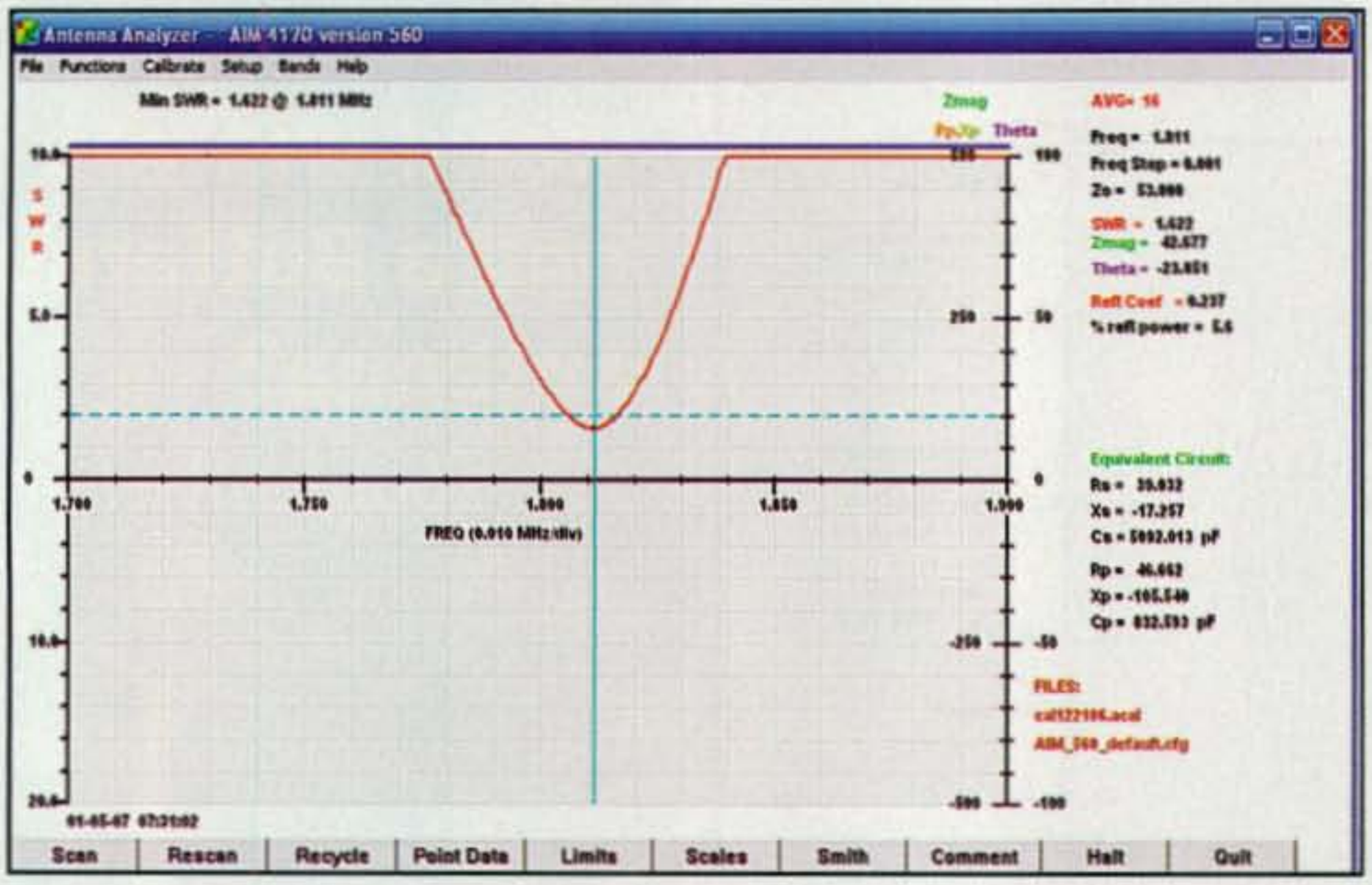

Photo D– The Butternut 160-meter swept response.

There is the CD with software and a printed quick-start guide as well. Calibration is a snap, requiring no tools or adjustments, and in just a few minutes you'll have everything up and running. If your computer only has a USB interface, you will need to purchase an inexpensive USB-to-serial adapter, which is easily installed using simple instructions in the AIM 4170 manual.

Now it is time to get down to business! First I wanted to look at the broad-band responses of my Butternut HF-9V vertical with the 160-meter coil, and my MFJ-1775 rotatable dipole. I had set the band resonance points on both antennas with an MFJ-259B antenna analyzer. However, I had never looked at the broad-band responses, since this is too difficult and time consuming to do with a manual antenna analyzer. The AIM 4170 will plot simultaneous curves of SWR (red), impedance magnitude (green), reactance (yellow), and the phase angle of the load impedance (magenta), as can be seen in photo B. However, this is too much information for these preliminary tests, so with a few mouse clicks I turned off everything except the SWR graph. I also enabled the SWR ruler and set it to 2:1 so as to give a feel for the usable bandwidth, and the "Highlight Band" feature so the ham band limits are obvious on the scans.

The full SWR sweep of photo C clearly shows the individual band resonances of the Butternut vertical. I took a closer look at 160 meters (see photo D), since the 2:1 SWR bandwidth is very narrow—as it should be if you have an electrically short antenna and a decent ground system. I use a remote relay to short turns on the 80-meter coil to give 60-meter operation, and shorting these turns also shifts the 160-meter resonance. The AIM 4170 software lets you do a re-trace, holding the original trace in place so you can see the effects of tuning your antenna.

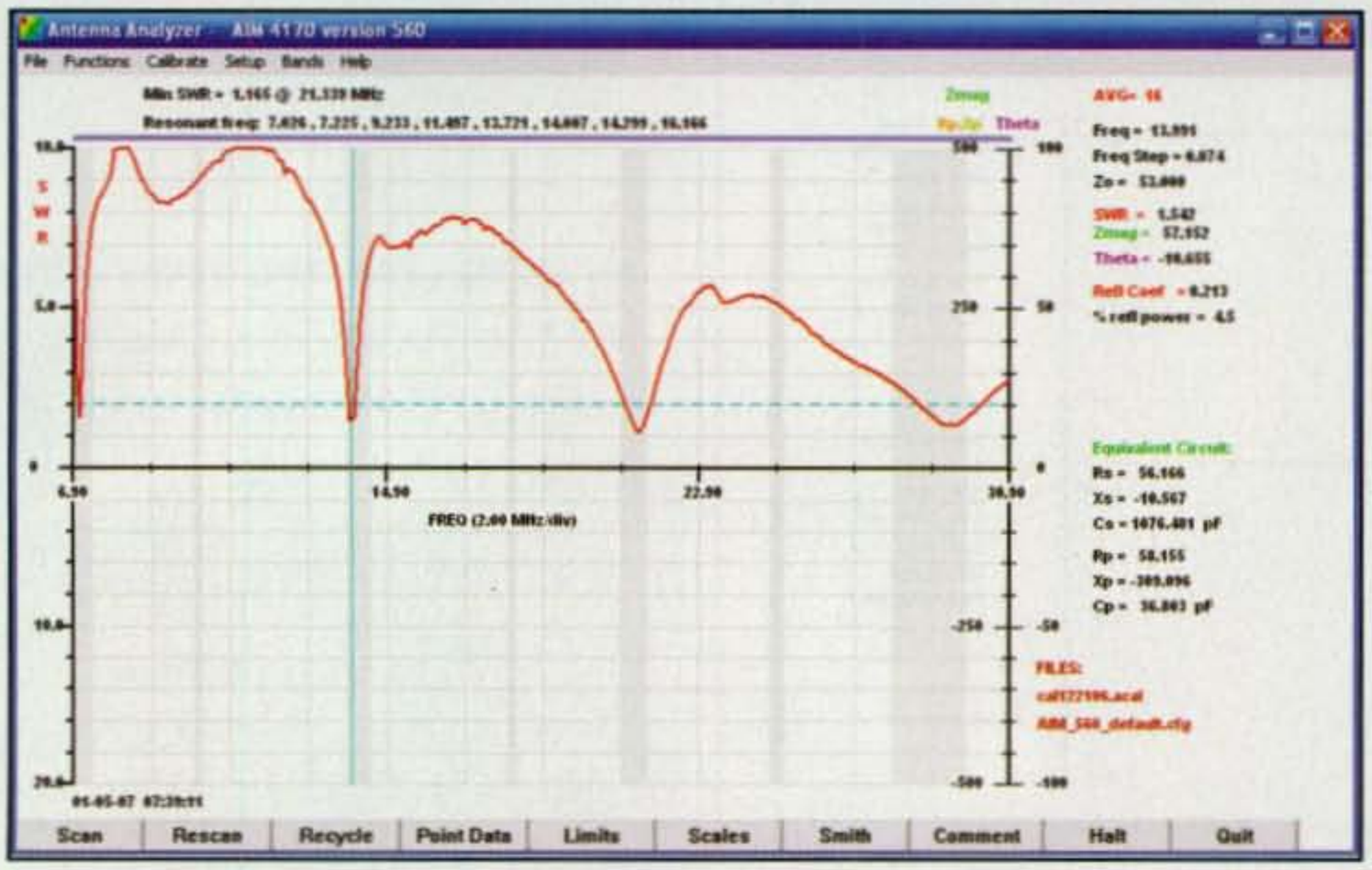

Photo E– Swept response of the MFJ-1775 rotatable dipole.

Photo E is the 40–10 meter sweep of the MFJ-1775 rotatable dipole. This is a short dipole (about 14 feet overall length), so the bandwidth is narrow on 40 and 20 meters. Photo F shows a 40-meter sweep of this antenna.

As mentioned earlier, the AIM 4170 includes internal bandpass filters to protect against undesired strong out-of-band signals that can overload the unit and corrupt readings. However, very strong signals may still overload the unit. If the readings on the AIM 4170 appear "flaky," you can use the "Band Scan" feature of the unit, whereby it operates as a spectrum analyzer to help you locate any strong problem signals. My main potential problems occur due to the nearby KRLD 50-KW AM broadcast station on 1080 kHz. Photo G is the spectrum scan I took of the AM broadcast band, which clearly shows KRLD. The top red line of the scan represents 150 mV peak. Signals above this level may overload the AIM 4170 and make the readings inaccurate. As you can see, the 150-mV peak maximum level of the AIM 4170 is not being exceeded by KRLD, although it is close! This "Band Scan" feature can also be valuable in helping to figure out who is overloading your receiver on Field Day!

Next I wanted to look at some crystal data. While I've built homebrew crystal filters for QRP rigs for many years, I've always used default designs by others, as I didn't want to build the test setup necessary to actually directly measure the crystal parameters. However, the AIM 4170 makes measuring crystal characteristics trivial. My current QRP project is a 30- and 20-meter CW radio using a 2-MHz VFO and a crystal filter made up of inexpensive 12-MHz microprocessor crystals. In order to measure the 12-MHz crystals, I used a Banana-to-BNC adapter (Mouser 565-1296). I recalibrated the AIM 4170 with this adapter in place. Then I attached the crystals and clicked on the "Measure Crystal" function. Within seconds the screen shown in photo H appeared. As I said before—a trivial effort!

Another interest of mine is using the AIM 4170 as a signal generator for making receiver measurements. The nominal output level is 30 mV RMS into 50

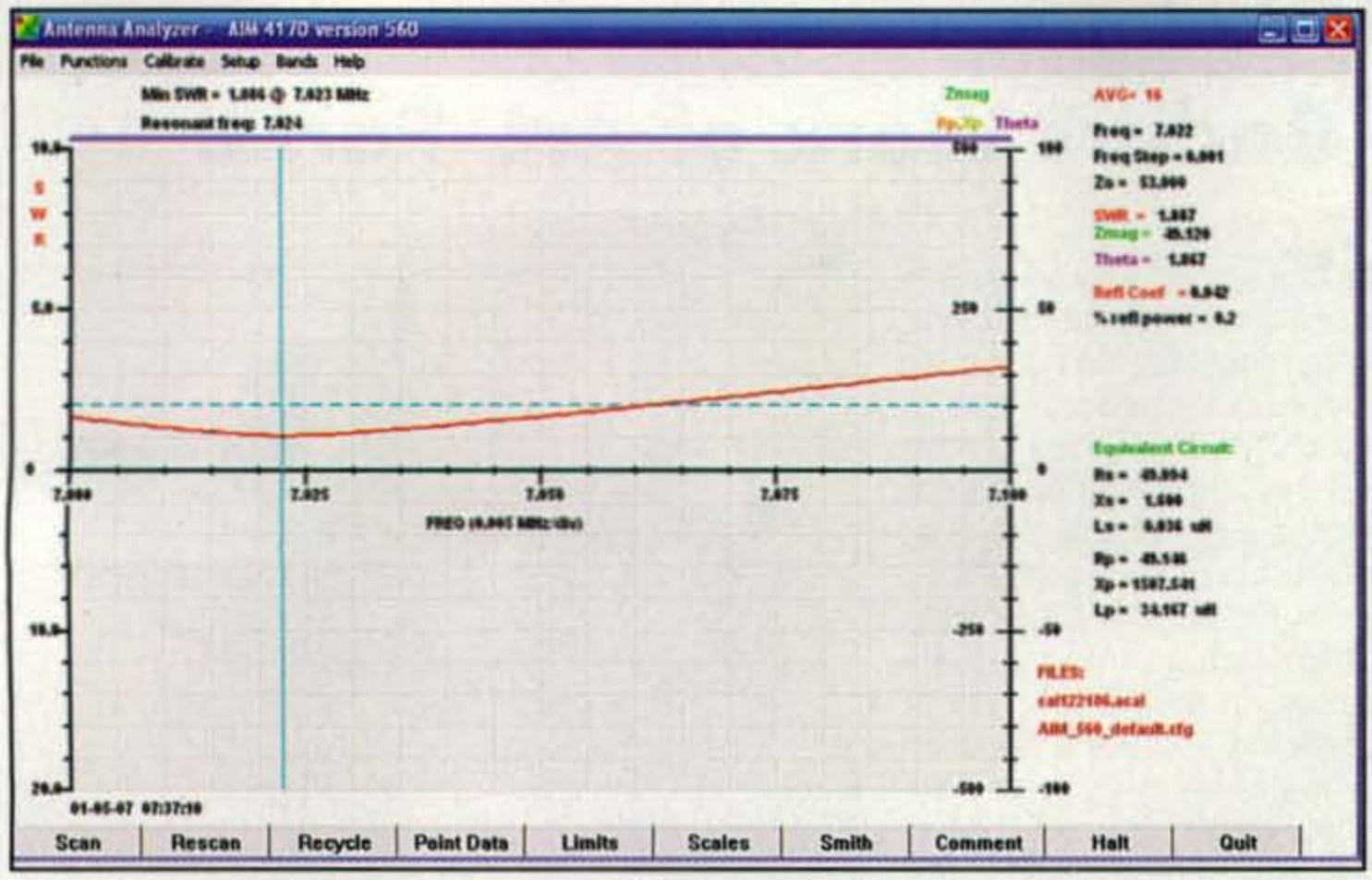

Photo F– The MFJ-1775 40-meter swept response.

ohms, which means you need about 56 dB of attenuation to give you a 50-µV S9 signal. I use the AIM 4170 with a 52-dB fixed attenuator and an MFJ-762 step attenuator (see "The Weekender," *CQ*, September and October 2006) to provide me with a stable and accurate RF source for tests and measurements.

There are many other features and capabilities of the AIM 4170 that I haven't even begun to describe. For everything this device can do, download the complete user manual from <http://www.w5big.com>, as well as a demo program that runs without the hardware.

Wishes

While the AIM 4170 does almost everything I'd like to see in an antenna and component analyzer, I feel that the need for a PC for operation is somewhat of a hindrance, especially for outside tuning of an antenna. It would be nice if Array Solutions had a compact LCD display with a few buttons that could maybe just enable the SWR function at specific frequencies for outdoor use, and maybe one of these days, expand the capability to include the 450-MHz ham band as well.

Conclusion

The AIM 4170 is a reasonably priced, lab-grade antenna and component analyzer that quickly will become an indispensable item once you begin using it. Plus, with software and firmware updates available for download at no charge, you won't have to worry about product obsolescence.

I've only touched on the basic capabilities of this unit, so please investigate it further on the website referenced above. Once you get used to displaying swept responses of your antenna systems, you will find it difficult to go back to single-frequency measurements.

The AIM 4170 is available from Array Solutions: <http://www.arraysolutions.com>. Price is $400. ■

Photo G– Band scan of the AM broadcast band.

Photo H– The 12-MHz crystal parameter measured data.

Keys 2007:
Amateur Radio's Work of Art, Part II

BY DAVE INGRAM,* K4TWJ

Our mighty Morse tour continues this month with more views of attention-grabbing keys, bugs, and paddles specially designed for super CW enjoyment. As I mentioned last time in part I, interest in keys and CW is definitely on the rise. That is apparent in the number of operators running at 5 or 6 wpm on the air, and in the constantly increasing membership of Morse code oriented groups such as the FISTS CW Club highlighted last month and the recently formed Straight Key Century Club. Each group deserves a hearty round of applause for helping amateurs become code proficient, and members of both groups deserve compliments on continuing our proud legacy and tradition of using CW regardless of the speed. Well done, friends!

If you are not familiar with the Straight Key Century Club (SKCC), incidentally, listen around 3.550, 7.120, 10.120, 14.048, 18.080, 21.120, 24.910, or 28.170 MHz for on-the-air activity (typically recognized by folks sending slow CW with straight keys). You can also check out the club's website (www.skccgroup.com) and join on the spot. You can even jump right in with both feet by ordering your own official SKCC key as shown in photo 1.

Before proceeding, we wish to thank the following CW afficionados for sharing their key views with us this month: N1FN, N3ZN, KI7VY, KA6IRL, WZ8C, W6AME, W4PAL, and James H. Richard of Michigan. It is support from people such as you that makes these keys columns possible. Thanks! I also remind everyone with a special key or CW item others might enjoy studying to send a couple of photos and details directly to me, K4TWJ, and I will do everything possible to feature it/them in future keys columns. Do it now! "Keys 2008" is already taking shape and you should be included.

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Photo 1– This new SKCC key is a smart-looking and smooth-functioning item that any radio amateur would be proud to own and display in the shack or office. It sports a Marconi-type design and an 18-kt. gold-plated mechanism with the SKCC logo, is mounted on a 3×5.5 inch oak wood base, and also is reasonably priced. The key is available from <www.MorseX.com>. (Photo courtesy of Morse Express)

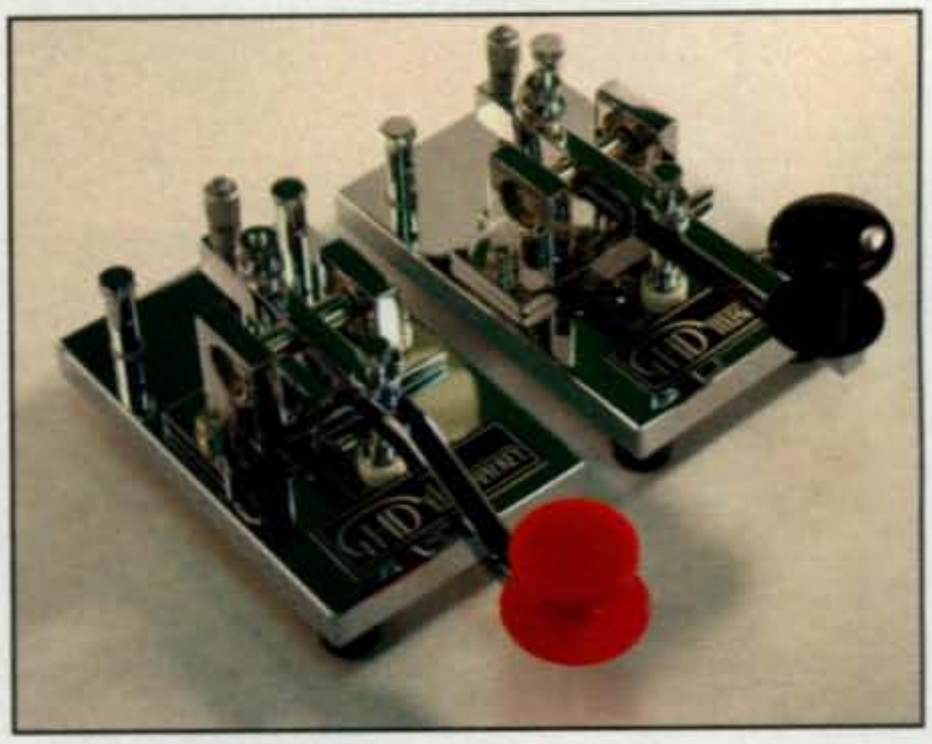


Photo 2– Morse Express also offers these two GHD beauties for the dedicated straight-key enthusiasts, and they are fancy! Special features include micrometer-adjusted contact spacing, aircraft-grade ball-bearing movement, and two knob-mounting holes for effectively changing arm length. The keys are identical, except one has a straight lever and one has a curved lever. The keys available from Morse Express, 1-800-238-8205. (Photo courtesy of Morse Express)

Keys, etc., from Morse Express

Returning to photo 1, the SKCC key is a classic Marconi-style item with contacts for both "make" and "break" (handy for wired-QSK operation with a separate transmitter and receiver). It has the traditional adjustments for gap and tension, a behind-the-fulcrum mounted pull-down spring, and an 18-kt. gold-plated mechanism for class and flash. The key's arm is engraved with its serial number and the SKCC logo, and it is available from <www.MorseX.com>.

While visiting the Morse Express website, take a look at the company's other unique hand keys, such as the luxurious GHD GT-502A and GT-502MIL that WZ8C and the group used during the 2006 "Straight Keys in Belize" DXpedition (photo 2). These beauties have a deep chrome finish that is beyond compare, plus aircraft-grade ball bearings at the fulcrum and a lower contact set in a ceramic insulator to reduce vibration. In the special features department, both keys have contact spacing set with a micrometer for precision adjust-

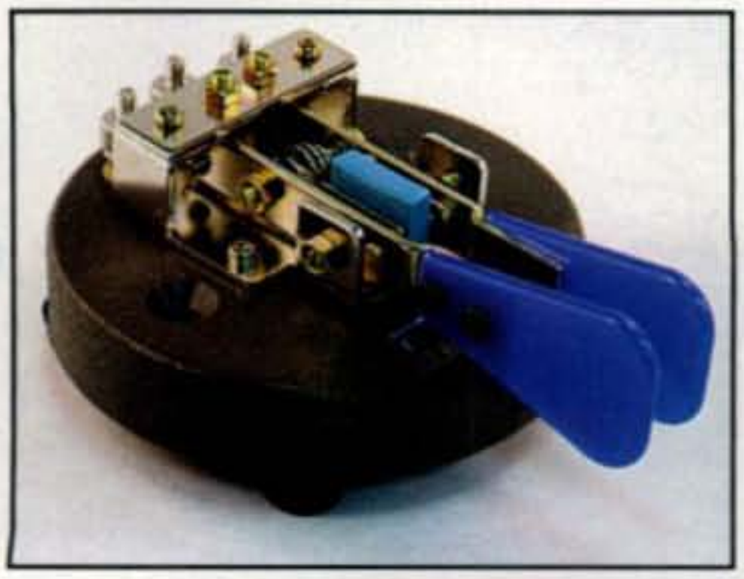


Photo 3– Just in at Morse Express is this smart-looking, round-base iambic paddle from Japan's long-time manufacturer of high-quality keys, Katsumi. It is 4 inches in diameter, 2 inches tall, weighs 2.5 pounds, has needle bearings at pivot points and a full complement of adjustments, and is attractively priced! (Photo courtesy of Morse Express)

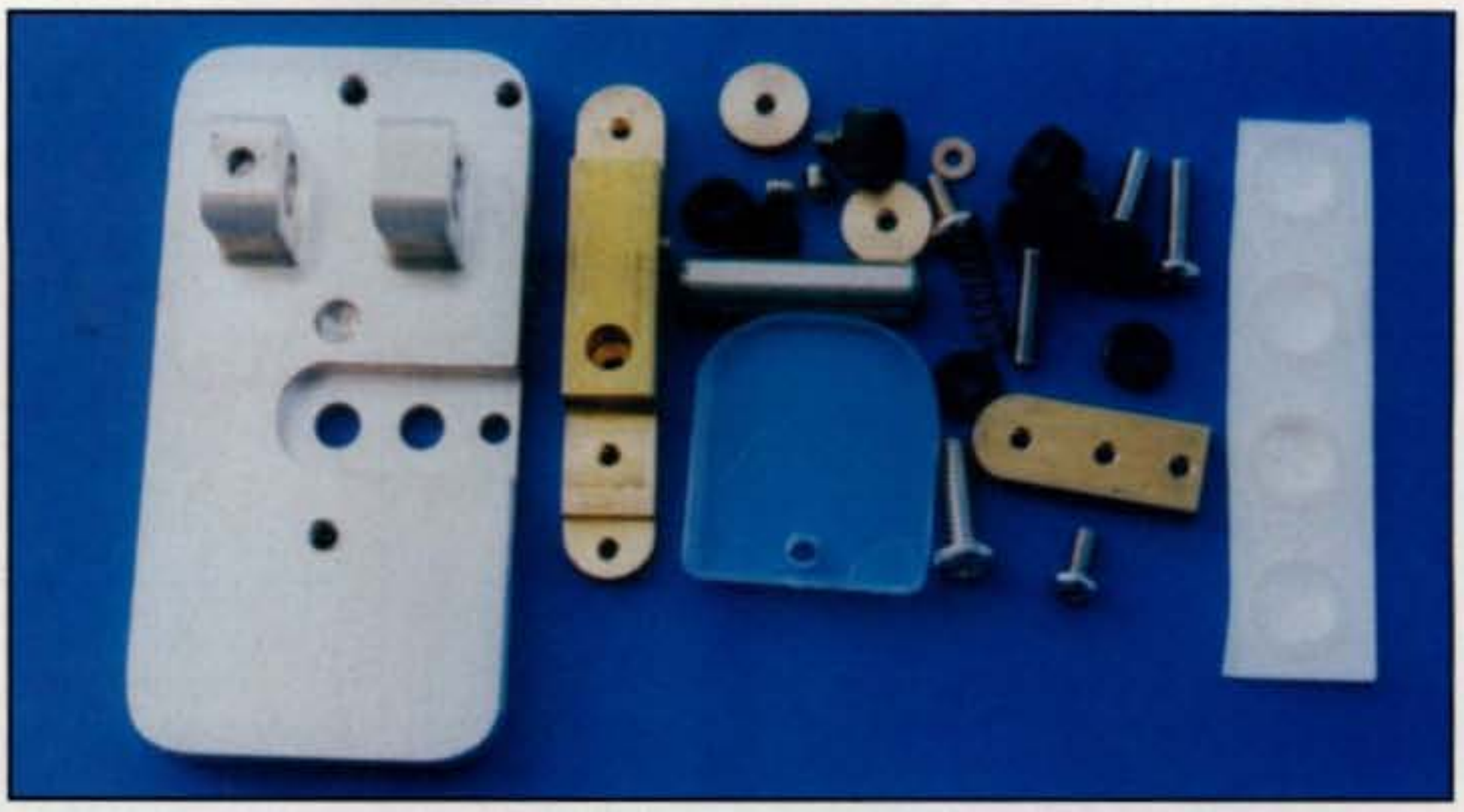


Photo 5– The American Morse kit key prior to assembly. Everything is predrilled and buffed, so all you need to assemble it is a Phillips screwdriver and a few minutes, which makes it a great project.

ments and returning to a preferred setting in a flash. When you are really serious about using a straight key, these gems are tops!

Incidentally, if you ever travel to the Aurora, Colorado area, be sure to visit the Morse Express store and showroom. As owner Marshall Emm, N1FN, points out, Morse Express has become the largest distributor of keys and CW-related items in the world. Over 130 different types of keys, bugs, and paddles are in stock at any given time, and a tour of the showroom can only be compared to turning a kid loose in a candy store. Morse Express's latest addition is the round-based Katsumi paddle shown in photo 3. It is stout-hearted, agile, fully adjustable, and is also the best buy we have seen in the "under $100" category. Nice!

Photo 4– We're not sure who is complementing whom here—Nancy Kott, WZ8C, the leader of FISTS U.S. or the cool-going mini key she quickly assembled from a kit produced by Doug Hauff, W6AME, of <www.americanmorse.com>. The key measures 3 inches long by 1.75 inches wide; sports a classy aluminum base, brass arm, clear and flat fingerpiece; (which Nancy is marking with fingers) and it also works quite well. (Photo courtesy of WZ8C)

W6AME Hand-Key Kit

During a recent discussion with the FISTS Club's U.S. leader, Nancy Kott, WZ8C, she told me about a new mid-size hand key available as a kit from our mutual friend Doug Hauff, W6AME (ex-KE6RIE) of <www.americanmorse.com>. Nancy shared a view of her key after quick assembly and it looked so attractive we simply had to include it in this month's column (photos 4 and 5). Nancy's award-winning work with promoting CW is much too extensive to describe in our limited space, so I will just focus on the key. It goes from kit to contact in 20 or 30 minutes, looks good, has a light and nice feel, and is just right for "grab-and-go" portable use—those times when carrying a large, expensive key is not feasible. More details on the key, and on those great little "mity boxes" for Rock Mite mini transceivers also being made by W6AME, are available at his previously mentioned website.

N3ZN Keys

While writing this month's column, details arrived on two new, exquisitely crafted iambic paddles being made by Tony Baleno, N3ZN. The little heart-throbs were so dazzling that I immediately did a reshuffle and included them in photos 6 and 7. The round-based paddle (Model ZN-2A) sits on a 3-inch diameter base of solid brass and weighs 2.5 pounds. Photographs cannot cap-

Photo 6– Dazzling, captivating, and delightful to use accurately describes this new high-gloss iambic paddle made by Tony Baleno, N3ZN. Its solid-brass base is 3 inches in diameter and complemented with short magnetically tensioned aluminum arms fitted with Indian rosewood fingerpieces. It has a smooth and responsive feel that is great for sending both slow and fast CW. More views at <www.n3znkeys.com>.

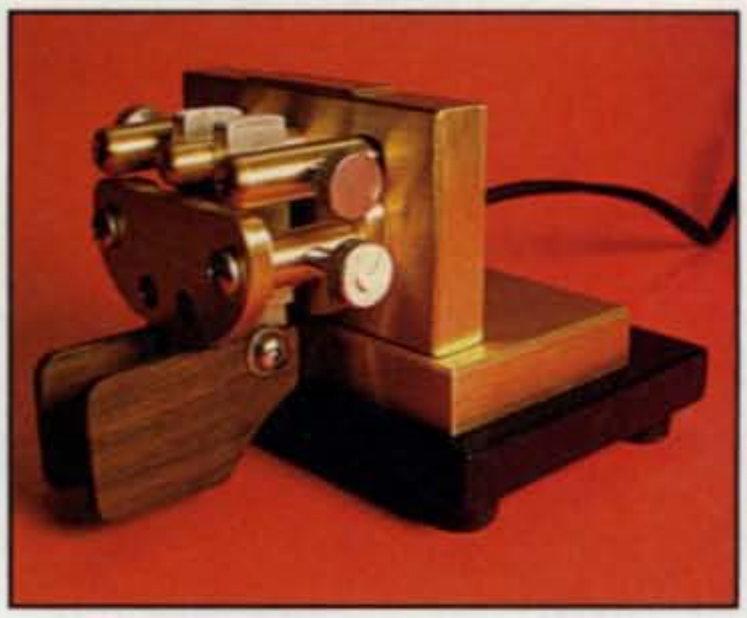


Photo 7– Tony Baleno, N3ZN, also makes his super paddle in an upright or vertical version, as shown here, and it too looks and handles like a dream. Tony's paddles are top-notch!

Photo 8– Nothing brings back fond memories of our first days in amateur radio like a J-38 hand key, and this tiny 1.5 × 2.5 inch replica does it in high style. Its brass mechanism is fully adjustable, it handles well, and it even emits those legendary "click-clack" sounds like an original J-38. More details are at <www.qrpj38.com>. (Photo courtesy of KA6IRL)

ture the full glamour and remarkable luster of this showpiece. It is polished beyond perfection and lacquered to deter tarnishing while producing a gloss and texture like fresh honey.

The paddle's mechanism incorporates an old-school look with new-school technology, and features fine ball-bearing movement, magnetic tensioning, and quick-adjust screws that hold their settings without traditional lock nuts. The arms are aluminum and fitted with Indian rosewood fingerpieces. The overall feel during use is excellent, especially at higher speeds. Tension can be adjusted from rather light to almost stiff. Let's explain that: If one is a "light as a feather" touch and 10 is tight enough to produce minor skidding on a table during keying, the paddle can be set from 3 to 6.

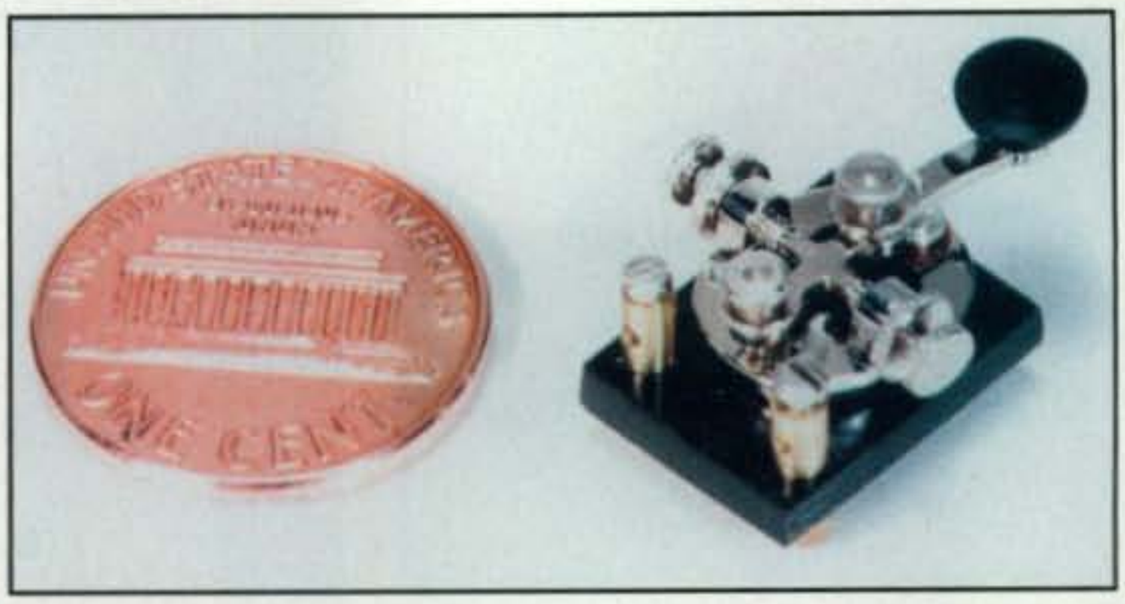


Photo 10– This is an honest-to-goodness working hand key the size of a penny. It is called the Nanokey and is made by noted clock maker W. R. Smith, W4PAL. It is complete with knurled thumbscrews and nuts for gap and tension adjustments, silver contacts with insulating washers, and a tiny plastic knob. It is amazing! (Photo courtesy of W4PAL)

Tony is also producing a square-base, upright version of this paddle sporting the same great look and feel, and you can see more views of both paddles (and order them!) at <www.n3znkeys.com>. Questions? E-mail Tony at <tony6807@aim.com>. These paddles look so good that even voice-ops-only can use them as room decor!

Tiny Treats

Little keys continue to be big attractions among traveling amateurs, and a hot item worthy of a revisit is the miniature J-38 hand key made by Lee Hutchins, KA6IRL (photo 8). The key sports a meticulously polished brass mechanism with full adjustments, your choice of a mahogany-wood or black-bakelite base, works very well, and even produces classic "click-clack" sounds like an original J-38. It is a winner! The key available at <www.qrpj38.com>.

Our views of miniature keys continue with the updated and streamlined pair of Paddlettes shown in photo 9. Producer Bob Hammond, KI7VY, recently reduced the line to three items: a single-lever PK-2 paddle, a dual-lever PK-1 paddle,

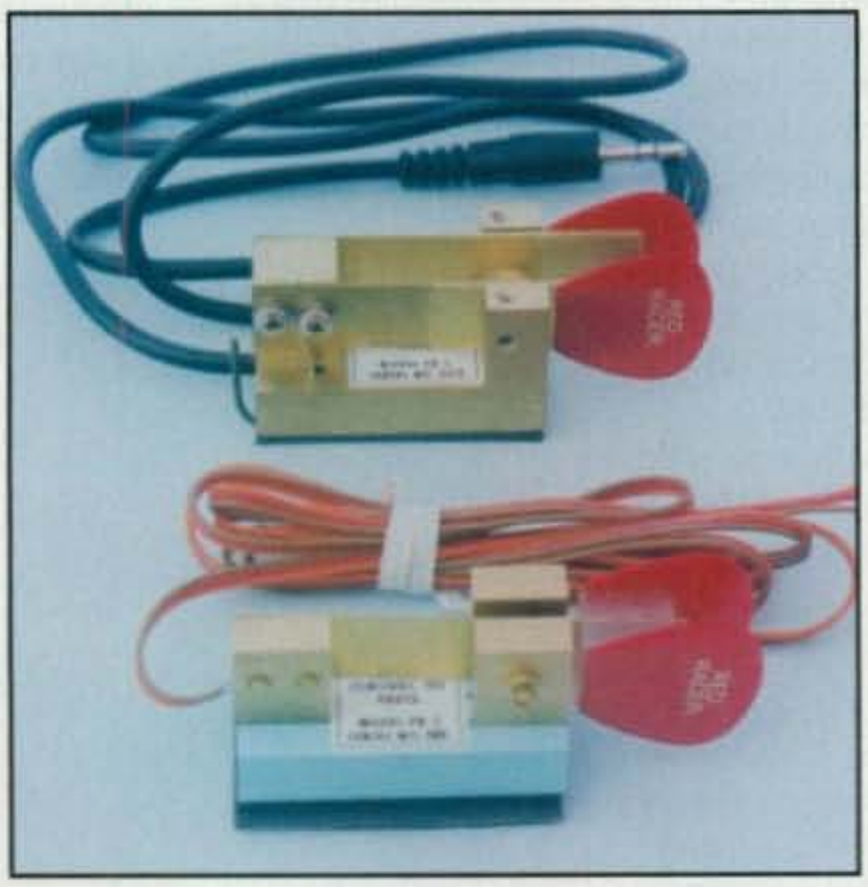


Photo 9– KI7VY's Paddlettes continue to be popular items among mobileers and portable enthusiasts. The line now consists of a single-lever paddle, a dual-lever paddle, and a knee mount. Paddlettes measure approximately 1 × 1.75 inches and may be special ordered in colors as shown here.

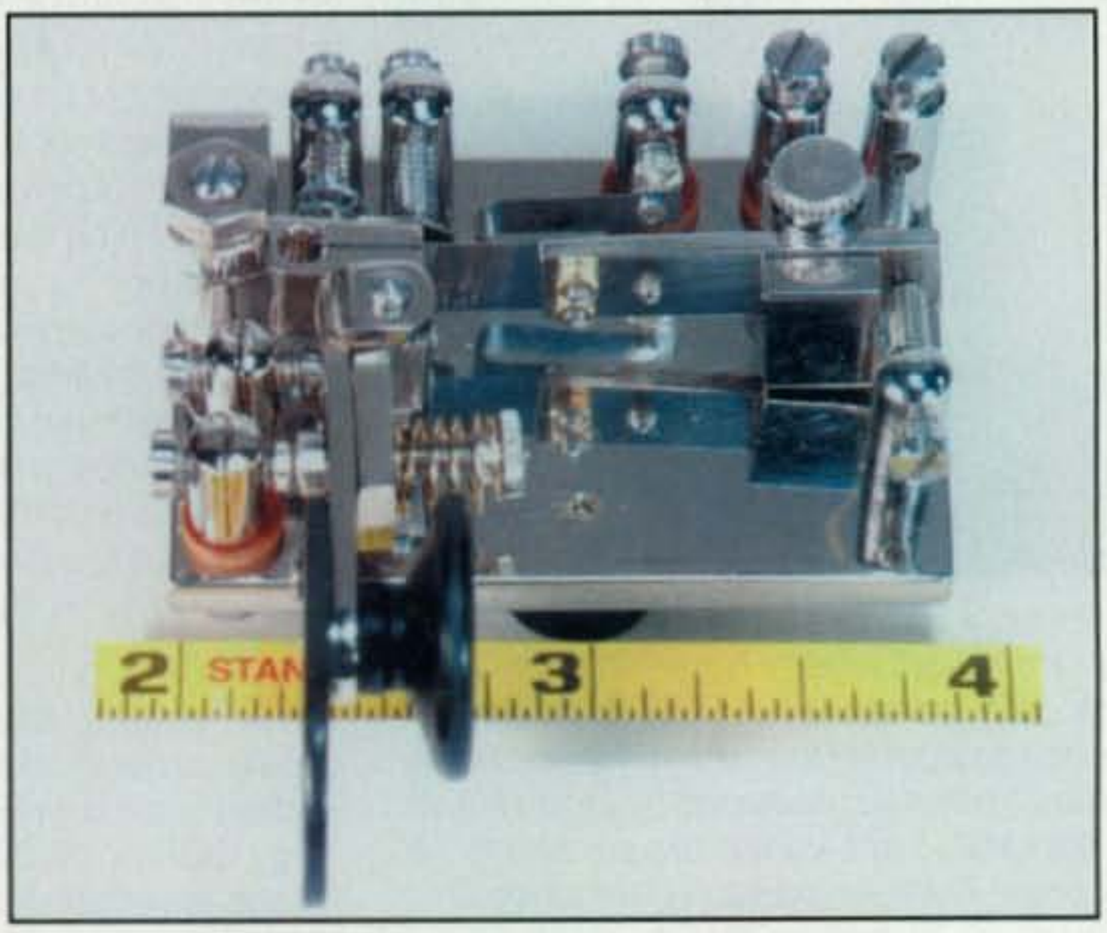
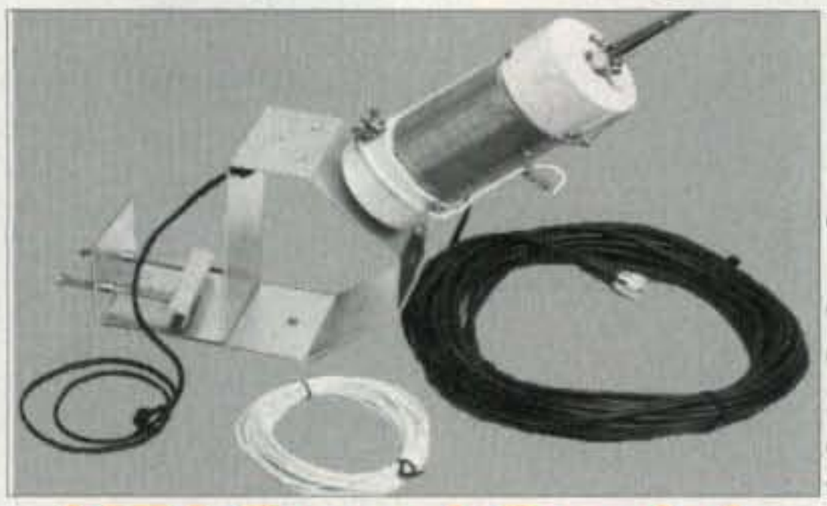


Photo 11– This -tiny Minikey bug, also made by W4PAL, is only 1.8 inches long, really works, and has a speed range of 18 to 35 wpm. Its carrying case is a regular -size ring box. (Photo via W4PAL)

MFJ Apartment Antenna

Covers 40 thru 2 Meters . . . Mounts outdoor to windows, balconies, railings . . . works great indoors mounted to desks, tables, bookshelves



MFJ-1622
$99.95
New!

New MFJ-1622 Apartment Antenna lets you operate 40 thru 10 Meters on HF and 6 & 2 Meters on VHF with a single antenna!

Its universal mount/clamp lets you easily attach it to window frames, balconies and railings. It also works great indoors mounted to a bookshelf, desk, or table. It's not a 5 element yagi, but you'll work your share of exciting DX!

Highly efficient air wound "bug catcher" loading coil and telescoping 5½ foot radiator lets you really get out! Radiator collapses to 2½ feet for easy storage and carrying.

It includes coax RF choke balun, coax feed line, counterpoise wire and safety rope. Handles 200 Watts PEP.

Operating frequency is adjusted by moving the "wander lead" on coil and adjusting counterpoise for best SWR.

MFJ Ground-Coupled Portable Antenna Base

Provides effective RF ground and stable mount for 160-10M vertical antennas

MFJ-1904
$99.95

Capacitive coupling to ground is a *well-proven* principle. Needs no tuning. Provides excellent antenna performance with low SWR on all bands.

Provides permanent, temporary or portable installation/RF ground system for lightweight multi-band verticals like 160-10 Meters Hy-Gain AV-18AVS and 40-10 Meters MFJ-1795.

Makes verticals easy to set up and take down for stealth operation. Cover base with dirt to hide. Super-strong 2x2 foot *stainless steel* square has reinforcing bends. 6-inch *stainless steel* legs firmly anchor it into the ground.

Versatile *stainless steel* vertical antenna mount with built-in coax connector accepts standard and homebrew vertical antennas.

Built-in 3/8-inch x 24 mobile mount for MFJ Mobile Whips, bug catchers, *Hustlers* and screwdriver antennas. Handles make carrying/removing base fast and easy. You can also attach radials for improved performance.

Whip Tuner/Artificial Ground

Gives instant 80-10M, 150W Antenna

MFJ-1644
$149.95

Short whip and counterpoise wire gives you *instant* 150 Watt antenna. Efficient variable loading coils resonates short whip and tunes counterpoise. Operate 30-10M with included 4½ft. telescoping whip and counterpoise. For 80-40M operation, add longer whip or random wire and external loading coil. L-network gives low SWR.Current balun decouples radiating elements. Has RF current meter.

33 Feet Telescoping fiberglass Mast . . .

Collapses to 3.8 feet, weighs 3.3 lbs.

MFJ-1910
$79.95

Super strong fiberglass mast has huge 1¾ inch bottom section. Flexes to resist breaking. Resists UV. Put up *full size* inverted Vee dipole/vertical antenna in minutes and get *full size performance!*

MFJ Vertical

for Antenna Restricted Areas

40, 20, 15, 10 Meters, Automatic Band Switching

MFJ-1795
$159.95

Perfect for permanent or portable operation in antenna restricted areas. Hide behind trees, fences, buildings, *in* bushes -- only 7 to 10 feet tall (adjustable).

Low angle of radiation for DXing, omni-directional, handles 1500 watts PEP, low SWR.

Highly efficient end-loading. Entire length radiates.

Ground mounts with suitable ground such as MFJ-1904 *Ground-Coupled Antenna Base*, radials or ground rods. Or roof mount with radials.

MFJ LoopTuner™

MFJ-935B
$199.95

Drape a wire around a bookcase or window and attach both ends to this MFJ-935B Small *LoopTuner™*. It instantly turns into a small, high efficiency multi-band transmitting loop antenna!

Radiates low angle DX signal that rivals full size dipoles. Lets you operate 5.3 to 30 MHz with full 150 Watts. No ground, radials or counterpoises needed.

Very quiet receiving antenna. High-Q reduces QRM, overloading, harmonics. Perfect for apartments, antenna restricted areas and portable operation. Has relative RF current meter with sensitivity control for tuning.

MFJ *QUICKSTUDY™* License Manuals

MFJ-3211 *Technician*
MFJ-3213 *General*
MFJ-3215 *Extra*
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Guaranteed License Upgrade or your money back!

If you don't pass your exam on your first try we'll refund your money in full (with proof of failure/purchase receipt). Each MFJ license guide has all the exact questions on the exam and *only the correct answers*! No wrong answers to clutter your mind. When you take the exam the correct answer jumps out at you.

MFJ Portable Antenna

MFJ-1621
$99.95

Operate from apartments, homes, hotels, campsites, beaches or any antenna restricted area. Work all bands 40, 30, 20, 17, 15, 12 and 10 Meters.

DXCC, WAZ, WAC, WAS have been won with the MFJ-1621! Compact 6x3x6 inch cabinet has 4½ foot telescoping whip, built-in antenna tuner, field strength meter and 50 feet coax. Handles 200 Watts.

MFJ Super High-Q Loop

MFJ-1786
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MFJ's *tiny* 36-inch diameter *high-efficiency* loop antenna performs like a *full-size* dipole! Operate 10 to 30 MHz *continuously* -- including WARC bands!

Ideal for limited space -- apartments, small lots, motor homes, attics or mobile homes.

Mounts vertically or horizontally. Low angle radiation gives you excellent DX.

Super easy-to-use! Remote control auto-tunes to desired band, then beeps. No control cable needed. Handles 150 watts.

Fast/slow tune buttons and built-in two range Cross-Needle SWR/Wattmeter lets you quickly tune to your exact frequency.

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- *gives you highest possible efficiency*. Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

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http://www.mfjenterprises.com for instruction manuals, catalog, info

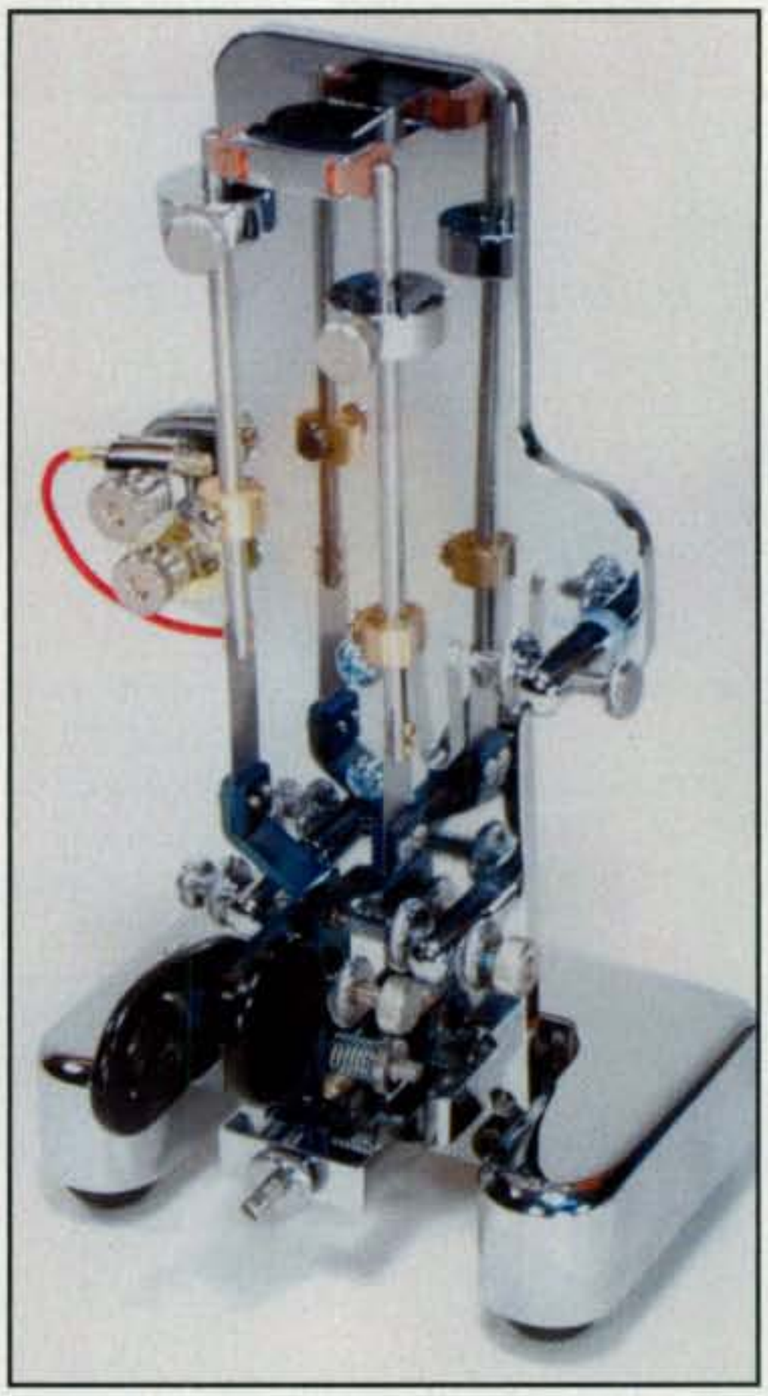


Photo 12– Vertical bugs always capture attention, but this W4PAL version is extra special. It is fully automatic with dual pendulums and a below-fingerpiece pivot point. The combination of polished brass, chrome, and heat-blued steel add real eye appeal. Look closely and you will see the dash contact is on the left and the dot contact is on the right. This seemingly reversed arrangement works because the key pivots from below fingerpiece. (Photo via W4PAL)

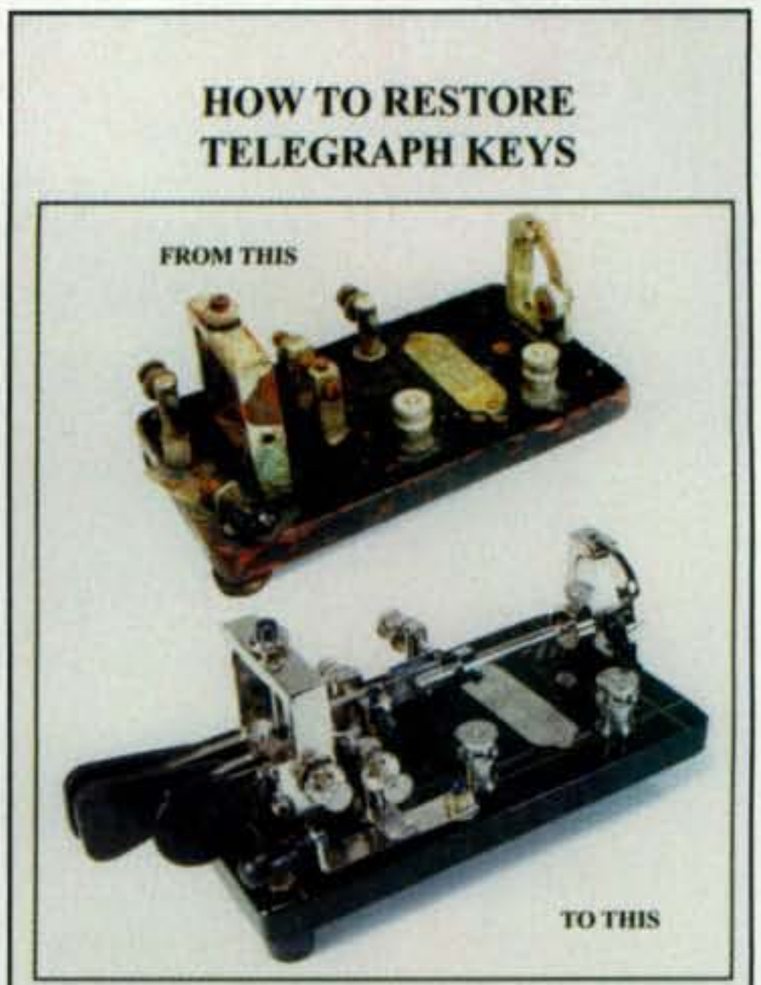


Photo 13– Many hams ask how to resurrect classic bugs damaged from age and abuse, so W4PAL put together a full-color, 100-page book on the subject with over 250 photographs. Don't harm another bug with "kitchen-sink cleanup" before reading this incredible book!

and a strap-on magnetic knee mount for either item. Bob also introduced a new option for the two keys— colored bases in blue, brass, or other colors upon special request. In addition, Bob has added small "stiffeners" to the arms for a crisp and responsive "big key" feel. The Paddlettes measure 1 × 1.75 inches, sport a magnetic base, may be positioned on a side and used like a hand key, and work very well—especially for mobile or portable operation. More details are available at <www.paddlette.com>, or you can e-mail Bob at <bham379627@aol.com>.

Fantasy Works of Art

What happens when a highly celebrated clock maker such as W. R. Smith, W4PAL, turns his attention to making keys? Some remarkable items such as the NanoKey, MiniKey, and Duovert (shown in photos 10, 11, and 12) emerge. The Nanokey is approximately the size of a penny. It really works, it gets lost in a finger ring box, and W. R. offers a magnifying glass to viewers so they may study its fine detail. Readers may question if anyone could actually make such a tiny key, so W. R. shared with us a reprint from the *Knoxville News Centennial* featuring a 1-millionth horsepower motor he made some years back. The motor is complete with ruby bearings and the whole thing is the size of a dime!

Applying his talent of producing miniature keys to bugs, W. R. next made the Minikey, a fully operational right-angle bug with a speed range of 18 to 35 wpm and a pendulum so well-balanced that it can produce up to 100 dots at a time. The little marvel also travels comfortably in a regular finger-ring box.

Moving up in size, W. R.'s Duovert is a fully automatic vertical bug with separate dot/dash pendulums linked to a single arm near the fingerpiece. All the parts look shiny new because, well, they are shiny new! W. R. fabricated all the parts in his home workshop, just like he made replacement parts (and fully restored some original parts) for "basket-case bugs" as featured in last year's "Keys Special" column (page 64, May 2006 *CQ*). Going a step further, W. R. then put together a lavish book on the subject (photo 13). The book explains

Photo 14– Roaring back from the 1950s is this exceptionally well-preserved Tri-Signal Telegraph Practice Set owned and operated—err . . . photographed—by James H. Richards (an attorney with an appreciation for the finer things in life, such as telegraphy). The set was manufactured by L. K. Elkay Mfg. Corp. NY and uses a buzzer or pilot light for operation. (Details in text.)

everything from simple clean-up techniques to replacing bases and "remanufacturing" parts. If you would like a copy of the book, contact W4PAL at 8049 Camberley Dr., Powell, TN 37849, or e-mail <WRSmith2@aol.com>.

Practice Makes Perfect

Rounding out this year's views is one of those varieties of ever-popular practice sets from yesteryear (photo 14). The Tri-Signal set, owned and photographed by James H. Richards, P.C., of Jenison, Michigan, should bring many fond memories among amateurs over age 40. You loaded it with C cells, connected it with another set (from a next-door buddy), then used its built-in pilot lamp or buzzer to exchange Morse messages. As youngsters, sets such as this one were our first exposure to Morse code communications. Today they are prized collectables.

That wraps up the views for now, friends, and remember my standing invitation to share views and details of your special CW items (new or old) with us for inclusion in upcoming keys columns. Remember, too, my new *World of Keys* book featuring views and details of keys, bugs, paddles, and miniatures such as few people have ever seen is available direct from my house to yours (K4TWJ, 3994 Long Leaf Drive, Gardendale, AL 35071). The book is $18 plus $4.05 Priority Mail, and more details are available at <http://k4twj.blogspot.com>. May the force of good CW signals be with you!

73, Dave, K4TWJ

BY PHIL SALAS,* AD5X

A 200-watt Dummy Load/ Peak Detector

This month we'll wrap up our thick-film resistor-use series with a 1.8–54 MHz 200-watt dummy load/peak detector. Last month's dummy load/peak detector was limited to 30 watts due both to the thick-film resistor used and the peak voltage rating of the detector diode. The 1N5711, as well as popular germanium detector diodes, is limited to 70 volts peak. The peak voltage for a 100-watt transceiver is 100 volts, based on this formula:

$$V_p = \sqrt{2P \times Z_o} = \sqrt{(2 \times 100 \times 50)} = 100V$$

where:

V_p = peak voltage
P = output power
Z_o = impedance of load

An easy way to get around this problem is to put two 25-ohm resistors in series and place the detector diode at the resistor junction as shown in fig. 1. Now the peak voltage at 100 watts is 50 volts. At 200 watts the peak voltage is 70 volts. Therefore, using two 100-watt thick-film resistors, we can build a dummy load/peak detector with up to a 200-watt capability. Since we're detecting half the actual peak voltage, the relationship between detected voltage and transmit power can be determined as follows:

$$V_p = V_{det} \times 2$$

$$V_{rms} = V_{det} \times 2/\sqrt{2}$$

$$P = V_{rms}^2/50 = (V_{det} \times 2/\sqrt{2})^2/50 = V_{det}^2/25$$

where:

V_{det} = detected voltage
V_{rms} = root mean square voltage

*1517 Creekside Drive, Richardson, TX 75081
e-mail: <ad5x@cq-amateur-radio.com>

The 200-watt dummy load/peak detector must be physically different from the 30-watt unit discussed last month. The two 25-ohm thick-film resistors each are much larger than the single 30-watt 50-ohm resistor, and you have a lot of heat to get rid of. To help get rid of the heat, I used the inexpensive microprocessor heatsink/fan assembly called out in the parts list. This heatsink/fan assembly fits the aluminum box almost perfectly! The blue wire on the fan is unnecessary and can be removed. I added a PowerPole connector on the remaining red/black wires to interface with all of my other 12-volt devices and power sources.

To ensure maximum heat transfer from the thick-film resistors, it is important that they be mounted on a flat surface. Therefore, I mounted the resistors directly on a 1/8-inch thick piece of aluminum bar stock. I drilled two #6 clearance holes through the bar stock and aluminum box where the resistors are mounted, and one #4 clearance hole through the box where a terminal strip is mounted. Next I marked, and then drilled and tapped, two #6 screw holes and one #4 screw hole in the heatsink/

Photo B– Heatsink/fan assembly mounted to the back of the box.

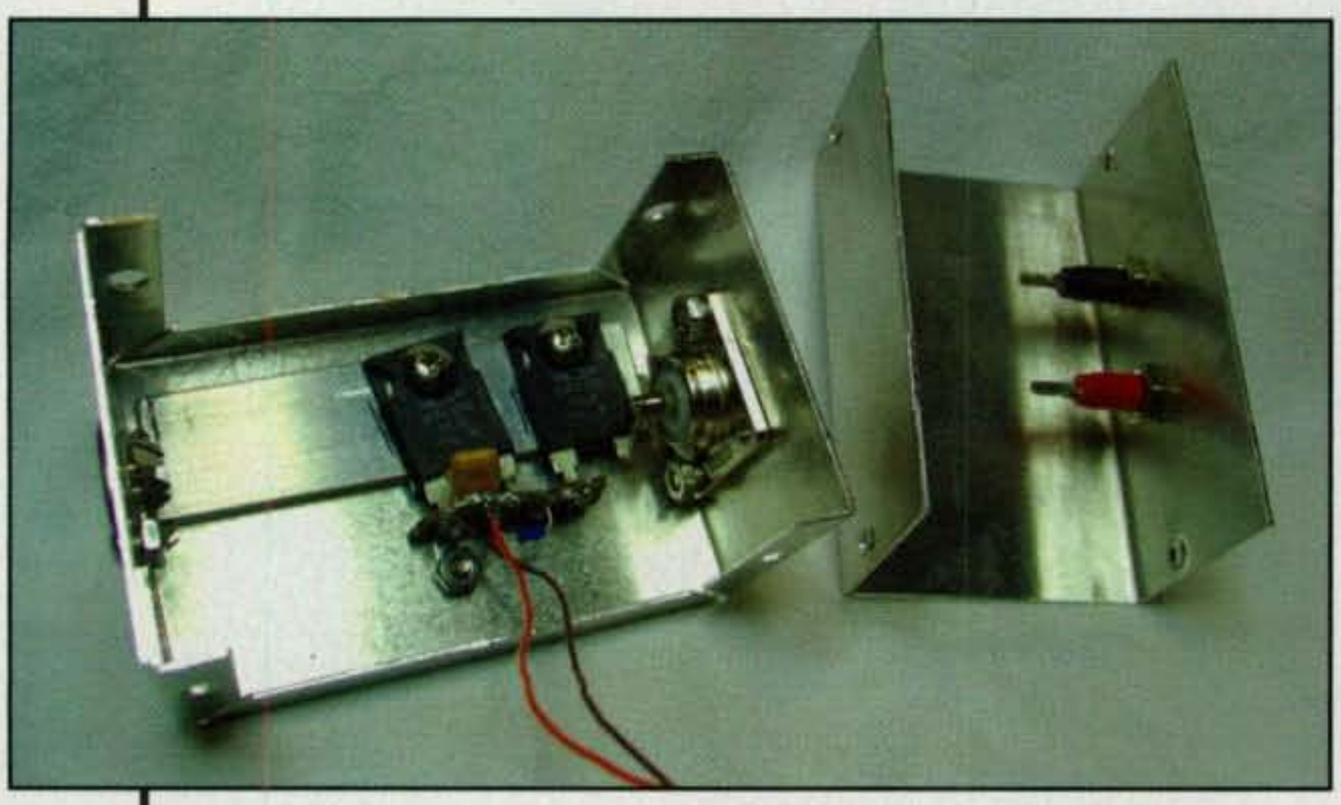


Photo A– Resistor and other component mounting inside the aluminum box.

Photo C– Final 200-watt dummy load/peak detector view showing the detector connectors and UHF connector.

Parts List: 200-watt HF 50-MHz 50-ohm Detector

Qty.	Description	Source/Part Number	Price ea.
2	25-ohm 100-watt resistor	Mouser 684-MP9100-25	$9.14
1	1N5711 Schottky	Mouser 511-1N5711	$0.10
1	0.01-µf 100V cap.	Mouser 581-SR151C103KAR	$0.14
1	0.10-µf 100V cap.	Mouser 581-SR201C104KAR	$0.18
1	1.0-µf 100V cap.	Mouser 581-SR301E105MAR	$0.63
1	3.25" × 2.13" x 1.63" box	Mouser 563-CU3001A	$4.75
1	Red-tip jack	Mouser 530-105-0802-1	$0.66
1	Black-tip jack	Mouser 530-105-0803-1	$0.66
1	Heat-sink grease	Mouser 590-8461-85ML	$6.95
1	SO-239 connector	All Electronics SO-239	$1.00
1	Fan/heatsink assy.	All Electronics CF-271	$3.50
1	Terminal strip	All Electronics TP-70	10/$1.00
1	3/4" × 1/8" × 3" AL bar	Hardware store	
Misc.	#4 & #6 hardware	Hardware store	

fan assembly which matched the clearance hole placements. The #6 mounting screws sandwich the box and bar stock between the thick-film resistors and the heatsink/fan assembly, and the #4 screw attaches the terminal strip through the box to the heatsink/fan assembly. You can see details of the component mountings in photo A. Photo B shows the heatsink/fan assembly mounted on the back of the dummy load/peak detector. Photo C is a view showing the UHF connector and the peak-voltage monitoring connectors.

The measured SWR was 1:1 from 1.8–54 MHz, so the detected voltage will be quite accurate. You can run 100 watts into the dummy load for maybe 30 seconds without the fan powered up before the dummy load gets too hot. However, it is always best to run the fan.

That's about it. These thick-film resistors are interesting components. Another use for them would be for a resistive SWR bridge using three 50-ohm resistors. If you come up with other ideas for these resistors, please let me know!

73 until next month . . . Phil, AD5X

public service

BY BOB JOSUWEIT,* WA3PZO

Helping Others to be Prepared

It's time for the annual summer tradition called Field Day. For many it's a social event, but for others it's a time to learn and practice their skills of setting up and operating a radio station when communications are disrupted. This month we'll take a look at those who serve by helping others to be prepared. We'll also take a look at the 75th anniversary of Field Day.

Amateur radio operators have a long tradition of volunteering in times of need. In 2002, President George W. Bush issued a challenge to all Americans to make time to help their neighbors, communities, and the nation through service. He called on each person to dedicate at least 4,000 hours, or two years, to volunteer service over the course of his/her lifetime. Since then, he has presented over 575 awards, which come in the form of an engraved gold pin, in recognition of outstanding volunteer efforts.

For the second year in a row, President Bush presented an amateur radio operator with the President's Volunteer Service Award. Randy Hatfield, AG6RH, of Victorville, California is a volunteer with the City of Victorville Community Emergency Response Team (CERT) and Emergency Communication Service (ECS). Hatfield said he has been interested in helping the community since he helped with island rebuilding after Hurricane David in 1979. As he moved around the country he wanted to learn what the hazards were in his community. He said the best way to find out was to join a CERT team.

Robert Barton, Victorville's emergency-services manager and Hatfield's supervisor, said Hatfield "has answered the President's challenge by providing over 500 hours of volunteer service over the past 12 months. He has inspired many others in our community by his actions to also volunteer their time and receive CERT and ham radio training." In making his nomination Barton said, "Randy has been our lead instructor, volunteering his time in teaching the ham radio Technician and General Class courses. His classes provide hands-on and practical applications to the materials taught. A recent graduate of our Technician Ham Class, a city councilman, praised Randy's ability to hold the classes' attention and provide a great course. To date *all* of his students have passed the FCC tests. Randy has been providing ham radio instruction for over 20 years as a volunteer and is personally responsible for over 350 people being licensed as ham radio operators."

"Randy provides many hours of tutoring to new hams (who) call him at all hours of the day and night," said Barton. "In his continuing efforts to assist others he has given or loaned radio equipment to get them started. Randy has made service to his community a priority in life by volunteering his time and talents. He is always there when needed to provide support and resources to accomplish any task requested."

Randy Hatfield, AG6RH, poses with President Bush after being presented with the President's Volunteer Service Award. (White House photo by Eric Draper)

Hatfield got involved in ham radio and CERT because he knows "the day will come—it's just a matter of time—when volunteers will be needed to support the infrastructure of every city that might be affected." He said, "Well, look at Katrina. There weren't enough ham radio operators at that time. If you don't have communications, you can't recover."

Meeting the President

Hatfield said he first thought this was a joke. After all, he said, the call telling him that he was going to be the High Desert representative to receive the Freedom Corps award came in on April Fool's Day. As the calls continued into Monday, Hatfield told the Freedom Corps representative that he "thought this was an elaborate April Fool's joke perpetrated by Robert Barton." He was assured that he would meet the President.

On Wednesday, April 4th, Hatfield and his wife Lori, KD7GNC, went to the old George Air Base in Victorville and waited with other local, county, and state officials. Hatfield picks up the story:

There was a holding area where we were screened and went onto the tarmac of the base. Lori was taken to the press platform to take pictures. (At) 11:30 AM, when Air Force One stopped on the ground, I was taken to a special place next to the plane. The White House pho-

*c/o CQ magazine
e-mail: <wa3pzo@cq-amateur-radio.com>

tographer positioned me. The President came down the stairs waving. He paused and looked directly at me and waved.

President Bush greeted the local officials and then came over to me. He shook my hand and asked how I was doing. I was presented the Presidential Volunteer Award pin. I gave him something as well. It was a postcard dated December 8, 1941.

My dad was at Pearl Harbor when it was bombed. He was allowed to send a postcard to his parents to let them know he was okay. It read, "I am well. Will write at first opportunity." I gave that postcard to President Bush and explained its meaning. He said it would be displayed in the Presidential Library.

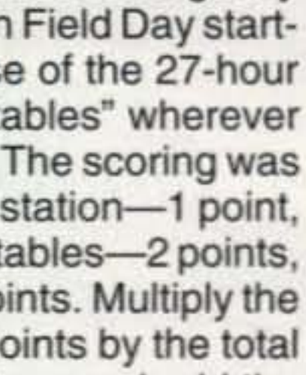
President Bush headed off to his helicopter and I was escorted to the press area for questions from the press and pictures.

Hatfield said that he had no reluctance parting with the postcard, especially after his conversation with the President. "It's history," he said. "It won't get lost."

Last year President Bush presented Greg Ybarra, N8HXQ, of Flint, Michigan with the same award for his work with the Genesee County Amateur Radio Emergency Services.

Honor Your Volunteers

A local club or emergency communications group can honor its hard-working volunteers by becoming a "Certifying Organization" for the President's Volunteer Service Awards. To earn a President's Volunteer Service Award, individuals, families, and groups must keep a record of their activities and hours of volunteer service. They can track their hours in a journal at home, on-line through the USA Freedom Corps Record of Service, or through another system that is recommended by their Certifying Organization. Each individual, family, or group then submits its record of service to the Certifying Organization. Any individual, family, or group can receive Presidential recognition for volunteer hours earned over a 12-month period or over the course of a lifetime at home or abroad. To receive a bronze award, kids are required to have 50 to 74 hours of service; young adults, 100 to 174 hours; and adults, 100 to 249 hours. Silver and gold awards are available for more hours of service. For more info go to: <www. presidentialserviceawards.gov>.



Your group could be presenting Volunteer Service Awards to hams serving in the community. (Courtesy <PresidentialServiceAwards.gov>)

Field Day Happy 75th Birthday

For many amateur radio clubs and groups the ARRL's Field Day weekend is a time for an annual cookout. For others this is a serious test of emergency communications. When Field Day started in 1933, the purpose of the 27-hour event was to test "portables" wherever they may be available. The scoring was simple: contact a fixed station—1 point, contacts with other portables—2 points, and DX contacts—3 points. Multiply the total number of QSO points by the total number of ARRL sections and add the number of countries worked. The winning club made 62 QSOs.

In 1934 the total number of ARRL sections and countries was removed. Pow-

ARRL Slow to Notify Members on Red Cross Talks

In what appears to be rather slow notification to its membership, in mid-April the American Radio Relay League provided an update about its ongoing negotiations with the American Red Cross on the issue of background checks for volunteers.

According to an April 16th statement issued by the ARRL, representatives met on March 20th with "two attorneys from the Red Cross General Counsel's office and two management-level staff members from Red Cross Disaster Services." According to the statement, their questions were answered during the meeting. This has prompted questions from hams as to why it took four weeks to provide information on such an important topic to amateur radio emergency communicators, particularly in light of the Red Cross's March 31st deadline for the required background checks.

ARRL General Counsel Chris Imlay, W3KD, and Chief Technology Officer Paul Rinaldo, W4RI, asked the Red Cross staff if ARRL ARES volunteers would be subject to the American Red Cross background check if they are providing communications for more than seven days. According to the Red Cross, "ARES volunteers would not be permitted to provide communications at a disaster site for more than seven days without submitting to the Red Cross background-check procedure."

ARRL representatives then asked if the Red Cross would be willing to modify the background-check consent form so that only a criminal background check would be done instead of allowing "a consumer report and/or an investigative consumer report — which includes certain credit checks and includes mode of living checks." According to the ARRL, "the Red Cross representatives did not indicate a willingness to modify the consent form."

Finally, the ARRL suggested alternatives to the Red Cross investigation firm, MyBackgroundCheck.com. According to the report, "ARRL was given an indication that the Red Cross is also unwilling to accept background checks conducted by other entities, because the Red Cross would be required to compare the methodologies of its selected entity with those of the alternative background-check provider." This would indicate that the Red Cross will not accept a local emergency management or law-enforcement background check.

Again, though, we must wonder why it took the ARRL until April 16th to report this information to its members.

Readers Respond to April Story

Several readers questioned the timeliness of the information contained in the April "Public Service" column about the initial Red Cross statement that it was relaxing some background-check requirements. The questions were not as to whether the information was accurate, but rather why it wasn't up to date.

The "Public Service" column is written two months before the issue date. Thus, the April column was written in early February. The information in the column included the most up-to-date information available at the time. In fact, on February 9th we issued a bulletin via the CQ e-mail news service indicating there was some late-breaking information from the Red Cross which indicated a change in its national policy on background checks. CQ was the first amateur radio news organization to report on the Red Cross's February 6th statement.

On March 9th, well after the April issue went to the printer, the ARRL issued a statement saying it "will not attempt to advise members what organizations they should or should not support, or the extent to which they should comply with policies that such an organization requires in order for them to accept volunteer Amateur Radio communication services. However, we feel compelled to caution ARRL members to read *very carefully* any request for, or consent to the collection or disclosure of, personal, normally private information from a served agency. ARRL members should carefully consider what is being requested; for what purpose the information is needed; to what use the information will be put; and to whom it will be disclosed." This information, too late for the April issue, appeared in the May column.

As of early April, we received word that several hams who were Red Cross volunteers had resigned from their Red Cross positions because of the ongoing concern over the background-check policy. Yet as a severe nor'easter pounded the Mid-Atlantic and New England coasts, many amateur radio operators were on duty providing Red Cross shelter communications.

We will continue to cover this important story.

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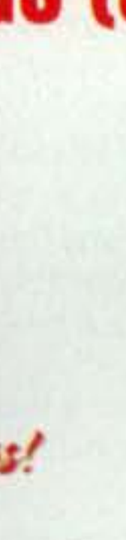

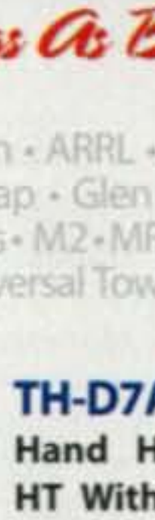

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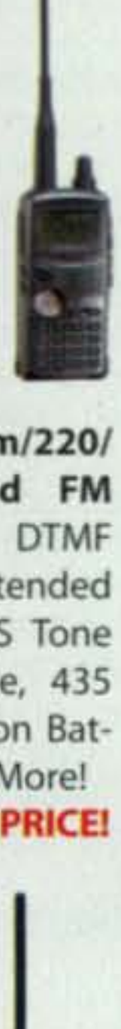

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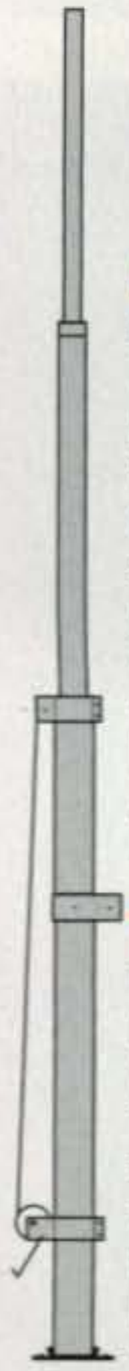

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Various agencies test communications interoperability with Army MARS during the DICE 07 exercise. (Photo courtesy of Army MARS)

er output breakpoints were at 20 and 60 watts. By 1937 the Field Day message was added. The bonus gave 10 points for a properly formed message to the ARRL stating the number of operators, the location, conditions, and power level. (Today, copying the the ARRL Field Day message is worth 100 points.) For the first time, the winning QSO total reached 204, with a breathtaking average rate of 7.5 QSOs per hour. By 1941 a VHF-only category was introduced, and in 1949 a mobile category was added.

This year's Field Day still offers many opportunities to learn. It offers learning opportunities for recently licensed HF operators. It allows both new and experienced hams to become familiar with other radios and modes that they may not have operated before.

ARRL Regulatory Information Manager Dan Henderson, N1ND, says, "Amateur radio stands at a juncture where we can embrace both the old and new." He says the variety of available operating modes, traditional and experimental, contributes toward Field Day's status as the most popular annual operating event.

With 17 named storms predicted for this year's hurricane season, which starts on June 1 on the East Coast (May 15 on the West Coast), Field Day should be about setting up a station in areas with which you are not familiar. Take the challenge of testing your emergency go-kit to see if you can set up a station in an unfamiliar area, get it on the air, and make your contacts. Don't run back home to get that spare coax connector or go to the local electronics store to get some extra coax. This will give you some indication whether or not you really are ready to respond to a disaster in an unknown location.

Defense Interoperability

With all of the antennas on the vehicles, one might have thought it was a hamfest. The only difference is that in this case the hams were highly outnumbered. Military personnel, police officers, firefighters, and other emergency-response professionals joined ham radio operators from MARS, ARES, and RACES during the 2007 Defense Interoperability Communications Exercise (DICE) sponsored by the Department of Defense.

The exercise took place at Ft. Huachuca, headquarters of the Army Military Affiliate Radio System and its parent organization, the Network Enterprise Technology Command/ 9th ASC.

For 24 hours over a three-day period sophisticated radio gear was put into action at the Joint Interoperability Test Command drill. The Army MARS crew transmitted e-mail over HF radio via its new WinLink 2000 system. The U.S. Coast Guard demonstrated its portable shipboard communications system. The Army's 112th Signal Battalion displayed a new Special Operations Forces Internet Package.

The purpose, sponsors said, was to show progress toward communications interoperability among the many response agencies while emphasizing deployability and reliability.

Robert Hollister, N7INK/AAA9SD, wore three hats, one as Chairman of the Cochise County Local Emergency Planning

In April, Colorado State University scientists Philip J. Klotzbach and William M. Gray predicted a 50% probability that the east coast of the United States would be hit with a major category 3 or higher hurricane this year. Remember, the Atlantic hurricane season begins on June 1. (Photo courtesy of NOAA)

Committee, one as lead operator for the Cochise County Mobile Communications Unit (MCU), and one as a member of the Army MARS Chief's special staff. Fourteen other ARES/ RACES members manned the MCU along with three Army MARS members. The Arizona State Communications Unit also had three amateur radio operators participating and the American Red Cross Emergency Communications Unit was staffed with two ham operators.

"The DICE 07 activity provides a unique opportunity for the amateur radio operators from around the state to work directly with emergency responders and participate in an unparalleled learning experience with the federal and military agencies assembled at Fort Huachuca," Hollister said. "The scenario simulated a terrorist attack on two major transportation arteries (Interstate 10 and the Union Pacific Railroad) passing through Benson, Arizona. The situation was made even more severe by simulating the release of Chlorine Gas and Nitric Acid from damaged rail cars and 18-wheel over-the-road trucks."

"Starting as a local incident," said Hollister, "the requirement for multiple agencies and the injection of hostage incident quickly elevated it to a situation requiring unified command."

Among visitors to the Cochise County MCU were Brig. Gen. Mark Bowman, chief of staff of the Defense Information Systems Agency (DISA); Maj. Gen. Barbara Fast, Ft. Huachuca Post Commander; and Air Force Lt. Gen. Charles E. Croom Jr., DISA Commander.

Col. Debra Dexter, commander of the JICS, said, "There are always barriers to communication. It's everyone's job, both military and civilian authorities, to continue to improve and integrate our systems especially in a post-Sept. 11 and post-Katrina world."

Among participating response agencies were the FEMA Mobile Emergency Response System from Denton, Texas; Arizona Division of Emergency Management; Glendale, Arizona Police Department, Tempe, Arizona Fire Department, and the 91st Army Civil Support Team.

It's a Wrap

This month we took time to recognize a volunteer we can all look up to and discussed Field Day, which will be June 23–24. Remember, if you are using Field Day to test your emergency operating skills, consider picking a location that you have never been to before. Finally, we looked at a variety of communications services getting together to test communications. After all, it's all about getting the message through. We want to thank Army MARS for supplying information for this column.

Do you have a story of interest to tell? Are you involved with a special event or exercise? Please drop me a note. Until next month . . .

73, Bob, WA3PZO

BY FREDERICK O. MAIA,* W5YI

Sorting Through the Callsign Jungle

Getting the Amateur Radio Call You Select

Station callsigns are a very popular topic among radio amateurs. The rules surrounding the issuing and changing of callsigns are very complex. The FCC has three amateur radio callsign programs: Sequential, Vanity, and Special Event.

All amateur radio callsigns in the United States must begin with K, N, W, or AA through AL. These country prefixes are allocated by the International Telecommunication Union (ITU), the Geneva-based United Nations organization that regulates global telecommunications.

There are no U.S. ham callsigns that have a single letter "A" prefix. The single letter "A" prefix (A2 through A9) is shared by several Middle Eastern, African, and South Pacific nations. (The AM–AO country prefixes are ITU-assigned to Spain, AP–AS to Pakistan, AT–AW to India, AX to Australia, and AY–AZ to Argentina.)

The first callsign a radio amateur usually gets has a 2-by-3 format and begins with the letter "K." It is automatically issued by the FCC when the license application Is processed. A 2-by-3 format has two prefix letters, followed by a geographic radio district number (zero through nine) and three suffix letters. This is a "Group D" callsign.

The letters and number in the callsign are issued in strict sequence from an alphabetized regional-group list based on the licensee's operator class and mailing address. This callsign is retained indefinitely unless the holder specifically requests that it be changed to another new sequentially assigned callsign or to a "vanity" callsign which an amateur may select. Very few amateurs request a new sequential call. They want to choose the format, numeral, and letters that make up their callsign. This is accomplished under the vanity callsign program, which began operation in 1996.

The vanity callsign system allows you the opportunity to request a specific callsign for your station or for your ham club. In a sentence, a vanity callsign is selected by the FCC's computer from a list of callsigns requested by the station licensee or, in the case of a club, its trustee.

The third callsign system allows amateurs to select a temporary 1-by-1 format callsign (such as W1A) to be used in conjunction with an event of special significance. This Special Event callsign is used in place of the amateur's assigned callsign to call attention to some sort of celebration. It can be anything from a family back-yard barbecue to an event of international importance. There are 750 1-by-1 callsigns available for temporary use. The Special Event Callsign System is administered by the Volunteer Examiner Coordinators. More information on this system is available at: <http:// www.ncvec.org/1x1.php>.

Thousands of Technician radio amateurs began upgrading to higher license classes once the Morse code testing requirement was abolished in February. Most all held Group D (2-by-3) format callsigns. Many want to upgrade to shorter, more mainstream calls, and hundreds have already changed their callsigns.

This month let's zero in on what's available in a shiny new callsign and how you go about getting it. There is more to it than you think! Let's start by reviewing how the FCC assigns callsigns.

Callsign Groups, or Who Gets What

The FCC issues callsigns from four groups: A, B, C, and D. Extra Class amateurs qualify for Group A callsigns. There are three different Group A formats: a K, N, or W prefixed callsign with a two-letter suffix; a two-letter prefix with the first letter A, N, K, or W and a one-letter suffix; and a two-letter AA through AL prefix and a two-letter suffix. Group A callsigns are in short supply and are the most wanted, since they signify that the holder has reached the pinnacle in ham radio.

Advanced Class licensees qualify for Group B callsigns: a two-letter prefix with the first letter K, N, or W; a geographic district numeral; and a two-letter suffix. Since Advanced Class licenses are no longer being issued, Group B callsigns are widely selected by Extra Cass amateurs who cannot get the Group A calls that they want.

Group C callsigns may be held by both Technician and General Class operators. These are 1-by-3 format callsigns beginning with K, N, or W, (for example, K1ABC.) To get a 1-by-3 format, a licensee must apply for it under the vanity callsign program.

Group D callsigns (2-by-3 format) are automatically issued to *beginning* Technician or General Class radio amateurs and club stations. These Group D calls consist of two prefix letters beginning with K, followed by a geographic district numeral (Ø through 9), and then three suffix letters—e.g., KE1ABC. These callsigns are issued in strict sequential order by the FCC's computer.

All amateurs may change to a different Group D (2-by-3 format) callsign at any time. The first two letters must begin with WA through WZ or KA through KZ, but not NA through NZ or AA through AL-by-3 letters. A Novice, and there are still a few of them, may only hold a 2-by-3 Group D callsign.

Any licensee may hold a callsign from a lower group. This means that an Extra Class amateur may hold an A, B, C, or D format callsign, and a Tech or General Class licensee a C or D format.

Ham stations with mailing addresses located outside of the U.S. mainland qualify for special two-letter geographic prefixes. These special pre-

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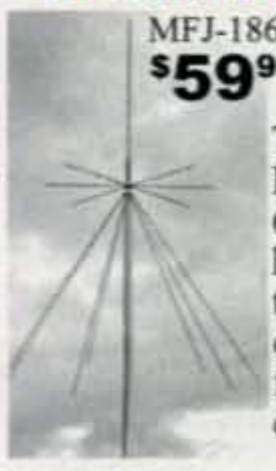

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Isn't It More Complicated Than That?

Yes, it is, but the above covers the bulk of what a radio amateur who wants to change a callsign needs to know. There are several additional callsign exclusions, such as WC, WK, WM, and WR prefixes by three-letter suffixes, which are reserved by the FCC. Certain DX island locations have special geographical prefixes and numerals assigned to them—for example, Amercan Samoa is AH8, KH8, NH8, and WH8.

Callsigns may not have the letters SOS or the Q-signals QRA through QUZ as the suffix. Callsigns with the prefix AF, KF, NF, or WF, and the letters EMA as the suffix are allocated to FEMA (Federal Emergency Management Agency) stations. And some 2-by-3 format callsign blocks beginning with the letter K are reserved for the military. However, these are the exception rather than the rule.

Upgrading to a Shorter Callsign

Anyone can change his or her callsign at any time! The format of the callsign you qualify for is determined by your license class. The higher your license class, the shorter the callsign you are able to obtain.

Under the vanity callsign program, many Technician Class amateurs change to a more mainstream (Group C) 1-by-3 format callsign once they upgrade to the General Class level. The first letter of a callsign must be a W (most popular), K (second most popular), or an N. Although it is not required, in the interest of uniformity it is suggested that the numeral after the prefix letter be consistent with your callsign district (i.e., the same numeral as in your original callsign). You do not have to upgrade to the General Class to get a 1-by-3 format callsign. The Technician Class is also authorized to hold Group C callsigns.

Most amateurs upgrading to the Extra Class want a 1-by-2 or a 2-by-1 Group A callsign. If these are unavailable, then they usually select a 2-by-2 format call. Although not the ideal situation, many hams select callsigns from outside their radio district in order to get a short Group A callsign or a suffix that means something to them.

What Callsign Should I Choose?

This is a matter of personal preference. The most popular suffix letters seem to be those that make up a person's initials. Many amateurs retain their originally assigned three-letter suffix and eliminate the second letter in their prefix or change the prefix to a W or N. For example, KI4ABC might be changed to K4ABC or W4ABC. That is, of course, provided it is available.

Sometimes the suffix letters are a nickname, such as K2JOE, W7MAC, or N3LEE. W6NBC worked as a broadcast engineer for NBC. Some hams like to choose callsign letters that are easy to send in Morse code. Choosing the station callsign to that of a deceased ham friend or relative is also popular.

There is no end to the thought behind a station callsign. Radio amateurs generally like callsign letters that mean something to them, but sometimes it is just a case of taking whatever is available, especially in the case of short Group A 1-by-2 and 2-by-1 callsigns.

How Do I Know What Callsigns are Available?

A vanity callsign is like a vanity automobile license plate. It is an amateur callsign that, subject to availability, is personalized to the radio amateur's wishes. Unlike sequentially issued callsigns, vanity callsigns are not free. The FCC charges an annual Regulatory Fee for the vanity callsign payable up front for the entire ten-year license term. The current charge is $2.08 a year, or $20.80 for the ten years. This amount is changed annually.

As mentioned above, you must meet certain license class criteria in selecting your callsign and list the exact prefix, numeral, and suffix for each selected callsign. You may select several callsigns of the appropriate format, and the first available one on your list will be assigned to you.

Any individual amateur or club station that has already been issued a callsign may obtain a callsign of choice subject to certain restrictions. RACES and military recreation stations are not eligible for vanity callsigns. A vanity callsign can only be obtained in exchange for an existing call. Licensees cannot get a vanity callsign as their first callsign. Individual and club vanity callsigns may only contain a format equal to, or lower than, that of the amateur or club trustee making the request.

There are nearly 15 million possible callsign combinations in the Amateur Radio Service. It is very important that you check the FCC's online ULS database to be sure that the callsign you want is available. This database is located on the web at <http://wireless.fcc.gov/uls>. Click on the button labeled "Licenses" and enter the callsign you would like to have assigned to you. Vanity callsign assignment is not limited to your callsign district. *You* may apply for a callsign with any radio district numeral, Ø through 9.

The Amateur Service database contains amateurs with expired licenses, but their license callsign may still be active because it is in the two-year grace period for renewal. A callsign is normally assignable two years following license expiration or death of the licensee, whichever is sooner. There-

fore, it is important that the callsign has been inactive for two years before you request it. If the callsign is not found, it is available. If it is found, check to be certain it has been two years since expiration or cancellation due to death. Only the FCC's database contains this information; others merely tell you if the callsign is assigned.

Even though the licensee may be deceased for two years, it still may show up in the database as an unexpired callsign if no one has notified the FCC to cancel it. In that case, you must send a copy of the death certificate or an obituary notice from a newspaper to the FCC and request that the callsign be canceled. This must be done prior to filing the application for a vanity callsign. Send to: FCC Amateur Section, 1270 Fairfield Road, Gettysburg, PA 17325-7245. A callsign cannot be held for you during the cancellation process.

There are two special priority situations in which applicants need not wait the two years before applying for a vacant callsign. These apply to former holders (within the past two years) of a callsign and to close relatives of a former holder now deceased. Club stations also may apply for a former club member's callsign "in memoriam" without waiting the two years.

Finally, be aware that thousands of vanity callsigns are issued every year and someone else may also be requesting the same callsign you want. It goes to the radio amateur who requests it first. The callsigns of vanity applications filed online are issued 18 days after filing. This is to allow time for mailed-in applications to reach the FCC. An application received on a specific day by mail is matched with the same day's electronically filed applications. There is, therefore, no advantage to either filing for a vanity callsign online or by mail.

Since the FCC does not receive mail on Saturday or Sunday, electronically received vanity applications filed on the weekend are handled with Monday's mailed-in applications. To say it differently, a Saturday- or Sunday-received online application is shown to be received on Monday. You can begin using your new vanity callsign once it appears in the FCC's database.

How to File for a Vanity Callsign

Both the FCC and the American Radio Relay League have excellent online write-ups on how to file for a vanity callsign. The FCC's vanity callsign instructions are located at: <http://wireless.fcc.gov/services>; then click on "Amateur Radio Service" and (on the next screen) click on "vanity" on the left sidebar. The FCC also has a helpful "Vanity Facts" web page at: <http://wireless.fcc.gov/services/amateur/callsigns/vanity/faq.html>. The ARRL's instructions are located on the web at <http://www.arrl.org/arrlvec/vanity.html>.

It is always a good idea to select as many callsigns as possible to increase your chances of getting a vanity call.

73, Fred, W5YI

qrp

BY DAVE INGRAM,* K4TWJ

Reaching High with Low Power

A quick look through recent amateur radio magazines might lead one to assume that interest in homebrewing, kit building, and communicating with low power is declining. However, we are proud to say all three pursuits are alive and thriving in the world of QRP. Indeed, even QRPers with little spare time and/or limited technical knowledge are having a ball building and using basic-style gear of all types. Supporting that fact, in this column we regularly strive to include one or two just-for-fun projects and highlight some noteworthy feats of fellow QRPers. If you have a favorite project or kit, or if you have made some good contacts with low power, drop me a note with the details plus one or two photos and I will try to include them here . . . and that brings our first bit of good news into focus.

Recently, while listening on 30 meters one Saturday morning I heard Paul, N8XMS, calling CQ and gave him a quick reply. Paul returned, describing his rig as a home-assembled "Rock Mite" mini transceiver running 400 mw to a Cushcraft R-7000 vertical (photo A). I suspected Paul might be running 10 or 15 watts—although I have heard 100-watt stations come through at the same S2 level—but I never guessed that he was running less than one watt. The sensitive "front-end" circuitry and high-performance AGC (automatic gain control) systems in modern transceivers are genuine power equalizers for sure!

During further conversation with N8XMS, I learned that Paul recently had built the Small Wonders Lab Rock Mite and had already worked 17 states with it—and it is not his only homebrew rig. Paul also built an Elecraft K-1 and a KX-1 (this guy spends as much time building kits as he does operating!). Paul also enjoys portable hamming, so he put together the clever "shack in a box" setup shown in photo B. The carrying case is from Harbor Freight Company; it is fitted with foam cutouts to protect the KX-1 while holding two four-packs of AA batteries, a palm paddle, earbuds, a quick-to-deploy antenna, log book, and LED flashlight. Everything needed to get on the air with a respectable signal is in the box. Now that's what we call fun, ready to go, and emergency-prepared QRP! If you have questions for Paul, incidentally, his e-mail address is <paulhuff@usol.com>.

During another spare moment on 30 meters a few days later, I answered a CQ from Tom Mitchell, KB3LFC, and was again amazed to learn he was running 4 watts with a Heathkit HW-9 and 50-ft. long-wire antenna (photo C). Understand, too, I was not digging in the noise for weak signals. I guessed Tom was running around 50 or 60 watts, until I heard a small amount of QSB (a typical "signature" for QRP). In comparing notes with Tom, I learned he has operated QRP almost exclusively since receiving his license in the 1980s and has owned several beautiful classic rigs such as an original Argonaut, a Century 21, and an HW-7. More recently, Tom and his good friend, John Shannon, K3WWP, founded the popular North American QRP CW Club. Today, NAQCC has more than 1700 members, in every state and Canadian province plus over 40 countries worldwide. The club encourages QRP operation with simple wire antennas and hand keys, membership is free, the club holds several good contests annually, and an NAQCC newsletter is available online. You can learn more about the club online at <www.arm-tek.net/~yoel>.

Looking further into the magical world of QRP, Keith Ericson, KØKE, shared some of his milliwatting experiences and they reminded us of Tommy Tompkins, K6ATX's call for help with a grid-dip oscillator in the classic novel *SOS at Midnight*. Using only 200 mw of power, Keith worked amateurs in Massachusetts, Florida, and Washington State in a single afternoon on 20 and 15 meters. Two days later, and again running 200 mw on 15 meters, he worked VK9NDX. The big surprise here is Keith's gear for the contacts was all test-bench equipment (photo D). The transmitter was a Hewlett Packard 8640B Professional Grade Signal Generator and the receiver was an HT3745A Frequency Selective Level Meter. No doubt about it, friends. . . . A little QRP goes a long way!

*3994 Long Leaf Drive, Gardendale, AL 35071
e-mail: <k4twj@cq-amateur-radio.com>

Photo A– Paul Huff, N8XMS, uses this pocket-size setup for casual QRP fun, and has contacted 17 states with it on a strictly spare-time basis. The Rock Mite mini transceiver kit can be obtained from <www.smallwonderlabs. com>. The "Mite box" is available from <www.americanmorse.com>, and the paddle (also a kit) was offered by the Arizona SQRPion QRP Club. Total class for sure! (Photo via N8XMS)

An Easy-to-Assemble CW Filter

Do you remember Phil Anderson, WØXI, the man behind Kantronics Company of past times and today's popular Crystal Set Society? He is still enthusiastic about QRP, and one of his latest goodies worthy of recognition is the Passive CW

Andrew Cinta® Cable Assemblies

From

CABLE X-PERTS, INC.

Connecting You to the World...

ANDREW® Cinta CNT-600

HALF INCH SIZE SHOWN

Connector: **N, PL259, TNC & 7/16,** Burial: **Yes**, UV Resistant: **Yes**.
Shields: **2** (100% bonded foil +90% TC Braid) **VP 87%,** Attenuation 3.9dB @ 2 GHz at 100ft.
Usage 450 MHz and Higher.

PL259 CONNECTORS EACH END

Part #	Footage	Price
600C125	125 ft	$235.95
600C100	100 ft	$205.95
600C75	75 ft	$175.95
600C50	50 ft	$145.95
600C25	25 ft	$115.95
600C3	3 ft	$ 88.95

PL259(UHF) TO "N" MALE CONNECTOR

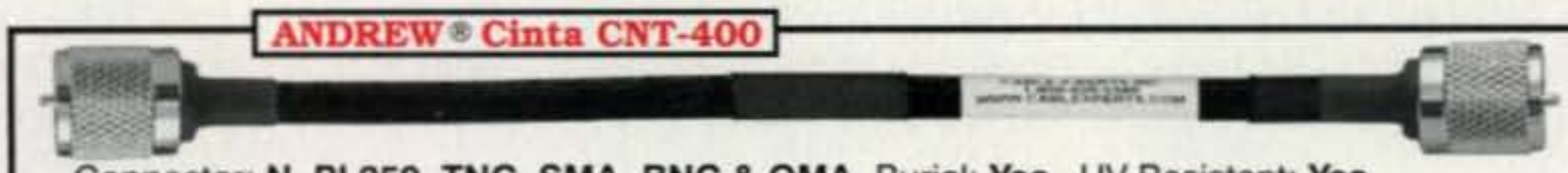
Part #	Footage	Price
600CN100	100 ft	$187.95

"N" MALE CONNECTORS EACH END

Part #	Footage	Price
600N100	100 ft	$168.95
600N75	75 ft	$139.95
600N50	50 ft	$108.95
600N25	25 ft	$ 77.95
600N15	15 ft	$ 66.49
600N6	6 ft	$ 55.49

Or CREATE YOUR OWN CUSTOM LENGTH ON-LINE.

ANDREW® Cinta CNT-400



RG8U SIZE SHOWN

Connector: **N, PL259, TNC, SMA, BNC & QMA,** Burial: **Yes**, UV Resistant: **Yes**.
Shields: **2** (100% bonded foil +90% TC Braid) **VP 85%,** Attenuation 6.0dB @ 2 GHz at 100ft.
Usage 450 MHz and Higher.

PL259 CONNECTORS EACH END

Part #	Footage	Price
400C100	100 ft	$ 82.49
400C75	75 ft	$ 63.95
400C50	50 ft	$ 45.49
400C25	25 ft	$ 27.49
400C6	6 ft	$ 14.95
400C3	3 ft	$ 11.95

"N" MALE CONNECTORS EACH END

Part #	Footage	Price
400N50	50 ft	$ 54.95
400N6	6 ft	$ 22.95
400N3	3 ft	$ 20.95

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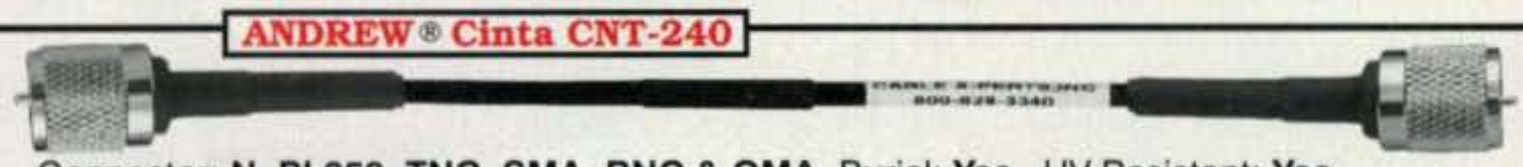
ANDREW® Cinta CNT-240



RG8X SIZE SHOWN

Connector: **N, PL259, TNC, SMA, BNC & QMA,** Burial: **Yes**, UV Resistant: **Yes**.
Shields: **2** (100% bonded foil +90% TC Braid) **VP 84%,** Attenuation 3.0dB @ 150 MHz at 100ft.
Usage 1 MHz and Higher.

PL259 CONNECTORS EACH END

Part #	Footage	Price
240C6	6 ft	$ 14.75
240C3	3 ft	$ 12.95

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Photo B– This tiny "grab-and-go" QRP setup, also built by N8XMS, has it all! The Elecraft KX-1 transceiver is equipped with an automatic antenna tuner and SWR monitor and may be powered by internal batteries or an external battery pack. The roll-up 42-ft. long wire antenna and ground radial system are designed for easy deployment using a rubber ball. The banana adapter is handy for quickly connecting antenna wires to the BNC socket on the KX-1. (Photo via N8XMS)

Audio Filter Kit shown in photo E. The filter has a bandwidth of approximately 400 Hz with a center frequency of 750 Hz, does not require external power, and is on a 1.25" × 5" PC board. It works with both low- and high-impedance earphones, and assembly time is roughly a half hour. If you need a little help separating signals on busy bands and your rig does not include a narrow CW crystal filter, this low-cost alternative may be the answer. For more details, check with the Crystal Set Society at <www.midnightscience.com>.

Incidentally, while visiting the Crystal Set Society's website, take a look at its new transistor amplifier kit for a crystal radio (photo F). It is fully contained on a 2" × 2" PC board, has gain up to 14 times, and is especially designed to drive a crystal earphone. Nice!

Acorn Tube Receiver

A couple of columns back, we revisited the little 955 Acorn Tube Transmitter, in both rectangular and round-based versions, and your response was simply

Super Power for Your FT-817

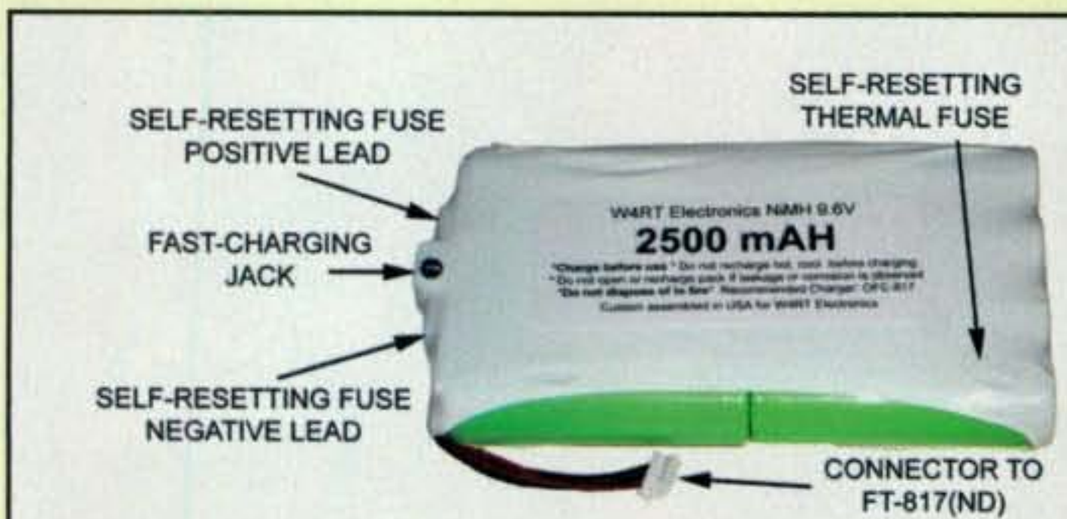
Yaesu's FT-817 continues to be very popular, especially among portable-oriented QRPers, and W4RT Electronics recently announced a 2500-milliamp/hour battery pack that makes it a real romper. That's a whopping 2.5 amps of current, friends; almost twice the capacity of a standard Yaesu battery pack, and it fits right into the FT-817's internal battery compartment. This thing concentrates so much energy in such a small pack that I suspect it uses a handful of dilithium crystals right out of *Star Trek* disguised as eight familiar-looking AA cells!

I recently added one of the W4RT Electronics' 2500-mAh battery packs to my own FT-817 and could not believe the long operating time it delivers between recharges—even when running 5 watts output. This gem is definitely the best accessory anyone could ever add to an FT-817.

The battery pack can be charged using the FT-817's internal circuit (the long-time way, sort of like filling the fuel tank of a bus with a small hose), or W4RT has an optional quick-charger that does the job in 2 1/2 hours. The battery pack's quick-charge socket also disconnects it from the FT-817, so you can also operate the rig on external power while "rejuicing" the pack. Cool!

If you are looking for a long-life and rechargeable battery for the FT-817—maybe for IOTA operating from an uninhabited island, or hamming on a bicycle, in a canoe, or on a week-long stay in the wilderness—check out W4RT's new 10,000-mAh Mega Battery. It is one incredible powerhouse of energy, and it keeps an FT-817 going and going and going. More details on both battery packs are at <www.w4rt.com>.

Thinking about emergency preparedness and/or week-long camp-outs with your FT-817? This 10,000-mAh/9.6-volt Mega Battery from W4RT is the perfect answer. It measures 2.3" × 2.6" × 5.2", weighs 3 lbs., and can power the transceiver at its full 5-watt output level until the cows come home.!



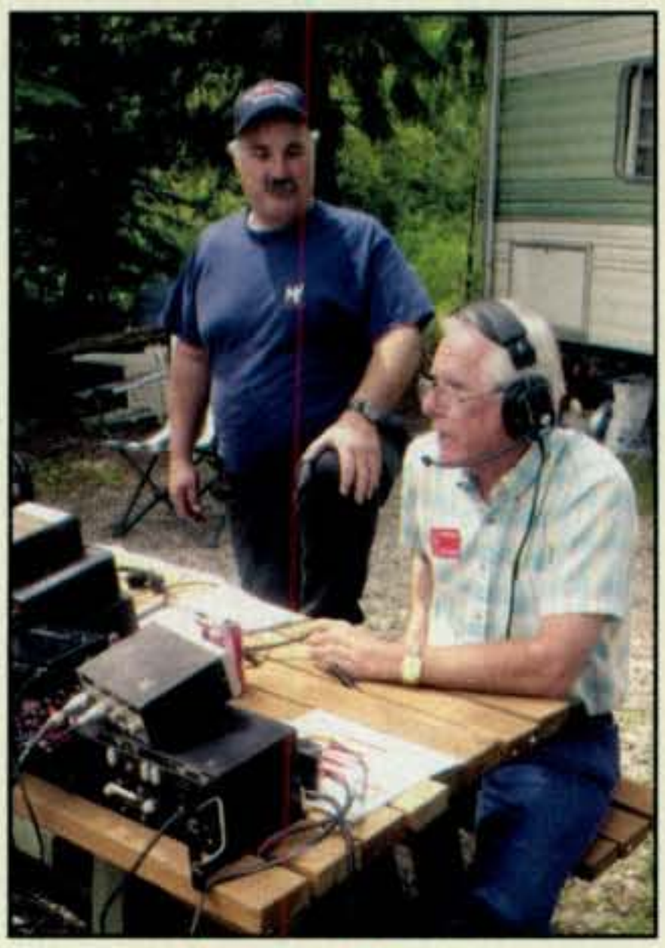
Check out this new 2500-mAh battery pack for Yaesu's FT-817 transceiver. It fits right in the little rig's battery compartment, delivers more hours of operation between charges than any other battery pack, and may be slow-charged with the FT-817's internal charger or rapid-charged with an optional external charger from W4RT Electronics. It is super! Details are at <www.w4rt.com>.

Photo C– Tom Mitchell, KB3LFC, pumps out a very good QRP signal with this modest Heathkit-favoring setup. Tom and John Shannon, K3WWP, founded the popular North American QRP CW Club. (Details in text)

Photo D– Keith Ericson, KØKE, with his workbench test equipment used for milliwatting fun on 20 and 15 meters. The receiver is an HP-3746A Frequency Selective Level Meter and the transmitter is an HP-8640B keyed through a Dow Key T/R relay on its output. It's wild, but Keith worked VK9NDX—with a scant 200 mw output! (Photo courtesy of KØKE)

incredible. In light of that, we now offer another equally special treat: a mating Acorn Tube Receiver. I originally planned to highlight a single 955 circuit here, but Jerry Fuller, W6JRY, quickly changed my thought with his marvelous two-tube version shown in photo G and fig. 1. It is a trim showpiece, is fun to build, and is surprisingly sensitive and a blast to operate. What else could one want?

In looking at the receiver's circuitry, capacitor C1 may be a small trimmer or you can tightly twist two insulated wires together four or five times to make a "gimmick" capacitor. Frame-type variable capacitors (with their frames connected to the circuit's ground line) are ideal for main tuning/bandset capacitor C2, fine-tuning/bandspread capacitor C3, and regeneration-controlling capacitor C4. Real open-frame capacitors—even the "midget variable" type so common a



On the Cover

If it's June, it's time for Field Day, one of the highlights of most clubs' event calendars, combining a social weekend with an annual emergency preparedness exercise. The ARRL first ran the event in 1933, making this year Field Day's 75th anniversary!

In our cover photo this month, Jim Monroe, N7ESU (standing), and Mel Frost, KD7DCR, are operating the Kootenai Amateur Radio Society's club station, K7ID, from a campsite on Eagle Creek, along the Coeur d'Alene River, near Pritchard, Idaho. The club is based in Coeur d'Alene, some 50 miles to the southwest, and has about 80 members. It is a general-interest club with a wide variety of activities, including a hamfest every June (two weeks before Field Day), monthly license exam sessions, regular highway cleanups along Interstate 90, and communications support for an annual two-state triathlon and several other events. The group also hosts an annual pancake breakfast and ice cream social!

Jim has been the club's Field Day Coordinator for the past 18 years (as well as hamfest coordinator and chief repeater tech). He says the group tries to operate FD from a different location every year. This year they'll be in Hidden Valley in Rathdrum, Idaho, about 700–800 feet above the prairie *(some valley!—ed.)*. Last year, Jim says, the group also ran a Get On the Air (GOTA) station for the Spokane DX Association at its FD site, one of several joint activities between hams in Coeur d'Alene and those in Spokane, Washington, which is only about 30 miles to the west. *(Cover photo by Larry Mulvehill, WB2ZPI)*

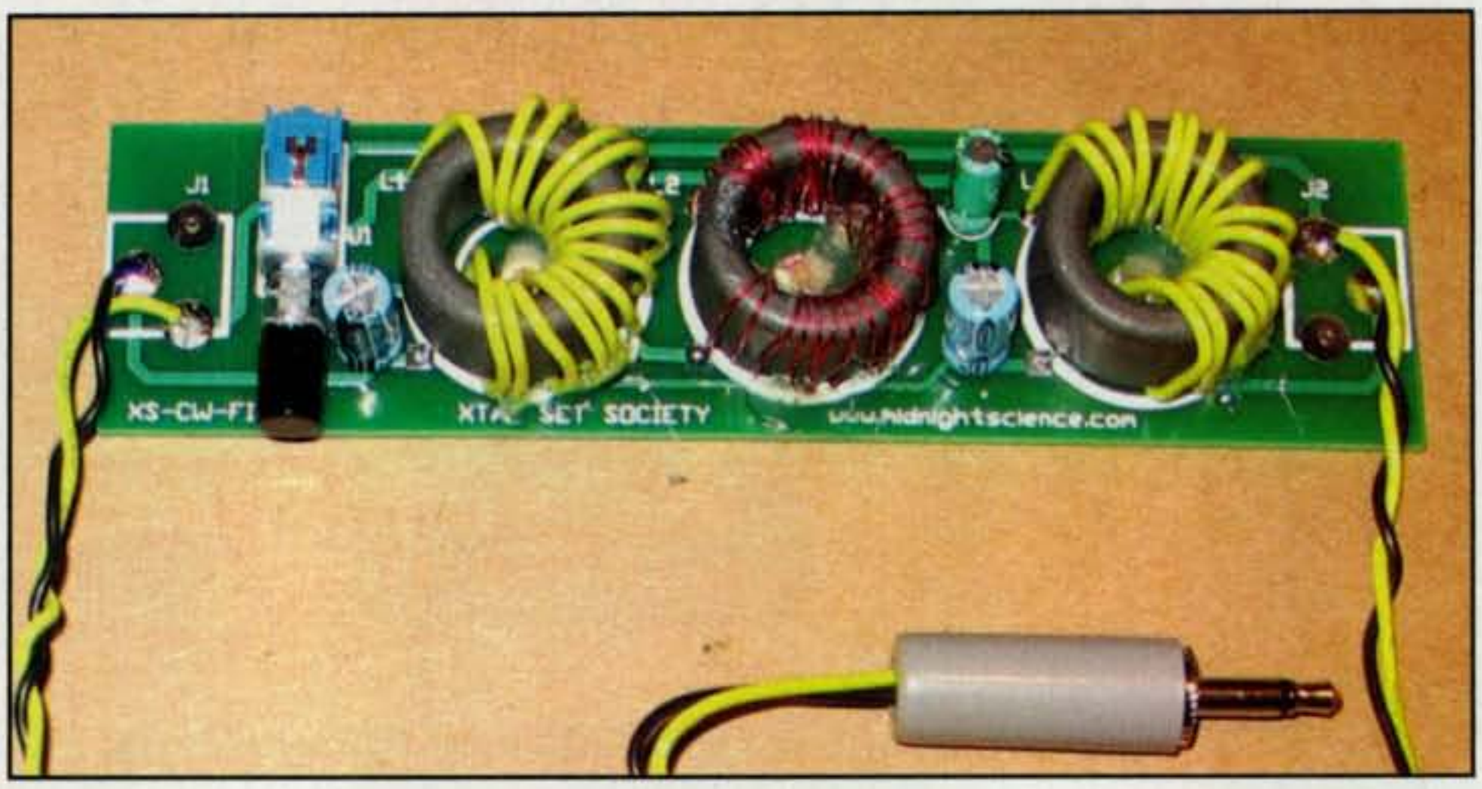


Photo E– This new passive-audio CW filter kit is available from the Crystal Set Society and is a super asset for copying weak signals amidst QRM. It has a 400-Hz bandwidth, and it connects between your rig's audio output and earphones and does not require DC power for operation. (Photo courtesy of WØXI)

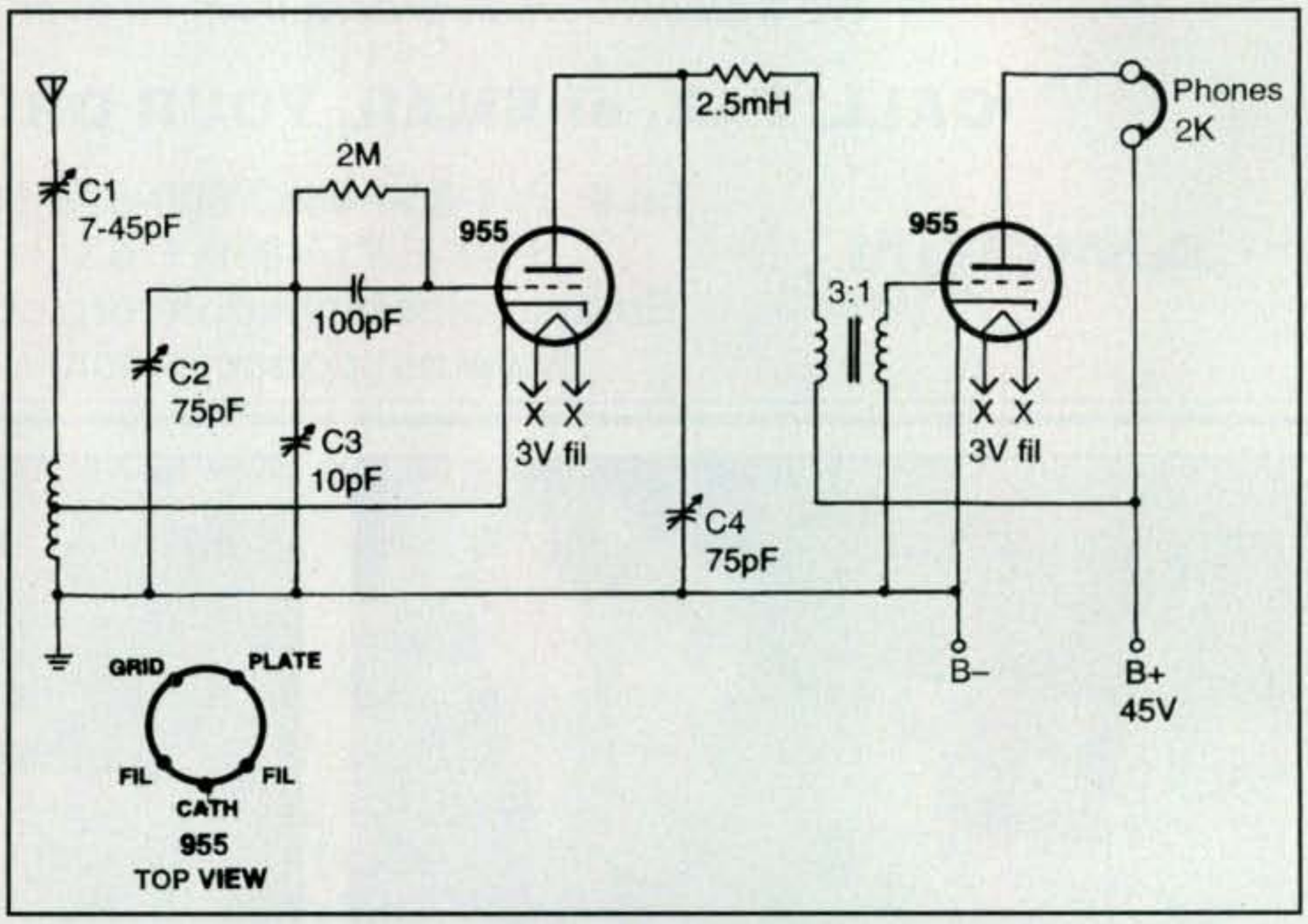


Fig. 1– Circuit diagram of the dual 955 Acorn Tube Receiver, courtesy of Jerry Fuller, W6JRY. The filaments of the tubes are wired in parallel and connected to two D cells for 3-volt power. They are marked "XX" here for simplicity. (Discussion in text)

few years ago—are scarce today, but you can probably find some reasonably close value ones at hamfest flea markets. Some modern plastic-cased tuning capacitors can also be modified for the required low value and used here. Antique Electronic Supply (www.tubesandmore.com) is another good source of parts: capacitors, tubes, sockets, earphones—everything! They may be a bit pricey, but they are top-grade. Funds limited? Look back at my February QRP column for details on homebrewing a socket for the 955.

The receiver's main tuning coil is wound on a 1-inch diameter form approximately 2 inches tall (plug-in type or a pill bottle, your choice). For 40 meters, it is 12 turns of No. 26 or 28 enamel-coated wire tapped two turns from the bottom. For 80 meters, it is 41 turns (same wire) tapped six turns from the bottom. I understand No. 16 or 18 wire may also be substituted if necessary, and I also understand a coil of 8 turns tapped at two turns tunes 30 meters. The 3:1 transformer is a small audio type and may be a regular open-cased

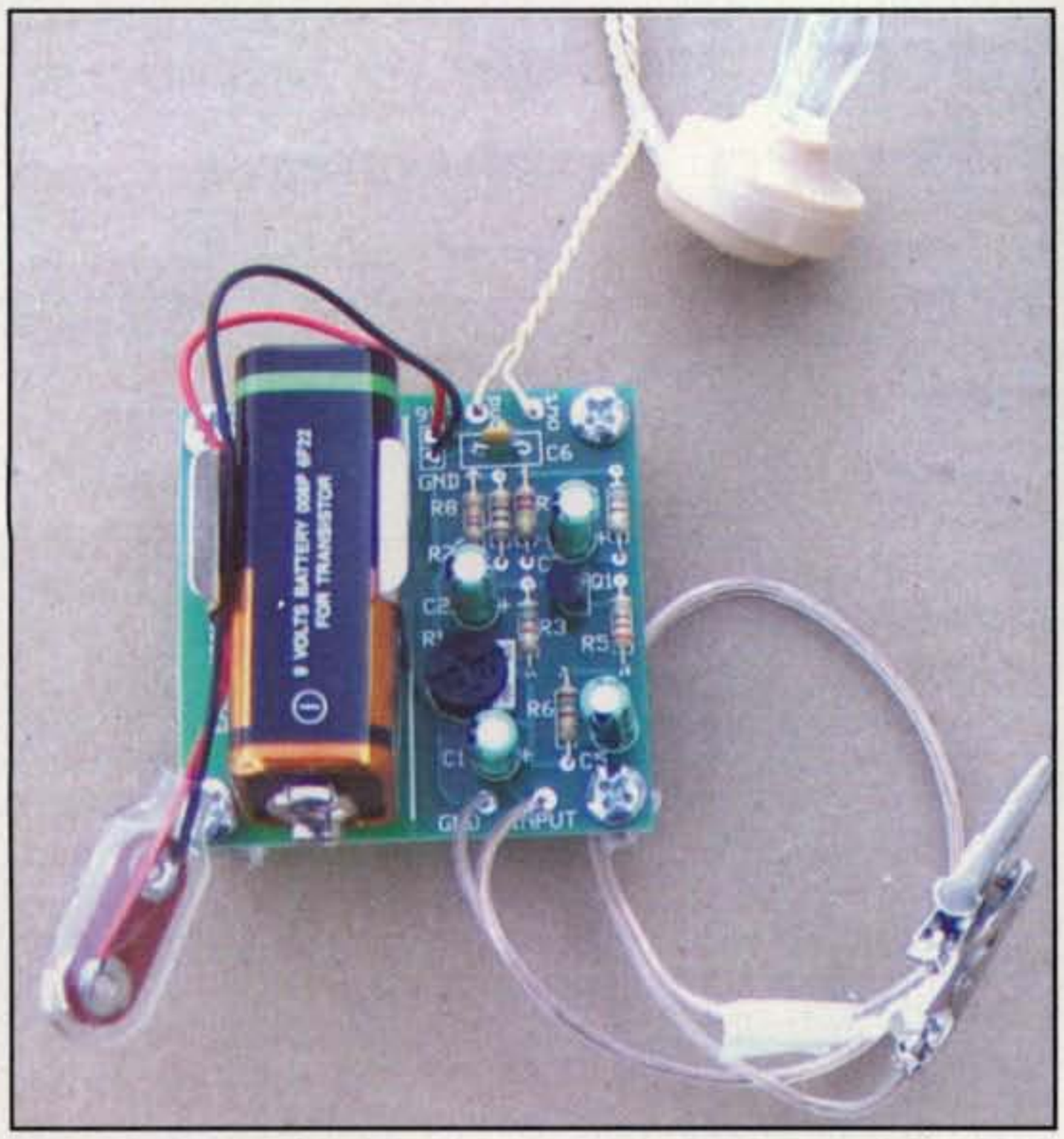


Photo F– The Crystal Set Society's new transistor amplifier kit is very handy for experimenting with crystal sets or comparable low-power/high-impedance output projects. It is fully contained on a 2-inch-square PC board and assembly time is approximately 45 minutes. (Details in text)

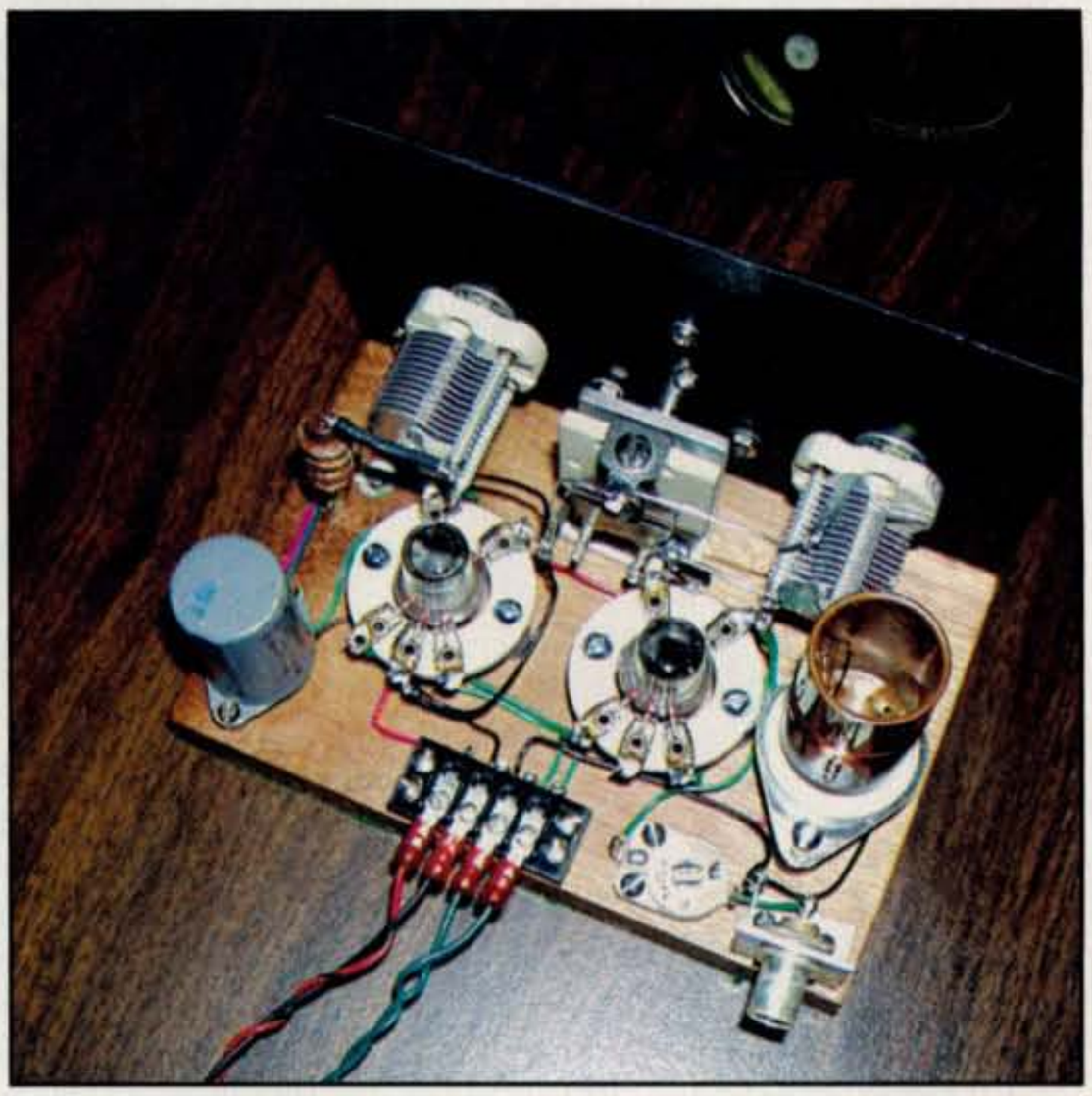


Photo G– This twin 955 Acorn Tube Receiver built by Jerry Fuller, W6JRY, is tastefully laid out on a wood base with a metal front panel. The three variable capacitors are (left to right) regeneration, fine-tuning, and main tuning. The plug-in coil form on the right is 1-inch in diameter. The item on left rear of the board is a 3:1 audio transformer in a round metal case. (Photo courtesy of W6JRY)

type or an enclosed type such as the one W6JYR used. A couple of folks even used a small 6-volt transformer removed from a wall wart, and it worked.

The earphones are the tubes' plate load, so use 2K-ohm or 4K-ohm types rather than 8-ohm types. In a pinch, a small 2K to 8-ohm audio output transformer will permit operation with 8-ohm phones (with slight reduction in volume). A pair of regular C or D cells make a good filament supply, and five 9-volt batteries are ideal for a plate supply. Current drain is quite low, so the little receiver plays a long time on one "round" of batteries. Build one for fun, let us know of your success using it, take some pictures of the completed receiver, and we will strive to include your story in a future QRP column.

Conclusion

That overflows available space for this time, friends, but stay tuned for more good news and more great easy-brew projects coming up in our next QRP column. Meanwhile, remember that despite low sunspot activity, everything is booming in QRP. Get on the air, enjoy QRP to the max, and listen for me nightly on 30 meters.

73, Dave, K4TWJ

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Curing that Scratchy Signal with an Upside-Down Antenna

"You're very scratchy and noisy into the repeater today; what's going on?" asked one of my friends on my favorite repeater. "I am using my dual-band HT at my dad's house, doing some work in the garage," I replied. "Oh," my friend said. "You need to do something to improve your signal, because you keep dropping out and are barely making it into the repeater." "Okay, thanks. I will do something today to fix that. WB6CWN from KH6WZ."

My little HT (handie-talkie, a portable radio transceiver) even on high power was a little bit too weak to establish a reliable "connection" into the local repeater and give me a "full-quieting" signal.The term *full-quieting* refers to the signal quality of an FM signal. On the FM mode, signals are said to be fully quieting when the signal is strong enough to open the receiver squelch firmly and the resulting audio coming out of the speaker sounds crisp and clear, as opposed to a "noisy and scratchy" sound coming from the speaker when signals are weak. I could solve my problem by either increasing power with an external amplifier or changing the rubber-flex antenna to something bigger.

*16428 Camino Canada Lane, Huntington Beach, CA 92649
e-mail: <kh6wz@cq-amateur-radio.com>

Qty.	Description	Approx. Price
1	Mobile antenna with coax and connector to match radio	$80
1	Magnet mount for above	$40
1	Scrap sheet metal	free

Table I– Bill of materials for the upside-down vertical antenna.

An amplifier would improve my transmitted signal and make my signal stronger so that other stations could hear me better. However, an external power amplifier would not improve the receive signals for listening at my end.

The best way to improve communications in any radio station on any frequency or mode is to improve the antenna system. A better antenna improves signals on both receive and transmit and is usually a less-expensive solution, too.

In this case, I had several criteria for an improved antenna system at my father's house when I visit there and work around his house:

1. Must be inexpensive.
2. Must be unobtrusive and possibly hidden from view of the neighbors.
3. Must be portable so that I could remove it quickly if needed.
4. Must have dual-band, 144-MHz/440-MHz, capability to match the radio's capability.

Photo 1– The simple, cheap, and portable dual-band antenna system is effective and easy to install. But wait . . . the antenna is upside-down. See the text for more details.

5. Must have vertical polarization, since this antenna would be for repeater and simplex operations on FM.

As I thought about what to do, I glanced at an old microwave oven that was destined for the trash later in the week. I tried to fix it, but then decided that getting a new unit would be cheaper and faster to get cooking again. I noticed several "fridge magnets were stuck all over the microwave-oven housing, and for some reason, I thought about a spare mobile antenna and magnet-mount I had in the closet. This would be perfect for my cheap and portable antenna system.

As you can see in photo 1, the simple and cheap, portable, dual-band home-station antenna is a very simple affair, and it works very well. All of the repeater channels on the HT are "full-quieting" and strong. Even simplex (non-repeater) contacts to the far end of the city are now possible with this simple setup. As a bonus, I can install or take down this antenna system in less than five minutes, perfect for an emergency situation. In addition, I have several of these antenna systems installed in various locations around my house as well as my dad's house, ready to be used if an emergency antenna is needed. Although not a "complete station," all I have to do is bring a rig and source of power with me, and I can be on the air almost immediately. Table I is the bill of materials list for this antenna system.

Photo 2– The "ugly ground-plane antenna" might not look pretty, but it is also an effective and small antenna for VHF-FM work, curing scratchy and noisy signals.

Not Really Building

This is a construction project without too much building. You do have to get some tools out, including a hammer to smash the sheet metal flat. If you are lucky, you may already have a metal mounting spot someplace near the roof, such as an air-conditioner unit, furnace duct, or something similar.

I removed the sheet-metal cover from the microwave oven and flattened it by stepping on it, and then hammered it as flat as I could. I drilled some holes in the metal and fastened it to a rafter at the peak of the garage roof with some drywall screws. The sheet-metal surface serves as a place for the magnet mount to grab on to and also serves as a ground plane.

Which End is Up?

But wait. If you noticed, the sheet-metal ground plane is above the antenna. How can "ground" be "above"? I view the upside-down vertical antenna this way:

First, it works, effectively boosting station performance of the small handheld portable antenna from "very noisy" to "full-quieting" on all the local repeater systems in which I am interested.

Second, antennas can be thought of as "floating in free space," meaning

Qty.	Description	Approx. Price
1	Solid copper wire, #10 or #12 gauge, not critical	35 cents/ft.
1	RG-8X or RG-58 50-ohm coax, length to suit, with PL-259 connectors	$40/25 ft. with connectors attached
1	SO-239 chassis-mount connector	$10
1	Mast, PVC pipe (see text)	scrap
1	Conduit clamps, or other suitable mount for the pipe mast	$1.00

Table II– Bill of materials for the "ugly ground-plane antenna."

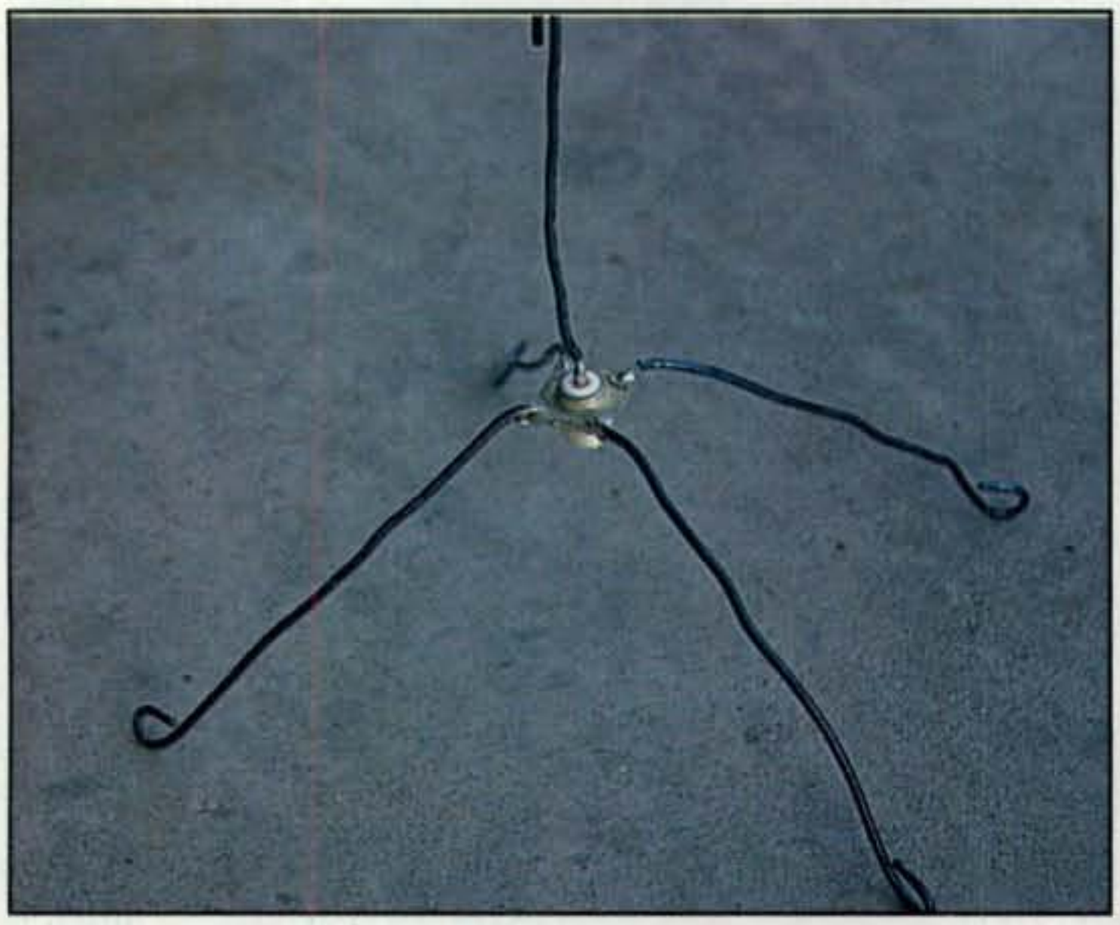


Photo 3– A closer look at the "ugly ground-plane antenna." The chassis-mount SO-239 connector forms the basis of this antenna. The driven element is soldered to the center conductor pin, and the ground radials are connected to the flange. Little loops are added to the free ends for safety.

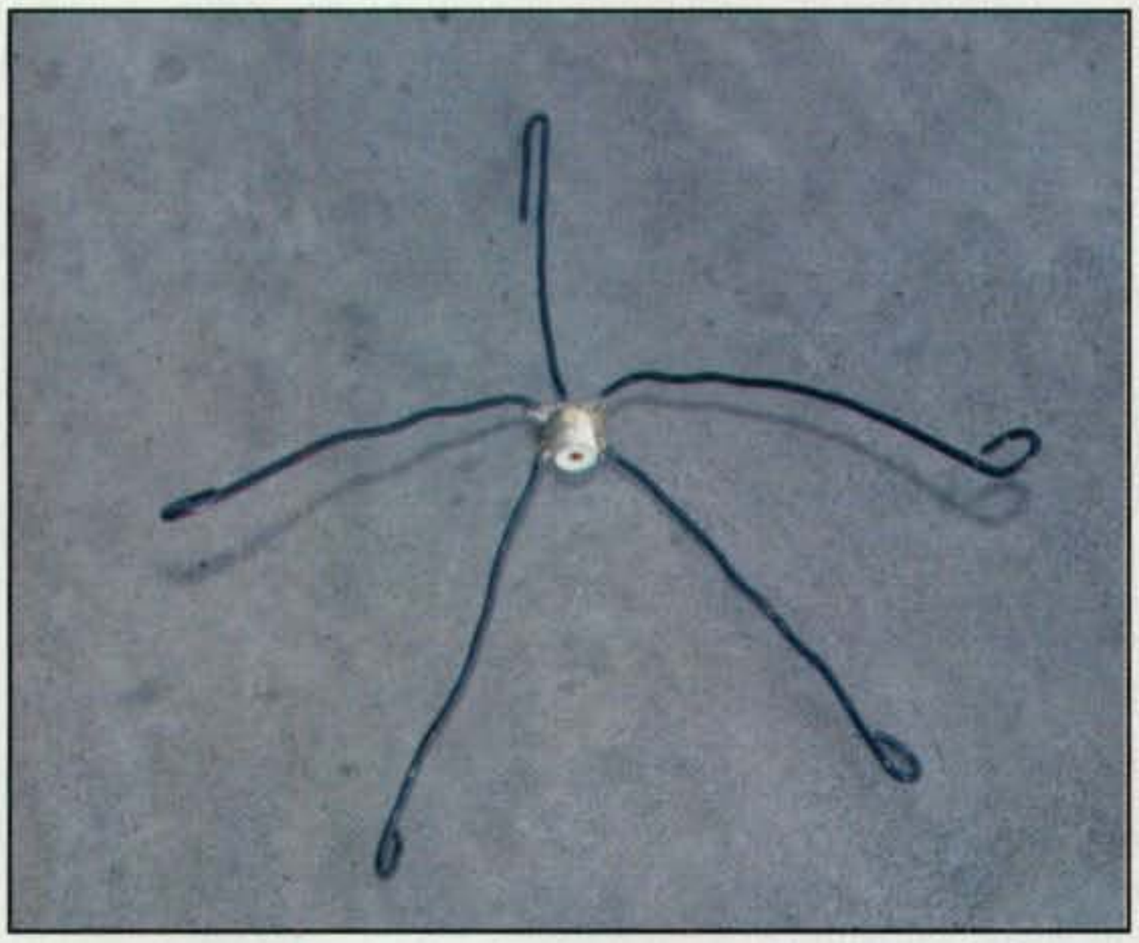


Photo 4– This is another view of the antenna. Remember, it is better to cut the wires a little long, since it is easier to trim the lengths to the proper length after the assembly is completed.

there is no point of reference, except for the elements of the antenna itself. In other words, if you look at this antenna while you are sitting on the floor, you may think the antenna is upside-down, since the ground portion (the shield of the coax cable, the chassis of the radio, and the sheet-metal ground plane) is at the top, and the radiating element of the antenna (the whip antenna and its coils and so forth) and the "hot" center conductor side of the coax is on the bottom.

However, if you were floating in space, where there is no "up" or "down," you would have to look at the antenna and use the antenna elements themselves as reference points. Therefore, in any case, the antenna driven element (the vertical element connected to the center of the coax) forms "half" of the antenna, and the ground plane (ground radials that are connected to the coax shield) form the "other half" of the antenna.

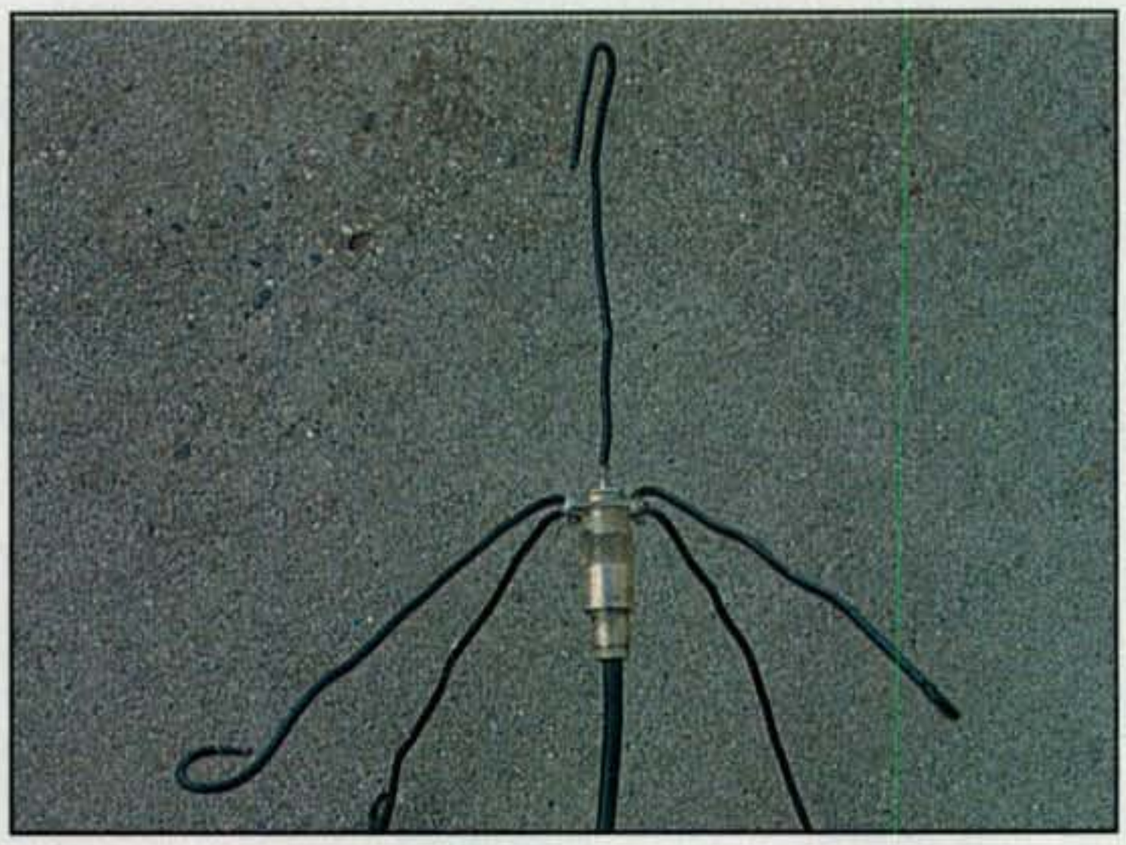


Photo 5– Here is a close-up of the solder connections to the SO-239 flange. If you are not able to heat the connector for a proper solder joint, you may use ring terminals and machine hardware to make these connections.

	146 MHz	225 MHz	445 MHz
Driven Element	$19\frac{5}{16}$	$12\frac{5}{8}$	$6\frac{3}{8}$
Ground Radials	$18\frac{11}{16}$	12	$5\frac{3}{4}$

Lengths in inches, the ground radials are bent to 45 degrees to the driven element.

Table III– A quick list of element lengths for "ugly ground-plane antenna" for the most common FM bands.

From Upside-Down to Ugly

Photo 2 shows an antenna I have in one corner of my bedroom station. Although it is rather ugly, it works great and is also very inexpensive to build. This antenna is hanging from a length of string, tied to a push-pin stuck in the ceiling. This ground plane is made for a single band, 440 MHz. A more elegant-looking antenna can be made with a few other parts, which are included in the bill of materials list, Table II.

This antenna is a "simple single-band ground-plane system." Let's build one. First, the antenna dimensions must be figured out. The ground-plane antenna is a quarter-wave radiating element with quarter-wave ground radials, for a total of a half-wavelength. In small antennas such as this, there are usually three or four ground radial elements, and the elements are made of stiff wire or aluminum tubing.

You can use "the quarter-wave antenna formula" to calculate element lengths, but Table III gives a quick list for the most common FM bands.

Take a look at photos 3, 4, and 5 to understand the details of building this ground-plane antenna. Make the wire elements at least 3 or 4 inches longer than the required dimensions so that you will have some "wiggle room" as you build the antenna. Remember the old carpenters' rule: "Measure twice, cut once." I always like to add: "It is always easier to cut longer than to try to stretch something too short."

Next remove about an inch of insulation from one end of each of the solid wire elements.

Solder the radiating (vertical) element onto the SO-239 con-

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- Built-in high grade Vocoder (AMBE)
- Built-in FEC protocol
- Compact unit. Easy to operate.
- Utilizes a uniquely designed high performance DSP engine
- Uses the established G4GUO open protocol
- ARD9800 can also be used for digital slow scan TV and data transmissions (images require optional memory board)

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info@aorusa.com http://www.aorusa.com

Oops...

Well, this is what happens when they take away your calculators and you have to actually do things like divide by two in your head... In April's "Beginner's Corner" (p. 69), we noted that a dipole antenna being discussed needed to be made shorter "by a total of 4.38 feet ... This means we have to cut off 1.19 feet (about 14 inches) of wire on each side." Well, um, it seems that after running this equation through the Cray supercomputer in the back room at *CQ*, we've discovered that 4.38 divided by 2 is actually **2.19**, not 1.19, meaning that each side of the antenna would have to be shortened by about **26 inches**, not 14. So, if you made our recommended cut and found your antenna is still resonant outside the 40-meter band (at around 6.72 MHz), cut another 8 inches off each end and things should look a lot better at the target frequency of 7.065 MHz. *(Tnx KØEU for the catch)*

Also, as we're likely to be reminded by every reader who ever attended Purdue University or whose school ever played Purdue at anything, the home of the Boilermakers (May front cover) is in **West** Lafayette, Indiana, across the river from just-plain-Lafayette. *(Tnx W9CW)*

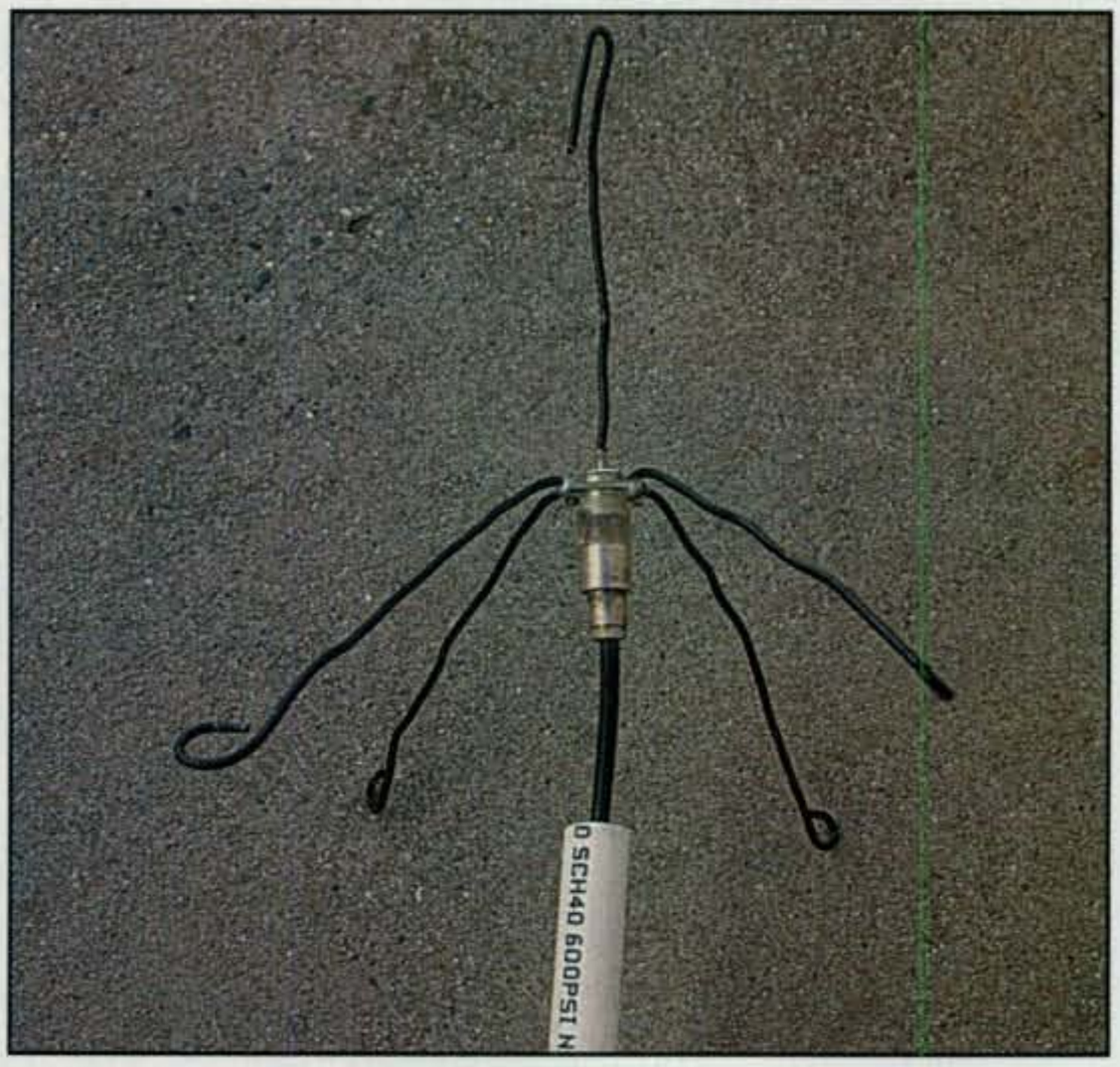

Photo 6– Here is one way to mount the "ugly ground-plane antenna." Half-inch PVC pipe is used as a mast, and the coax feedline (RG-8X in this case) slides inside the pipe. When the coax is pulled slightly, the PL-259 connector cinches the antenna in place. The "mast" can be mounted to a rafter inside the attic with U-bolts or electrical conduit clamps.

nector center-conductor pin. Be sure to mount the wire in the "bottom" part of the connector, not on the side where the feedline will be connected. Next solder the radial elements to the flange holes. You will have to use a lot of soldering-iron heat to make a proper solder joint. If you do not have soldering tools to do this, you can use ring terminals on the ground radials, and then use 6-32 machine screws, lock washers, and nuts to mount the radials to the SO-239 connector.

The coax cable screws onto the bottom of the antenna, and you are ready to mount the thing on a mast. If you want to install this antenna outdoors, make sure you add weather-proofing to the connections before installing the antenna on a mast. I use two layers of electrical tape, and then squeeze some silicone adhesive or sealant over the tape.

An easy way to mount this antenna is to use 1/2-inch PVC pipe (see photo 6). The coax cable goes inside the pipe, and the PL-259 connector holds the antenna in place at the top. The bottom end of the pipe can be fastened onto a rafter or the eaves of the house. Note: I am not sure how long the PVC pipe will last in an outdoor installation, but my antennas have been in place for the last two years or so and seem to be okay. In any case, these antennas are so cheap and easy to build that you can always build another one to take its place later.

You can use an SWR meter (make sure it's rated for VHF/UHF use) to trim the elements to the best length.

These simple antenna ideas can boost the receive as well as the transmit capabilities of your portable station. The materials are readily available and are inexpensive, so it may make sense to build several antenna systems like this and install them in various locations within your home. It is also a good idea to include one in your car, since you never know when you may have to deploy this "antenna substitute" in an emergency communications situation.

73, Wayne, KH6WZ

Digital Modes and Getting Started

BY DON ROTOLO,* N2IRZ

Which digital mode is best for you? Well, that depends mostly on what you plan on doing, but to a lesser degree how much time and effort you are willing to put in. This month we have a brief overview of some of the more popular digital modes (not including digital voice modes, a topic for another month), and then will focus on getting started with PSK31.

Digital operations fall into two basic categories: error-free and not error-free. (Maybe there's a better pair of terms, but I can't think of them at the moment). Modes such as packet, G-TOR, and PACTOR III are considered error-free, because they detect and compensate for any errors in transmission, virtually guaranteeing perfect copy at the receiving end. Other modes, such as PSK31, CW, and RTTY are not error-free, so it would not be unusual or unexpected to see an occasional garbled word.

The difference is really evident when you are sending a data file, where even the slightest error will likely damage the file beyond use. It would be foolish to try to send a computer file, or very important information, using anything but an error-free mode. Of course, we don't always have that option, so we use our own error-detection and correction systems—e.g., the ones used by the National Traffic System (NTS), which uses word counts and careful operating to help limit errors.

For casual keyboard QSOs, however, an occasional error is acceptable and can usually be understood anyway. Just like on the local repeater, if someone says, "OK, I'll meet you at the fire house in (garble)teen minutes," you can either understand that it will be around 15 minutes or you can ask for a repeat. It's the same thing if you're just having a long conversation with a fellow 700 miles away; it doesn't really matter if every word is perfect. CW operators are quite good at filling in the missing letters, and I'd have never passed my 5-wpm test all those years ago if I wasn't allowed to edit my copy.

On VHF and above frequencies, by far the most popular mode is packet. The basic protocol for packet is AX.25, a derivative of the X.25 protocol from the wireline world, and it is considered an error-free mode. (A *protocol* is just a standard way of sending and receiving data.) You can buy a Terminal Node Controller (TNC)—new they're about $180, and I've seen them consistently on eBay for under $50—or you can download one of several freeware and shareware programs that allow you to run packet through your computer's sound card. The limiting factor is speed. Most TNCs run at 1200 baud (with any FM radio), and you'll need a modem (at extra cost) to go up to about 19,200 baud, if your radio can handle it. More recently, equipment has become available from Europe for 128k and above, but it's not widely used here in the U.S.

Today the majority of packet operation is supporting APRS, which uses a simple protocol to distribute position data and simple messages or information, using a special mode that is not guaranteed error-free. There are also several types of

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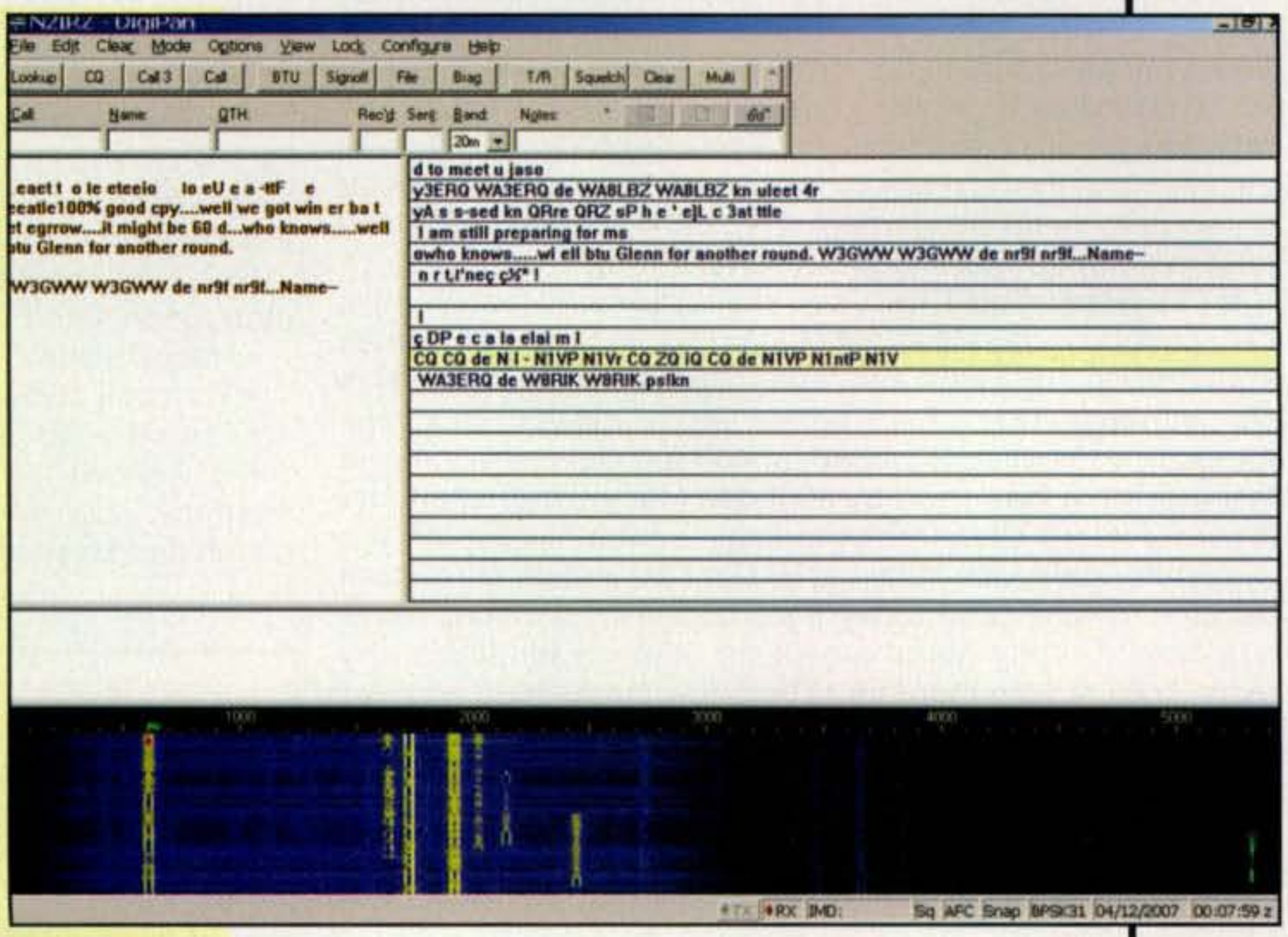

Fig. 1– A screen shot of DigiPan 2.0. The waterfall display at the bottom shows the stations in the passband of my radio and their frequency relative to its front display. The upper left window shows the text from the station to which I'm tuned (indicated by the diamond symbol at around 600 Hz), while the upper right window shows the text from all of the stations in the passband. The blank box above the waterfall display is where outgoing text would appear. Note that many of the garbled words remain understandable.

packet networks that exist to allow further communications than VHF and above frequencies usually permit. You can also find services on the network –such as a DX cluster, bulletin board, or chat server—but these are somewhat rare these days, since the internet does all this so much better. Also note that while AX.25 is the underlying protocol, some run TCP/IP or some other high-level protocol on top of it. HF packet, at 300 baud, is also a possibility, but it is not well suited to typical HF band conditions.

On HF, the de-facto standard for sending error-free data is PACTOR III, an improved version of PACTOR and PACTOR II (all from Special Communication Systems GmbH, or SCS, in Germany). It has several significant advantages, such as speed and a robust quality, especially under varying band conditions, but cost is not one of these advantages. A new PACTOR III modem runs nearly $1000, and you rarely see them on the open market. The original version of Pactor is now available as a sound-card mode, if you want to experiment with it.

On a side note, amateurs have been working on a protocol called SCAMP as a potential open-source replacement for the expensive PACTOR III system. While it has been demonstrated successfully, further work is necessary to increase its robust quality under poor band conditions.

Other error-free modes for HF include the granddaddy of them all, AMTOR (AMateur Teleprinting Over Radio), an old mode that's not in common use today. Other popular error-free modes include CLOVER (and CLOVER II, both from HAL Communications) and G-TOR (from Kantronics), both of which approach PACTOR III in speed and robustness.

Most of the error-free modes are used for the transmission of data to and from established stations. In other words, it would be unusual for someone to call CQ on an error-free mode, although it could be done.

On the other hand, if you're more interested in a good ragchew or just some DX hunting, there are plenty of modes for you. CW, or Morse code, is the oldest and by far the most popular digital mode. Now that we Americans no longer need to pass a code test for any level of license, I predict that there actually will be a surge of new CW operators. It is definitely the coolest digital mode. It is generally decoded by ear and sent by hand (try that with RTTY!), uses the simplest of equipment, and experienced operators can easily send 150 characters per minute. Although it requires a bit more skill than typing on a keyboard, knowing the "secret" language of CW is a skill to be proud of. Also, in a pinch you can communicate with the fellows in the next cell by tapping on the wall! It is popular on every amateur band where it is permitted, from Top band (160 meters) up well into the TeraHertz range (Light).

RTTY (Radio TeleTYpe) is an old digital mode that remains very popular today – second only to CW, in fact. RTTY dates from around 100 years ago, and until the early 1970s it was sent with large, heavy electro-mechanical teletype machines. Although originally developed for commercial operations—a faster system than used by all those Morse code operators (think Western Union Telegrams)—amateurs adopted the system for radio use fairly early. Over the years, equipment became simpler, and today it's a sound-card mode. I'd be surprised if many hams are using teletype terminals any more, but I'm sure there must be a few out there.

PSK31 is another very popular mode, probably the fastest growing mode today. It runs off your computer's sound card, there is a choice of free software, and it's popular enough that activity is easy to find. It is well-suited to keyboard QSOs, since you can almost keep up with the transmit rate using hunt-and-peck typing. Using only 31 Hz of bandwidth, it's almost as efficient as CW, and dozens of conversations can be carried out using just a few hundred Hertz.

Before we get into some of the specifics about PSK31, I just want to mention that there are literally hundreds of different digital modes out there, primarily for frequencies below 30 MHz, but with a decent assortment for 50 MHz and above. There is a lot of information available on the internet about all of these modes, so I won't provide any details, just some names and maybe a comment: PSK63 is a faster version of PSK31; Hellschreiber is an old mode that remains popular, using facsimile techniques to send text; MT63 is a DSP-based mode that handles fading and interference well, at the expense of a wide bandwidth; THROB is another DSP mode that also handles poor band conditions well; and MFSK (with various derivatives, such as MFSK8 and MFSK16) is yet another system designed to manage the vagaries of the HF world well.

There are also digital SSTV (slow-scan TV) systems, POCSAG paging systems, applications that use one or another of these to accomplish various tasks, hybrids that leverage the internet, and much more, far too much to mention here.

Getting Started on PSK31

OK, now on to PSK31. Start with a basic HF station equipped for SSB, and you'll need a Pentium-class computer that has a sound card installed. (Linux and Macintosh are also supported, but not having either, I can't help you there). You'll have to set up some cabling between the PC and radio, but that's fairly simple, as I'll explain in a moment.

Next get some PSK software. There are a lot of possibilities out there (just Google "PSK31" and you'll see what I mean), but the one I'm recommending today is DigiPan 2.0, which runs under Windows®. It is real freeware, small enough to fit on a floppy, and very easy to install and use. If you have an internet connection, just go to <http://www. digipan.net/> to download a copy. If you can't get a copy that way (or maybe through a friend, or the local library's internet system), send me a dollar and your address, and I'll send you a copy on a PC-formatted HD 3.5-inch floppy.

Although DigiPan is my favorite, that doesn't mean it'll be your favorite, too. Please look around at what else is out there, try some alternatives, and arrive at your own conclusion. I'll say it again: There's a lot out there. Even DX4WIN, the popular logging program, includes a PSK31 module.

Installation, which runs with a Wizard, is simple. Just run the Digipan20.exe (or the latest version) file, and it will self-extract to the Windows/Program Files directory. Run the program from the Start menu or from the desktop shortcut.

Now to connect the radio to the computer's sound card. To start, understand that we need to manage three things:

- Receive audio from the radio to the PC
- Transmit audio from the PC to the radio
- Push-To-Talk (PTT) control from the PC to the radio

Fig. 2 shows the schematic for a basic sound card to radio interface. Shown is but one of many ways to accomplish this; a web search will turn up dozens more. To start with, try to

Suggested Operating Frequencies for PSK31

While not part of an official band plan, you'll find the majority of the PSK31 activity around the lower end of the IARU RTTY band plan (except 10 meters, to allow Novice participation). Specifically, look around 3630, 7070, 10140, 14070, 18105, 21070, 24920, and 28120 kHz.

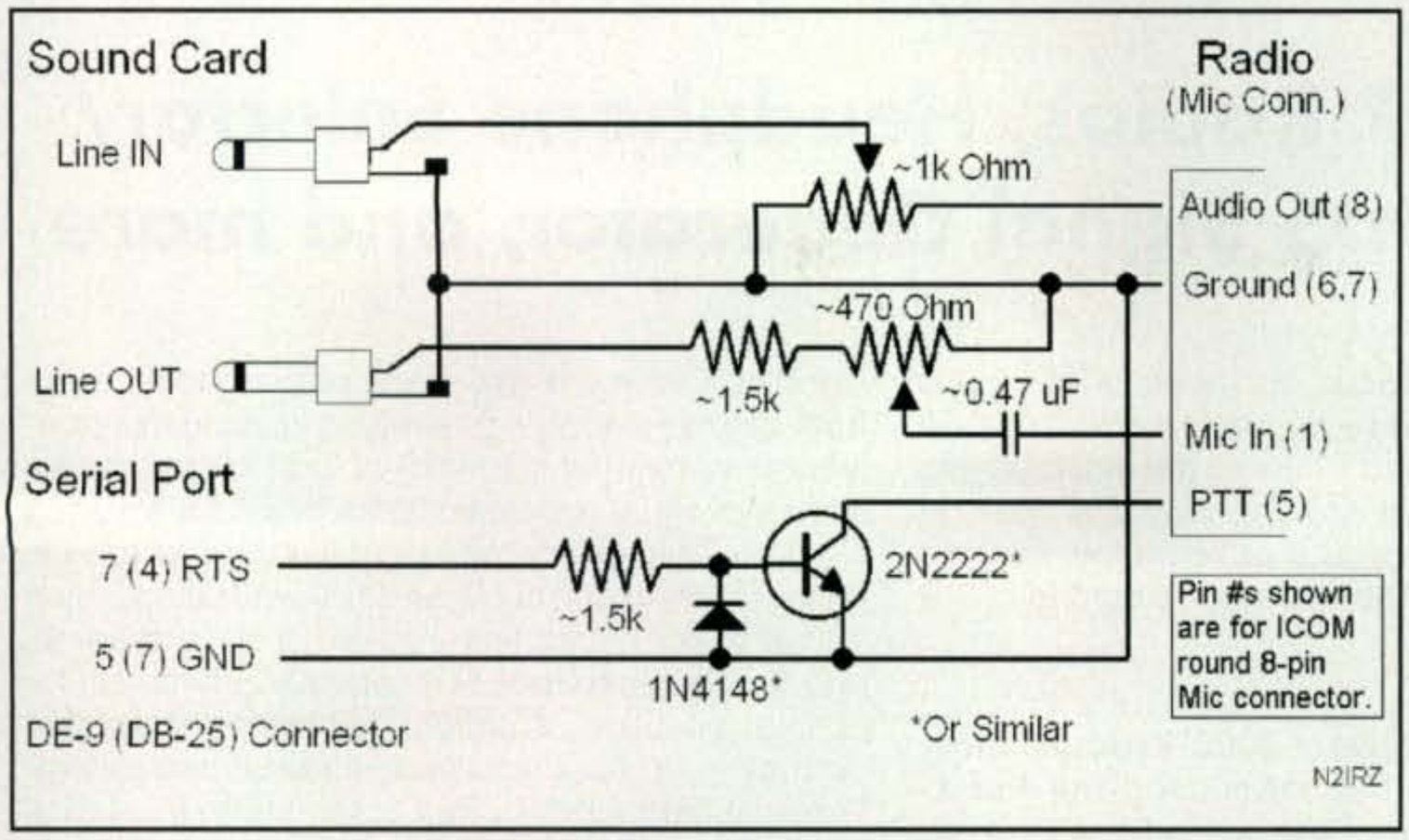

Fig. 2– Wiring for a basic interface cable. Your radio's microphone connector should have all the signals you need, but you might have to use the headphone jack for the Line In signal. You can build an interface like this for your radio and sound card using common parts. Nothing is critical, but make sure the output of the sound card is reduced sufficiently (see the text). You can also buy a kit or ready-made interface box, so you don't have to unplug wires to operate other modes.

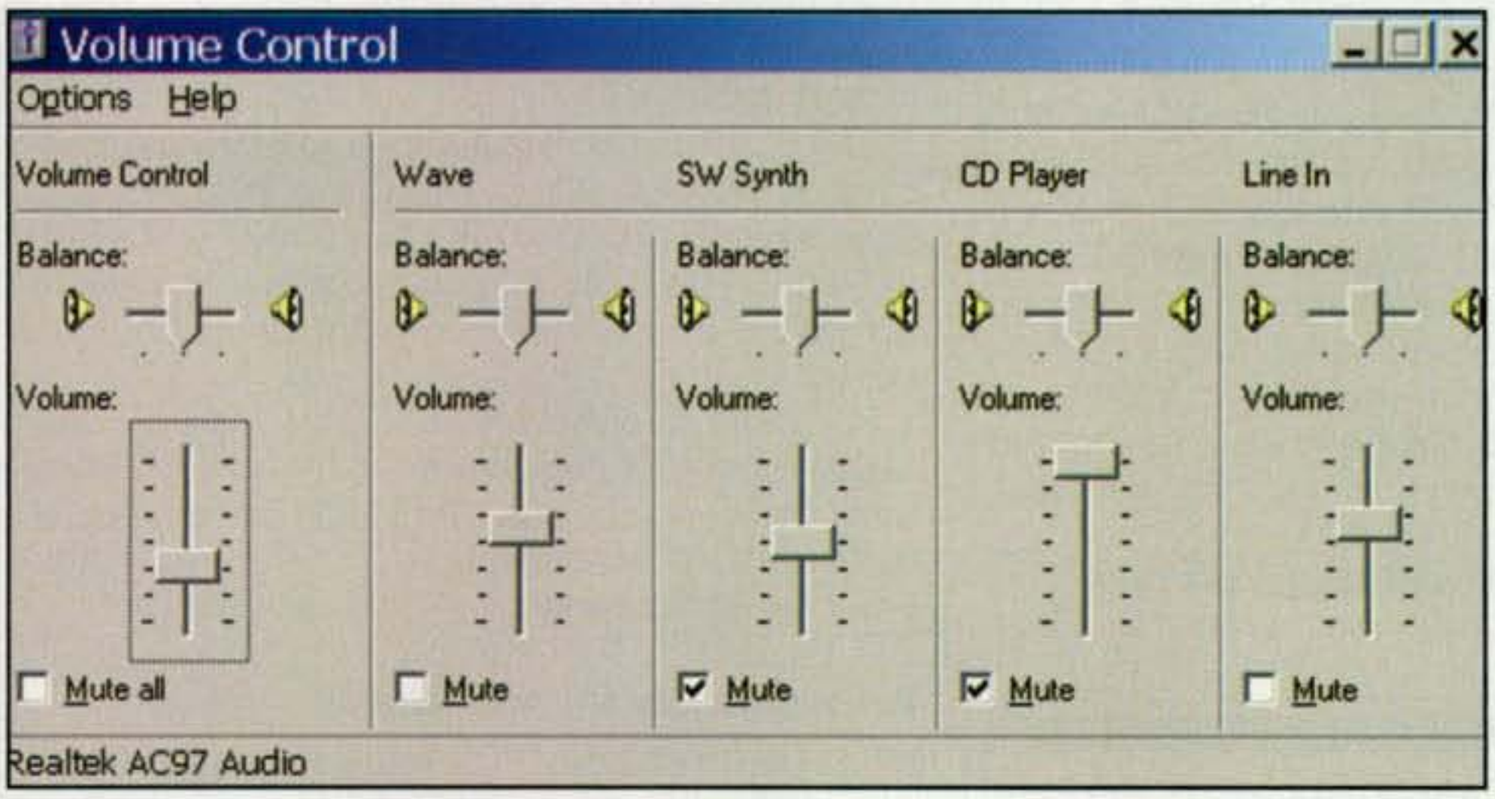

Fig. 3– The sound-card control panel. Open it by double-clicking the little speaker icon in the system tray. It is absolutely essential that you adjust the audio properly. Your control panel may show more or fewer controls, depending upon your sound card and how you have the options set. Mute everything you won't be using to help prevent accidentally transmitting noises over the air.

get the radio audio output into the sound card. If your radio has a fixed-level sound output, which doesn't vary with the volume control, use that. You can also use the speaker or headphone output; just keep the volume low at the start. Connect the sound output of the radio to the "Line In" jack of the sound card.

Now go to the Windows® sound card controls (fig. 3), disable (mute) every output except Wave, and every input except Line In. With DigiPan running, adjust the 1K potentiometer and the mixer's Line In control so that signals are bright green and the background is mostly black with some dark blue. Signals in the red and yellow are too strong; cut back the level a bit.

That should leave you all set up for reception. I suggest tuning around a bit, getting used to the software and its features. Now would also be a good time to read through the Help file. It isn't that long, and it contains many useful hints for operating. Also, before you start transmitting, configure the software (just scroll through the Configure menu and fill in the blanks; also check the Options menu to enable TX).

Once you're familiar enough with the software functions and settings, make up a transmit cable. For this you need both an RS-232 cable, to key your radio's PTT line (which works better than relying on VOX), and an audio cable, both connected to the microphone input of the radio. (If you have a newer PC without a serial RS-232 port, don't panic. Either buy a USB interface [see below] or a USB-to-RS-232 converter (about $20).

The audio output cable (Line Out) is really important. If you try to drive your radio with the raw sound-card output, bad things will happen. The sound-card output is way too much (maybe a few hundred millivolts or more) for the radio's microphone input, which expects maybe 10 millivolts. The resistive attenuator (470-ohm potentiometer) shown should be adjusted for minimum signal, and then slowly work your way up. You can then fine-tune the signal level with the sound card's output-level control. Set it so you don't overmodulate.

With the cables assembled and connected, and everything else in place, call CQ and see what happens!

If you're not the type to build your own sound-card interface, rest assured that the market has several models available. I can recommend the products of these manufacturers. While there are several others that offer comparable products, I have no personal experience with them. Contact the following manufacturers to review their offerings, and select one that fits your operating style and budget:

• West Mountain Radio:
<www.westmountainradio.com>
RigBlaster series

• MFJ Enterprises:
<www.mfjenterprises.com)
Computer Interface Products

• BuxComm (K4ABT):
<www.commparts.com>
RASCAL series

So there you have it, PSK31 in a nutshell. It really is as easy as it sounds, and once you try it, I guarantee you'll be hooked. Give it a try, or one of the many other digital modes—the sound-card interface works for virtually all of them—and keep the rest of us company on the bands. Until next time . . .

73, Don, N2IRZ

what's new

BY KARL T. THURBER, JR.,* W8FX

New SDR Radios, Headphone Selector/ Mixer, DDS Signal Generator, and more

This month we focus our attention on radio gear, accessories for the shack, antenna accessories, what's new on the net, the radio bookshelf, and more—taking a close look at "what's new" in our amateur radio hobby. Are you ready to begin? Well, then, let's dig right in.

Radio Gear

FlexRadio Systems New 5000 Product Line. FlexRadio Systems has introduced the FLEX-5000™ line of Software Defined Radios (photo A). The F5K is the successor to the very popular SDR-1000 radio, but unlike the SDR1K, the F5K has a self-contained A/D converter and only a single cable connection to a user-provided computer. A separate sound card is not required. There also are two additional versions of the new F5K, the C and D models. The F5KC has a built-in processor and comes with the Windows® XP operating system and wireless keyboard and mouse, whereas the F5KD adds a 9-inch LCD display with touch screen and large tuning knob.

Some of the key features of the FLEX-5000, which has a MRP of $2499, include: PowerSDR™, the open-source DSP software that allows continuous evolution, in which you get a "new radio" every time you download the latest version; high-resolution spectrum display/panadapter; fully adjustable and mode-specific "brick wall" filters; high audio quality; instantaneous point-and-click tuning; outstanding CW and digital-mode performance; spectrum-display averaging, resulting in lifting extremely weak signals out of the noise; high frequency stability; individual optimized filters for all ham bands; FlexWire™ interface for external control of rotator, antenna, and much more; and 100 watts output over 160–6 meters. Also featured are a general-coverage receiver; separate RX antenna connectors for optimal reception; an optional full-performance second receiver; fully automatic internal test/calibration; standard input/ output jacks; internal antenna switching; full QSK; quiet high-volume fan to keep the unit cool; and more.

The FLEX-5000C™ also includes an integrated Intel Core2 Duo processor with 1 GB RAM and a 160-GB hard drive, in addition to the Windows® XP operating system; internet connectivity standard; built-in 7-watt speaker; and wireless keyboard and mouse. The FLEX-5000D™ also includes a second receiver and ATU installed; 9-inch LCD touch-screen display on the front panel; a large main tuning knob; and an oven-controlled frequency reference.

The FLEX-5000™ is planned to be available on or about June 1, 2007. The C model is expected to be available around July 1 and will have a MRP of $4499. The D model is expected to be available before the end of the year, although its price has not yet been set.

For more information or to purchase a FLEX-5000™, contact FlexRadio Systems, 8900 Marybank Drive, Austin, TX 78750 (512-535-5266; e-mail: <sales@flex-radio.com>; on the web: <http://www.flex-radio.com>).

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e-mail: <w8fx@cq-amateur-radio.com>

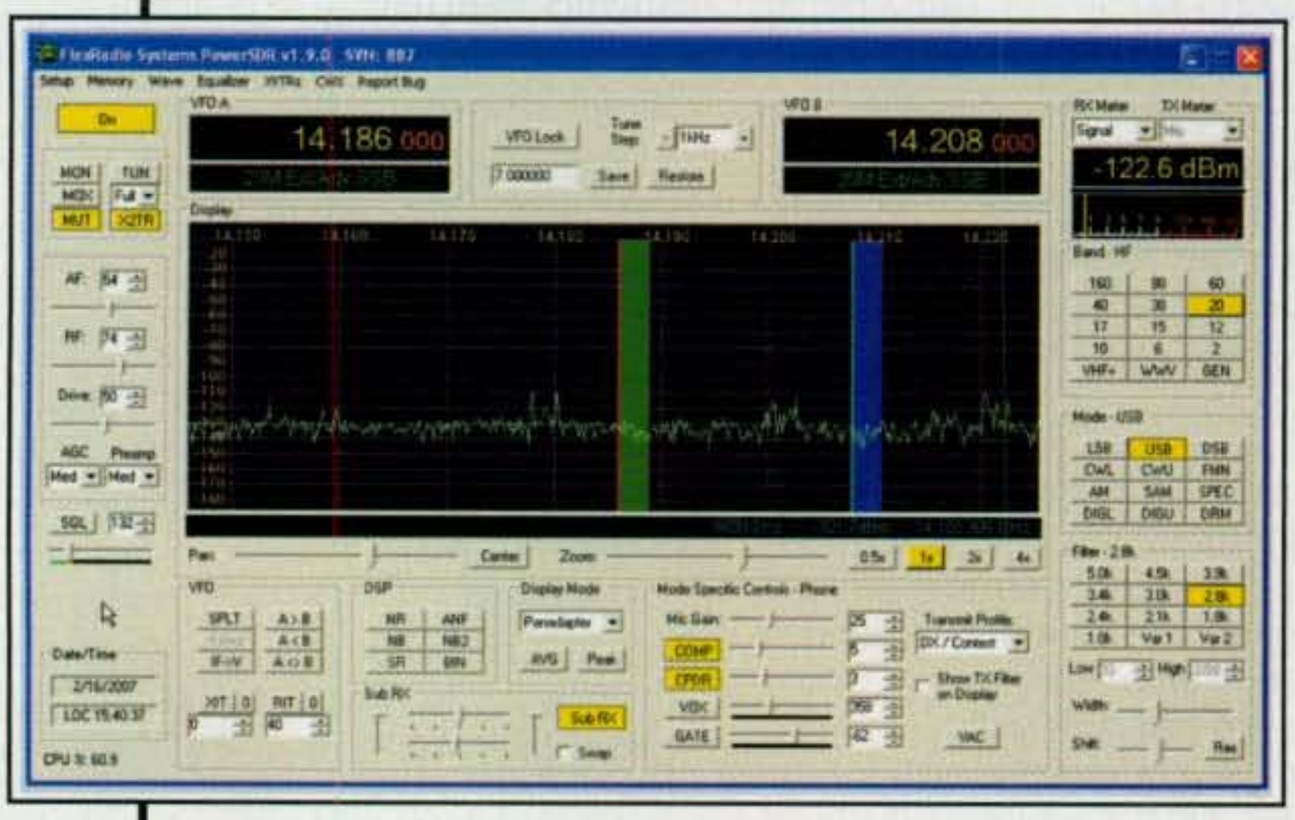


Photo A– Screen shot of FlexRadio's PowerSDR™ software, the "brains" behind the company's new FLEX-5000™ line of software-defined radios for the ham market. (Photo courtesy of FlexRadio)

Accessories for the Shack

MFJ HamProAudio™ 2-Radio Headphone Selector/Mixer. The novel MFJ-640 (see photo B), at $49.95, combines or selects audio from two different receivers. As such, the crew at MFJ says it's great for operating "split" for HF contests and DXing, or cross-band for VHF/UHF satellite work. To use the MFJ-640, just connect the audio output of two receivers to the two 3.5-mm audio connectors on the back of the unit. Then plug in your stereo headphones and you are ready to go. Conveniently, the MFJ-640 provides both 1/4-inch and 3.5-mm stereo headphone jacks, so there's no need for adapters.

The compact unit's front panel lets you select the audio output desired: Mix, Radio 1, Stereo, or Radio 2. In the Mix mode both radios are combined in both the left and the right earphones, and the audio mixing levels between the two radios are controllable. In the Stereo mode, Radio 1 is heard in the left ear and Radio 2 is heard in the right ear. As is customary with MFJ, the MFJ-640 mentioned

Photo B– The MFJ-640 HamProAudio™ 2-Radio Headphone Selector/Mixer combines or selects audio from two different receivers. It's said to be great for operating "split" for HF contests and DXing, or cross-band for VHF/UHF satellite work. (Photo courtesy of MFJ)

in this month's column is protected by MFJ's famous No Matter What™ one-year limited warranty. Under it, MFJ will repair or replace (at its option) your MFJ products no matter what for one complete year.

For more information, to place an order, to get a free catalog, or to find your nearest dealer, contact MFJ Enterprises, Inc., 300 Industrial Park Rd., Starkville, MS 39759 (1-800-647-1800; e-mail: <mfj@mfjenterprises.com>; on the web: <http://www.mfjenterprises.com>).

Novatech Instruments Model 409A 170-MHz DDS Table-Top Signal Generator. Steven D. Swift, President of Novatech Instruments, which specializes in supplying laboratory-quality professional-grade equipment, recently announced the Model 409A. It's a four-channel 170-MHz Direct Digital Synthesis (DDS) Table-Top Signal Generator (photo C) with 0.1-Hz frequency resolution and ±1.5 ppm accuracy.

The Model 409A features four phase synchronous sine or cosine output channels up to 170 MHz, serial control, 500-MHz external clock input, and an on-board TXCO (temperature compensated crystal oscillator) that's stable to ±1.5 ppm—all in a small shielded instrument case.

The small, table-top case allows the Model 409A to be integrated into test stations and other applications requiring multiple and frequency-agile outputs. When used with the external clock input, all 409A units can be synchronized to a system-wide frequency standard. Also, the 409A can store up to 32K profile points consisting of phase, frequency, dwell time, and amplitude settings. The profile can then be sequenced automatically without further control from the host computer.

Photo C– Novatech recently announced its Model 409A, a four-channel 170-MHz Direct Digital Synthesis (DDS) Table Top Signal Generator with 0.1-Hz frequency resolution and ±1.5 ppm accuracy. (Photo courtesy of Novatech)

For more detailed information and product pricing, contact Novatech Instruments, Inc., P.O. Box 55997, Seattle, WA 98155-0997 (206-301-8986; e-mail: <sales@novatech-instr.com>; <http://www.novatech-instr.com>).

Navigator Software Defined Interface. Rig Technologies offers The Navigator (photo D), which it bills as "the world's first software-defined interface—with one cable to your computer to do it all." With the new product, just one USB cable to your computer controls almost everything, using any software. Everything is built into the Navigator, including a high-speed sound card, and everything in the Navigator is software-defined. Also, K1EL's newest Software Defined WinKey USB Keyer is built in. As a result, changing to a different rig should be a snap: no more removing covers, changing jumpers, or using shorting straps just to switch to another transceiver. The Navigator also is said to have the lowest noise level on the market, so you can stop losing those elusive weak signals and start working stations you couldn't copy before.

The new Navigator is very flexible, and software-definable options are said to make setup easy. You can plug two (or more) Navigator interfaces into the same computer while they each operate separate transceivers; reportedly, no other interface can accomplish that. The sturdy Navigator (contained in a case of 100% extruded aluminum) is FCC Class B certified as a USB digital device and meets or exceeds various international standards.

Photo D– Rig Technologies offers "The Navigator," and it bills as "the world's first software defined interface—with one cable to your computer to do it all." Check the column and the Rig Technologies website for further details. (Photo from the Rig Technologies website)

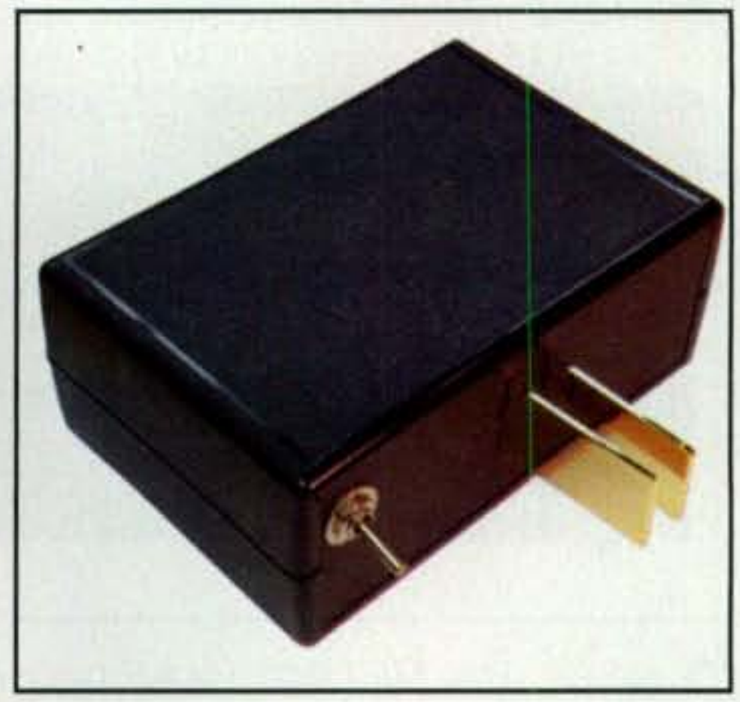


Photo E– Packaged in an attractive black ABS plastic case, the Model P1PAD Touch Paddle Set offered by CWTouchKeyer replaces any mechanical paddle lever set. It uses switched FET output transistors for "total silence" operation, and it relies on an external sidetone for audible feedback. (Photo courtesy of CWTouchKeyer)

At the bottom line, the Navigator is a very feature-rich software-defined interface, with considerably more features and capabilities than we can possibly mention here in the column, so see the Rig Technologies specifications page on its website (see below) for further details.

For more info and product pricing, contact Glenn Wetherell, W3GWW, at Rig Technologies, 1 Krouse Court, Aberdeen, MD 21001 (410-272-9110; e-mail: <info@rigexpert.com>; on the web: <http://www.rigexpert.com>). We should also mention that the website features American-made products exclusively.

Model P1PAD Self-Calibrating Capacitive Sensing Touch Paddle Set. CWTouchKeyer has announced the release of their new Model P1PAD, a self-calibrating capacitive sensing touch paddle set. Employing solid metal, gold-plated paddles, the unit is said to offer a quick response, an ultra-light touch, and zero paddle movement.

The model P1PAD (photo E) consumes less than 2 mA of current during standby, and it can be operated off an internal 9-volt transistor battery or a 9–14 volt "wall wart." The paddle output is via a supplied 3.5-mm (1/8-inch) stereo plug and is compatible with most modern transistor rigs. It's designed to key inputs of positive 13.8 volts or less. Conveniently, paddle output can be configured for either right- or left-handed operation.

Housed in a weighted 4.5" W × 3" D × 2" H black case, the unit matches most modern rigs and displays a level of elegance with the gold-plated paddles. The paddles are designed not to tarnish, corrode, or oxidize, and they will maintain their luster for years.

The model P1PAD replaces any standard mechanical paddle-lever set. It uses switched FET-output transistors for "total silence" operation, and it relies on an external side tone for audible feedback. The unit is said to be an excellent choice for portable operation, because no contact adjustment can be accidentally altered during transportation. For mobile operation, it's not subject to bouncing on rough roads.

The model P1PAD touch paddle set is available wired and tested for $75 or in an easy-to-assemble complete kit for $60. For more information, contact CWTouchKeyer, 14 Boutas Drive, Norton, MA 02766 (505-285-7600; e-mail: <cwtouchkeyer@aol.com>; <http://www.cwtouchkeyer.com>).

Antennas and Antenna Accessories

Products from Advanced Receiver Research. Advanced Receiver Research, also known as Ar2 Communications Products, was founded in 1978 by Jay Rusgrove, W1VD, as an electronic communications equipment manufacturing and consulting firm (fig. 1).

The company's primary product line includes Gallium Arsenide low-noise preamplifiers (LNAs), with hundreds of standard frequency models and special frequency units. These preamplifiers are said to represent the state-of-the-art in low-noise preamplifier performance. They are widely used to increase the coverage area of communications systems, especially with the proliferation of small, low-power hand-held radios.

Other uses of the company's preamplifiers include: deep-space research; medical MRI equipment; cellular telephone, radar, satellite communications; data communications; motorist aid callboxes; security systems; cable television head ends; remote-control equipment; radio and television station links; wildlife tracking equipment; and numerous other applications. Needless to say, the company's preamps also are especially popular among radio amateurs to help cure weak-signal reception problems over the range 100 kHz to 1 GHz. Other product lines offered by the firm include coaxial-cable assemblies, power dividers, receiver multicouplers, power supplies, custom assemblies, Gunnplexer microwave equipment, accessories, and more.

Advanced Receiver Research has a customer base that ranges from individuals who purchase a single preamplifier for their amateur radio station, and small communications companies that install several preamplifiers on local police and fire department equipment, to Fortune 500 companies that purchase hundreds of units for data-transfer equipment and the Air Force, contracting for 10,000 LNAs used to

Fig. 1– Advanced Receiver Research, also known as Ar2 Communications Products, has offered high-performance communications equipment since 1978. The company's primary product line includes Gallium Arsenide low-noise pre-amplifiers (LNAs), popular within the amateur radio community for weak-signal reception. (Photo from the Advanced Receiver Research website)

upgrade the Space Surveillance Radar at Eglin AFB, Florida. The company also provides development and consulting services for individuals, companies, and government agencies.

For more information, check out the company's ads in the amateur radio magazines, or contact Advanced Receiver Research, Box 1242, Burlington, CT 06013 (860-485-0310; e-mail: <info @advancedreceiver.com>; on the web: <http://www.advancedreceiver.com>).

New Quick Change (QC) Solderless Connectors. Bird® Technologies Group, a leading manufacturer of RF measurement and management equipment based in Ohio, recently released a new series of high-power loads and attenuators that use the Bird 4200 Series "Quick Change" (QC) solderless connectors for hundreds of possible connector combinations (photo F). The new series of products allows users to quickly change the connectors for different applications while avoiding the need for special adapters, cables, or additional units with custom connectors.

"This groundbreaking series of QC high-power loads and attenuators provides our customers with greater flexibility," said Dave Distler, Manager of Component Products. "These connectors are an important new addition to our robust selection of innovative solutions for the RF industry."

Power capabilities for the loads and attenuators with the QC option range from 150 watts to 1.5 kW and 3 to 40 dB for fixed attenuators in a DC 2.5-GHz bandwidth. The new series can be purchased directly from Bird either separately or with loads and attenuators featuring standard QC N connectors. Delivery time is typically 2–4 weeks from the factory. Standard QC Connector types include N, BNC, SMA,

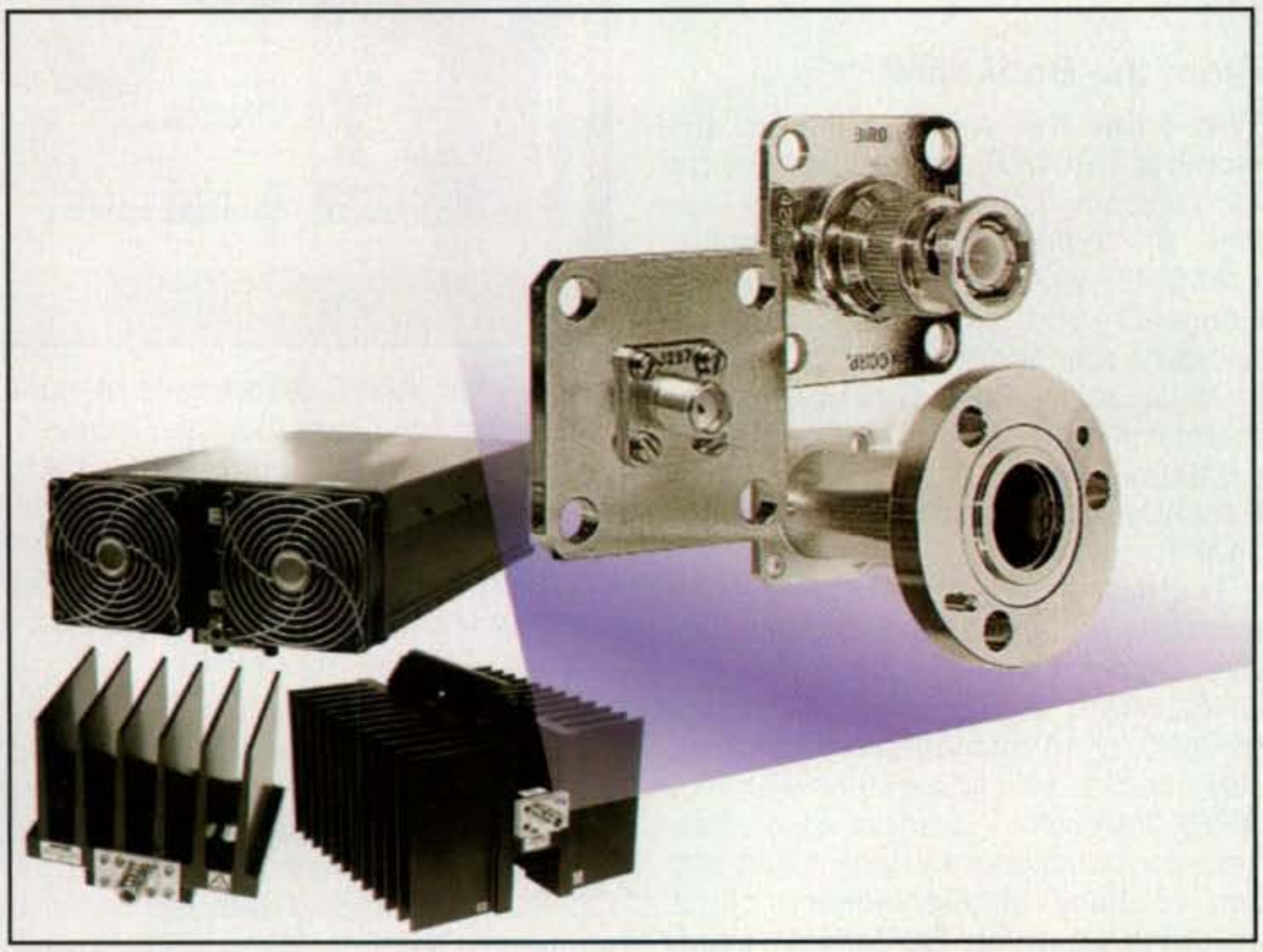


Photo F– Bird® Technologies Group recently released a new series of high-power loads and attenuators that use the Bird 4200 Series "Quick Change" (QC) solderless connectors for hundreds of possible connector combinations. The new series allows users to quickly change the connectors for different applications while avoiding the need for special adapters, cables, or additional units with custom connectors. (Photo courtesy of Bird Technologies Group)

TNC, LC, 7/16 DIN, Terminal Lug (for DC applications), UHF, Mini UHF, HN, C, LT, SC, 7/8 EIA, and 1 5/8 EIA for both fixed and swivel mount.

Bird Technologies Group is a global supplier of RF products, systems, services, and educational solutions. Combining the industry leading brands of both Bird Electronic and TX RX Systems in one company reinforces the commitment to providing "RF Measurement and Management in Your World." For more information, contact Bird Technologies Group, 29100 Aurora Rd. Suite #400, Solon, OH 44139. (440-248-1200; on the web: <http://www.bird-technologies.com/>.

Fig. 2– QsoNet and its online transceiver work "right out of the box." This means you can use the system from hotel rooms, airports, public libraries, internet cafes, etc., over five HF radio bands: 80, 40, 20, 15, and 10 meters. Intriguing? Check the details in this month's column. (Image from the QsoNet website)

New on the Net

QsoNet: A Virtual Ionosphere for Amateur Radio. A very interesting and sophisticated online web application is QsoNet. It makes use of the internet to receive audio signals from an amateur radio transmitting station, and then instantly reflects the audio back to all stations listening on that frequency. There is no RF involved, as everything is being done over the internet. The result is a simulated ionosphere for worldwide amateur radio communication, and stations can use either voice or CW. And, yes, there's no TVI (television interference), QSB (fading), or QRN (static) when you use QsoNet.

QsoNet works with dialup, DSL, and cable internet connections. The network consists of an array of internet servers which provide streaming VoIP (Voice over Internet Protocol) audio between stations. After installing the transceiver software, QsoNet stations are connected to a central server by a single, outbound TCP connection.

The use of QsoNet is restricted to licensed amateur radio stations. QsoNet and its online transceiver (fig. 2) work "right out of the box," with no need to configure router ports. This means it can be used from hotel rooms, airports, public libraries, internet cafes, etc., covering five HF radio bands: 80, 40, 20, 15, and 10 meters. A computer-based microphone provides voice modulation, and there's a built-in CW keyer; simply type on the keyboard to send perfect CW. A spectrum graph shows radio activity within a settable sweep range of 50, 100, 200, and 500 kHz. Callsign, handle, QTH, etc., are automatically displayed for the current transmitting station, and keyboard "hot keys" provide a simple interface for vision-impaired operators. Roundtable QSOs are possible with QsoNet, because any frequency may have a large number of listeners

For more information and details, contact CorMac Technologies, Inc., 34 North Cumberland Street, Thunder Bay, ON P7A 4L3, Canada (fax: 807-345-7114; e-mail: <douglas@qsonet.com>; on the web: <http://www.qsonet.com>). Note that the company does not provide technical support by telephone, so please contact them using e-mail instead.

From the Bookshelf

Two from the ARRL. First up this month is *The ARRL Instructor's Manual for Technician Class License Courses* (fig. 3), edited by Mark Spencer, WA8SME, who has served the ARRL Education and Technology Program and also teaches the ARRL Teachers Institute on Wireless Technology. The manual's organization and content w as based on the work of the ARRL Educational Materials and Methods Task Force.

The new third edition of *The ARRL Instructor's Manual* is divided into bite-size sections that correlate with *The ARRL Ham Radio License Manual (HRLM)*, used by students. Instructors can use the *HRLM* together with *The ARRL Instructor's Manual* as an integrated instructional system. Each section contains detailed lesson plans, including Learning Objectives, Study Materials, Equipment and Materials Requirements, Recommended Instructional Strategies, and Suggested Classroom Activities. The new manual also contains a guide on preparation to teach amateur radio, written by Peter Kemp, KZ1Z, as well as practice exams and lesson plans for Morse code instruction.

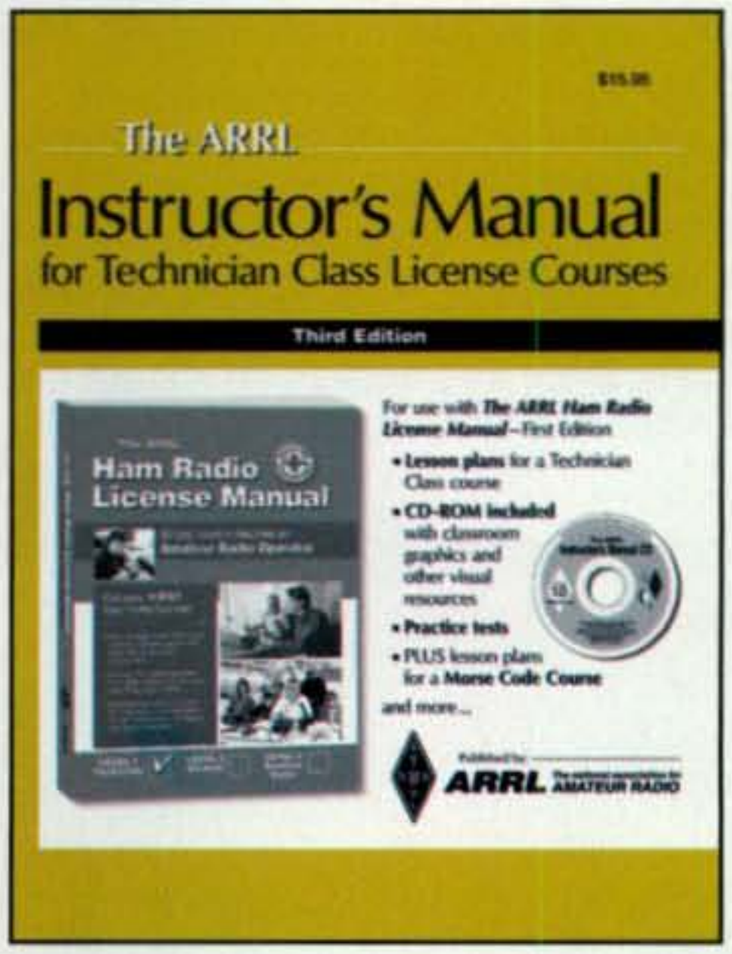


Fig. 3– The ARRL Instructor's Manual for Technician Class License Courses, Third Edition, *is edited by Mark Spencer, WA8SME. The new manual is divided into bite-size sections that correlate with* The ARRL Ham Radio License Manual (HRLM). *(Image courtesy of the ARRL)*

Interactive and graphic materials for classroom instruction are provided. A CD-ROM is bundled with the book. It contains complete Microsoft® PowerPoint® lesson presentations for each section, ARRL ExamWin software for generating practice tests, and files of the graphics from the HRLM.

Together, *The ARRL Ham Radio License Manual (HRLM)* and *The ARRL*

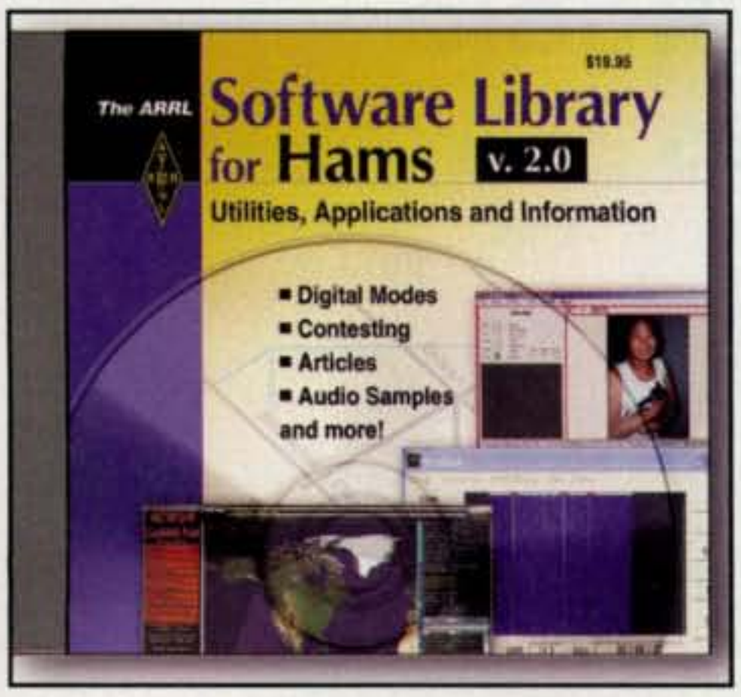


Fig. 4– Newly updated, The ARRL Software Library for Hams, *Version 2.0 CD-ROM offers quick access to utilities, applications, and information, including book excerpts and a selection of articles from the pages of* QST *magazine. (Image courtesy of the ARRL)*

Instructor's Manual serve as a complete and comprehensive Technician Class licensing course, and these materials also correlate with the ARRL's online Technician licensing course. This curriculum alignment among all of the ARRL's Technician licensing materials and products provides uniformity of curriculum and instruction in the field. *The ARRL Instructor's Manual* is $15.95 plus s/h. We should also mention that the manual is available free with the purchase of 15 copies or more of *The ARRL Ham Radio License Manual.*

Last up from the ARRL actually is a CD, rather than a book: *The ARRL Software Library for Hams,* Version 2.0. The new CD-ROM (fig. 4) offers access to utilities, applications, and information, including book excerpts and a selection of articles from the pages of *QST* magazine. (It's an update and enhancement of the V 1.0 CD that we described in last October's column.)

The content on the $19.95 plus s/h CD-ROM is divided into folders that contain software for a variety of amateur radio applications. The CD is replete with useful programs, such as contesting software, including the N1MM Logger; Jason low-frequency digital software; Weather Satellite software; CW Decoder Morse code translator; WinDRM digital voice software; HF digital software for PSK31, MFSK16, MT63, Slow-Scan TV, Digital SSTV, RTTY, and other modes; WSJT software for meteor scatter and moonbounce; and considerably more.

You'll also find programs for APRS, Winlink 2000, packet radio, and satellite tracking. Plus, there are handy software tools for calculating transmission-line loss, creating custom DSP audio filters, and more. Bonus files include ARRL screensavers, audio samples, video files, and PowerPoint® presentations.

You should note, however, that the ARRL doesn't support the software in this collection; for support questions, you should contact the program authors directly. Minimum system requirements for the CD are a 400-MHz Pentium PC with 256 MBytes of RAM and Microsoft® Windows® XP or Windows® 2000.

Contact the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494 (1-888-277-5289; e-mail: <pubsales@arrl.org>; on the web: <http://www.arrl.org/shop>). You may place orders online, and the paper-based ARRL Publications Catalog is available upon request.

Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

Overheard: I have found that one can learn just as much, if not more, from a bad example as from a good one.

73, Karl, W8FX

Note: *Listings in "What's New" are not product reviews and do not constitute a product endorsement by CQ or the column editor. Information in this column is primarily provided by manufacturers/vendors and has not necessarily been independently verified. The purpose of this column is to inform readers about new products in the marketplace. We encourage you to do additional research on products of interest to you.*

awards

BY TED MELINOSKY,* K1BV

The Finnish Amateur Radio League Awards Series

This month we begin with the awards of Finland offered by the Suomen Radioamatoorillittory (SRAL), the Finnish Amateur Radio League. Southern Finland begins at about the latitude of St. Petersburg, Russia (UA1) and extends northwards crossing the Arctic Circle into Lapland. The effect of the northern lights on HF radio communications is a problem Finnish hams have had for many years. They seem to use big tubes and lots of aluminum.

Finnish awards center around working many of the country's very active amateurs. The award certificates go up to 600, and there is a series of plaques for those work who work 1000, 2500, and even 5000 OH stations. OH stations typically are very active in DX contests and in the annual Scandanavian Activity Contest (SAC) and are generally known as good QSLers. If you've been active on the bands for a few years, it's quite likely that you will qualify for at least the 100 level award. Check your QSL collection and you may find more.

For those seeking a bigger challenge, you may want to consider the Finnish County Award. Yes, this small country has 488 counties, and a list of them is available at the SRAL's website: <http://www.sral.fi/en/award.html>.

General requirements: All awards are available to amateur radio operators, clubs, and SWLs. They all require you to work stations situated in Finland who are using the OH, OHØ, and OJØ prefixes. All bands OK, and CW, phone, and/or digital modes. Contacts after June, 10, 1947 count for the awards (exception: for the OHA-500 award only QSOs worked after January 2,1967 are valid. Contacts with /AM and /MM stations are not valid. Use of repeaters is not allowed. Working the same station under two different callsigns or in different call areas counts as different stations. OH3RM and OH3RM/7 count as two different stations. However, note that /M or /P, with the same station, such as OH2A and OH2A/P, counts only once.

Contacts must be listed by callsign area and in alphabetical order—for example, OH1A, OH1B, OH2A, etc. If you apply for more than one award at the same time one list is sufficient, and you must clearly mark which award or awards you are applying for. Contacts worked with different callsigns and from different QTHs are accepted, if the applicant is the same. Specify in the application if you want specific band or mode endorsement.

You must have the cards in your possession. GCR list is accepted. Fee for each award is 5 Euros, $US8, or 10 IRCs for each award. Apply to: SRAL/Award Manager, P.O. Box 44, FIN-00441 Helsinki, Finland.

OHA: Finnish stations need to work at least nine call areas on two separate bands. The call areas are: OHØ, OH1, OH2, OH3, OH4, OH5, OH6, OH7, OH8, and OH9. European stations must work nine call areas; no band restrictions. DX stations need to work five call areas; no band restrictions.

OHA-100: Work at least 100 different Finnish stations, making sure that all ten call areas are worked on two separate bands. The other rules are the same as the rules for the OHA award.

OHA-300: Finnish stations have to work 300 different Finnish stations such that all ten call areas

The OHA award is sponsored by the SRAL for working Finnish call areas.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

USA-CA Special Honor Roll

Rory D. Porter, WYØA
USA-CA All Counties #1150
March 9, 2007

Barry L. Mitchell, NØKV
USA-CA All Counties #1151
March 22, 2007

Barry B. Storer, KB8OMG
USA-CA All Counties #1152
March 23, 2007

USA-CA Honor Roll

500		1500		2500	
WYØA	3400	WYØA	1449	WYØA	1262
WA4RNN	3401	WA4RNN	1450	WA4RNN	1263
NØKV	3402	NØKV	1451	NØKV	1264
VA6JR	3403	VA6JR	1452	VA6JR	1265
				KB8OMG	1266

1000		2000		3000	
WYØA	1728	WYØA	1342	WYØA	1173
WA4RNN	1729	WA4RNN	1343	WA4RNN	1174
NØKV	1730	NØKV	1344	NØKV	1175
VA6JR	1731	VA6JR	1345	KB8OMG	1176
		KB8OMG	1346		

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

Work at least 100 different Finnish stations to earn the OHA-100 award (see text for additional details).

are worked on three separate bands. Europeans need to work 150 different stations such that nine call areas are worked. DX stations need to work 75 different stations such that five call areas are worked. The other rules are the same as the rules for the OHA award.

OHA-500: The SRAL published this award in 1967 honoring the 50th independence day of Finland. Finnish stations need to work 500 different stations. Europeans have to work 250 different stations, and DX stations need to work 125 different stations.

OHA-600: Finnish stations must work 600 different Finnish stations such that all ten call areas are worked on five separate bands. Europeans need to work 300 different stations such that all ten call areas are worked on two separate bands. DX stations need to work 150 different stations such that five call areas are worked on three separate bands. The other rules are the same as the rules for the OHA award.

The OHA-600 award is sponsored by the SRAL for working 600 Finnish stations in all ten call areas.

The OHCA county award is also available as the OHCA CW award.

OHA plaques: OHA-1000, OHA-2500, and OHA-5000 are available for working 1000, 2500, and 5000 Finnish stations, respectively. These are beautiful plaques made of wood. Stickers are available for each new 250 stations worked for each plaque. If you apply for more than one plaque or sticker at the same time, one list is sufficient. In the application, soecify if you want the used band or mode indicated on the award. Plaque fee is 25 Euros, $US30, or 50 IRCs. Sticker fee is 5 Euros, $US8, or 10 IRCs.

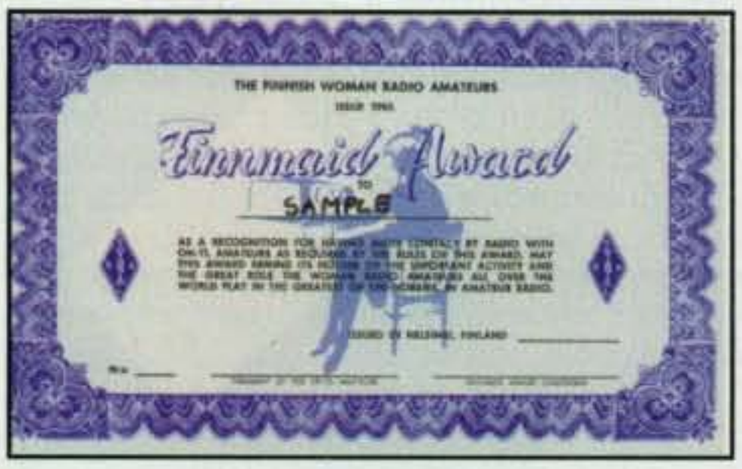
OHCA: For the OH County Award, work OH counties after February 1, 1974. The counties are listed at: <http://www.sral.fi/info/kunnat.html>. For the OHCA CW award contacts must have been made after January 1, 1983.

OHCA is available in three classes:

Class 1: OH stations need all counties (488), European stations 226 counties, DX stations 113 counties.

Class 2: OH stations need 400 counties, European stations 200 counties, DX stations 100 counties. The minimum for OH stations for each area is: OH1, 84 stations; OH2, 36; OH3, 45; OH4, 23; OH5, 26; OH6, 77; OH7, 35; OH8, 45; OH9, 18; and OHØ, 6.

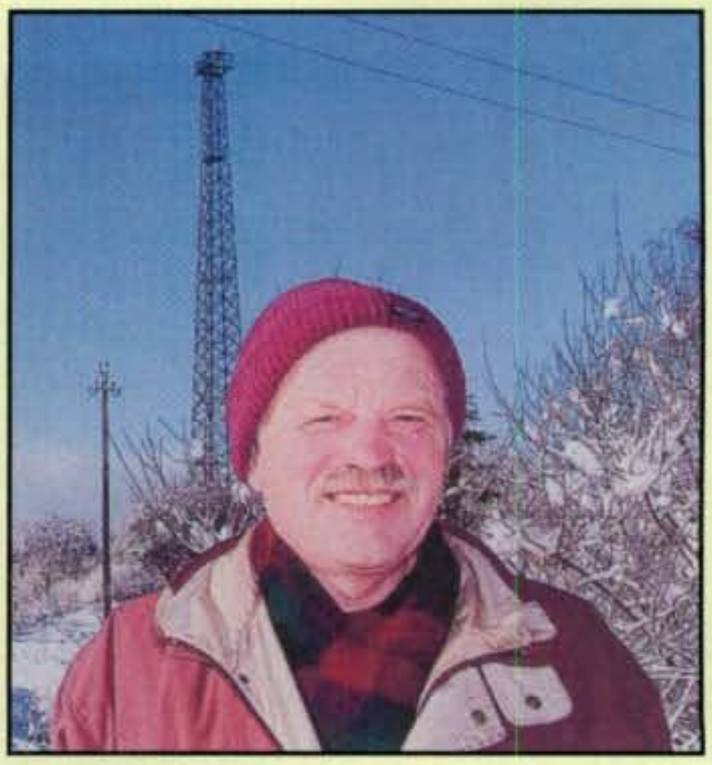
Class 3: OH stations need 320 counties; European stations 160; DX stations 80. The minimum for OH stations for each area is: OH1, 71 stations; OH2, 29; OH3, 36; OH4, 18; OH5, 21; OH6, 64; OH7, 28; OH8, 35; OH9, 12; and OHØ, 6.



The SRAL has four different YL awards for working OH YL stations (see text for details).

Jonas Paskauskas, LY2ZZ
USA-CA All Counties #1141, July 22, 2006

This month we are pleased to feature an autobiographical sketch of Jonas Paskauskas, LY2ZZ, who is the first from Lithuania to attain USA-CA All Counties. Jonas is a well-known contest operator who completed this huge challenge at a time when propagation conditions approached the bottom of the current solar cycle. —*K1BV*



Jonas Paskauskas, LY2ZZ, USA-CA All Counties #1141.

I'm happy to achieve the goal I was trying to get for more than 25 years. In fact, I'm *very* proud and have already started a second round.

I'm 55 years old, living with my XYL Zita, who has always supported my hobby. My son and two daughters have their own lives, but they know how important to their dad are those boxes in the shack.

Back in 1966 I made my first QSO: a CW contact from the school club station, UP2KAG, in my native rural area of Vilkaviskis, Lithuania. I graduated from the Technical University as a radio engineer and moved to Siauliai in the north of the country. There I got a job with a big company producing TV technical goods for Eastern Europe. We built up a competitive club station and produced good results in many contests using the calls UK2BAS, UP1BZZ, RG6G, UP4A, UP7A, UP8A, UP9A, LY2ZZ, LY5A, etc.

Dramatic changes occurred in the years after Lithuania regained its independence. The company I worked for went bankrupt. I bought equipment, towers, and a ham shack in the outskirts of the town and secured LY2ZZ as my personal callsign and LY5A as a contest call.

My priorities in ham radio varied during those decades: DXing, contesting, constructing my antennas, designing power amplifiers, and county hunting. I managed to win many contests as a single op as well (CQ WW DX, CQ WPX, ARRL, etc.). Now my ICOM-756 runs nine monoband antennas and nine separate amplifiers.

My first attempt to collect counties occurred around 1980, but in about four years my enthusiasm slowed when it seemed like an impossible task to collect all the counties from here in northeastern Europe. I resumed ten years later, but again, it was just for a few years.

In February 2003 I proudly showed my old buddy Victor, LY1A, my DXCC Honor Roll #1. He said that it was a trifle compared to earning USA-CA All Counties. Once again I got hooked and counted the QSLs I had already collected for USA-CA. Many of the counties were missing, some of the QSLs had disappeared, and I had a task to get them again.

So, on the third attempt, I started by building a new 6-element homebrew Yagi on top of a 42-meter high tower. Thanks to the better antenna, I started to hear those scratchy mobile stations which I had never been able to hear before! I began to spend days on 14.336 and 14.056.5. Three years later, I got to the total of 3074 and was missing only three counties. Then what happened is what I can only call the spirit of a true ham. Dan, KM9X, drove five hours from Indiana down to the intersection of Monroe and Cumberland counties in Kentucky just to give me an opportunity to try a QSO with two of the missing counties. We managed a contact with reports 44 both ways without the assistance of the net control station!

Then came the last one . . . Schleicher County in Texas. The family of Janet, KC5QCB, and Randy, AJ5ZX, drove three hours just for me! Conditions at my sunset here were poor. I sent a signal report to Janet, she received it, and now it was my turn to receive a report. You know, one can try to receive it only twice. Those few seconds I was listening to Janet's signal could fill all of my prior life on this Earth. Then came the voice of Jim: "Jonas, what did you receive?" I told him the report I heard, and then came the explosion of greetings on the frequency! I have heard other stations receive congratulations on that frequency, but this time they were addressed to me. This happened on May 27, 2006. The long journey was finished.

The statistics: One third of my contacts were from fixed stations and the rest from mobile operators. My special thanks go to all the hams who assisted me in my efforts; to the net control operators; and to Bob, N4CD, Rich, AI5P, Ray, WG6X, Terry, WQ7A, Frank, AA9JJ, Jim, ND9M, Jerry, WØGXQ, and Matt, WØNAC.

What is next? Just a dream—to visit the town of Eldorado in Texas, which was my last county, to attend a MARAC convention and to shake the hands of the mobile operators who provided me with a new county. I have never met any of the mobile operators in person.

Now I'm trying to make it for the second time. I'm addicted and no medicine can help me. I'm just not sure if I'll manage to make it during the rest of my lifetime.

—73, Jonas, LY2ZZ

Submit proff of having contacted 100 or more Special Event stations to earn the Special Events Stations Hunter Award, sponsored by the editor of the Polish Radio Amateur's Journal QTC.

OH stations must work all contacts from the same call area. The list of contacts must be in order of county numbers. Application must be verified by two hams or the award manager of your own league.

YL awards: The SRAL has four different YL awards. The goal is to work as many OH YL stations as possible. If the same station is contacted in different call areas (for example, OH1LAG and OH1LAG/7) it counts as two different stations. All contacts have to be confirmed by QSL cards. You can get aa endorsement for band or mode on the award upon request. The application must include the callsigns, the dates of the QSOs, bands, modes, and the names of the YL operators worked.

The YL awards as as follows with the number of contacts required for each:

Finnmaid: OH stations need 7 contacts, other Europeans 5, all others 3.

OH-YL 22: OH stations need 22 contacts, other Eurpoeans 11, all others 7.

OH-YL 33: OH stations need 33 contacts, other Europeans 22, all others 11.

OH-YL 88: OH stations need 88 contacts, other Europeans 44, all others 22.

The Lakes of Finland Award: Work 25 Finnish stations that are located nearer than 100 meters from a lake or who have made the contact from a boat on a lake. Stickers are available for each 25 new lakes. No band or mode restrictions. Contacts via repeaters are not valid. Contacts made after July 1, 2000 are accepted. The application must include callsigns, the dates of the QSOs, bands, modes, the name of the lakes worked, and the county in which the lakes are located.

Special Events Stations Hunter Award

In recent months, I've written about the fascinating world of chasing awards that involve relatively short-term special events or celebrations. Coincidentally, John, EA3GHZ, has uncovered an award that honors those who have contacted 100 or more of these stations.

The Special Events Stations Hunter Award (SESH) is issued by the editor of *Polish Radio Amateurs' Journal QTC*. Submit proof of contacts with 100 or more Special Event stations. All bands and modes may be used. All contacts must have been made after November 15, 1945. SWL OK. All contacts must be two-way in the mode for which the application is made. Send a GCR list of all QSOs/heard stations in alphanumeric order (A to Z and 1 to Ø) by station callsign with fee of 10 Euros, $US12, or 10 IRCs.

Applications should be sent via registered mail to: Polish Radio Amateurs' Journal, c/o Sylwester Jarkiewicz SP2FAP, Suchacz-Zamek, ul. Wielmozy 5b, 82-340 Tolkmicko, Poland (e-mail: <sp2fap@post.pl>; <http://qtc.radio.org.pl/pokazartykul.php?articleID=482>).

Looking for some help in publicizing your group or club's award? *CQ* magazine can help. Please send all details and samples to me to review.

73, Ted, K1BV

BY CARL SMITH,* N4AA

Mongolia and . . . Nowhere?

We sure have been experiencing some strange weather here in the U.S. this *spring* (?). It's been warm where it should be cold and vice versa. The weather can't seem to figure out what it is supposed to be. Global warming? I doubt that here in the east.

Anyway, as I write this in mid-April, we enjoyed the Swains Island DXpedition the past few weeks. They have gone QRT with something over 105,000 QSOs logged. That should take care of the demand for that one for a long time. All bands from 160 through 10 were covered, although 10 meters was a "no-go" from my own QTH in North Carolina. A few in my area managed to log them on 10, but I must have missed that time slot. They did a very good job of providing SSB/CW and RTTY Q's to all who could hear them, and they did seem to have very good ears. Thanks to the N8S team for a very good operation.

Now we await the *big one*—Scarborough Reef. It is due the end of April, and almost everyone in the world needs that one, many for "the last one." The team continues working on all the details necessary for an operation such as this, and we'll know soon enough how their efforts worked out. By next month there should be plenty of news on the operation.

Some of the many "rocks" that make up Scarborough Reef. (Photo courtesy of the N4GN website)

The antennas at JT1KAI. (Photo courtesy of Ken, K4ZW)

The Titanex vertical at JT1KAI. (Photo courtesy of Ken, K4ZW)

Mongolia

Ken Claerbout, K4ZW, reports the following:

My DXpedition to Mongolia in January 2007 was aimed at operating the low bands for the purpose of handing out rare zone 23. Particular emphasis was placed on those parts of the world where working Mongolia is the most difficult.

I arrived in Ulaanbaatar late afternoon on January 15 and was met at the airport by JT1CO. It had been a little over four years since my last visit. We quickly caught up on lost time and then got to work (DXing). As I would find out later that evening, the Asian jamming/radar signal was in full force on 160 meters, and it pretty much rendered the band useless for my entire stay. I was able

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

CQ DX Field Award Honor Roll

The CQ DX Field Award Honor Roll recognizes those DXers who have submitted proof of confirmation with 175 or more grid fields. Honor Roll lisiting is automatic upon approval of an application for 175 or more grid fields. To remain on the CQ DX Field Award Honor Roll, annual updates are required. Updates must be accompanied by an SASE if confirmation is desired. The fee for endorsement stickers is $1.00 each plus SASE. Please make all checks payable to the Award Manager, Billy F. Williams. Mail all updates to P.O. Box 9673, Jacksonville, FL 32208.

Mixed

K2TQC 249	N4MM 198	N4NX 182
HAØDU 228	W4UM 196	KØCA 181
VE3XN 217	HA9PP 190	W5ODD 177
N8PR 208	BA4DW 188	K2AU 177
KØDEQ 207	OK1AOV 187	NØFW 176
HA1RW 206	9A5CY 187	ON4CAS 175
KF8UN 205	F6HMJ 182	K8OOK 175
JN3SAC 199	K2SHZ 182	

SSB

VE7SMP 190	W4UM 178	DL3DXX 175
KØDEQ 180	W4ABW 177	
N4MM 180	NØFW 176	

CW

DL3DXX.....203	W4UM.....188	KØCA.....175
KØDEQ.....198	OK2PO.....184	
JN3SAC.....193	N4MM.....178	

CQ DX Awards Program

SSB Endorsements

330 ..... K9MM/337	330 ..... W7FP/334
330 ..... XE1AE/337	320 ..... KD5ZD/324
330 ..... N5ZM/336	300 ..... 4Z5FL/M/301
330 ..... K3JGJ/336	275 ..... XE1MEX/282
330 ..... KE5K/336	

CW Endorsements

330 ..... K9MM/336	330 ..... W7CNL/335
330 ..... NØFW/336	330 ..... NZM/333
330 ..... WB4UBD/336	330 ..... N6AW/333
330 ..... K4CEB/335	300 ..... WA4DOU/305

RTTY Endorsements

330 ..... NI4H/333	320 ..... N5ZM/324

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 337 active countries. Please make all checks payable to the award manager.

The WPX Program

CW

3179 ..... JA2EPW

SSB

2972 ..... KM6HB 2973 ..... YC9WZJ

MIXED

1982 ..... KM6HB

CW: 2500 OZ5UR. 3600 W4VQ. 5287 WA2HZR.
SSB: 950 KU4BP. 1000 I3JUK. 1300 G3TSZ. 4435 I2PJA
Mixed: 4050 WB2YQH. 4437 I2PJA.
80, 40, 20 Meters: KM6HB
15 Meters: KM6HB, YC9WZJ
10 Meters: KM6HB, YC9WZJ
Asia: KM6HB, YC9WZJ
Africa: KM6HB
Europe: DS4DRE, KM6HB, YC9WZJ
Oceania: KM6HB, YC9WZJ
N. America: KM6HB, YC9WZJ
S. America: KM6HB

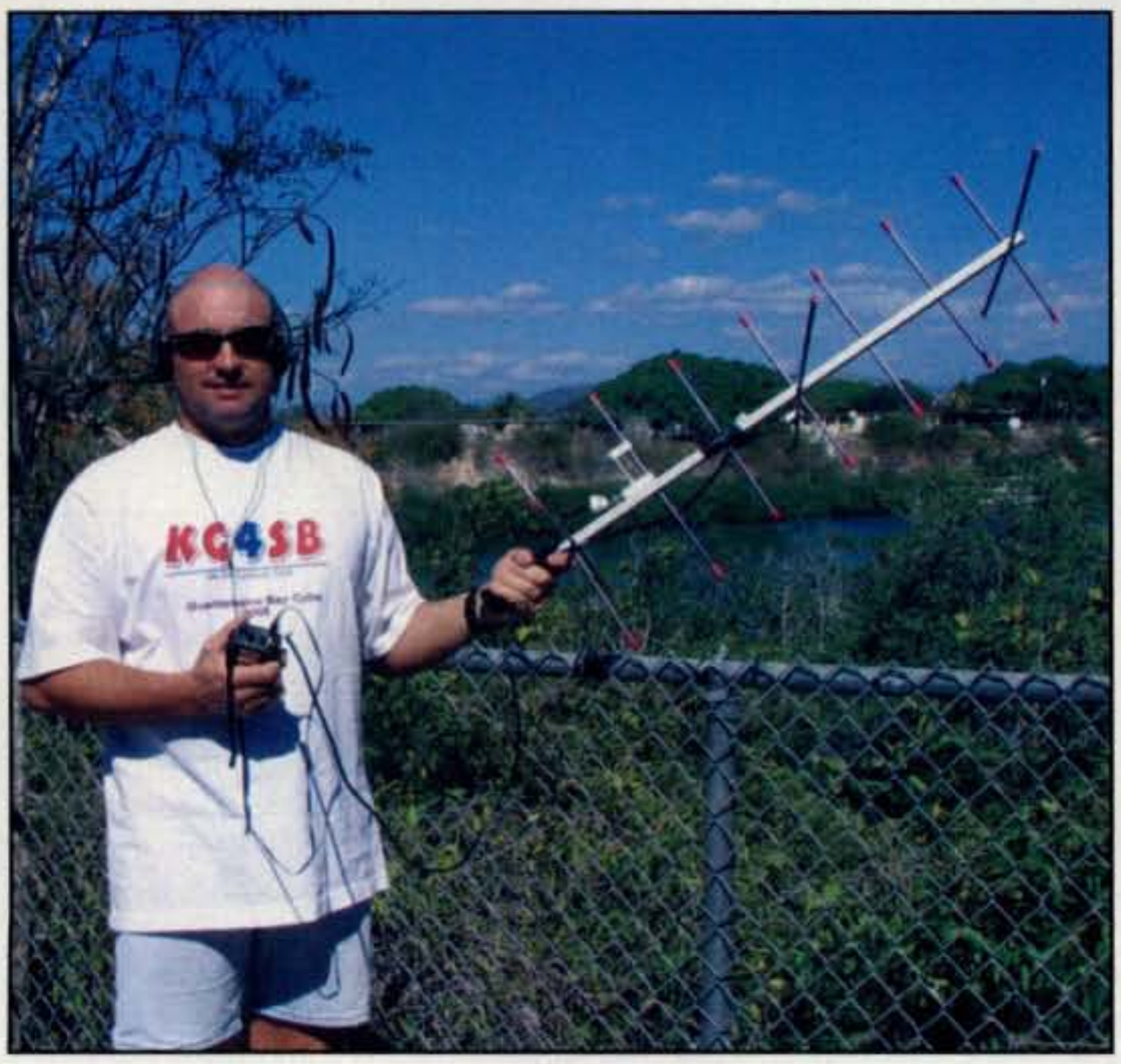
Award of Excellence: 7K3QPL
160 Meter Bar: 7K3QPL
Award of Excellence Holders: N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MDD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GO, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, WB8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8UB, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IK4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBF, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, I7PXV, S53EO, DF7GK, S57J, EA5BM, DL1EY, DJ1YH, KUØA, VE2UW, 9A9R, UAØFZ, DJ3JSW, OE6CLE, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RAØFU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, K4LQ, KØKG, DL6ATM, VE9FX, DL2CHN, W2OO, AI6Z, RU3DX, WB9IHH, CT1EEN, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, KT2C, UA9CGL, AE5B, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ.
160 Meter Endorsements: N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8ILC, K9BG, W1CU, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, DJ1YH, KUØA, VR2UW, UAØFZ, DJ3JSW, OE6CLD, HB9BIN, N1KC, SM5DAC, S51U, RAØFU, CT4NH, EA7TV, LY3BA, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, DL6ATM, W2OO, RU3DX, WB9IHH, G4PWA, OK1FED, EU1TT, S53MJ, DL2KQ, RA1AOB, UA9CGL, SM6DHU, KØDEQ, DKØPM, SV1EOS, N4GG, UA4RZ.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 355, New Carlisle, OH 45344 USA. Note: WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means. *Please Note: The price of the 160 meter bar for the Award of Excellence is $6.50.

to get a little relief by listening high in the band, above 1900 kHz, but even that was often a challenge. Forty and 80 meters played quite well early in my stay and again the last couple of days. The bands were often quite crowded, with two VU7 stations, BXØZR, XU7ACY, and myself. Over the next 10 days I racked up a total of 312 QSOs on 160 meters, 939 on 80 meters, 604 on 40 meters, and 21 on a quick stint to 30 meters.

The trip also served as an overdue chance to renew old friendships from previous visits. We had a lot of laughs and good times over the 10-day visit. Several toasts were raised to our good friend Baatar, JT1BG, who became a Silent Key in November 2005. Naran, JT1BV, took me out on the town for dinner and drinks for my birthday on Friday evening.

The Mongolian amateur community *recently established* a new national society, the Mongolian Amateur Radio Society (MARS). One of its goals is to introduce amateur radio to the young people of the country in schools and colleges. I hand-carried a Kenwood TS-440 donated by Chuck, NIØC. The society is looking for a couple more radios either donated or available at a reduced cost. If you would like to support its effort, you can contact MARS President Khos, JT1CD, at <JT1KAA@mt.cone.net> or me at <k4zw@comcast. net>. On a final note, after delivering the 440 and other



Jose, N4BAA/KG4SB, making satellite QSOs from GITMO. (Photo courtesy of N4BAA)

Carlos, TI2KAC, has been licensed since 1989, but has only been DXing since 1999. He has a nicely equipped shack with a TS-2000, Alpha 91B, and a TH6DXX at 21 meters with sloopers for 160, 80, and 40 outside. He likes 20 meters SSB, but works all bands on SSB, RTTY, and CW. In contests you'll hear him as TI8M or TE2M. (Photo courtesy of John, KDØJL)

The CQ DX Field Award Program

Mixed

84 .....HA9PP 86 .....VE3ZZ
85 .....K1NU

SSB

49 .....WA4NEL

Endorsements

Mixed

200 .....N8PR/208 175 .....W4UM/196
200 .....HA1RW/206 175 .....HA9PP/190
175 .....N4MM/198

SSB

175 .....N4MM/180 100 .....AE9DX/102
175 .....W4UM/178

CW

175 .....W4UM/188 175 .....N4MM/178

The basic award fee for subscribers to *CQ* is $6. For nonsubscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. All updates and correspondence must include an SASE. Rules and application forms for the CQ DX Awards may be found on the <www.cq-amateur-radio.com> website, or may be obtained by sending a business-size, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Please make all checks payable to the award manager.

5 Band WAZ

As of April 1, 2007, 720 stations have attained the 200 zone level and 1540 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
WB6RSE WI8A 9H1ZA

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
IK1AOD, 199 (1)
DF3CB, 199 (1)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W3NO, 199 (26)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
N3UN, 199 (18)
OH2VZ, 199 (31)
W1JZ, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
SP5DVP, 199 (31 on 40)
N4NX, 199 (26)
N4MM, 199 (26)
EA7GF, 199 (1)
N6HR/7, 199 (37)
JA5IU, 199 (2)
CT3DL, 199 (26)
NØIJ, 199 (21)
RU3DX, 199 (6)
N4XR, 199 (27)
WØPGI, 199 (26)
HA5AGS, 199 (1)
EA8AYV, 199 (27)
VE3XN, 199 (26)
K7BG, 199 (22)
YU7GMN, 199 (10)
K7LJ, 199 (37)
K8SIX, 199 (29)
W6XK, 198 (17, 34)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
F5NBU, 198 (19, 31)
OE2LCM, 198 (1, 31)
HA1RW, 198 (1, 31)
WK3N, 198 (23, 24)
W9XY, 198 (22, 26)
KZ2I, 198 (24, 26)
W7VJ, 198 (34, 37)
WØCP, 198 (18, 40)
K9MIE (18, 21)

The following have qualified for the basic 5 Band WAZ Award:

ON6MX (167 zones)
IK2GSB (153 zones)
JH4UYB (196 zones)
K7LJ (199 zones)
KØEU (170 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $100 ($120 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

The WAZ Program

17 Meter SSB

44 .....WA5VGI

20 Meter SSB

1158 .....ON6MX

80 Meter SSB

87 .....WA5VGI

10 Meter CW

195 .....WB6RSE 196 .....WI8A

12 Meter CW

52 .....9H1ZA

15 Meter CW

329 .....WB6RSE

17 Meter CW

64 .....9H1ZA

20 Meter CW

571 .....N8PW

30 Meter CW

77 .....9H1ZA 78 .....W9RPM

40 Meter CW

253 .....WB6RSE 255 .....I5ZJK
254 .....WI8A 256 .....RN3OK

80 Meter CW

87 .....WA5VGI

160 Meters

241 .....9H1ZA

All Band WAZ

Mixed

8451 .....HB9DRS 8452 .....N5KDA

SSB

5030 .....IZ8EZP 5031 .....WA7UZU

CW

506 .....KØOK 508 .....GØDEZ
507 .....JF1FEV 509 .....N4HL

RTTY

172 .....W6XK

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Floyd Gerald, N5FG, 17 Green Hollow Rd., Wiggins, MS 39577. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Floyd Gerald. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. N5FG may also be reached via e-mail: <n5fg@cq-amateur-radio.com>.

items, the extra space in my luggage was used to bring back about 15 pounds of bureau cards from several of the JT hams. Those cards were sent out to their respective bureaus as of April.

Where is Everyone?

Recently, a good friend sent me an e-mail. It brought up some interesting points that I'd like to share with you and ask for your response to his thoughts. This is from Jack, W4TJE:

What is going on with ham radio activity these days? I've been active now long enough to have seen sunspot minimums before, and I cannot recall anything as bad as this.

It's not so much the lack of propagation as it is the lack of activity. Nobody is on the air anymore. Sure, you can find plenty of QSOs on 80 and 20, but a good portion of our spectrum is becoming a desert of silence. This week has been particularly demoralizing. Last night, just around sunset, I tuned across 15 meters phone and heard three QSOs going on between ZL's and statesiders. These all were skeds, but it told me the band was open. One of the ZL's was running slightly over S-9, so I started calling CQ on phone, with the antennas toward ZL/VK and the amp running. After 20 minutes of deafening silence, I QSYed to the bottom of the band, and started calling on CW. There I called for another 20 minutes with no takers as well. Then I switched to 40 meters CW and heard a few stations, so I started calling CQ again on CW. After 15 minutes of calling, I finally managed to work two Europeans. Those results were better than the previous evening, when I called CQ on 40 meters CW for over 30 minutes with no takers.

When occasionally I have a day off, I enjoy getting on 40 meters CW during the day and working up and down the East Coast, just trying to make QSOs, anything to improve my code. But lately there is so little activity during the day that it has become a major exercise to get anyone to answer me.

However, just when you think the bands are dead, a contest weekend rolls around, and suddenly everyone is back on the air again exchanging reports.

Have we gotten to the point where we are no longer using large portions of the HF spectrum outside of contests and DXpeditions? I have always looked forward to getting home at the end of the day to just get on the air for a few minutes to make some QSOs, whether it be rag chews, DXing, or just getting a good CW workout. But I wonder if the internet has replaced radio for the basic communications that hams used to engage in on a daily basis. And while I do use the packet cluster, I keep my HF radio turned on. I wonder how many hams now have their packet clusters filtered to only spot their remaining needed countries and otherwise never turn on their HF radios.

You have been working hard to clean up the bands, and rightfully so. I commend you

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MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅛ x 6 x 9	3.2
SS-12	10	12	1⅝ x 6 x 9	3.4
SS-18	15	18	1⅝ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¼ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¼ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

CIRCLE 134 ON READER SERVICE CARD

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SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5264 .....9A2AA	3956.....VE3XN	3560....KØDEQ	3089.....W9OP	2637..OZ1ACB	2024.....AE5B	1683.....KX1A	1269....K5WAF
4846....W2FXA	3948.....I2PJA	3481.....KF2O	3011.....W2WC	2457...JN3SAC	1947.....KØKG	1662....SV1DPI	1016..RA1AOB
4735.....W1CU	3760 .....N9AF	3475..YU7BCD	2996.....9A4W	2442....W6OUL	1891 .....VE9FX	1643.....N1KC	979.....KM6HB
4419 .....EA2IA	3723 .....I2MQP	3393.WB2YQH	2873.....W2ME	2415.....K5UR	1826 .....W7CB	1556 .....W2OO	825.....KL7FAP
4187 .....N4NO	3703 .....I2UIY	3331 .....IK2ILH	2815.....W9IL	2242 .....I2EAY	1741 .....AB5C	1522.....N8BJQ	742 .....K5IC
4145.....YU1AB	3646.....S53EO	3227.....K9BG	2704 .....K2XF	2239.....VE6BF	1705 .....W2EZ	1288 ....K6UXO	648.....KWØH

SSB

4710 .....IØZV	3445.....EA2IA	2857.....4X6DK	2227 .YU7BCD	2076.....K2XF	1744 .....KQ8D	1480.....AB5C	1214 ....AE9DX	952 .....KU4BP
4266 ....VE1YX	3276 .....N4NO	2711 ..LU8ESU	2209...IK2QPR	2051 .....K5UR	1729 ...W6OUL	1464 .VE7SMP	1202 .....AG4W	843.....VE6BF
3932 .....I2PJA	3155 .....I2UIY	2658 ....KF7RU	2209 .....I3ZSX	1935..SV1EOS	1693 ..DL8AAV	1458 ..JN3SAC	1145..EA3EQT	729.....K7SAM
3900 ....F6DZU	3142..CT1AHU	2595.....EA1JG	2196.....W2WC	1855.....K3IXD	1688 .....KI7AO	1412.....I2EAY	1042 ...IZØBNR	637.....K5WAF
3573 ....OZ5EV	3108.....I4CSP	2557 ....IN3QCI	2178 .....NQ3A	1827.....AE5B	1623.....VE9FX	1386 ...IK4HPU	999 .....IK8OZP	
3532.....9A2NA	2972..OE2EGL	2431 ....G4UOL	2093.....W9IL	1795....W2FKF	1611 .....W2ME	1371 ...IK2DZN	995.....KX1A	
3529.....I2MQP	2900.....KF2O	2326 ....CX6BZ	2085.....N6FX	1776 .SV3AQR	1595.....W3LL	1258 .....N1KC	978 .....EA7HY	

CW

4629 .WA2HZR	3313 .....EA2IA	2541 .....KF2O	2251 .....N6FX	2086 ...IK3GER	1832 .....I2EAY	1268 ....K6UXO	915.....N1KC	
4346 ....K9QVB	3078 .....9A2NA	2522 .....KA7T	2250 ....OZ5UR	2081 .....W9IL	1793 .EA7AAW	1202.WA2VQV	824 .....VE9FX	
3749 .....N4NO	2688 .....I2UIY	2476.....W2WC	2120...JN3SAC	1955.....K5UR	1434 .....AC5K	1135 .....KX1A	608 .....IK2SGV	
3690.....VE7DP	2632.....W2ME	2468...EA7AZA	2093.....VE6BF	1901 .....I2MQP	1402 .....WO3Z	1053....K5WAF		
3363.....LZ1XL	2526 .....I7PXV	2401..YU7BCD	2089 .....K2XF	1900....W6OUL	1334 .....RUØLL	1042.....VE1YX		

The VU7RG QSLs are still being printed, but here is one of the first.(Photo courtesy of Carl, N4AA)

QSL Information

2UØWMG via 2EØWMG
3B6/SP9PT via SP9PT
3DAØAM via EI7CC
3DAØFC via ON4CJK
3DAØGI via EI7CC
3DAØGV via EI7CC
3DAØPB via EI7CC
3DAØPM via EI7CC
3DAØRH via EI7CC
3W5KVR via EA5KB
4C2M via EA5KB
4M5DX via EA5KB
4M5R via EA5KB
5B/AJ2O via RW3RN
5B/NN3AA via RW3RN
5B4/UW3QC via RW3RN
5C5Z via W7ZR
5WØRE via HA8IB
6H1YYD via EA5KB
6H1ZVO via EA5KB
6J1YYD via EA5KB
6W/DL6CT via DL6CT
6W/DL7CM via DL7CM
6W/DM2AYO via DM2AYO
6W/F6HMJ via F6HMJ
6W2SC via HA3AUI
6Y5/KI4HLV via KI4HLV
7WØAD via EA5KB
7XØAD via EA5KB
7XØMT via F5MSR
7X3WDK via EA5KB
8P1A via NN1N
8P2K via KU9C
9G1OH via EA5KB
9G5SW via DC8XL
9K2K via EA5KB
9K2YM via EA5KB
9K2YM/P via EA5KB
9M4SDX via JAØDMV
9M6/SM5GMZ via SM5GMZ
9M6/VK2CZ via VK2CZ
9N1BFI via VK6NE
9N1NE via VK6NE
9UØX via DJ6SI
9U9Z via DJ9ZB
A25/V51AS via V51AS
A61NT via ON5NT
AX8NSB via VK6NE
AY1ECZ via EA5KB
AY1QS via EA5KB
AY4DX via EA5KB
AY5DT via EA5KB
AY9RBI via EA5KB
C4M via RW3RN
C6A/W2IRT via W2IRT
C6ANM via WA2IYO

(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," 106 Dogwood Dr., Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)

and support you in your efforts. Well, recently I have become disheartened over both the dying level of activity as well as the poor operating practices that I hear on air.

Sure, activity will pick up some as Cycle 24 cranks up, but ham radio needs energizing. The "how to" part I have no answer for. Maybe if you have noticed the same thing, you might use your "bully pulpit" to spur our ranks to get back on the air and start enjoying themselves again.

73, de Jack W4TJE

Jack brings up some interesting points and I solicit your comments. If I get enough responses, I'll share at least some of those with you. Are you guilty of just working DXpeditions and/or contests? If so, why?

CQ's "Survival Guide"

The new "CQ HF Operator's Survival Guide" may be something that can help solve the problem that Jack mentioned above. From the *CQ* website we find: "In response to recent changes in licensing rules and operating privileges for all hams, we've prepared this practical, hands-on, getting-started guide for newcomers to high-frequency (shortwave) Amateur Radio. The 'CQ HF Operator's Survival Guide' is $2 (the $4 internet price includes the $2 shipping), with discounts for clubs ($1.50 with a minimum purchase of 10 booklets, plus $5 shipping & handling)."

Until next month, enjoy the chase and Have Fun!

73, Carl, N4AA

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BY JOHN DORR,* K1AR

Am I Contesting or DXing?

June's Contest Tip

Here's something to keep in mind when working stations via split channels on 40 or 80 meters. During the CQ WPX SSB Contest, I called a W3-station above 7200. His response was "worked before," to which I replied, "No!" He went on to tell me it was my QSO #271. I said I had worked 5D5A at that time. It turns out that 5D5A must have been using the same listening frequency and they both thought they had worked me. Two thoughts arose: The guy should have just worked me again to save time, and I should have read 5D5A his call, or the QSO # he sent me, so that the 3-lander knew I wasn't working him. *(Thanks to AD1C)*

Calendar of Events

All year	**CQ DX Marathon**
May 26–27	**CQ WW WPX CW Contest**
June 2–3	SEANET Contest
June 2–3	Alabama QSO Party
June 2–3	IARU Region 1 CW Field Day
June 9	Portugal Day Contest
June 9–10	ANARTS RTTY Contest
June 16	Kid's Day Contest
June 16–17	All Asian CW DX Contest
June 16–17	West Virginia QSO Party
June 23–24	King of Spain SSB Contest
June 23–24	Marconi Memorial HF Contest
June 23–24	Quebec QSO Party
June 23–24	ARRL Field Day
July 1	RAC Canada Day Contest
July 14–15	IARU HF World Championship
July 21–22	**CQ WW VHF Contest**

I'm fairly certain that at some point you have heard someone say, "Oh no, I'm not a contester, I just [fill in the blank]." Others have been known to proudly proclaim, "Yes, I'm a DXer." As hams, we do like to assign monikers to ourselves as a way of designating our areas of interest in this great hobby of ham radio.

The reality is that at least when it comes to the question of contesting versus DXing, the vast majority of us are active in both endeavors. While there are notable exceptions, a scan of any on-line DXpedition log will show a high percentage of active contesters working a DX operation on multiple bands and modes.

Even though there appears to be crossover between these interests, we certainly maintain our own identities. For example, consider how contesters and DXers separate themselves:

- There are Contest and DX Halls of Fame.
- You can attend a Contest and DX Dinner at the Dayton Hamvention®.
- You can read contesting and DX columns in *CQ* and other publications
- E-mail is segregated between various contest and DX reflectors.
- There are a variety of contest- and DX-specific publications and products.
- There are websites dedicated to both interest groups.
- Most ham conventions sponsor both a contest and a DX forum.

At this juncture, you're probably wondering about the point of all of this. Indeed, many contest participants (perhaps most) really are not specifically participating in the contest at all. Whether it's a domestic contest such as the North American QSO Party or a worldwide affair such as the CQ WW, DXers and award chasers create a good part of the activity. Fortunately for serious contesters, that's a good thing. Not only does the participation of this important group dramatically affect activity, one can say that the casual operator is what makes contests work in the first place.

From a personal perspective, I often think about my own roots in ham radio. They were clearly focused on DXing. From the very first time I put a signal on the air, I was attracted to the concept of working stations in faraway lands. In fact, my interest in DXing began even before I obtained my ham radio license, as I was an avid teenage shortwave listener with a bedroom wall covered with QSLs from broadcaster stations around the world. Of course, that's in sharp contrast to the way my kids' rooms used to look like, but I digress.

Like many of you, I simply fell into contesting. My interest in DXing was a prerequisite to my inevitable participation in contests. After all, it was great to be able to work so many DX stations in a short period of time simply by operating a contest. In those days, it didn't matter that I wasn't using a big ham station with monster antennas, because for me contest operating was logging lots of interesting stations, not winning a plaque or placing well in a competitive category. In my case, it took several years before my focus changed from being a DXer who operated contests to a contester who worked DX. Some of us never get there, and that's just fine, too.

As contesters, some of us want to deny our DXing roots as if it's admitting some defect in our contesting resume. The fact is, after nearly 40 years of hamming I still enjoy chasing DX and am proud to say that. Like many of you, I still set my alarm clock to ridiculous hours to snag a DXpedition on the low bands. I get excited when I work something rare, even if it's for the hundredth time. After I worked the first VU7 group last year, I was one of the first guys in line to work the second group that came in right behind them. It's a part of the hobby I will always enjoy.

The diversity of ham radio is what makes our hobby as great as it is. The next time you operate a contest, be thankful for that. The guys who are calling you are indeed DXers, experimenters, equipment homebrewers, rag chewers, and an-

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e-mail: <K1AR@contesting.com>

tenna experts, to name a few of the interests out there. Some of them are serious contesters, too. How about that?!

Separating Winners from Participants

Even though the vast majority of participants in any given contest are casual operators, there are also a few of us who actually try to win the darn things. If you aspire to be in that group of serious competitors, there is an entirely different mindset you are going to need to develop. While the event is still fundamentally based on fun and enjoyment (at least I hope that's the case for all of you), serious contesters need to ask themselves a series of critical questions that are unique to their winning mentality. Here are just a few examples:

- Have I established an operating plan for the upcoming contest, and while operating, how well am I performing based on my plan?
- Am I discouraged because of band conditions, or is it my operating tactics that are falling short? How can I rework my plan?
- What opportunities exist to utilize one or more operating differentiators I traditionally establish for myself? For example, seeking unusual band openings, leveraging known station/geographical strengths, or taking advantage of personal operating skills (high-speed CW) come to mind.
- Am I using the list of shortfalls from the prior year's contest that I prepared ahead of the contest as a guide to this year's event?
- What operating technique can I deploy right now that others may not be considering?

By now I hope that you're beginning to see the picture. Successful contest operating is much more than just sitting down in front of the radio and calling CQ. It's like almost everything else in life: Those who take it seriously and plan in advance inevitably will do better than others who simply "shoot from the hip." The most significant benefit of approaching contest operating this way is that your score can improve without adding a single antenna.

The most often-asked question of a successful contester is: What's your real secret to winning? Most will tell you that there really isn't any secret to winning per se. Success in contest operating, like anything else, largely is based on experience, desire, and a bit of good luck. However, when the next big contest comes along, consider approaching it from a totally different angle. Focus the majority of your thinking away from rates and tally sheets. While I'm realistic that consideration of contesting's fundamentals is not necessarily going to rocket your tribander-based station's score into the leaders box, I guarantee that you will improve. And, at the end of the day, for those of us who enjoy contesting, that's one of the main reasons why we operate—to improve our operating skills in a dramatic way.

I challenge you to sit down and compose your own list of operating questions. Take a few minutes to consider how often you really think about each of those aspects of contesting when you operate. Give it a try; you'll be amazed by the results!

Final Comments

Is it just me, or does the current solar minimum appear to be taking a long time to shake itself loose? Despite that reality, contest participation continues to enjoy record levels. Last year's CQ WW DX Contest had the highest number of submitted logs in the history of the event (more on that in a future column)! Contesting is indeed alive and well, and the old sun won't beat us this time, either. See you in the next one!

73, John, K1AR

vhf plus

BY JOE LYNCH,* N6CL

Another Big Dish on the Air

At about the same time the Jamesburg Earth Station was getting on the air, so was a big dish in Japan. (For more information on the Jamesburg Earth Station story, please see last month's column, along with the lead feature article in the Spring 2007 issue of *CQ VHF* magazine.)

According to Mike Watanabe, JH1KRC, KDDI, one of the Japanese telecommunication services companies, made one of its big dishes available for an experimental EME operation. Those involved were a group of 40 Japanese EME operators, known as Project Big Dish, and the Japan Amateur Radio League.

Taking place during the months of February and March 2007, the operation used the antenna IBA-4, which is the fourth antenna of Ibaraki Satellite Communications Center, KDDI Corporation, operating on the 144, 432, 1296, and 5760 MHz bands. IBA-4 is a 32-meter Cassegrain dish made by Mitsubishi Electric Corporation in 1980s and is located in the grid QM06. The operators were granted a special license to operate 500 watts and the special callsign 8N1EME.

Altogether they made 323 EME QSOs and approximately 10,000 non-EME QSOs during the activities from February through March. Many amateurs were involved in order to make the operation a success. It was pointed out that the signals from 8N1EME were so strong on 5760 MHz that a 1-meter dish was enough to receive the signals.

The breakdown of QSOs per band is as follows: **144 MHz:** 154 QSOs (11 CW, 1 SSB, and 142 JT65); **432 MHz:** 67 QSOs (34 CW, 2 SSB, and 31 JT65); **1296 MHz:** 71 QSOs (50 CW and 21 SSB); and **5760 MHz:** 31 QSOs (23 CW, 6 SSB, and 2 SSB/CW X-Mode). QSL cards, along with SWL reports, will be sent out in a few months. For more details about this very special EME operation, please visit <http://8n1eme.jp/>.

"Whispering Gallery" Propagation

It was around this time last year that certain areas of Japan enjoyed excellent, albeit unusual, propagation to various parts of the world. *Unusual* is an understatement, because the propagation conditions lasted for weeks between May 26 and July 21 and involved QSOs between Japan and the Atlantic coast of North America and Western Europe, over a distance of 6800 miles. These conditions took place despite low sunspot activity (hence, absence of *F*-layer propagation) and contrary to conventional sporadic-*E* propagation theory.

Elsewhere in this issue of *CQ* authors JA1ELY and TZ6JA put forward a theory of what they believe was behind these openings in their article entitled "'Whispering Gallery Propagation: Explaining the 2006 Worldwide Band Openings on 6 Meters." They believe it was a previously unrecognized

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

June 1	Full Moon
June 3	Very poor EME conditions
June 7	*Arietids* meteor shower predicted peak
June 8	Last Quarter Moon
June 8–9	Ham-Com Hamfest, Plano, Texas (see text for details)
June 9	*Zeta Perseids* meteor shower predicted peak
June 9–11	ARRL June VHF QSO Party (see text for details)
June 10	Good EME conditions
June 12	Moon Perigee
June 15	New Moon
June 16–17	SMIRK 6-Meter Contest (see text for details)
June 17	Moderate EME conditions
June 21	Summer Solstice
June 22	First Quarter Moon
June 23-24	ARRL Field Day (see text for details)
June 24	Moon Apogee; Poor EME conditions
June 28	*Beta Taurids* meteor shower predicted peak
June 30	Full Moon

—EME conditions courtesy W5LUU.

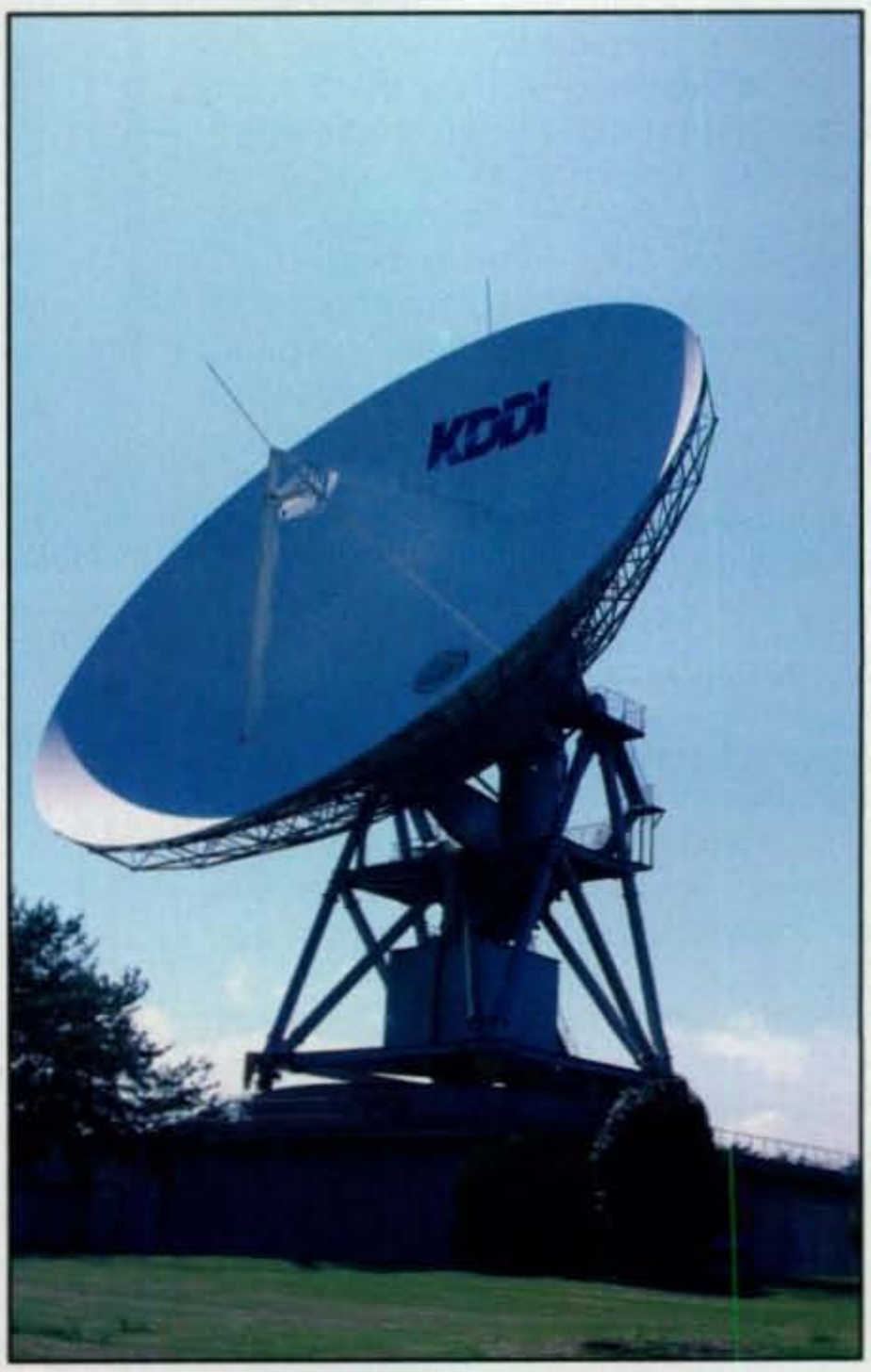


Photo of IBA-4 dish of the Ibaraki satellite communications center of KDDI Corporation used in the big dish operation. (Photo via the <http://8n1eme.jp> website)

Seven CubeSats Launched Successfully

With the failure of last summer's Dnepr Launch 1 of more than a dozen CubeSats, the folks at Cal Poly and the other CubeSat developers around the world held their collective breath in anticipation of this previously postponed launch of seven CubeSats. However, this time was different, because at 0645 UTC April 17 a Dnepr rocket lifted off from Kazakhstan and successfully deployed into orbit all seven CubeSats, along with seven other satellites from Egypt, Saudi Arabia, and the Ukraine. Among them were seven CubeSats, six 1-U CubeSats, and a single 3-U CubeSat. A first for Columbia is the successful launch of its first satellite. By 1230 UTC all seven CubeSats had been contacted.

More information on the launch, along with orbital information, can be found at: <http://cubesat.calpoly.edu/>. At that website follow the link to the Dnepr Launch 2. Additional coverage of this successful launch and deployment will be published in next month's column.

propagation mode they call "guided sporadic-*E*," or "whispering gallery" propagation. Their secret in exploiting this propagation mode is the positioning of the antenna. They claim that while a flat antenna is best for working local stations, in order to take advantage of this propagation mode the antenna must be manipulated to a forced high-elevation angle focusing on the DX stations.

The authors point out that not all hams in Japan were beneficiaries of this propagation mode. They indicate that while Yoshi, JM1DTF, of Saitama had excellent conditions during last season, by contrast, Hide, JR6EXN, had poor propagation as his QTH in Fukuoka. For more information on this intriguing theory, please see their article.

Zero-Pressure Balloon Recovered a Long Way from Home

The following is from the website of Robert Rochte, KC8UCE (http://arhab.blogspot.com/):

Recap of 15 March 2007 Zero-Pressure Flight

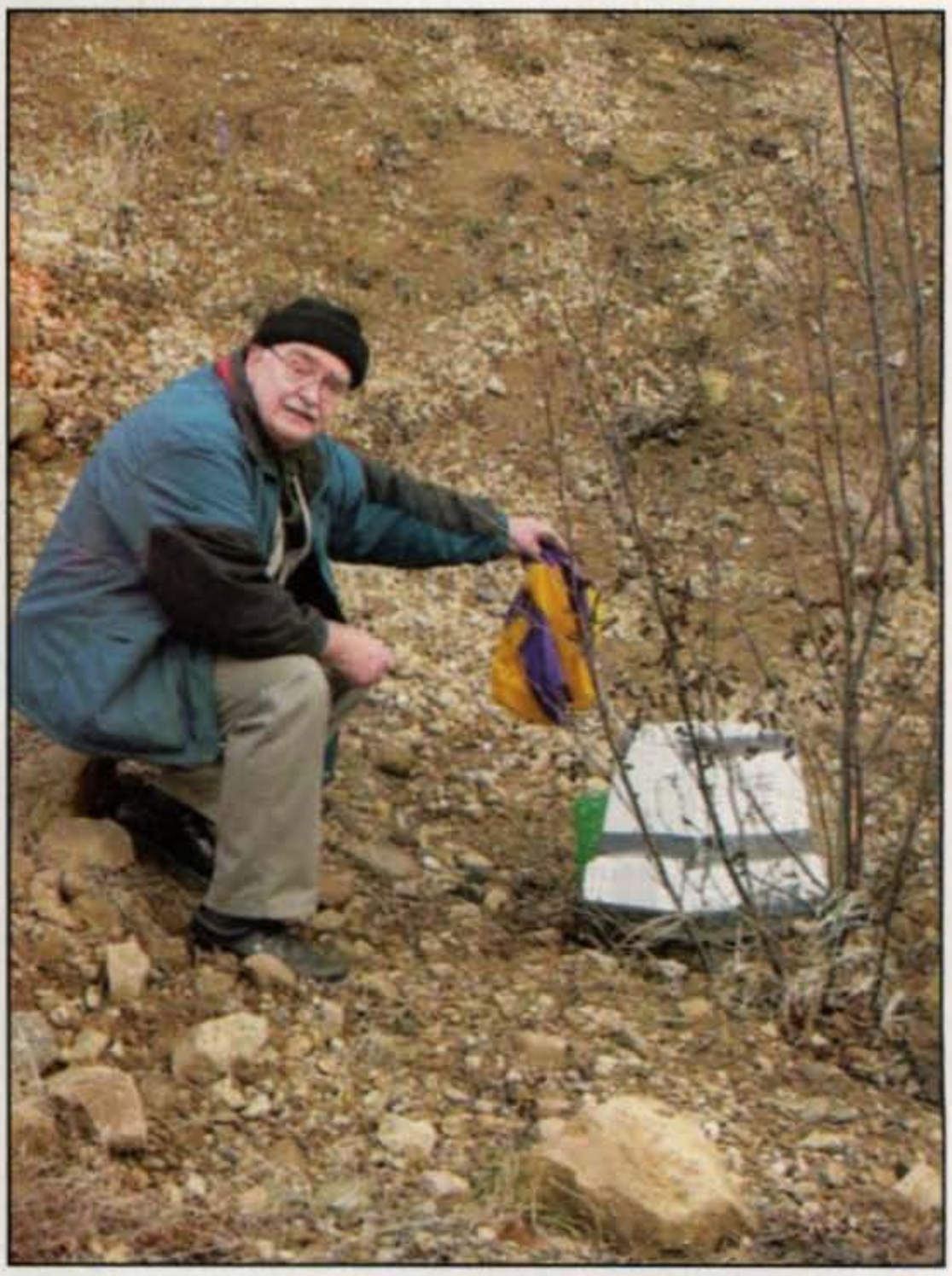
On 15 March 2007 we launched a small balloon carrying an APRS tracker and 10-meter beacon (beacon built by Pierre Thomson, KA2QPG) from the grounds of the Grosse Pointe Academy, Grosse Pointe Farms, Michigan to kick-off the fifth grade balloon project.

This unnamed balloon (not part of the Sky Diamond series) was a tetroon made from .35-mil high-density polyethylene with a trailing appendix used for both inflation and as a vent. The envelope was small—only about 300 cubic feet and reefed down to about 250 cubic feet—and was designed for a jet-stream-level float. Helium was used to partly inflate the balloon, and it was launched with help from the academy maintenance department (thanks to Chris, Kevin, Norm, and Jon!) into a windy sky.

Designed to float in the jet stream at around 28,000 feet, the balloon was launched with a dribble ballast device to avoid overshoot and early flight termination. It also carried a timer-activated ballasting system designed to drop liquid ballast around sunset, but this device failed due to a faulty electrical connection.

It was clear immediately after launch that the APRS tracker was not working—no position updates were available via Findu or other sites. Bill Brown later discovered that APRS packets were, in fact, being relayed into the tracking network, but no valid position was being reported from the onboard GPS. By watching which digis were relaying the packets to the network, however, a general estimate of the balloon location could be made.

The last packets were received by stations in St. John, New Brunswick and southern Prince Edward Island, Canada, and it was determined that the balloon was clearly descending by mid-evening.



Reed Park, VE1NU, with the payload he recovered from Robert Rochte, KC8UCE's zero-pressure balloon. (Photo courtesy of VE1NU)

A search was then on in the most likely landing zone as determined by Bill Brown—south of Moncton, New Brunswick.

A couple of days passed without any reception reports and we became quite convinced that the balloon had actually landed in the water (perhaps the Atlantic). Then, on 20 March, news was relayed to Pierre Thomson that Reed Park, VE1NU, in New Brunswick, had heard the 10-meter beacon! Reed, along with Mike MacDonald, later searched the area and found the intact payload and shredded balloon. It was recovered and returned to us at the academy a week or so later.

Many thanks to Pierre Thomson, Bill Brown, Reed Park, Mike MacDonald, and the many, many others who helped make the tracking and recovery of this flight possible!

Another University-Affiliated Balloon Program

Recently I came across information on yet another university-affiliated balloon launch program. Mark Ford, KB1MSA, is the coach for the USM Scientific Ballooning Group, affiliated with the University of Southern Maine. They were to have launched their first balloon on April 22, which is after the deadline of the writing of this column. I will have information on their launch in a future column. For any who might be interested in contacting Mark, his e-mail is: <markus@feathermark.org>.

First France to Australia 10-GHz EME QSO

The following is from Hermann Peterhaensel, F5VKQ (ex-DC9UP), via the Moon-net reflector: "I am happy to announce

that we made it! The first 10368.130-MHz contact between my station and Charlie Kahwagi, VK3NX, took place on 16 April 2007 at 0500 UTC. Both signals were 519 to 529, and excellent on frequency, thanks to GPS and Rubidium lock. VK3NX used a 3.7-meter dish and 25 watts, while F5VKQ used a 3.1-meter dish and 35 watts. Thank you, Charlie!"

This is Charlie's side of the report: "Today, April 16, I had the pleasure of making a successful contact with F5VKQ. Thank you, Hermann, for number 10. After an unsuccessful attempt on 15 April due to wind at VK3NX, we worked very easily on 16 April at 0500– 0520 UTC. O/O reports were exchanged and signals were 519 to 529. Hermann's signal was very easy to copy now that he has completed his new setup and more power—and the frequency was +30 Hz on 10 GHz!

"I will be available for skeds later if anyone is interested. Soon I will build a new feed for 10 GHz and assemble a feed for 3.4 MHz."

Charlie's e-mail address is: <ibnkarim @bigpond.net.au>. Hermann is also interested in more 10-GHz skeds; his e-mail is <F5VKQ@wanadoo.fr>.

Down East Microwave Has Moved "Down East"

As of April 14, Down East Microwave has closed its New Jersey business and was in the process of relocating "down east" to Florida. According to its website posting in mid-April, the firm will be shut down until some time in June. Once relocated, it is the plan to bring up the repair department first, followed by the order department. Unfortunately, the company's being out of business until this month will preclude it from being able to sell any products for this month's June VHF QSO Party. For the latest information, please see <http://www.downeastmicrowave.com>.

Current Contests

ARRL June VHF QSO Party: The June VHF QSO Party will take place June 9–11. Complete rules are in *QST*. Rules can also be found on the ARRL website (http://www.arrl.org). Many are making plans to activate rare grids. For the latest information on grid expeditions, check the VHF reflector (vhf@w6yx.stanford.edu). This is by far the most popular VHF contest. For weeks in the run-up to the contest postings are made on the VHF reflector announcing rover operations and grid expeditions. It is a contest that will create plenty of opportunities for you to introduce the hobby to those who are not presently working the VHF-plus bands or who are not amateur radio operators.

EADX 6 Meter Contest: The EADX 6 Meter Contest is from 1000 UTC June 9 to 1600 UTC June 10. Single operators must have a minimum rest period of six continuous hours. Exchange is RST plus full 6-digit grid locator. All contacts must be direct and terrestrial. No repeater or EME QSOs are allowed. Paper logs are to be sent to EADX6M Contest, PO Box 68, E-08960 Sant Just Desvern, Barcelona, Spain. Electronic logs in Cabrillo format only are to be e-mailed to <eadx6mcontest@gmail.com>. For full contest rules see the SMIRK Klub website: <http://www.smirk.org>. Click on the Contest link in order to go to the EA6DX 6 Meter Contest link.

SMIRK Contest: The SMIRK 2006 QSO Party, sponsored by the Six Meter International Radio Klub, will be held from 0000 UTC June 16 until 2400 UTC June 17. This is a 6-meter-only contest. Exchange is your SMIRK number and grid square. Score 2 points per QSO with SMIRK members and 1 point per QSO with nonmembers. Multiply points times grid squares for final score. Awards are given for the top scorer in each ARRL section and country. Please note that the rules have been changed for this year's contest. In particular, the .150 rule has been eliminated. In addition, the person to whom you send your logs has changed. Please send a legal-sized SASE for a copy of the log forms. Logs and log requests should be sent to: Dale Richardson, AA5XE, 214 Palo Verde Dr., Kerrville, TX 78028. Entries must be received by August 1. For more information go to <http://www.smirk.org> and click on the SMIRK Contest link at the top of the page.

Field Day: the ARRL's classic, Field Day, will be held June 23–24. Complete rules for this event can be found in *QST* and at <http://www.arrl.org>. In years past, huge European openings have occurred on 6 meters. Also, as happened in 1998, tremendous sporadic-*E* openings can occur. Certainly, this is one of the best club-related events to involve new people in the hobby.

Current Conventions

The annual Ham-Com hamfest will be held June 8–9, in Plano, Texas. As always, the North Texas Microwave Society will present a microwave forum. For more info, see the Ham-Com website: <http://www.hamcom.org/>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings*, or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following have announced calls for papers:

Central States VHF Society Conference: The Central States VHF Society is soliciting papers, presentations, and poster/table-top displays for the 41st Annual CSVHFS

Conference to be held in San Antonio, Texas, on July 26– 29. Papers, presentations, and posters on all aspects of weak-signal VHF and above amateur radio are requested.

Deadline for submissions: For presentations at the conference and for notifying them you will have a poster to be displayed at the conference: July 2. (Bring your poster with you on the 26th of July!)

Further information is available at the CSVHFS website: <http://www.csvhfs.org>. Contact Lloyd Crawford, N5GDB, e-mail: <n5gdb@austin.rr.net>; alternate: Thomas Visel, NX1N, e-mail: <Thomas@neuric.com>. Snail mail: RMG, PO Box 91058, Austin, TX 78709-1058.

ARRL and TAPR Digital Communications Conference: Technical papers are solicited for presentation at the 26th Annual ARRL and TAPR Digital Communications Conference to be held September 28–30 in Hartford, Connecticut. These papers will also be published in the conference *Proceedings* (you do *not* need to attend the conference to have your paper included in the *Proceedings*). The submission deadline is July 31. Please send papers to: Maty Weinberg, ARRL, 225 Main St., Newington, CT 06111, or you can make your submission via e-mail to: <maty@arrl.org>. Papers will be published exactly as submitted and authors will retain all rights.

Current Meteor Showers

Between June 3 and 11, the *Arietids* meteor shower will once again be evident. This is a daytime shower with the peak predicted to occur on June 7 at around 2300 UTC. Activity from this shower will be evident for around eight days, centered on the peak. At its peak, you can expect around 60 meteors per hour traveling at a velocity of around 37 km/sec (23 miles per second).

On June 9 the *Zeta Perseids* is expected to peak around 2200 UTC. At its maximum, it produces around 40 meteors per hour. The June *Lyrids* is expected to appear between June 11–21, with the peak on June 16. The *Boötids* is expected to make a showing between June 27 and July 2, with a predicted peak on June 27 at around 2000 UTC. On June 28 the *Beta Taurids* is expected to peak at around 2100. Because this is a daytime shower, not much is known about the stream of activity. However, according to the book *Meteors* by Neil Bone, this and the *Arietids* are two of the more active *radio* showers of the year. Peak activity for this shower seems to favor a north-south path.

For more information on the above meteor shower predictions see Tomas Hood, NW7US's "Propagation" column elsewhere in this issue. Also visit the International Meteor Organization's website: <http://www.imo.net/calendar/2007/>.

And Finally . . .

This past March 31st I attended the Hanging Judge Hamfest in Ft. Smith, Arkansas. While I was there I made a presentation pertaining to NASA's Space Grant Consortium program. In the audience was Billy Graham, N5QEM, who is an instructor at the Northwest Technical Institute (NTI) in Springdale, Arkansas. Billy pointed out that since he started working at NTI, he has taken an electronics technician program of essentially zero students to its present level of 18. He was quite intrigued by what other higher education institutions are doing with ballooning and is planning on following up with the information that I gave him.

As I pointed out in last month's column, and I repeat here: Education is the key to the survival of our hobby. If you have access to a college program, or are able to become involved in a K–12 school program, you could be the key to bringing more people into our hobby. Please check out the stories in the Spring 2007 issue of *CQ VHF* magazine for some great ideas that you might be able to implement in your area. If you have a story to tell, please e-mail me at: <n6cl@sbcglobal.net> so that I can give you publicity as a way of generating even more ideas for others.

Thank you again for making this, your column, the success that it is in the VHF-plus niche of our hobby.

Until next month... 73 de Joe, N6CL

Elevation Angle (degrees)	One-hop Surface Distance (km)	Ionospheric Attenuation (dB)					
		$f/f_oE_s = 1$	2	3	4	5	6
1	2031	5	6	9	13	19	26
2	1841	3	4	8	13	19	27
3	1672	2	4	8	13	27	37
5	1389	2	5	10	17	27	37
7	1169	2	6	12	22	34	48
10	927	3	8	17	30	46	65
20	513	4	18	40	70	N/A	N/A
30	335	8	30	70	N/A	N/A	N/A

Table III– Relation among antenna elevation angle, surface distance (in kilometers), and ionospheric attenuation due to f/f_oE_s ratio in sporadic-E propagation for h = 100 km. (Miya, et al., 1978)

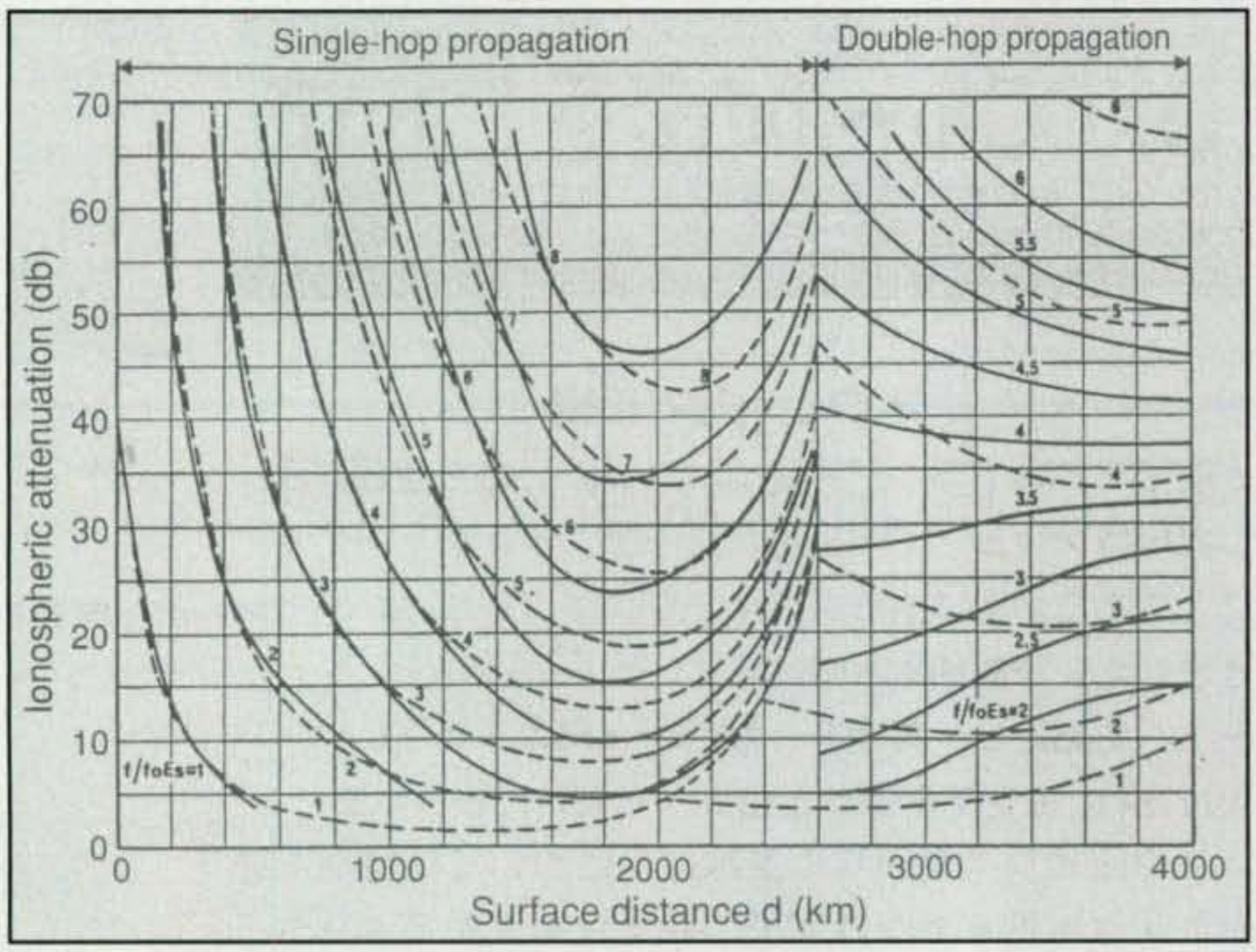


Fig. 2– Signal attenuation for E_s propagation, from Miya, et al., 1978. Dashed lines are from observed values; solid lines are from empirical formulas.

lower portion of the sporadic-*E* layer is shielded by the Earth.

These are the reasons why we have no evidence of multi-hop propagation beyond double-hop, and consider multi-hopping to be unrealistic.

Fig. 3 (Miya et al., 1978) and Table III, derived from fig. 3, indicate that propagation greater than double hop is not be possible because of heavy ionospheric attenuation mainly due to the dependence of the f/f_oE_s ratio.

These indicate that propagation up to two hops will be possible with an antenna elevation angle below 10 degrees and moderate ionospheric attenuation. On the other hand, it is assumed that an elevation angle over 10 degrees is not appropriate because of extremely high attenuation.

On the contrary, much evidence, as we mentioned earlier, indicates that an elevation angle over 10, up to 25, degrees was *most appropriate* in this case. This reflects the fundamental differences of the propagation modes—that is to say, multi-hop E_s vs. "Whispering-Gallery" mode beneath the *E*-layer without intermediate ground reflection.

Whispering-Gallery Mode Beneath the *E*-Layer

The whispering-gallery phenomenon for sound waves has been known since medieval times. By analogy with sound waves, the propagation of radio waves, from 30 kHz up to VHF, beneath the same sphere with low attenuation has been studied since the 1940s and was examined intensively during the 1970s. Please see the sidebar "What is Whispering-Gallery Mode?"

Data from several research projects over 20 years have been in mothballs for an additional 20 years. The following are abstracts from several such papers, including Budden (1962), Grossi (1966), Chang (1971), and CCIR Report 250-6,-259-1, -295 (1986):

- Whispering–gallery propagation is possible in any phase of the solar cycle and on any frequency from 30 kHz up to VHF, and in either the *E* or *F* region of the ionosphere.
- Sporadic-*E* (E_s) propagation has no sunspot cycle dependence. Observations made during a complete 11-year solar cycle indicate that there is no simple long-term correlation between solar activity and VHF propagation via E_s. However, it became apparent that the yearly variations are rather regular and tend to be similar for different paths.
- The MUF (maximum usable frequency) in the whispering gallery is roughly twice the basic MUF of an equivalent multi-hop path between ground-based terminals.
- There can be simultaneous existence of multi-hop and whispering-gallery paths on both the day and night sides of the Earth.
- The total calculated losses inclusive of absorption are relatively insensitive to terminal separation and are on the order of 125 to 138 dB from 25 MHz to 45 MHz.

Signals from satellites below the horizon have been explained by Chang (1971) as full-wave analysis of guided propagation in the ionosphere. The theoretical results indicate:

- The MUF for *F*-layer whispering-gallery propagation is approximately six times the incidence frequency.
- As the ratio of wave frequency to vertical-penetration frequency increases above six, energy leaks and attenuation increases.
- The MUF for *E*-layer whispering gallery is 14.9 times the vertical-penetration frequency.
- For a daytime *E* region, the MUF for whispering-gallery propagation is more than 2.6 times higher than the MUF for ground-to-ground communications.

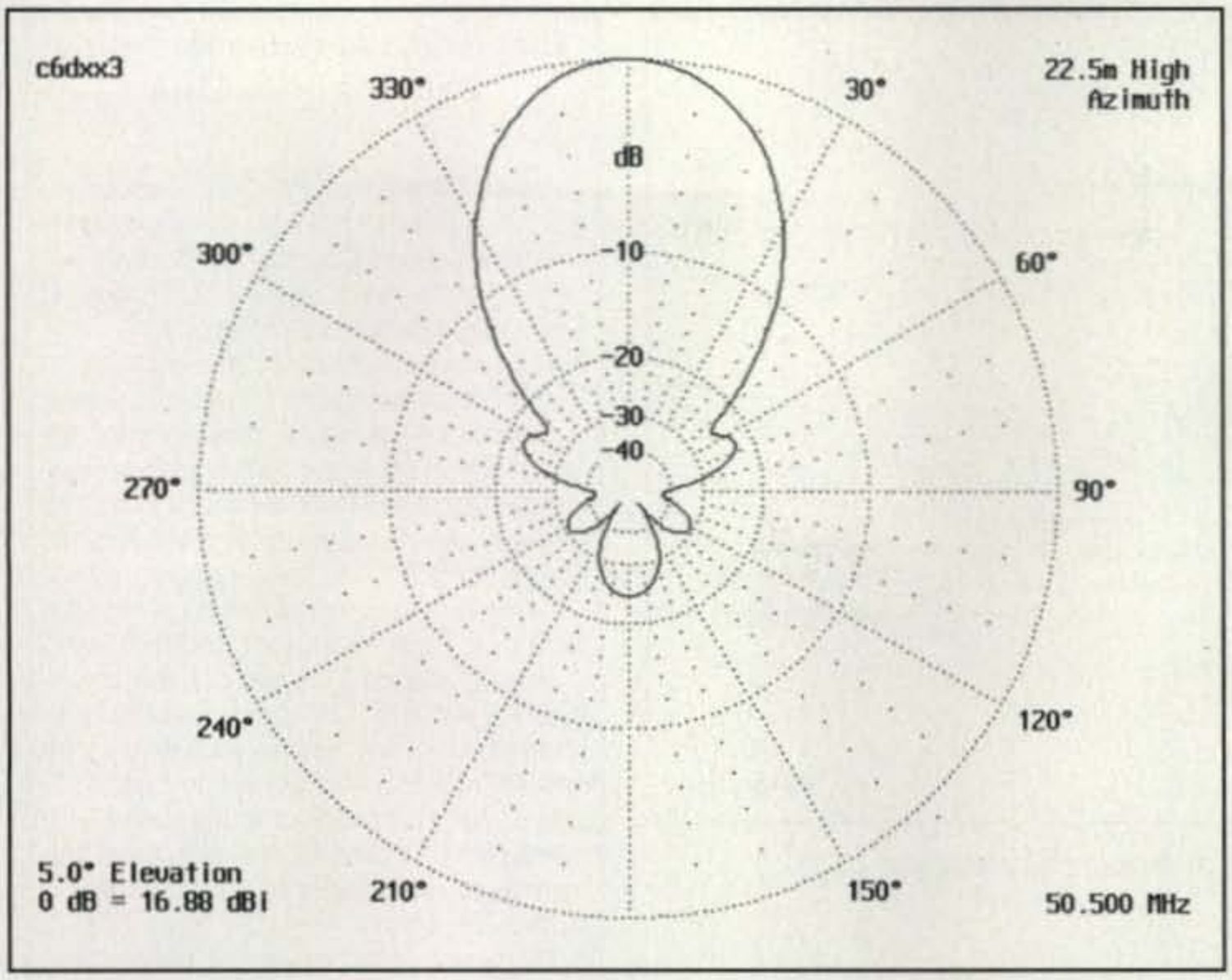


Fig. 3– Figs. 3 through 6 show antenna radiation patterns of a single 10-element CL610A Yagi for 6 meters, boom length 10 meters, at a height of 20 meters from the ground. (Courtesy of Creative Design Co. Ltd. Japan.) Fig. 3 shows the horizontal-plane radiation pattern.

• Collisions cause serious attenuation of trapped whispering-gallery modes associated with the *E*-region whispering gallery. Unlike communication along the *F*-region whispering gallery, *E*-region communication is practical only for a distance of a few thousand kilometers.

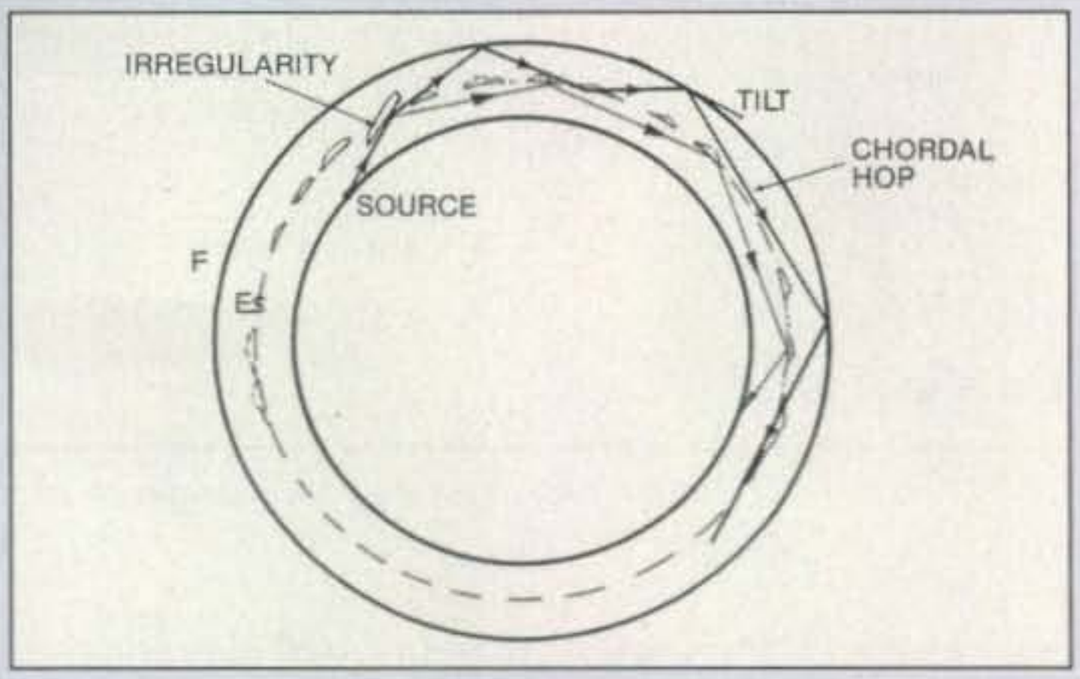
In summary, the authors consider that it is possible to propagate 6-meter whispering-gallery mode via sporadic-*E* because of the seasonal high MUF of the summer solstice, in spite of the low MUF of the *F2*-layer during the sunspot minimum. That is to say, whispering-gallery mode in the *E*-region raises severe ionosphere attenuation compared to the *F*-region. However, this

What is the Whispering Gallery Mode?

A whispering gallery is a place, such as that in St. Paul's Cathedral in London, so shaped that a whisper uttered at a certain point can be heard (by reflection and concentration of the sound) at a distant point, beyond the range of ordinary hearing. Under proper conditions, a sound made near a reflecting surface is heard with abnormal loudness anywhere along the surface. The term also refers to any chamber or hollow place, such as a cave or a sphere, having the same acoustic property.

Whispering galleries for sound waves have been known about since medieval times, although their principle of operation was analyzed and recognized correctly just more than a century ago by Lord Rayleigh (1878).

The propagation of radio waves to great distances is conveniently treated by regarding the space between the Earth and the ionosphere as a waveguide. Several scientists have found that the least attenuated modes are profoundly affected by the Earth's curvature. This effect has been investigated for several modes in the ionosphere. It was found, in particular, that at frequencies greater than about 30 kHz, some modes are possible for which the energy is concentrated in a region near the base of ionosphere, and the field strength near the ground is small. It is useful to think of such models as being composed of waves repeatedly reflected at the inside spherical surface of the ionosphere, the ray being chords of this sphere. By analogy with sound waves, these modes are called "whispering gallery modes."



Long-distance paths involving scattering, reflections, and chordal propagation (whispering-gallery modes).

Two basic features of the Earth's lower ionosphere—concavity and the negative gradient versus altitude of its index of reflection—make this medium capable of supporting low-loss guided propagation paths which do not require the intervention of the Earth's surface to circulate around the Earth. That is, the lower ionosphere behaves as a whispering gallery for radio waves capable of being propagated, from 30 kHz up to VHF (Booker, et al., 1962; Woyk 1959; Baker 1962; Wait 1962; and Chang 1978).

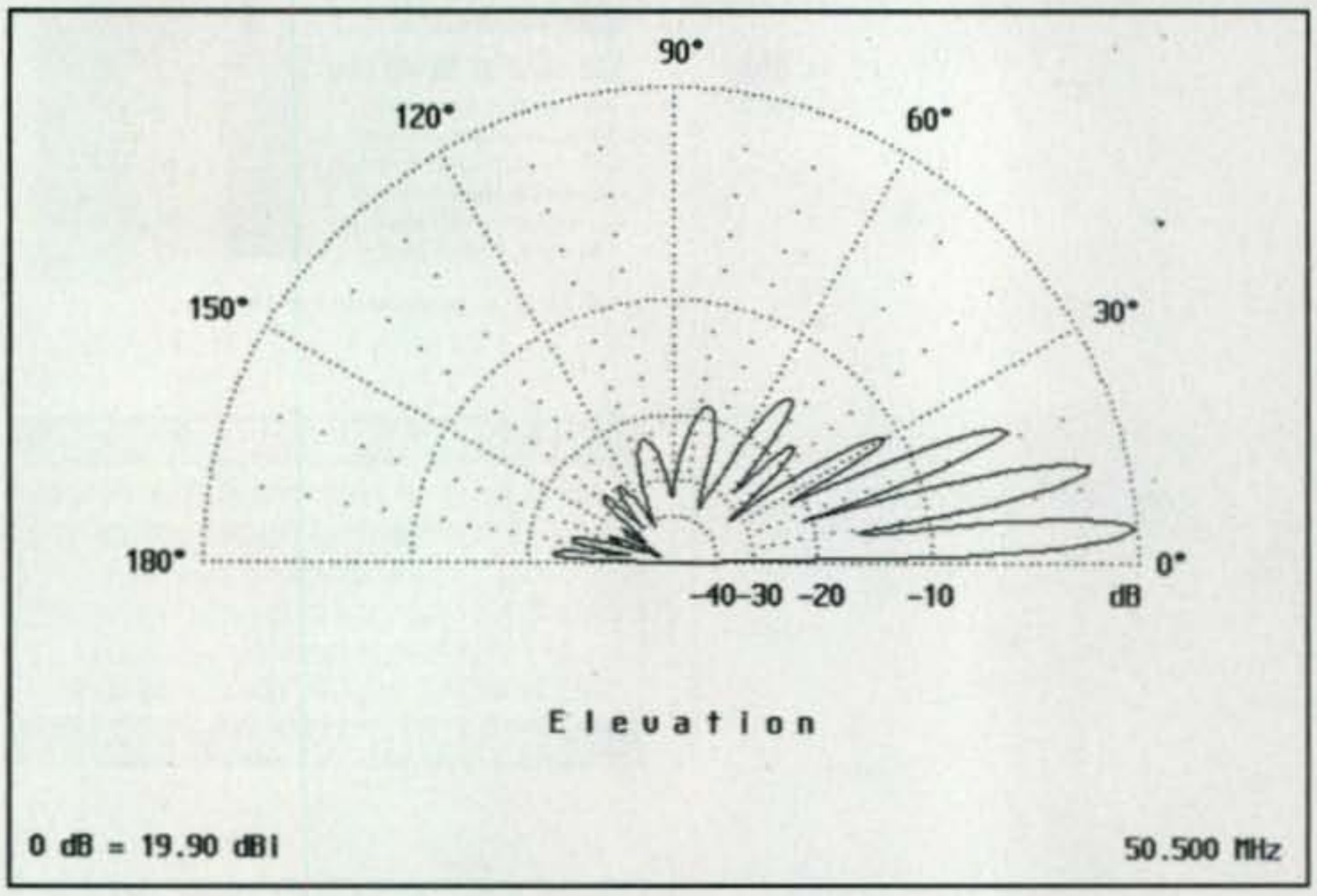


Fig. 4– Vertical (longitudinal) plot at 0 degrees elevation angle.

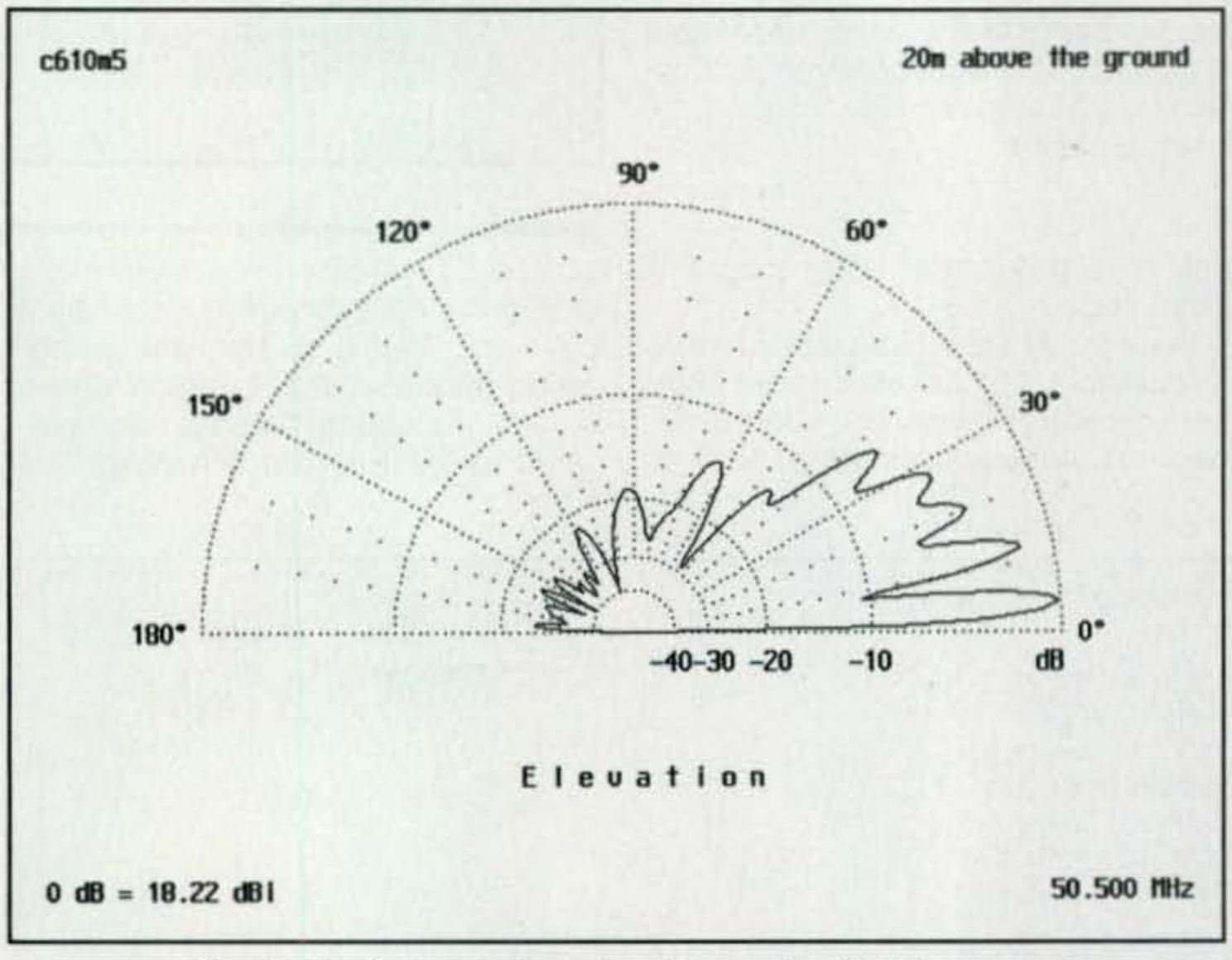


Fig. 5–Vertical plot at an elevation angle of 15 degrees.

mode, which is propagation without intermediate ground reflection, cancels ground-reflection loss and *D*-layer absorption. Consequently, both are relevant to offset each other.

Control of Elevation Angle of an Antenna

The major characteristics of this propagation mode are an ionospheric duct without intermediate ground reflection and high angle ray arriving at an angle of 10–25 degrees to the ground. Hence, it is very often possible to receive DX signals by manipulating an antenna's angle of elevation.

A new technique is to force high-angle incidence and receiving signals to/from a sporadic-*E* "cloud" with a single Yagi antenna at an angle. Contrary to our conventional wisdom of HF and VHF propagation, the higher the elevation angle (10 to 25 degrees), the *longer*

Theoretical Antenna Radiation Patterns of CL610A

Yoshi Miyamoto, JM1DTF, has a single 10-element CL610A Yagi made by Creative Design Co., Ltd. and controlled by azimuth and elevation rotators. Theoretical patterns simulated by a computer at the height of 22 meters with 30 feet of boom length are shown as follows:

Horizontal radiation pattern (fig. 3). Longitudinal vertical pattern with an elevation angle of 0 degrees (fig. 4); 15 degrees (fig. 5), and 25 degrees (fig. 6), respectively.

These are theoretical results, which are different from empirical models, and these differences should not be disregarded. Actually, a forced elevated radiation pattern will not be as affected by ground reflection as shown in figs. 4, 5, and 6, but will be closer to the pattern for free space. Therefore, the results of the forced elevated angle of the antenna will satisfy the theory.

Differences between the theoretical pattern and the empirical model. Comparing both patterns, there are two significant differences:

1. In fig. 4, two obvious lobes (the ground lobes) above the main lobe do not exist in practice.

2. In figs. 5 and 6, in the case of elevation angles of 15 and 25 degrees, respectively, the lowest low-angle lobe would not exist in practice.

The reasons for the above are that, in case of ground reflections, the accuracy of the simulation could be very poor. It is already known that the ground reflected pattern of a VHF antenna more than 30 meters high—that is, more than several wavelengths in height—shows a remarkable discrepancy between the theoretical pattern and empirical model. EMEers and satellite operators are already aware of this discrepancy. Receiving solar noise facing toward the sun with a single flat (0-degree elevation angle) Yagi antenna, and comparing with an elevated-angle Yagi, you can also realize that the actual pattern will be different from the simulated patterns.

In this regard, it has been mentioned already by Miya (1978) that in cases of long-distance E_s propagation, the effects of ground reflected signal can be ignored and the antenna height gain need not be considered in the unusual estimation of attenuation. Hence, it can be assumed to be 0 dB because of the extremely low arrival angle. In fact, he said, measured data indicate that such an assumption is reasonable.

As a conclusion, in the case of a tall antenna it is hard to generate a high-angle radiation pattern by ground reflection. Therefore, a forced elevated angle on VHF will be justified in this case.

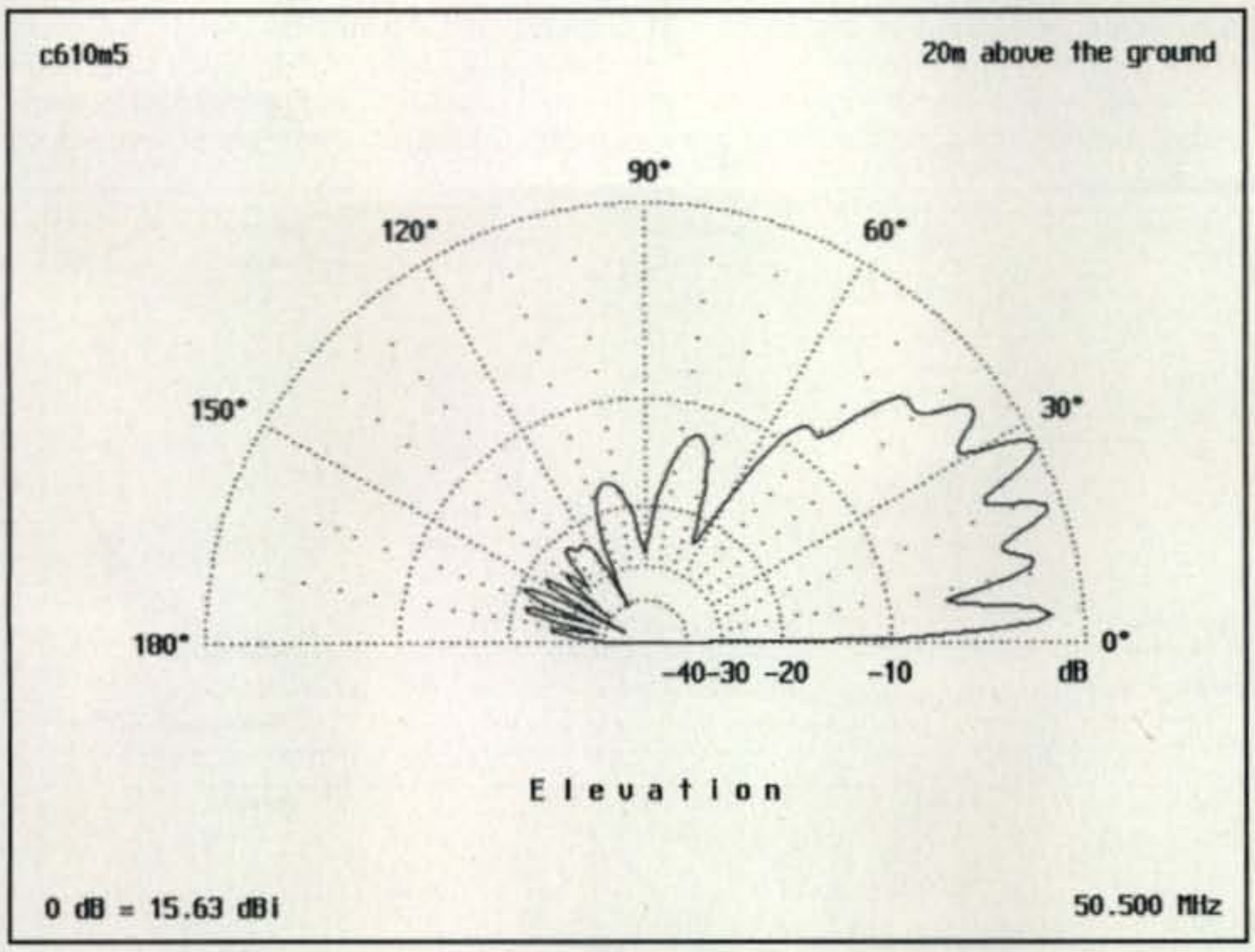


Fig. 6– Vertical plot at an elevation angle of 25 degrees.

the distance covered (e.g., North America and Europe from Japan). On the other hand, the lower the elevation angle (0 degrees), the shorter the distance (contacts from Japan to Korea, China, and far eastern Russia).

This contradicts our conventional wisdom of HF multi-hop propagation. Therefore, the mode will not be a conventional mode, but a new mode as mentioned earlier—that is, a hybrid of classical theory into a new medium for propagation, which is called E_s *guided mode*. In practice, it is required to habitually set an elevation angle of 10 to 25 degrees by nosing up the head of the antenna, consequently decreasing urban noise and TV buzz coming in at low angles. Then, at the time of a QSO, fine-tuning of the angle will help to tune in the best S/N and signal strength. Actual QSOs indicate that it was possible to make DX contacts even at a maximum elevation angle of 30 degrees (JM1DTF).

In conclusion, we consider that forced elevation angle of the antenna is thought to be the right way to facilitate concrete reception of very distant signals, at the same time excluding urban noise and TV buzz as well as uncertainty of the ground lobes. We encourage 6-meter DXers to try pointing their antennas upward as we enter this summer's sporadic-*E* season, and see if you can work the "Whispering Gallery" as well. ■

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"The Round Earth on Flat Paper," National Geographic Society, 1947.) People have struggled with various projections, but it seemed there was always some distortion, some *stretching* of the land, that made the maps look strange.

The ACE-HF folks struggled with the same problem in considering antenna charts, and it would be great if we could have a 3D spherical antenna chart that would visualize our *gedanken* experiment. On the flat computer screen, as on

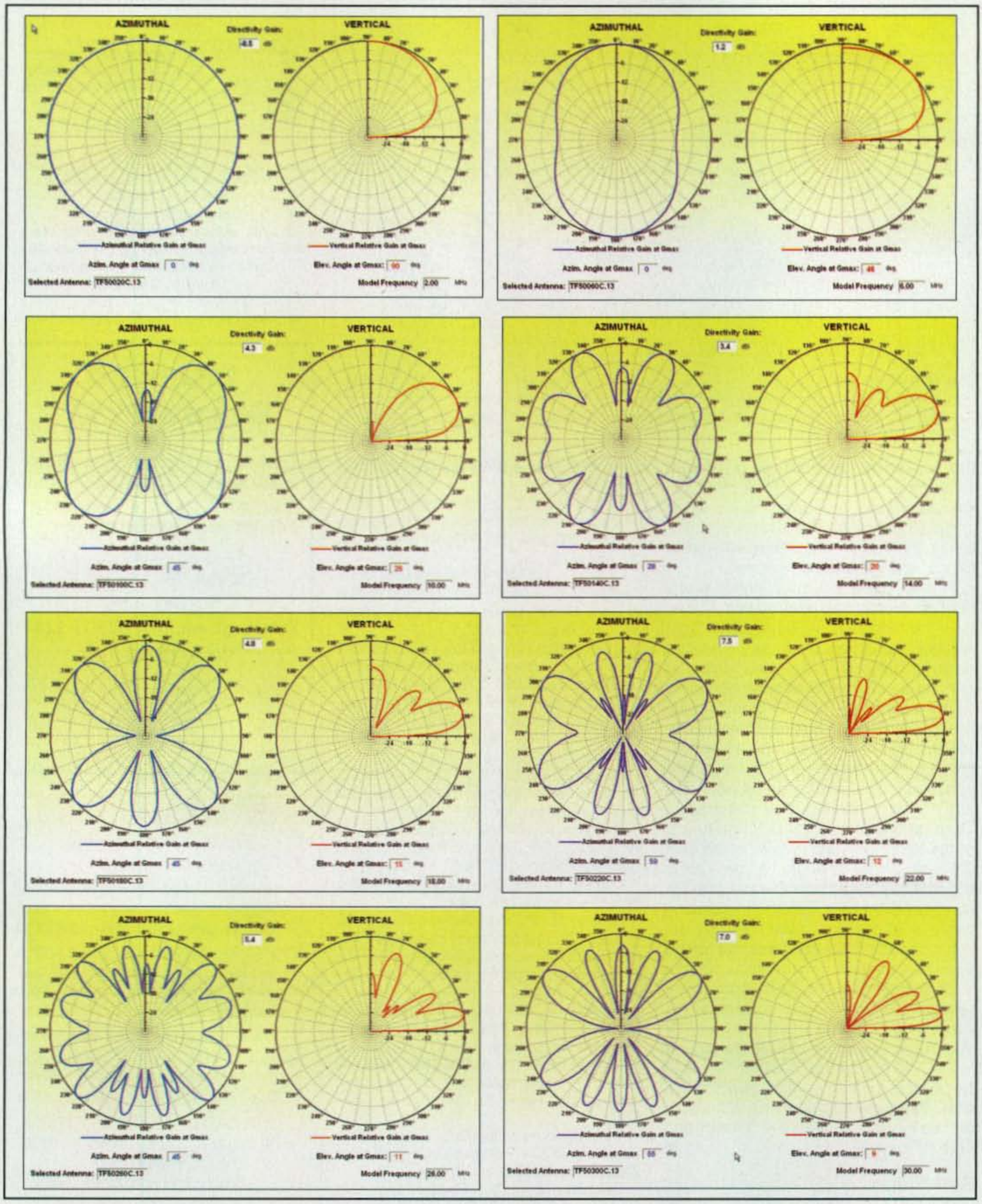

Fig. 10– Terminated folded dipole antenna at 2–30 MHz.

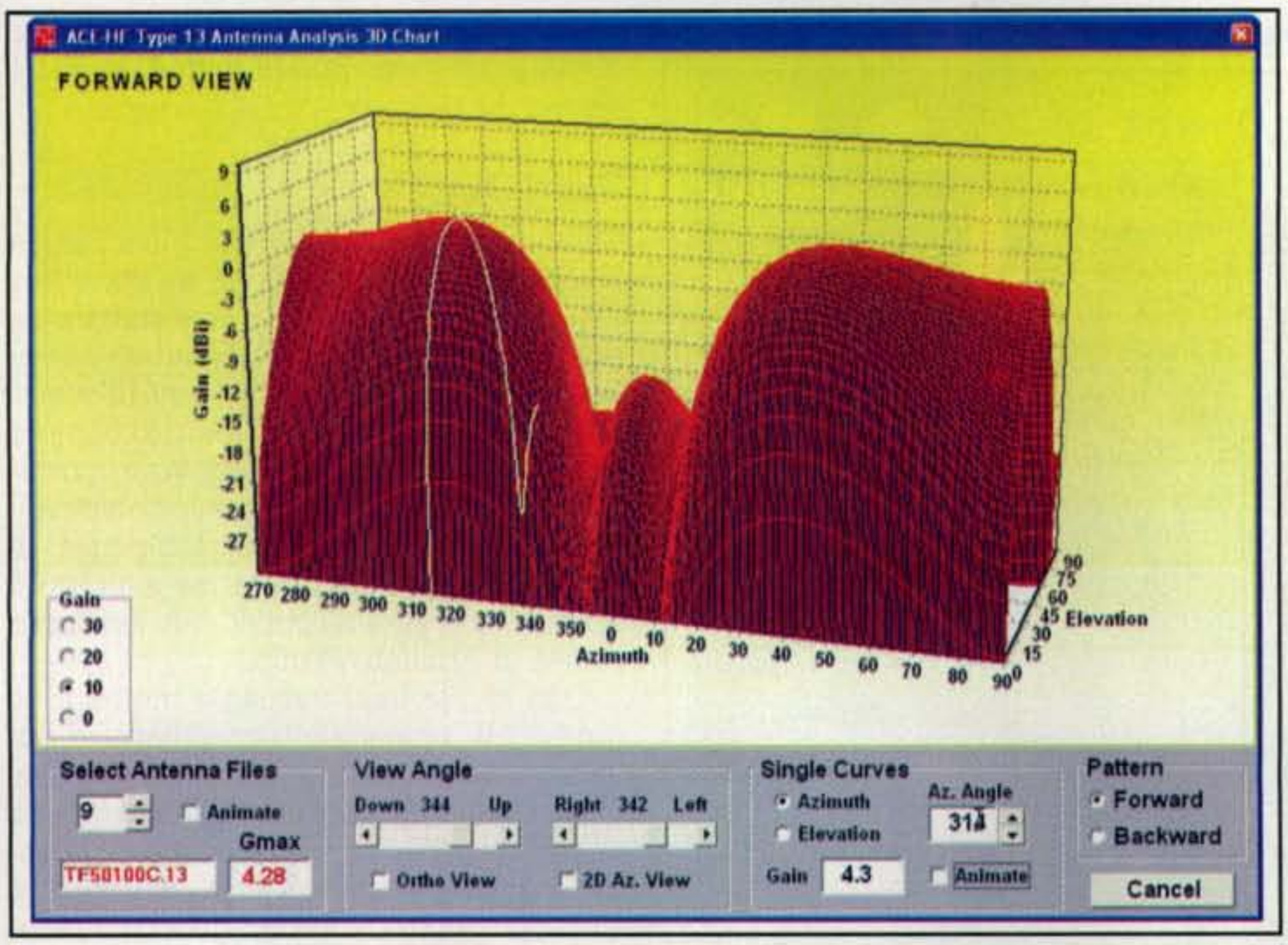

Fig. 11– Three-dimensional chart of TF dipole antenna at 10 MHz.

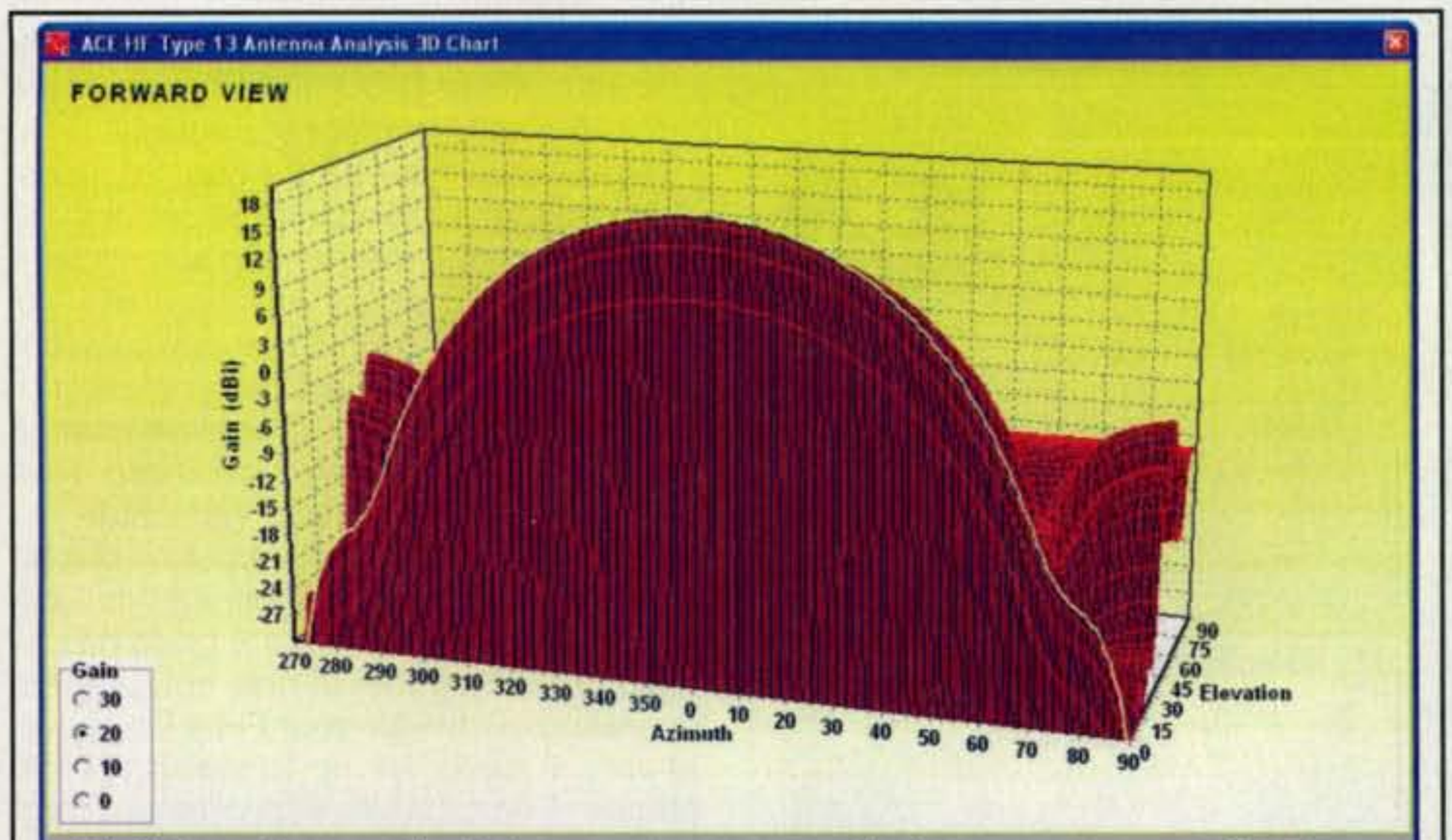

Fig. 12– Three-dimensional chart of OptiBeam Yagi stack at 28.4 MHz.

the paper of this article, a compromise was reached. Figs. 11 and 12 show three-dimensional charts for two of the antennas discussed, from the ACE-HF PRO V2.05 software.

The 3D charts are lots of fun to play with. You can change the viewing angle, show different projections, and even shift between forward and backward antenna patterns. Also, you can animate a single *slice* through the figure as a function of azimuth or elevation angle. In fig. 11, the yellow line shows the slice at 314° azimuth where G_{max} of 4.3 dBi occurs at the top of the diagram. In fig. 12, the yellow line shows the G_{max} slice at an elevation of 4°.

The Bottom Line

I can guarantee that once you play with all these charts, you will be a lot smarter about antennas. However, the bottom line is to show the effectiveness of our radio station. To answer that question, I ran

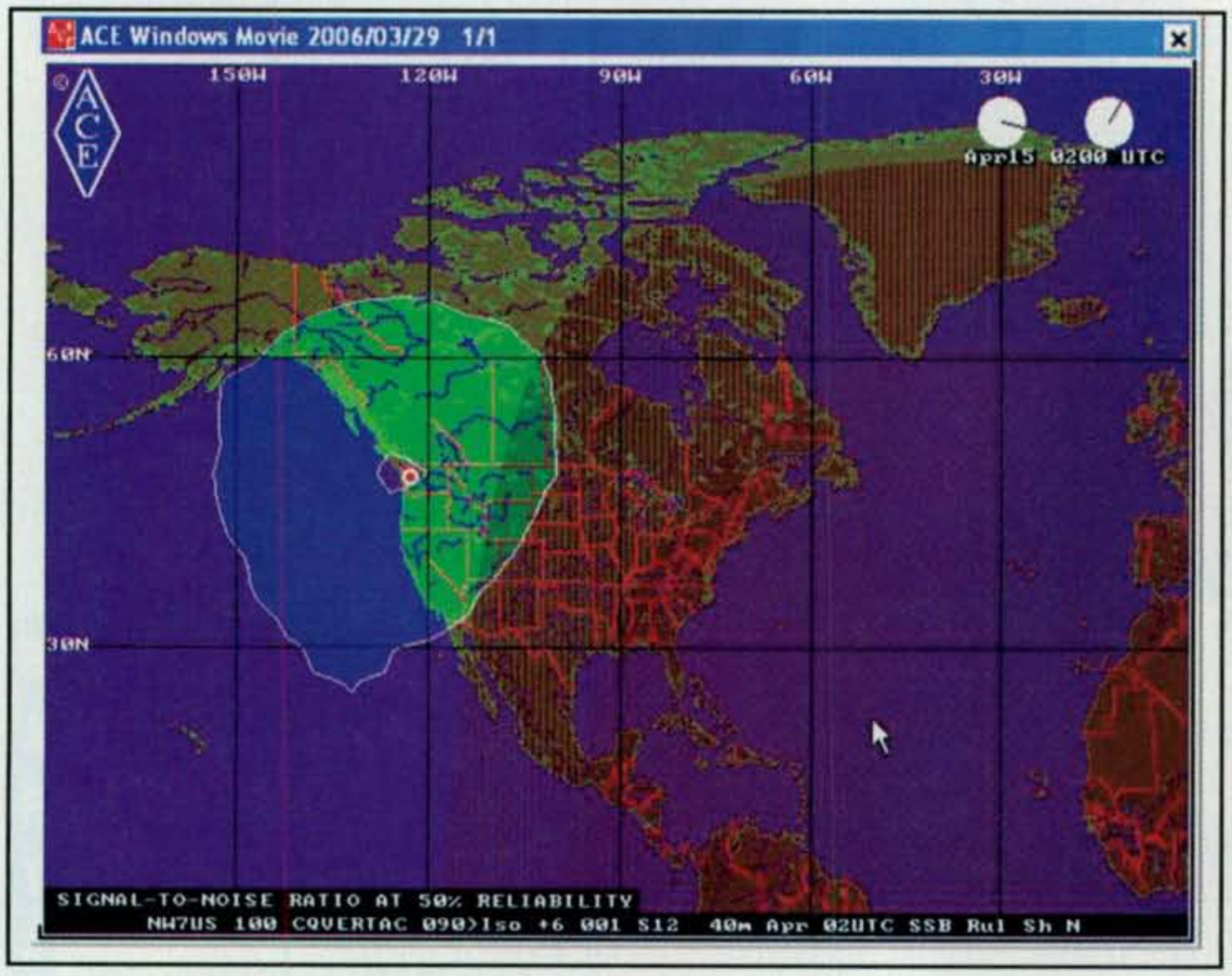

Fig. 13– NW7US 40-meter coverage with quarter-wave vertical.

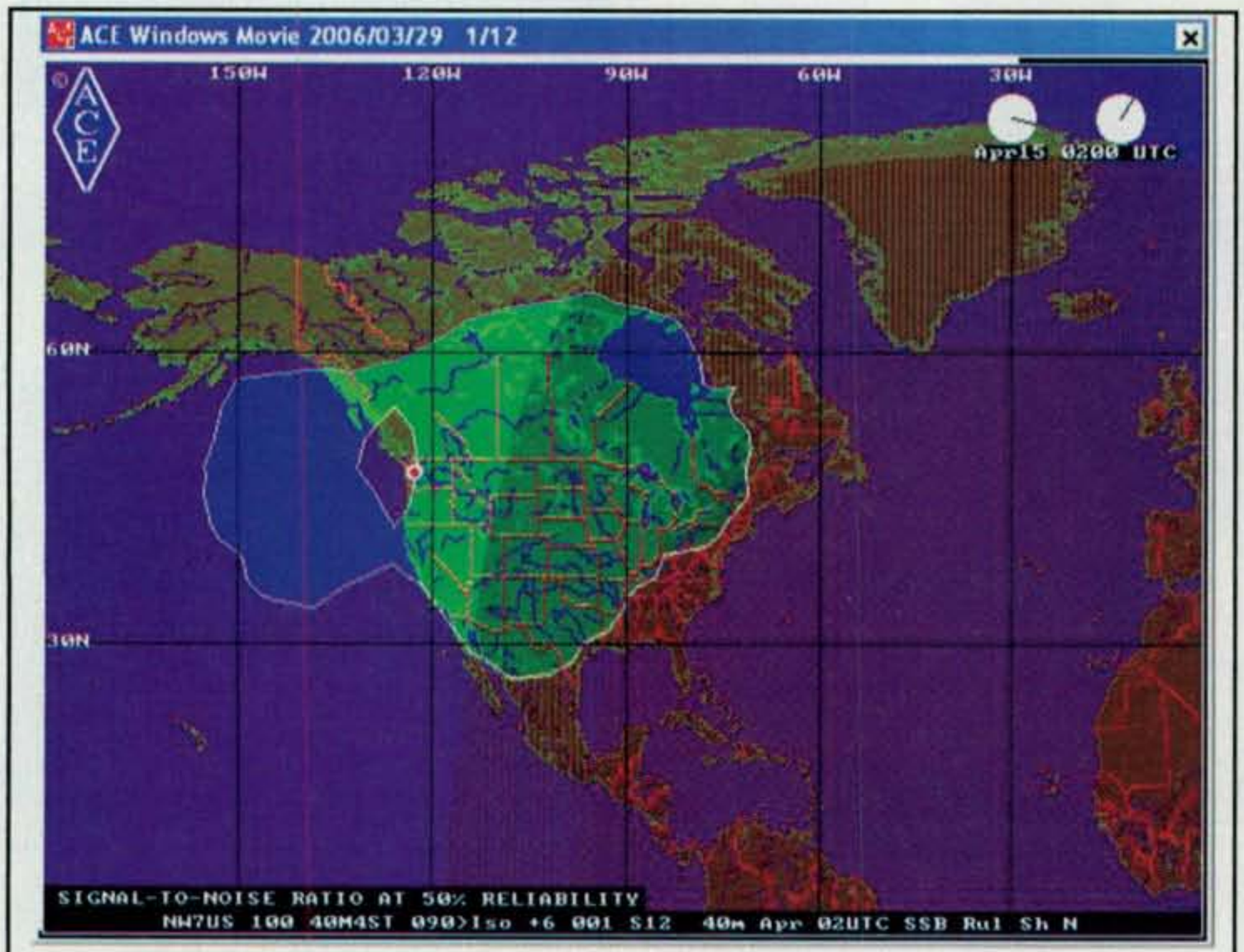

Fig. 14– NW7US 40-meter coverage with two-stack Yagi array.

ACE-HF area coverage maps for my station in Brinnon, Washington to see how different antennas would affect my communications range. Fig. 13 shows 40-meter coverage at 02 UTC from a quarter-wave vertical monopole, while fig. 14 shows coverage from a two-stack array of 4-element Yagis mounted at 75 and 125 feet above ground, pointed at a 90° azimuth angle. The conclusions are obvious, and just wait until you animate these maps through 24 hours with the ACE MOVIE program!

Have I learned anything from my analysis? *Yes!* Do I want a new antenna? *You bet I do!*

Now you also know how to explore the right antenna for your Field Day operation before you deploy. Once you discover the right antenna by using the modeling features of ACE-HF, you can spend the time constructing the antenna and then be armed for success.

Field Day

This year the annual ARRL Field Day is June 23 and 24. The goal, as stated by the ARRL, is to "work as many stations as possible on any and all amateur bands (excluding the 60-, 30-, 17-, and 12-meter bands) and in doing so to learn to operate in abnormal situations in less than optimal conditions. A premium is placed on developing skills to meet the challenges of emergency preparedness as well as to acquaint the general public with the capabilities of Amateur Radio."

One of the best available methods to predict HF propagation conditions in advance is the 27-day recurrence tendencies of geomagnetic, solar, and ionospheric conditions. It is not an absolute method, but it does give a very good indication of what is expected. This column is being written in April, about three 27-day solar rotation cycles away from the start of the Field Day weekend. Based on a study of the patterns expected during the next three rotational periods of the sun, it looks as if conditions for Field Day 2007 will be poor to fair with some geomagnetic activity.

Predictions for one 27-day rotational period are far more accurate than for three 27-day rotational periods. Be sure to carefully check conditions on about May 27 and 28, since this would be one rotational period before Field Day weekend. There is better than 90 percent chance that conditions observed on those days will recur during the event weekend.

If you wish to maximize your on-the-air efforts, you'll want to check out the Last-Minute Forecast, and use a good propagation modeling tool to help you prepare operating guides for your Field Day operations. I have an up-to-the-day Last-Minute Forecast at <http://hfradio.org/lastminute_propagation.html>.

Remember, short-skip propagation (often by sporadic-*E*, or *Es*, mode) is a big part of Field Day on-the-air activity, especially on the higher HF bands and even on low VHF bands during this year, as we are in the bottom of the solar cycle activity.

June Propagation

June marks the changeover from equinoctial to summertime propagation conditions on the shortwave (HF) bands. Solar absorption is expected to be at seasonally high levels, resulting in generally weaker signals during the hours of daylight when compared to reception during the winter and spring months.

When using the Last-Minute Forecast chart, since we are at the bottom of the solar cycle, you should use either the (2) or (1) column. Use the (2) column if the flux

is averaging around 80 or higher for a few days or more, but to be conservative, use the (1) column for the rest of the period (as we are more typically in the low 70s).

Ten-meter propagation to DX locations far to the east and west are a rare event during the peak of summer, but not for sporadic-*E* distances. With the low solar activity at this stage in the decline of the cycle, I don't expect to see much on 10, except via sporadic-*E* (*Es*) short-skip propagation. The flux just won't support a high-enough maximum usable frequency (MUF) on most DX paths. North and south paths on 10 meters may yet present opportunity for DX, especially around sunrise and sunset, but these openings will be short.

Seventeen and 15 meters will be just a bit more reliable than 10, holding some promise. However, these will still be a challenge with the decreased solar activity.

Twenty meters is poor to fair during the hours of darkness, and are weak even during daylight hours. The best openings on 20 will be the hours around sunrise. MUFs during the daytime hours are considerably lower during June and the summer months than during the other seasons. However, they are considerably higher during the hours of darkness in June than during the same hours of darkness in the winter.

Recurring coronal holes will cause occasional periods of geomagnetic storminess during June, degrading higher latitude signal paths more than middle- and low-latitude paths. Coronal holes and the associated high-speed solar winds containing clouds of plasma released by the coronal holes are the bane of propagation during the solar minimum. In addition, noise from electrical storms increases considerably during June and the summer months. These higher static levels will make DXing on 40, 80, and 160 meters more of a challenge.

The 30- and 40-meter bands should offer good DX conditions during the night despite higher static. Look for Europe and Africa as early as sunset. After midnight, start looking south and west for the Pacific, South America, and Asia. Short-skip should be possible out to about 750 miles during the daytime.

Expect some openings on 80 meters, similar to how 40 meters will be acting. Fairly frequent short-skip openings up to 1000 miles are possible during darkness, but expect very few daytime openings with all the static and absorption.

Sporadic-*E* propagation starts to peak during June. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters, with paths open between 50 and 2300 miles.

VHF Conditions

The summertime sporadic-*E* (*Es*) season for the Northern Hemisphere begins in force in May. By June things could well be hot on 6 meters and there might even be openings on 2 meters. During the late spring and summer months, a sharp increase of *Es* propagation at mid-latitude occurs. Through June you can expect to see 20 to 24 days with some *Es* activity. Usually these openings are single-hop events with paths up to 1000 miles, but June's *Es* are often double-hop. Europe can generally be worked from the East Coast throughout June.

During the daylight hours, monitor 6 meters for transcontinental openings, as well as between Hawaii and the western states, and the Caribbean and Central and South America. The best time to look for these is during the afternoon hours, especially when conditions are High Normal or better.

There is usually a seasonal decline in transequatorial propagation (TE) during the summer months, but some 6-meter openings may still be possible during June. The best time to catch an opening across the geomagnetic equator is between 8 and 11 PM local daylight time.

Current Solar Cycle Progress

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 72.3 for March 2007, down from February's 77.8. The 12-month smoothed 10.7-cm flux centered on September 2006 is 80.2. The predicted smoothed 10.7-cm solar flux for June 2007 is 75, give or take about 15 points.

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for March 2007 is 4.8, down quite a bit from February's 10.6. The lowest daily sunspot value recorded was zero (0) on March 7 through March 10, March 14 through March 22, and March 31. The highest daily sunspot count was 17 on March 5. The 12-month running smoothed sunspot number centered on September 2006 is 15.6. A smoothed sunspot count of 12, give or take 12 points lower to 12 points higher, is expected for June 2007.

The observed monthly mean planetary *A*-index (*Ap*) for March 2007 is 7, one point up from the previous few months. The 12-month smoothed *Ap*-index centered on September 2006 is 8.7. Expect the overall geomagnetic activity to vary greatly between quiet to disturbed during most days in June.

Signing Off...

Please take a look at what's new at my propagation website, <http://propagation.hfradio.org/>. Included on the site is an up-to-the-day Last-Minute Forecast for you to use to get the very latest forecast for the month. If you have a cell phone with internet capabilities, try <http://wap.hfradio.org/>.

Drop me an e-mail or send me a letter if you have questions or topics you would like to see me explore in this column. Also, I'd love to hear any feedback you might have on what I have written. Until next month . . . 73, de Tomas, NW7US

Notes

1. Numerical Electromagnetic Code (NEC) software was created by Laurence Livermore Laboratories to model very complex antenna structures and their surroundings by dimensionally specifying each antenna wire and structure using method-of-moments computations. Each wire within the antenna design is specified by the physical (XYZ) location of each end, and a line is drawn between the two ends to represent an antenna element. The process is repeated until all antenna elements and surrounding surfaces are described and computations then proceed. The resulting NEC model may then be analyzed vs. frequency. Common output parameters include both vertical and elevation patterns, gain values at each vertical and elevation angle, antenna input impedances, and VSWRs.

2. I have a friend who years ago worked for Continental Electronics, the maker of large HF broadcast transmitters. The company had a curtain array for testing purposes, and some of the ham employees made worldwide contacts driving the curtain with a keyed grid-dip meter!

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Looking Ahead in CQ

Here's a look at articles we're working on for upcoming issues of *CQ*:

- Results, 2006 CQ WPX RTTY Contest
- 2007 CQ Hall of Fame inductees
- "The DXers and the Dragon—The BXØZR DXpedition," by W9ZR
- "A First-Time DX QSL Manager," by K3IXD
- "Samoa, A DX Paradise," by KT8X/5WØDP
- "Want to Spice Up Your QSOs? Go Video, Part II," by KZ1Z

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our readers say

Contesting Frequencies

Editor, *CQ*:

In future contests, I think some consideration should be given to banning SSB contesting in the CW sub-band on 160 meters. Operators claiming points or heard here should be given some penalty. I know there is no legal sub-band, but 1843 has been considered the bottom end of the SSB portion for years. CW and SSB share the 1840–1900 segment per the ARRL band plan.

I won't go into the tirade I am feeling, but with so much available area, it seems rude in the extreme to allow such operation. There is plenty of space for SSB without the intrusion, *especially* in the DX window for CW. I work both SSB and CW, no bias here. Even though I can, I don't operate CW on 3976 kHz, 7258, 14.336 MHz . . .you get the drift. Thanks for the good magazine, and the contest support.

Please, fellows (and gals).

Mark Kenward, K8VF

Mark: Contest logs do not include specific frequencies, so there is no way of telling where on a band a contact was made; and we cannot ask our volunteer contest committee members not to operate in order to be "contest police." As you correctly note, there are no formal subbands on 160, and on the rare occasion (once or twice a year?) that there is too much activity in the traditional SSB portion of the band, some will inevitably slide down into the traditional CW portion. Courtesy and common sense are always in order, but cannot be legislated.—W2VU

BASIC X-24

The following letter was addressed to author Dennis Nendza, W7KMV, regarding his "BASIC X-24" article in March CQ:

Dear Dennis,

I saw your article on the BasicX-24 and thought, Wow! Maybe a good place to start to use all those new proto boards I just got. After reading your article several times and looking at NetMedia's web page, it seemed that this was just the ticket I needed to get back into the technology learning curve and maybe a few new up-to-date projects around the shack!

The long and short of this e-mail is to say tnx for a great article and taking the time to prepare it. I'm not totally sure where I will apply this project, but I do know I'll be looking real close at using Netmedia for my source of supply, at least for this type of technology. I have started to price out the items listed in the article.

Dennis, many thanks again, great job on the article. Take care, God Bless!

Joe Dozpat, WA3UVP

Twister

The following was addressed to Digital Editor Don Rotolo, N2IRZ:

Enjoyed your article in the April 2007 CQ about the simple encryption program, Twister. However, I was unable to find the software at the link given in your article.

Howard, K7HI/mm

N2IRZ replies:

Howard: Several people reported having trouble, but we could not duplicate the problem. Please be sure to type in the link exactly as published: <http://www.cq-amateur-radio.com/WEBTWISTERDC0407.zip>, then click "save." Thanks for your kind words, I hope this helps.—Vy 73, Don, N2IRZ

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with Audio filters

RF μ-Tune Kits

160m Band
RF μ-Tune Kits A

80/40m Band
RF μ-Tune Kits B

30/20m Band
RF μ-Tune Kits C

- Up to three μ-Tune Kits may be connected.
- μ-Tune Kit is included in purchase price of μ-Tune Unit.

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

Specifications subject to change without notice. Some accessories and/or options may be standard in some areas. Frequency coverage may differ in some countries. Check with your local Yaesu dealer for specific details.

YAESU
Choice of the World's top DX'ers

Vertex Standard
US Headquarters
10900 Walker Street
Cypress, CA 90630 (714)827-7600

D-STAR MOBILES

D-STAR optional

NEW IC-2820H

D-STAR UPGRADEABLE 2m & 70cm

50/15/5W RF Output Levels • Right Band RX: 118-173.99, 375-549.99, 810-999.99MHz*; Left Band RX: 118-549.99MHz* • Analog/Digital Voice with GPS (Optional UT-123) • 500 Alpha-numeric Memories • Diversity Receive Capable

GEE, I WISH MY OWNER WOULD GET ME A...

UT-123

GPS MODULE AND ANTENNA

Dual display

Diversity reception with band scope

Select your favorite display color, adjustable from amber to green

DIGITAL

D-STAR ready

ID-1

GO DIGITAL ON 1.2GHz

10 Watt • High Speed Digital Data, Digital Voice, Analog Voice (FM) • Wireless Internet/Network Capable • PC Control via USB Port • Digital Callsign & Digital Code Squelch

D-STAR ready

ID-800H

GO DIGITAL ON 2m & 70cm

55 Watt VHF/50 Watt UHF • Wide RX: 118-173, 230-549, 810.999 MHz* • Analog/Digital Voice & Data • Callsign Squelch • CTCSS & DTCS Encode/Decode w/Tone Scan

D-STAR optional

IC-2200H

DIGITAL UPGRADEABLE FOR 2m

65 Watt • 207 Alphanumeric Memories • Digital Voice & Data w/Optional UT-118 • Optional Callsign Squelch • CTCSS & DTCS Encode/Decode w/Tone Scan • Weather Alert

AMATEUR | AVIONICS | LAND MOBILE | MARINE | RECEIVERS | SYSTEMS

*Frequency coverage may vary. Refer to owner's manual for exact frequency specs.

ICOM