45241

Amateur Radio

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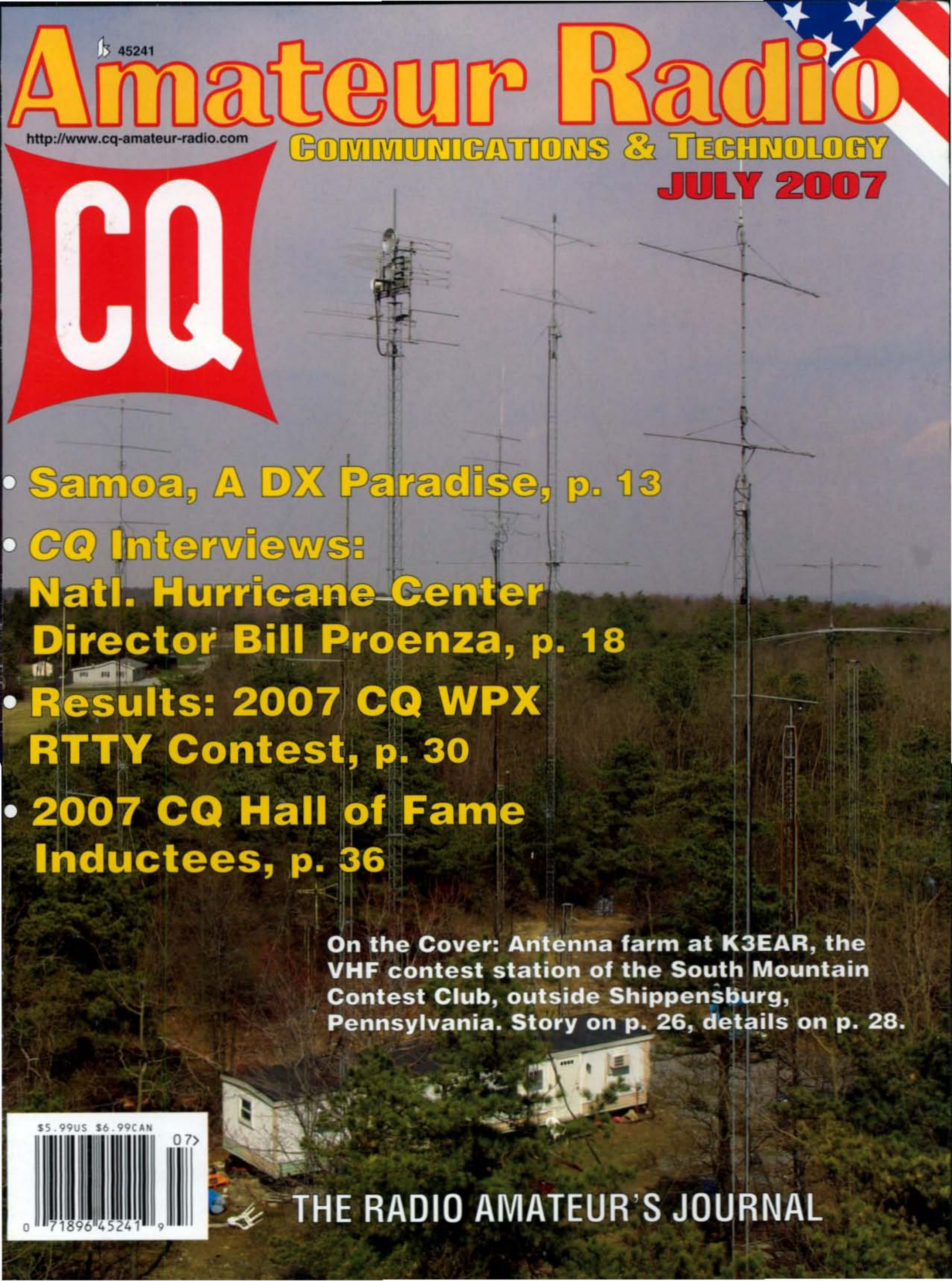
COMMUNICATIONS & TECHNOLOGY

JULY 2007

CQ



- Samoa, A DX Paradise, p. 13
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On the Cover: Antenna farm at K3EAR, the VHF contest station of the South Mountain Contest Club, outside Shippensburg, Pennsylvania. Story on p. 26, details on p. 28.

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

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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.

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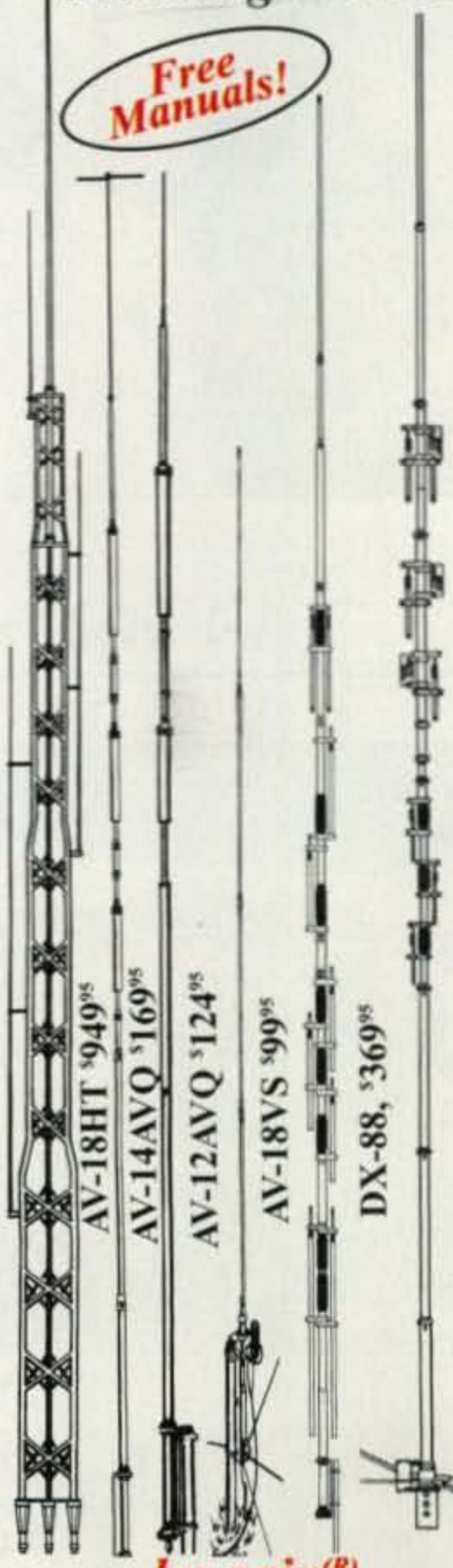
Self-supporting -- no guys required . . . Remarkable DX performance -- low angle radiation, omnidirectional . . . Handles 1500 Watts . . . Low SWR . . . Automatic band switching . . . Aircraft quality aluminum tubing . . . Stainless steel hardware . . . Recessed SO-239 connector . . . Two year limited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

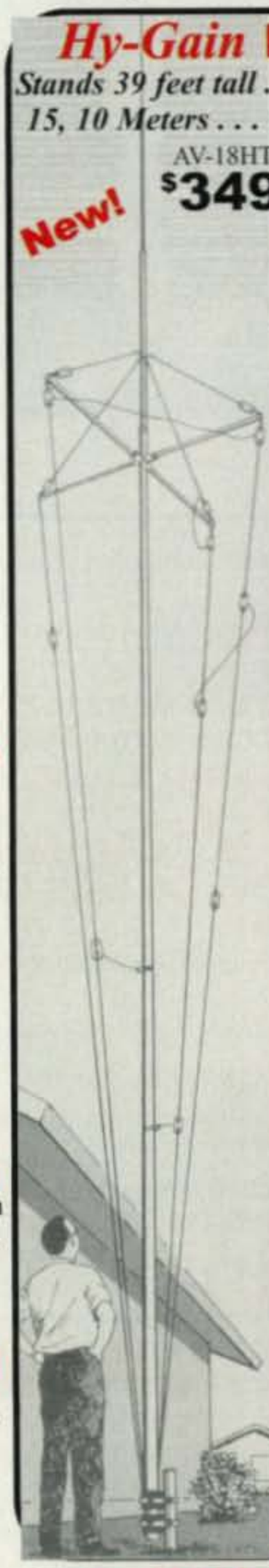
DX-77A, $449.95. (10, 12, 15, 17, 20, 30, 40 Meters). 29 ft., 25 lbs.

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	$124.95	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 w/o guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph w/o guy**	**1.5-1.625"**

Hy-Gain HyTower-Jr™

Stands 39 feet tall . . . Full 1/4 Wave on 40, 20, 15, 10 Meters . . . Cage loading on 80 Meters



AV-18HT-Jr. **$349.95**

Standing a tall 39 feet with *full-size* elements and rated at 5 KW, the AV-18JR *Hy-gain HyTower-Jr.*™ is the world's *second best** performing vertical!

Stub-decoupling is used to give *full-size* quarter wave radiators on 40, 20, 15, 10 Meters with super efficient cage loading on 80 Meters.

The *HyTower-Jr*™ has almost no losses -- your ground system determines your efficiency.

It is automatic bandswitching, fed with 50 Ohm coax and has low SWR over an exceptionally wide bandwidth. SWR is less than 1.2 at resonance on all bands.

The main radiator is aircraft high-strength, heavy walled, 2-inch aluminum tubing swedged at the top. Self-supporting in winds up to 40 MPH (use guy wires for higher winds). Mounts on 1¼ inch plumber's pipe. Heavy duty components will give you years of trouble-free operating pleasure. UPS Shippable.

Requires good ground system for optimum performance.

***The** famous 53 foot *Hy-gain HyTower*™ is legendary. It's the premier, best performing vertical in the world -- bar none! At less than half the price with nearly the *same* performance and based on the *same* principles, the *HyTower-Jr*™ is the poor man's version of its father *HyTower*. Of course, *Junior*™ doesn't have its father's rugged hot-dipped galvanized steel tower and construction!

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Never before has a compact HT offered as many features, and such high powered performance as the TH-F6A. Arm yourself with one today and gain your own airwave superiority.

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- Receives 2 frequencies simultaneously even on the same band
- 0.1~1300MHz high-frequency range RX (B band)[1]
- FM/FM-W/FM-N/AM plus SSB/CW receive
- Bar antenna for receiving AM broadcasts
- Special weather channel RX mode
- 435 memory channels, multiple scan functions
- 7.4V 1550mAh lithium-ion battery (std.) for high output[2] and extended operation
- 16-key pad plus multi-scroll key for easy operation
- Built-in charging circuitry for battery recharge while the unit operates from a DC supply
- Tough construction: meets MIL-STD 810 C/D/E standards for resistance to vibration, shock, humidity and light rain
- Large frequency display for single-band use
- Automatic simplex checker
- Wireless remote control function
- Battery indicator • Internal VOX • MCP software

[1]Note that certain frequencies are unavailable. [2]5W output

TH-F6A
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BS7H Provides "Last One" for Many DXers

The BS7H DXpedition to Scarborough Reef, #1 on the DX "Most Wanted" list, provided many DXers with their last "entity" needed to "work them all." Nearly 18,000 hams made contact with the group of 16 operators from seven different countries, including hams from both China and Taiwan. The week-long operation between April 29 and May 5 resulted in a total of 45,820 QSOs with 17,884 unique callsigns, according to the BS7H website. Nearly half of the contacts were made on 20 meters, and those were about evenly split between CW and SSB. The group's logs are online at <http://www.scarboroughreef.com/srlog.html>. QSL via KU9C.

ARRL Withdraws Regulation by Bandwidth Petition

Amid what it termed "widespread misconceptions" about the intent and effects of its proposal to subdivide amateur radio bands by signal bandwidth rather than by mode, the ARRL has withdrawn its November 2005 "regulation by bandwidth" petition to the FCC. According to the *ARRL Letter*, the League left open the possibility of resubmitting the petition in the future, either as it is or with changes. ARRL President Joel Harrison, W5ZN, said any future petition would be accompanied by a "far better explanation" of its consequences, "so that the misunderstandings that occurred with respect to [the initial petition] do not happen again."

New License Applications Up by 35%

The surge in applications for new and upgraded amateur licenses that began with the removal of the code test requirement for General and Extra Class licenses earlier this year has dropped off somewhat but continues far above last year's rates. The *ARRL Letter* reports that new amateur license applications coming through the ARRL VEC are 35% higher than at the same time last year, while upgrade applications are 150% above last year's pace. The heavy volume of applications is stretching the FCC's ability to quickly process all the paperwork. As of the end of April, it typically was taking eight to ten days from the time a test was given until the time the upgrade or new license appeared on the FCC database.

Air Force Radar vs. Ham Repeaters

More than 100 amateur repeaters on the 70-centimeter (420–450 MHz) band may be forced to make changes to their power and/or signal patterns or be shut down due to reported interference from them to Air Force "PAVE PAWS" radar systems in California and Massachusetts. Amateur radio is secondary to military users in the 70-centimeter band. The ARRL has submitted an "interference mitigation plan" to the Defense Department which, according to the *ARRL Letter,* would include temporary output power reductions to 5 watts and studies of each repeater system to make specific recommendations, such as site relocation, directional antenna patterns, permanent power reductions, or a combination of these efforts. The League pointed out that it cannot force repeater owners to cooperate, but noted that the alternative would be getting shut down by the FCC. At press time, the Defense Department had not yet responded to the ARRL proposal.

BPL Back in the News

Broadband over Power Lines (BPL) is back in the news, with two recent developments. Online newsletter ***BetaNews*** reported on May 15 that sometime next year satellite television provider DirecTV is considering a wide-scale test of delivering signals to homes via BPL rather than individual dish antennas. The company is already sending its signals into homes over phone company DSL lines. The article points out that BPL has its opponents—especially hams—due to interference problems, noting that "(i)nterference has been observed across the high frequency or 'shortwave bands,' as well as on VHF frequencies commonly used by first responders."

Meanwhile, Motorola is pulling the plug on its "Powerline LV" BPL product, one of the few systems that operated *without* causing interference to hams and other HF radio users. The *ARRL Letter* reports that the company has suspended product development on the LV system, deciding instead to focus on a system for multiple-unit dwellings called "Powerline MU." The ARRL says Motorola's move "reflects declining interest in residential broadband service delivery among utilities, coupled with more immediate demand for in-building BPL systems."

Serbia, Montenegro Agree on Prefixes

The governments of Serbia and Montenegro have agreed on dividing the callsign prefixes previously assigned to the two states when they were a single country, something demanded by the International Telecommunications Union (ITU), which did not want to issue a totally new prefix block to Montenegro, which became independent in June 2006. As a result of the agreement, reports the *ARRL Letter,* the entire 4O (four-oh, not four-zero) prefix block, from 4OØ to 4O9, will now belong to Montenegro, while Serbian stations all will soon have callsigns beginning with YT or YU. Two other prefix blocks previously assigned to the former Serbia-Montenegro, 4N and YZ, have been returned to the ITU for future reassignment. No firm date has been set for reissuing calls that no longer have the correct prefix, except that the ITU reportedly told the two administrations to do so as quickly as possible.

FCC Affirms "Cognitive Radio" OK for Hams

The FCC has issued an order affirming and clarifying an earlier ruling which exempted "cognitive radios," also known as "smart radios," built for the Amateur Service from FCC certification requirements. The order also applies to digital-to-analog (D/A) converters. According to the *ARRL Letter*, a cognitive radio is a software defined radio (SDR) that can change its operating parameters based on what else is happening in the RF spectrum around it. In an earlier proceeding, the FCC had adopted certification rules for "smart radios" in general, but apparently it was not clear whether ham rigs would be included. The recent ruling clarified that the FCC "did not intend to impose any new certification requirements for Amateur Radio equipment."

SARL Takes Radio Technology "On the Road"

The South African Radio League (SARL) is reaching out to teens and their parents across the country with a new traveling program called "Technology in Action." According to an article in *Dataweek* magazine, the program is intended "to highlight the technologies that amateur radio embraces and to encourage people to become more involved in technologically-based leisure-time activities." Talks and demonstrations include topics such as the invention of the battery ("The Mystery of the Frog's Thigh"), kit-building, "cricket satellites," ionospheric propagation research, and cognitive radio (see previous article). Presentations were scheduled in five South African cities between April and August.

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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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.**

HAM-V

HAM-V
$999.95
with DCU-1

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

ROTATOR OPTIONS

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

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.

TAILTWISTER SERIES II

T-2X
$699.95

T-2XD
$1079.95
with DCU-1

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.

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

AR-40

AR-40
$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.**

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.

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.**

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.**

NEW! Automatic Rotator Brake Delay

RBD-5
$34.95

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

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Actual Size

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

- 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.

Bluetooth®

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.

- 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

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The new ultra-compact HT, VX-3R, is loaded with new convenience features. Enjoy stereo FM broadcast reception, and better AM broadcast band reception with the internal bar antenna. Operate with "AA" batteries using the optional FBA-37* battery case. Yaesu again leads the World with our latest compact HT!

*Optional 3x "AA" Cell Battery Case FBA-37 & batteries not supplied.

- Ultra-Compact (1.9" x 3.2" x 0.9") and Light Weight! (4.6 oz)
- Rugged aluminum die-cast chassis
- 1.5 watts output with Internal battery (70 cm: 1 W)
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- The optional FBA-37 permits operation with replaceable "AA" batteries
- Supplied with a tiny super-thin, high-capacity lithium-ion batttery and charger (supplied)

- Special memory banks programed with WX broadcast, VHF Marine, and world wide short-wave broadcast stations
- Huge 1000-channel memory capacity
- Wide-band receiver coverage

Actual Size

- Internal bar antenna for the AM broadcast band

- Designated earphone jack for FM stereo broadcast listening

- Sub RX function
  Listen to your favorite AM, or FM stereo broadcast station, and monitor the amateur band at the same time
- New Mechanical Dial Lock Function

- CW Learning and Training Feature
- WiRES-II® Internet Key

ULTRA COMPACT 2 m/70 cm DUAL BAND FM HANDHELD

VX-3R

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a CQ editorial

zero bias

BY RICH MOSESON,* W2VU

The Turning Tide – Part II

In May, I wrote about the "turning of the tide" in ham radio that appears to have come with the elimination of the Morse code exam requirement, marked by sharply higher attendance at hamfests and test sessions, and the encouraging news that many DXing groups were planning to proactively welcome and mentor new DXers from among recently upgraded Generals and Extras. Now that I'm back from both Visalia and Dayton, I'm pleased to report that the trend is continuing.

This year's theme at the International DX Convention in Visalia, California was "Elmering New DXers is Job #1," backed up by a full track of programs designed specifically with new DXers in mind (see this month's DX column for details). Some four dozen new DXers attended. Considering the $85 registration fee (which included a breakfast, lunch, and dinner banquet), that was pretty impressive.

At Dayton, everyone who started or renewed a subscription to a CQ publication got a complimentary copy of our new *HF Operator's Survival Guide*. Note that I said *complimentary*, not free. That's because each one came with an assignment: "If you don't need it for yourself, find someone who does, give it to that person, and help him or her get active on HF." Virtually everyone responded positively, and many people talked about specific individuals they had in mind, or about getting more copies to give out at classes and/or test sessions.

This overwhelmingly positive response is in marked contrast to what many new hams encountered 15 years ago, when the code requirement was first removed from the Technician class license. At that time, many newcomers were told in no uncertain terms that they were not welcome on certain repeaters or in certain clubs, and were basically driven out of ham radio by those who were unwilling to accept change, and who blamed hams who entered the hobby under the new rules for decisions they had no part in making. It is largely because of this that the overall number of licensed hams in the U.S. continues to drop slightly, despite all the increased activity we're seeing by those already licensed and by a growing number of newcomers. Many of those who were first licensed in the mid-'90s and who were made to feel unwelcome have now come to the end of their license terms (plus the two-year grace period), have not renewed, and are dropping off the rolls.

According to the statistics kept by Joe Speroni, AHØA, in the three months from January 31 of this year to April 30, the total number of hams dropped by two-tenths of one percent, from just above 656,000 to just below 655,000. But the real activity was in upgrading: The total number of Technicians fell in that period by just over 8,000, while the number of Generals increased by more than 7,600 and the number of Extras went up by more than 1,500, for a total increase of nearly 9,200. This is where those overall totals don't paint a truly accurate picture. While the total number of hams fell a bit during this three-month period, the increase in numbers for Generals and Extras outpaced the decrease for Technicians by about 1,200. So assuming that all 8,000 of the no-longer Technicians upgraded (which is *not* a valid assumption, since we know there are many Tech licenses expiring and not being renewed), that means there were *at least* 1,200 *new hams* coming in at the General or Extra level during those three months. If you average that over a year, that would come out to a minimum of 4,800 new people entering the hobby as Generals or Extras. Considering the fact that we normally have about 20,000 new hams overall enter our ranks each year—until now, virtually all as Technicians—that would suggest either that we are seeing a significant number of people skipping over Technician or that we are in the midst of a major upsurge in new hams that is masked in the overall statistics by the number of expired licenses that are not being renewed. Which brings us back to where we started—the importance of welcoming, encouraging, and helping new hams and new upgrades, something today's hams seem far more inclined to do than their predecessors 15 years ago. This is very welcome and very encouraging. Keep it up!

In fact, I'm going to extend my "summer hamming assignment" to each and every one of you: If you're an experienced ham, find a newcomer, help him/her get set up and on the air, help with operating tips, and encourage club membership (along with a *CQ* subscription, of course!). If you are new at this yourself, first of all, congratulations and welcome. Next, find a radio club and/or experienced ham in your area who is willing to help you get your station put together and get you on the air.

Cool New Rigs, Too

Another arena in which the tide is turning is the hardware side of our hobby. For the past several years, as our population has been kind of just loping along, for the most part so have our radios. New models introduced have tended toward incremental improvements and upgrades rather than anything really new and different. Perhaps coincidentally, perhaps not, that is changing as well.

Earlier this year, Ten-Tec introduced a radio with an Ethernet connector that permits you to operate the rig from a remote location over the internet. At Visalia, FlexRadio previewed its 5000 series, which takes software defined radios to a whole new level. At Dayton, ICOM introduced a dual-band mobile rig with an add-on board that not only enables digital voice via D-Star, but includes a GPS (Global Positioning System) receiver as well; Yaesu brought out a weather-resistant dual-bander designed with motorcycle operation in mind; and Kenwood has a new rig that lets you take a list generated by the ARRL's "TravelPlus" repeater mapping program and export all the frequencies, tones, etc., right into the radio's memory. We'll have more complete coverage of all this and more next month in our annual review of new goodies introduced at Dayton.

One closing note on this theme: For those who fear that the end of code testing means the end of CW, we spoke with one vendor at Dayton whose entire business revolves around keys and keyers, and he reports that his business is up nearly 20% since the code requirement was dropped! It's all psychological, folks. No longer an obstacle, code is now a challenge and more people than ever actually *want* to learn it!

Pull your chairs up higher on the beach. The tide is rising.

73, W2VU

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

TOKYO HY-POWER

HL-1.5KFX

Complies with New FCC Rules.

HF Amp, HF/50MHz Linear Power Amplifier

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 in it's class.

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.

— Two More Fine Products from TOKYO HY-POWER —

HC-200AT

HF/50MHZ 200W Auto Antenna Tuner

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

Features

- HC-200AT is a compact 200W HF/6m auto antenna tuner . Works with any radio having a frequency coverage of 1.8~54MHz, and power output of 2-200W.
- With a wire antenna of 7.5m (25 feet) or longer, the tuner will tune from 3.5 through 54MHz. For 1.8MHz (160M), a minimum length wire of 30m (95 feet) is recommended.
- The advanced 16 bit MPU (micro processor) calculates the ratio of forward and reflected power. Our newly developed computing algorithm produces world class tuning speed.
- 256 capacitors (C) and inductors (L) are combined to form the inverted L-shape circuit. Depending on antenna, capacitances may be switched from one end of inductors to the other to form the reversed inverted -L shape circuit. Over 131,072 combinations of L & C. High current capacity relays are used in the L and C tuning network.
- Tuned data of L and C are stored in the ten channel memory. Tuning under memory mode using the same antenna on the same frequency is finished within 0.2 second after the initial tuning.
- Tuning will be accomplished by tapping the "TUNE" button, and or pressing the "TUNER" (or "TUNE") button of the radio, if the tuner is connected to the Radio Interface cable. (See Connection Section.)
- Analog meter monitors the forward power (PF) and SWR. SWR is indicated automatically with the modern processor IC.

Specifications

Frequency Range:
1.8 - 54MHz
Output Impedance Range:
5 - 500 ohms (3.5 - 54MHz)
15 - 500 ohms (1.8 MHz)
Maximum Handling Power:
200W (P.E.P. /CW)
Input Impedance:
50 ohms
Tuning Power:
2 - 20W
Minimum and most adequate power
Tuning Time:
1.5 sec.(typ.) for initial tuning for SWR= 3.5:1
4 sec.(max.)
0.2 sec. for memory mode
DC Power Voltage:
DC 12V - 14V
Current Drain:
0.8A max.
Quiescent Current:
0.1A
Operating Temp. Range:
0 deg. to +40 deg. C
VSWR (Max.):
1.5 (typ.) or lower *
After tuning
Number of Memory:
10 ch.
Dimension:
195 x 60 x 242 mm (WxHxD)
7.7 x 2.4 x 9.5 inches
Weight:
Approx. 1kg. (2.2 lbs.)
Accessories:
DC power cable, 3.5mm dia. Plug **
** Ear-phone plug
Optional Parts:
1: 4 Unbal. To Bal. Balun
Model HBL-100
Remote control Cable for ICOM Radio
HTC-100AT/ICOM5 (5 meter)
Remote control Cable for ICOM Radio
HTC-100AT/ICOM10 (10 meter)

* This tuner does not tune wire antennas length with multiples of half a lambda or its vicinity.

HC-1.5KAT

HF 1.5KW Auto Tuner

Fast and Quiet, Auto Band Set!!

Features

- HC-1.5KAT is a high power HF auto antenna tuner designed to work with Tokyo HyPower HL-1 .5KFX and HL-2.5KFX linear amplifers.
- When combined with these THP amplifiers, band change is automatically made through the band data signal from the radio and the amplifier. It also works with other amplifiers as well, in manual mode.
- Tuning time is typically within one second, (2.5 sec. max.). It handles maximum power of 1.5kW pep/cw when the intrinsic antenna SWR is no more than 2.0
- Maximum impedance matching range is SWR of 4 to 1, there are three antenna connectors.
- Two of high quality 3kV rating 200pF air variable capacitors are employed to form a "T" match circuit being driven by high speed stepping motors.
- Our own tuning algorithm together with an advanced 16 bit micro-processor enables an extremely fast tuning.

Specifications

Frequency Range:
1.8 - 29.7MHz
Output Impedanc. Range:
12.5 - 200 ohms: Reduced range at lower band edges
Maximum Handling Power:
1.5kW (P.E.P./CW): RTTY 1kW
Input Impedance:
50 OHM
Tuning Power:
50W (80W max.)
Tuning Time:
1 sec. (typ.)
2.5 sec. (max.): Under typical worst SWR condition
4.0 sec. (max.): Under absolute worst SWR condition
DC Power Voltage:
DC 12V - 14 V: From External AC adaptor
Current Drain:
1.5A max.
Quiescent Current:
0.7A
Display:
LCD Module: 16 characters x 2 rows
Operating Temp. Range:
0 deg. to +40 deg. C
VSWR (Max.):
1.5 (typ.) or lower: Alter tuning
Circuit Type:
T-match network
Driving Motors:
Stepping Motors for Two Air Variable: 0.25 deg. resolution/step
Matching Algorythm:
Analog Control with MPU: Phase and IZI Magnitude Detected
Dimension:
Approx. 8x5.6x12 inches (WxHxD)
Weight:
Approx. 11 lbs.
Input Connector:
SO-239 (UHF)
Output Connectors:
Three SO-239's
Cooling:
Partial air forced cooling with fan.
Accessories:
DC power cable, 3.5mm dia. plug. Band Control Cable with DIN 7 pin plugs.

TOKYO HY-POWER

TOKYO HY-POWER LABS., INC. – USA
487 East Main Street, Suite 163
Mount Kisco, NY 10549
Phone: 914-602-1400
e-mail: thpusa@optonline.net

TOKYO HY-POWER LABS., INC. – JAPAN
1-1 Hatanaka 3chome, Niiza Saitama 352-0012
Phone: +81 (48) 481-1211 FAX: +81 (48) 479-6949
e-mail: info@thp.co.jp
Web: http://www.thp.co.jp

announcements

The following Special Event stations are scheduled for late June and July:

W2CXV, from the 50th anniversary of the Fulton Amateur Radio Club, Fulton, New York; 1400–2200Z July 21 on 7.250, 14.250, 18.150, 21.350 MHz. For QSL send QSL and SASE to Tom Cantine, W2TQF, 2807 Co. Rt. 45, Fulton, NY 13069. <www.fultonhamclub.org>

K4F, from 36th annual Smithville Fiddlers' Jamboree & Crafts Festival, Smithville, Tennessee; DeKalb County ARC; 1400–2200Z July 7 on 28.425, 21.335, 14.280, 7.275 MHz. Send QSL and SASE to Wm. Freddy Curtis, KC4GUG, 288 Dogwood Circle, Smithville, TN 37166-2712. <http://web.infoave.net/~kg4bto/dcarc.html>

K4RC, from Colonial Williamsburg, related to July 4th; Williamsburg, Virginia; Williamsburg Area ARC; 1330–2030Z July 7 on 21.350, 18.150, 14.250, 7.261 MHz. For certificate send QSL and SASE to Russell Chandler, KU4FP, 132 Druid Drive, Williamsburg, VA 23185. <www.qsl.net/waarc>.

K4S, from from Summer Motion Festival, Central Park, Ashland, Kentucky; River Cities ARA; 8 AM to 3 PM EDT June 30 on 40 and 20 meters. For certificate send QSL and SASE to RCARA, P.O. Box 612, Ashland, KY 41105. <www.summermotion.com>

N5C, from 60th anniversary of "The UFO Crash at Corona," near Corona, New Mexico; SSB 20, 40, 74 meters General portion of the bands. For certificate send QSL and SASE to Callbook address of WA5WHN.

W7WV, from 4th of July Street Fair, Klamath Falls, Oregon; Klamath Basin ARA; 1600–2400Z July 4 on 7.200 and 14.250 MHz. QSL to KBARA, P.O. Box 8106, Klamath Falls, OR 97602.

W8F, from FinnFest 2007, Ashtabula, Ohio; 1000–1700 EDT July 27 & 28 on 28.415, 21.320, 14.260, 7.270 MHz. For QSL send QSL and SASE to Richard Madison, 2818 Hedrick Ln., Ashtabula, OH 44004-4816. <www.finnfestusa2007.com>

KØJFN, from 75th anniversary of the Pioneer ARC, North Bend, Nebraska; June 22–24 on 21.325, 14.325, 7.225, 3.855. For certificate send QSL and SASE to KØJFN, 2411 County Road 15, Colon, NE 68018. <home.net/jlhohhman/index.htm>

KØSDW, from Steamboat Lake, northern Colorado, Bridge Island USI #CO-12L, Routt County, grid square DN-60; July 10–22 on 80–6 meters SSB, CW, RTTY. QSL via card, LoTW, or USI QSL. QSL to Stan Whicker, KØSDW, 2539 South Fairplay Way, Aurora, CO 80014 (additional op KØYY).

EI7ØFOY, from commemoration of Transatlantic Flying-Boat Re-enactment Flight 1937–2007 from Newfoundland, Canada to Foynes, Ireland, and Foynes International Flying Boat Festival, Aoibhneas, Doon Houses, Clarina, Co. Limerick, Ireland; Limerick Radio Club; July 6–8. <http://www.qsl.net/ei4lrc/>

LZ17ØVL, from commemoration of the 170th anniversary of the birth of the Bulgarian national hero Vasil Levski; Balkan Contest Club; Jan. 1 to Dec. 31, 2007. QSL to LZ1KZA via LZ QSL Bureau. <http://en.wikipedia.org/wiki/Vasil_Levski> and <http://www.iianthropology.org/vassillevski.html>

The following hamfests, etc., are slated for July:

July 7, **Iowa 75 Meter Net Group/Central Iowa RAS Hamfest**, Marshalltown Community College, Marshalltown, IA. Contact Chuck Lynk, WØDYS, 641-753-6925, <http://www.k0miw.org>. (Talk-in 146.880– CG 141.3, 443.325+ CG 110.9; exams 10 AM)

July 8, **North Hills ARC 25th Anniversary Hamfest**, Northland Public Library, Pittsburgh, PA. Contact John Gorman, N3RQD, e-mail: <n3rqd@earthlink.net>, phone 412-487-9254; <www.nharc.pgh.pa. us>. (Talk-in 147.09 W3EXW)

July 13–15, **International Hamfest**, U.S. side of the International Peace Garden, CCC Lodge, Bismarch, ND. Contact Richard Holder, VE4QK, e-mail: <ve4qk@mts.net>, phone 204-268-1702.

Jyly 14, **Straits Area ARC Swap & Shop**, Petosky High School, Petosky, MI. Contact Dirk Esterline, KG8JK, e-mail: <kg8jk@qsl.net>, phone 231-348-5043. (Talk-in 146.68– PL 110.9; exams 12:30 PM)

July 14, **NOARSFEST '07**, Lorain County Fairgrounds, Wellington, OH. Contact Al, N8CX, 216-221-3682 (before 9 PM), e-mail: <n8cx@mindspring.com>; <http://www.noars.net/>. (**Special Event station K8KRG**)

July 15, **Valley Forge Hamfest & Computer Fair**, Kimberton Fire Co. Fairgrounds, Kimberton, PA. Info: <www.marc-radio.org/ hamfest.html>. (Talk-in 145.130– PL 131.8, 147.060+ PL 131.8)

July 20–21, **Ham Holiday 2007**, Oklahoma State Fair Park, northeast of I-40 and I-44 intersection, Oklahoma Expo Hall. Contact e-mail: <HamHoliday@hotmail.com>; <www.HamHoliday.org>. (Talk-in 146.82, offset 151.4 Hz; exams)

July 21, **Pioneer ARC Hamfest**, St. Charles Parish Center, North Bend, NE. Contact Rich Mehaffey, KBØARZ, e-mail: <mehaffey@ dtnspeed.net>, phone 402-652-3410. (Talk-in 146.67/07)

July 21, **Slidell, LA Hamfest**, Slidell Auditorium, Slidell, LA. Contact Mike King, W5PY, e-mail: <w5py@arrl.net>, phone 985-641-0831. (Talk-in 147.27/87, PL 114.8; exams)

July 22, **Baltimore Radio Amateur TV Society Hamfest**, Howard County Fairgrounds, West Friendship, MD. Information, call 410-461-0086 (phone/fax, 24 hr.).

July 28, **Cullman ARC Swapfest**, Cullman County Fairgrounds, Cullman, AL. Contact Charlie McBrayer, WB4PED, e-mail: <cmcbrayer@ corrwireless.com>, phone 256-708-1000. (Talk-in 145.310; exams)

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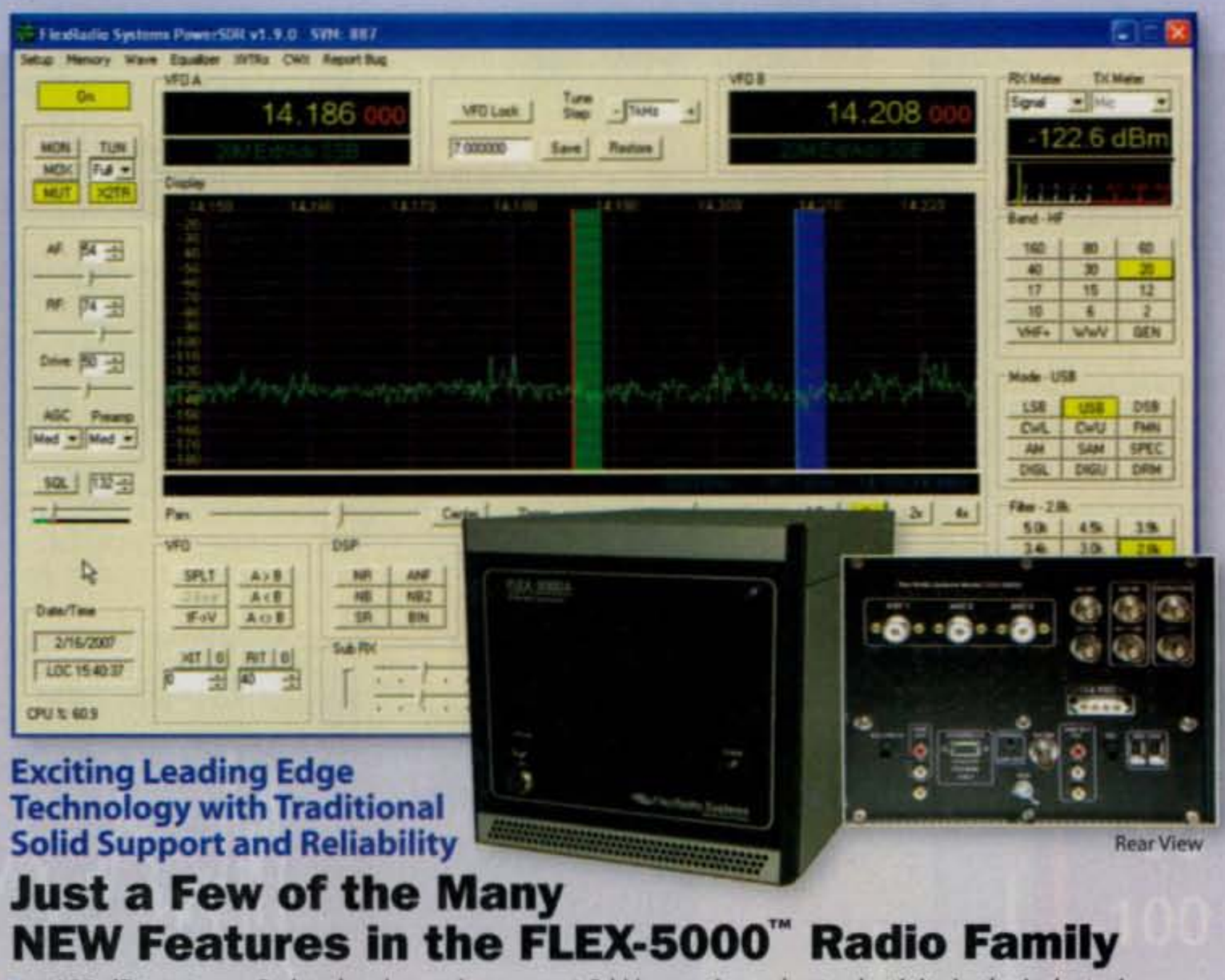
What Some of Our Customers Have to Say about FlexRadio:

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!*
- Frequency Stability: 0.5 ppm, TCXO equipped
- Individual optimized filters for all Ham Bands
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- Integrated Intel Core2 Duo processor with 1 GB RAM, 160 GB hard drive
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- 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.
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- 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.
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- 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.
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ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.
anaheim@hamradio.com

BURBANK, CA
1525 W. Magnolia Bl., 91506
(818) 842-1786
(800) 854-6046
Eric, KA6IHT, Mgr.
Magnolia between
S. Victory & Buena Vista
burbank@hamradio.com

OAKLAND, CA
2210 Livingston St., 94606
(510) 534-5757
(800) 854-6046
Mark, WI7YN, Mgr.
I-880 at 23rd Ave. ramp
oakland@hamradio.com

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(858) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa
sandiego@hamradio.com

SUNNYVALE, CA
510 Lawrence Exp. #102
94085
(408) 736-9496
(800) 854-6046
Howard, W6HOC, Mgr.
So. from Hwy. 101
sunnyvale@hamradio.com

NEW CASTLE, DE
(Near Philadelphia)
1509 N. Dupont Hwy., 19720
(302) 322-7092
(800) 644-4476
Rick, K3TL, Mgr.
RT.13 1/4 mi., So. I-295
delaware@hamradio.com

PORTLAND, OR
11705 S.W. Pacific Hwy.
97223
(503) 598-0555
(800) 854-6046
Leon, W7AD, Mgr.
Tigard-99W exit
from Hwy. 5 & 217
portland@hamradio.com

DENVER, CO
8400 E. Iliff Ave. #9, 80231
(303) 745-7373
(800) 444-9476
John N5EHP, Mgr.
denver@hamradio.com

PHOENIX, AZ
1939 W. Dunlap Ave., 85021
(602) 242-3515
(800) 444-9476
Gary, N7GJ, Mgr.
1 mi. east of I-17
phoenix@hamradio.com

ATLANTA, GA
6071 Buford Hwy., 30340
(770) 263-0700
(800) 444-7927
Mark, KJ4VO, Mgr.
Doraville, 1 mi. no. of I-285
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WOODBRIDGE, VA
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IC-7000

• 160-10M/6M/2M/70CM • 2x DSP • Digital IF filters • Digital voice recorder • 2.5" color TFT display

IC-718 HF Transceiver

• 160-10M* @ 100W • 12V Operation • Simple to Use • CW Keyer Built-in • One Touch Band Switching • Direct frequency input • VOX Built-in • Band stacking register • IF shift • 101 memories

IC-V8000 2M Mobile Transceiver

• 75 watts • Dynamic Memory Scan (DMS) • CTCSS/DCS encode/decode w/tone scan • Weather alert • Weather channel scan • 200 alphanumeric memories

ID-800H Digital Dual Band Mobile

• 55 watt VHF/50 watt UHF • Wide RX: 118-173, 230-549, 810-999 MHz (cellular blocked on US versions) • Analog/Digital Voice & Data • Callsign Squelch • CTCSS & DTCS Encode/Decode w/tone scan

IC-7800 All Mode Transceiver

• 160-6M @ 200W • Four 32 bit IF-DSPs+ 24 bit AD/DA converters • Two completely independent receivers • +40dBm 3rd order intercept point

IC-756PROIII All Mode Transceiver

• 160-6M • 100W • Adjustable SSB TX bandwidth • Digital voice recorder • Auto antenna tuner • RX: 30 kHz to 60 MHz • Quiet, triple-conversion receiver • 32 bit IF-DSP • Low IMD roofing filter • 8 Channel RTTY TX memory • Digital twin passband tuning • Auto or manual-adjust notch with 70 dB attenuation

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• 2M/70CM • VV/UU/VU • Wide band RX inc. air & weather bands • Dynamic Memory Scan (DMS) • CTCSS/DTCS encode/decode w/tone scan • Independent controls for each band • DTMF Encode • 212 memory channels • Remote Mount Kit Inc.

IC-2200H 2M Mobile Transceiver

• 65W Output • Optional D-STAR format digital operation & NEMA Compatible GPS interface • CTCSS/DTCS encode/decode w/tone scan • 207 Alphanumeric Memories • Weather Alert

IC-746PRO All Mode 160M-2M

• 160-2M* @ 100W • 32 bit IF-DSP+ 24 bit AD/DA converter • Selectable IF filter shapes for SSB & CW • Enhanced Rx performance

IC-2820H Dual Band FM Transceiver

• D-STAR & GPS upgradeable 2M/70CM • 50/15/5W RF Output Levels • RX: 118-173.995, 375-549.995, 810-999.99 MHz** • Analog/Digital Voice with GPS (optional UT-123) • 500 Alphanumeric Memories

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• 6M/2M/70CM @ 5W • Wide band RX 495kHz - 999.999MHz** • 500 alphanumeric memories • Dynamic Memory Scan (DMS) • Backlit keypad & display • CTCSS/DTCS encode/decode w/tone scan • Weather Alert

IC-91AD Digital Dual Band Transceiver

• 2M & 70CM @ 5W • 1304 Memory channels • Independent (dual watch) wide band RX 495kHz - 999.999MHz** • Full dot matrix LCD • New "duplex scan" • D-STAR digital voice • Compliments the ID-800H mobile

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A surprise invitation turns into an opportunity to "be the DX" ... and operate from the heart of Polynesia.

Samoa, a DX Paradise!

BY DENNIS WARD,* KT8X/5WØDP

While routinely checking the DX announcements on NG3K's website in January 2006, I saw an announcement by my friend and fellow contester Ted, K8AQM, of a trip he was planning to 5W, Samoa, in late July. I knew Ted had been to the South Pacific several times, and I was excited for him to be making yet another trip. I sent Ted an e-mail to acknowledge his trip and to wish him another successful DXpedition.

I was both surprised and complimented to receive a reply inviting me to come along on this DXpedition. We talked about the location, the amenities, and the need to make early flight reservations needed for the trip. There are only two flights a week from Hawaii to American Samoa en route to Samoa. After discussing the opportunity with my spouse, and inviting her to come along, I made my flight reservation and informed Ted that I was committed to the journey, along with Jeff, N8CC, and Kirk, JF3MYU.

Preparations for the trip were still several months away, but we remained in e-mail contact on a regular basis to keep up to date. Fortunately, both Ted and Jeff have extensive experience with trips to the South Pacific, and this was Ted's fourth visit to Samoa. We all are primarily CW operators, but I offered to lead the effort with the digital modes. Our plan was to offer 5W on as many bands and modes as possible.

We agreed to meet over Field Day weekend and use that time to assemble all the necessary equipment and antennas for our trip. Field Day weekend arrived quickly. We assembled three complete stations built around an Elecraft K2, a Kenwood TS-50, and an Alinco DX-70, along with two Sigma Force-12 verticals, dipoles for 20, 30, and 40 meters, and a Battle Creek Special for 40, 80, and 160. All the antennas were erected and tested, along with the stations and their accessories.

I brought my station home and then set it all up again to verify functionality, cables, computer interfaces, etc. I was packed by July 4th weekend and ready to go on the adventure that would commence in three weeks!

The 5WØTT team posing with the Battle Creek Special antenna in Samoa. Operators, from left to right, are Dennis Ward, KT8X/5WØDP; Jeff Benson, N8CC/5WØJB; Ted Rachwal, K8AQM/5WØTR; and Kirk Itaya, JF3MYU/5WØKI. (Photos courtesy of the author)

The Samoan Telecommunications office where we received our licenses is on the upper floor of this building. The lower floor is a hardware store!

On the Way...

My flight to Hawaii was scheduled to leave Detroit on July 26th. There I would meet K8AQM for the evening, and the next day N8CC and JF3MYU would meet us at the airport and we would fly together to Samoa. I arrived in Hawaii without issue and Ted was waiting for me. We both had all of our equipment and were only aware of a broken coffee carafe (essential to late-night DXing!) that we replaced at a K-Mart in Honolulu.

The next morning Ted and I went out for breakfast and coffee. I received a call on my cell phone from N8CC, saying

**c/o CQ magazine*
e-mail: <dward8@gmail.com>

This is the main entrance to the resort. Our bungalows are the first two on the right, barely visible through the trees. We had the entire site to ourselves!

that he was delayed in Phoenix but thought he would arrive in time to make the flight to American Samoa. Ted and I drove to the airport to pick up JF3MYU, who was waiting for us in the baggage-claim area. Several hours later we met N8CC at the airport. The team was assembled!

As we headed toward the gate for our flight to KH8, we found ourselves on a tremendously long line. It appeared that an Army company from American Samoa was returning home from training in Hawaii along with all its gear. The line was delayed nearly an hour while the military and airline personnel negotiated transportation of the Army small arms and personnel. All of a sudden, the Army personnel were told to assemble in another location and we found ourselves at the head of the line! Our luggage was weighed, and Ted's carry-on was over the allowed weight and had to be checked in. Ted removed our second K2, loaned to us by K8DD, so that it wouldn't be damaged by the high-powered X-ray machine, and we were checked in.

The flight from Hawaii to American Samoa was uneventful, with the exception of crying babies. When we arrived it was rainy and very humid. We cruised through immigration and waited for our bags. All but one bag arrived quickly. The remaining bag was one I had checked with the flight crew, as all the overhead spaces were full. I waited nearly an additional 30 minutes, and by this time I was getting very nervous. Finally the bag came through on what was probably the last trip from the aircraft. Ted was waiting for me, and we rushed to the counter of the airline for our last leg of the journey. Our luggage was again weighed, and this time both Ted and I encountered an overweight fee, but all our gear was checked.

We finally arrived in Samoa at 12:15 AM local time on Friday, July 28. Our transportation to Samoan Village Resorts was waiting, and they took us for the short ride to our final destination. Fortunately, the van was fairly large, as we filled all the available room with our equipment. We arrived, unloaded, made arrangements for a car so that we could drive to the Office of Telecommunications to collect our licenses the next morning, and then headed to the pool for a late-night swim to wind down after the journey. The stars we saw from the pool were amazing due to the minimal light pollution in the South Pacific. The Milky Way was incredibly defined; it was absolutely amazing!

Paperwork First

We began Friday morning with the first of many excellent breakfasts to come. We set up our equipment and antennas prior to leaving for Apia, the capital of Samoa, to pick up our licenses. The journey to Apia took roughly 45 minutes on an unmarked two-lane road. Along the way we were able to experience the real sights and sounds of Samoan life.

We arrived at the Telecommunications office, which is located on the upper floor of a hardware store. We explained that we had come to pick up our amateur radio licenses, but the office staff acted like they didn't know what we wanted. A gentleman then came to the counter, we again explained our circumstances, and Ted showed him a copy of the letter sent in March. He asked us to come back the following week, and we explained the difficulty in doing that, and the fact that we wanted to get on the air right away. The official left the counter and returned about 15 minutes later with papers in hand. We were handed our licenses and fortunately we reviewed them, as the effective date was nearly a week away! The official wrote in and initialed the correct date. Ted, Jeff, and Kirk were reassigned their previous calls of 5WØTR, 5WØJB, and 5WØKI, respectively. I was assigned 5WØDP. We then inquired about the special callsign request for the IOTA contest. There was some interesting debate between Ted and the official, but in the end he gave us "verbal permission" to use 5WØTT. We could pick-up our "official" paper license (for 5WØTT) before we left the island.

Elated, we went on to the "downtown" and did some grocery shopping and stopped in an internet café to let our families know we had arrived safely. We also sent some e-mails to let the amateur community know about our special call, as well as my new call, 5WØDP.

When we returned to the hotel, we put our full effort into completing the antenna chores prior to sunset. We finished erecting both Sigma Vees, the BC Special, and even a 40-meter dipole. We erected the Sigmas on the far sides of our "fales" (beach huts) and moved the BC Special as far away as possible to increase separation. It was good we carried

These are the bungalows we rented. Ted and Kirk stayed in the one on the left, while Jeff and I shared the one on the right. Note the Sigma Vee used by Jeff and me. The other Sigma Vee is not visible, but was mounted in similar fashion on the left-hand cabin.

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TEN-TEC

Ceremonial canoe approximately one-half mile from the resort. Total length was nearly 50 feet!

Ted, 5W0TR/K8AQM (front) and Jeff, 5W0JB/N8CC (rear), taking a break from the pile-ups. When the conditions weren't good, we were in the pool!

600-plus feet of coaxial cable with us. Our daily dinner appointment came at 6 PM, and we completed our setup just in time. At this point we were down one logging computer and agreed that one station would log by hand.

Lighting Up the Bands

After our first of many great dinners, we lit up the bands from 5W! We were pleased with signal reports and the responses to our calls when we first started, and throughout the expedition. In fact, the bands were so busy we decided to set up a fourth station. Unfortunately, the next of many curve balls was thrown in our direction. The K2 loaned to us by K8DD had a dead receiver! Not all was lost, though, as the K2 turned out to be a great, final SWR checking tool throughout the trip! Each morning the bands were slow, so that first morning K8AQM decided to look at the "dead" laptop. He agreed that it was beyond our local capabilities. It then dawned on me that we were able to boot from a Windows® 98 start-up disk, so it was likely that a DOS logging program would work. As it turned out, we were right and returned to a full complement of logging computers at three stations for the duration of the trip.

A box full of the direct QSL requests that were waiting for us when we returned home. Over 850 envelopes are shown here, with multiple requests in over half of them.

Each day all the operators worked large pile-ups on CW, SSB, and RTTY. Most ops followed our instructions and were patient with us during our many equipment issues. One moment in particular was a 20-meter SSB pile-up to Europe when the 5W0JB computer kept crashing. I had to leave the EU ops for 30 minutes to resolve the issue. No one complained, and everyone waited patiently for my return.

Memories of a Lifetime

After nearly two weeks, it was time to tear down and head home. Our memories of the expedition will fade very slowly. How can we forget the dead "ham" (pig) that floated by one morning? Was it an operator who just couldn't break the pile-ups and decided life wasn't worth it? N8CC, with the huge 160- and 80-meter pile-ups, had an ear-to-ear smile every day. Kirk, 5W0KI, was running JAs on 12 meters and using his voice as a 30-dB processor, while Ted continued to pound away on CW and consume untold gallons of coffee. Me . . . I was just amazed at the size of the endless pile-ups and the thrill of providing a "new one" to the gang on RTTY. It will be a very cold winter before I forget these memories.

During our two-week stay we encountered a failed 80-meter BC Special trap. We replaced it with a common-feed inverted-L for 80 that at first appeared to fail due to an arced piece of coax, a dead keyer, a broken iambic paddle, and even an island-wide power outage while the three stations were running pile-ups! We were grateful that none of us were appliance operators, and we always managed to find a way around every adverse situation.

Despite the temporary setbacks, none of us would trade our experiences and location. We had unlimited access to the resort grounds for any and all antenna work, as well as the quietest bands any of us had ever experienced. The pool was great, and we considered asking for sun-block donations from the pile-ups, but decided we wouldn't receive much sympathy (hi). The local people were friendly and served us great food every day.

We hope that we filled the needs of many DXers for 5W on several bands. Obviously we didn't work every station, but we tried to utilize the available openings with three stations to maximize QSOs for everyone. In the end, we logged 14,000 QSOs on CW, SSB, and RTTY. QSL 5W0JB, 5W0DP, and 5W0TR via KT8X. QSL 5W0KI and 5W0TT via JF3MYU. We are looking forward to our next trip to the South Pacific....How about A35 or C21? ■

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BY BOB JOSUWEIT,* WA3PZO

CQ Interviews:
National Hurricane Center Director Bill Proenza Plus a Hurricane Hunter Aircraft Tour

Hurricane season is upon us. Forecasters say this will be an active hurricane season. This month we meet up with National Hurricane Center Director Bill Proenza, and we'll take a look at preparations being made in case a hurricane does strike.

A Partnership

Hams play an important role in our severe-weather warning system. That was one of several messages National Hurricane Center Director Bill Proenza told *CQ* as we met him at the Cape May County, New Jersey airport, along with one of the National Oceanic and Atmospheric Administration's Lockheed WP-3D Orion "hurricane hunter" aircraft and its crew.[1]

Proenza, who recently took over from former director Max Mayfield, has a deep appreciation for the work that ham radio operators do through SKYWARN and other severe-weather programs. Prior to coming back to the National Hurricane Center, where he started his career, Proenza had served since 1998 as director of the National Weather Service Southern Region. He said most, if not all, of the local weather offices in the region had an amateur radio component to their programs.

He also cited the work of the ham radio operators at the National Hurricane Center. In particular, he mentioned the leadership of John McHugh, K4AG, and Julio Ripoll, WD4R, coordinators at WX4NHC, the center's ham station. Proenza also extended his appreciation to the entire amateur radio community for supporting the operations of the National Hurricane Center in providing surface reports and being a backup means for communications when all else fails.

The National Hurricane Center issues watches and warnings every time a storm bears down on the Atlantic or Gulf coasts. The NHC's mission is to save lives, mitigate property loss, and improve economic efficiency by issuing the best watches, warnings, forecasts, and analyses of hazardous tropical weather, and by increasing understanding of these hazards.

Using Ham Radio

During a stop in Rhode Island the day before, Proenza had the opportunity to talk via ham radio to Ripoll and McHugh at WX4NHC. "I just want to make sure that the staff there is treating you well," quipped Proenza.

"It is good to be able to talk to you, Bill, over amateur radio. We are preparing our radios here for backup communications," said Ripoll.

"We have been here for the last 26 years and are prepared to offer our support any way we can once again," added McHugh.

Proenza told the hams gathered at the airport that the amateur radio community living on the U.S. East Coast should be prepared regardless of the activity level of the season.

Proenza is also familiar with Morse code. When he started his career with the National Weather Service at the National Hurricane Center and with NOAA's hurricane hunters in the mid '60s, he dropped the sensors, or dropsondes, into the storm from the aircraft. The dropsondes measure temperature, wind speed, barometric pressure, and humidity. This information was sent back using Morse code and he heard one of the other crew members copy the data. Today, the dropsondes transmit their position along with their GPS coordinates. Each unit costs between $500 and $600. There may be between $5,000 and $10,000 spent on the dropsondes in a single flight.

Proenza went on to serve in a number of field, headquarters, and leadership capacities across the nation before returning to take the helm at the National Hurricane Center.

"Bill was the natural choice for this position," said Brig. Gen. David L. Johnson, U.S. Air Force (Ret.), director of the NOAA National Weather Service. "His passion and enthusiasm to expand the nation's hurricane program, combined with his extensive experience in leadership and operational roles, will serve the nation well."

"I certainly look forward to working with the outstanding National Weather Service teams at the

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

National Hurricane Center Director Bill Proenza (right) discusses the importance of being prepared with CQ's Bob Josuweit, WA3PZO (left). (Photo courtesy Beth Johnson)

Greensburg, Kansas was virtually wiped off the map by a powerful EF5 tornado. Amateur radio operators responded to provide emergency communications. (Photo by Michael Raphael, FEMA)

Tornado!

An intense few weeks of tornadoes from Kansas to Texas brought death and destruction to several towns. In early May, one tornado, with winds over 200 mph, completely wiped out Greensburg, Kansas. This was the first EF-5 tornado on the new Enhanced Fujita Scale and the first "5" tornado since May 3, 1999, when an F-5 tornado ripped through Moore, Oklahoma. Within 20 minutes, the 1.7-mile wide tornado virtually wiped out the town of 1500 people. Ten people were killed in the small town.

Amateur radio operators provided logistical communications for the Salvation Army on 2 meters, 70 centimeters, and 75 meters. Kansas and Western Missouri SATERN Coordinator June Jeffers, KBØWEQ, said SATERN members were utilized in Kiowa County to support Salvation Army canteens and the Service Center in Haviland. Other radio operators provided communications between the hospital in Pratt and the shelter in Haviland. It was anticipated that operators would be needed for more than one week to support shelter and canteen operations. "We have 'saved the day' by having hams on these canteens," said Jeffers, "and leaving one canteen without an operator can be a great disadvantage."

Operators were working six-hour shifts and then being rotated out. While volunteers were scheduled for a few days immediately following the disaster, Jeffers said, "I found it is best to assess the need every evening." While not required, APRS units were helpful in tracking the canteens.

President Bush thanked volunteers responding to the disaster in Kansas. Amateur radio operators kept the Salvation Army canteens in communication with other units and the command center. (Photo by Michael Raphael, FEMA)

Any operators who went into the disaster area were required to have a tetanus shot. Operators were asked to be self-sufficient for three to four days. They were told to have water, food, and radios. They were also told to bring a copy of their amateur radio and driver's licenses, a copy of their ARES card, and any other credentials they may have from local authorities (i.e., RACES card, EMCOMM, etc.). With all of the severe storms, it's a constant reminder to hams to always be prepared.

NHC Director Proezna had the opportunity to talk via ham radio to the WX4NHC operators at the National Hurricane Center. (Photo courtesy Julio Ripoll, WD4R)

Director Proenza talking to WX4NHC via EchoLink from Rhode Island with Rob Macedo, KD1CY, acting as control operator. (Photo by Bill Boyes, KB1G)

National Hurricane Center and the coastal Weather Forecast Offices across our nation," said Proenza. "While we were fortunate to have had a below-normal Atlantic hurricane season in 2006, with no land-falling hurricanes, we remain in an active hurricane period with its continued challenges to protect life and support the economic well-being of the nation. Working closely with our many partners in the scientific community, emergency management, and the media, I am confident we will meet those challenges and continue to advance the science of tracking and warning for devastating hurricanes and tropical storms."

"Although Bill has big shoes to fill as America's calm and trusted voice in the eye of the storm, his experience and his ties to the emergency management community will be a national asset in preparing our coastlines from tropical weather threats," said Commerce Secretary Carlos Gutierrez. NOAA and the National Weather Service are port of the Commerce Department.

"Bill directed warning and forecast services for the most active severe-weather region in the United States, the Southern Region, where nearly 90 percent of our nation's hurricanes make landfall. He has made hurricane preparation and the local forecasting of flooding, tornadoes, and high winds by our network of weather-forecast offices his top priority," added retired Navy Vice Admiral Conrad C. Lautenbacher, Ph.D., Undersecretary of Commerce for Oceans and Atmosphere, and NOAA Administrator. "He is an effective and knowledgeable leader and well respected by our partners in emergency management and the media."

Crew Meeting

CQ also met up with Hurricane Hunter crew member Sean McMillan. McMillan is the "go to" guy when something does not work. He enjoys working with computer networking and programming.

McMillan gave *CQ* a tour of the aircraft. As you climb the steps of the four-engine aircraft, you recognize the role it has played in supplying data collected by flying through over 80 hurricanes, including Rita and Wilma. Forecasters at the National Hurricane Center review scientific data coming in from a variety of sources, including the Lockheed WP-3D Orion "hurricane hunter" aircraft, as well as satellite and surface observations.

On board the plane, McMillan opened the doors of an electronics cabinet to reveal a rack crammed with computer servers. He said it's a long way from the days when he rigged a dial-up modem to show scientists the potential for transmitting data to the ground. Most of the data is now sent via satellite and the internet to ground locations that collect the data and allow the hurricane forecasters to issue their bulletins, watches, and warnings. There is also the

A NOAA Hurricane Hunter aircraft would be sent on its first hurricane mission of the season three weeks before the official start of the 2007 hurricane season. (WA3PZO photo)

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The AT-7000 is the ideal tuner for IC-7000 & other ICOM Radios: Covers all frequencies from 1.8–54 MHz **(including 6 meters),** and will automatically match your antenna in a flash. Requires just 0.1 W for operation, but will handle up to 125 W (100 W on 6 m), making it suitable for everything from QRP (IC- 703Plus) to a typical 100 W ICOM transceiver.

Ready to go right out of the box! No extra cable to buy. Two-Year Warranty.

Tunes with Tuner button on your radio. Includes over 2,000 memories, uses latching relays, tuning range is 4-800 ohms, powered by your radio. Includes ICOM interface cable.

List Price $169

AT-200Pro

The first auto tuner specifically designed for today's high-powered transceivers.

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

Two Year Warranty. Cables Included.

List Price $249

Z-100

The definitive low cost automatic antenna tuner!

The Z-100 is the definitive low cost automatic antenna tuner!

It has been designed from the ground up to provide the 100 watt power handling you asked for, in a small, light-weight package, perfect for portable as well as sitting on your desk in your shack!

Two Year Warranty. Cables Included.

List price $149

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Hurricane Hunter crew member Sean McMillan prepares a dropsonde for deployment in the tubular chute to the right. (WA3PZO photo)

Hurricane Specialist Michelle Mainelli from NHC talking to WX4NHC via EchoLink with Rob Macedo, KD1CY, acting as control operator. (Photo by Bill Boyes, KB1G)

capability of sending data via HF radio. McMillan emphasized that the scientists on the planes just collect the data. They do not issue any of the bulletins.

McMillan demonstrated the deployment of a dropsonde from the aircraft into the hurricane. The dropsonde is a cylindrically shaped instrument about 16 inches long and 3.25 inches in diameter. It is equipped with a variety of sensing devices and a radio transmitter. One dropsonde is released from the rear of the aircraft about every 400 miles, on each pass through a hurricane's eye. As the instrument descends to the sea surface, it measures and relays to the aircraft a vertical atmospheric profile of the temperature, humidity, and barometric pressure and wind data. The dropsonde is slowed and stabilized by a small parachute. The Dropsonde System Operator receives, analyzes, and encodes the data for transmission by satellite.

He said the aircraft, which is based at MacDill Air Force Base near Tampa, always operates right near the limits of fuel and weight. A typical flight could last 9 or 10 hours with up to 18 people on board. McMillan, who has flown hurricane missions since 1993, said that they get data in almost real time.

Ham Radio and the Hurricane Hunter

Although currently there are no ham radio operators on the Hurricane Hunter staff, there is hope. McMillan had an amateur radio license in the past, but became interested in computers and let his license lapse. During the tour, his interest in ham radio came back and he hopes to get his license again soon.

While in Rhode Island, another NHC staffer, Hurricane Specialist Michelle Mainelli, spoke via ham radio with Ripoll and McHugh at the National Hurricane Center. She also spoke with NHC computer operations staff member Chris Lauer. They discussed the cool New England temperatures and relayed some of the issues associated with the wildfires in Florida.

Ripoll had the opportunity to explain to Bob Thompson, meteorologist in charge of the Taunton, Massachusetts, NWS office, how amateurs in New England have assisted with the VoIP Hurricane Net on Echolink and IRLP and have provided reports in key situations where the reports would not have been received otherwise. Thompson explained to Ripoll how NWS Taunton relies heavily on the amateur radio SKYWARN spotters for New England and described their

Jeffrey Smith, W4ZH, a federal screener at Pensacola (FL) Regional Airport, is operating the TSA emergency HF radio during Operation Sidewinder. Airports across the country are being equipped with these portable rigs for use with the Army MARS Winlink network. (TSA photo by Jim Oldham)

role in supporting the NWS office during the mid-April nor'easter.

Even though the technology to predict hurricanes has improved over the past ten years, the one thing Proenza said we don't have control over is how people will react. One potentially lethal complication for inexperienced shore residents is a hurricane's habit of picking up forward speed once it gets north of Cape Hatteras, North Carolina, he explained. "When they do start to curve, they accelerate up the coast and add the strength of their forward motion to their winds," Proenza said.

Anyone living in a coastal region threatened by a hurricane should have at least one to two weeks' supply of food, medicine, and water available to contend with the potential for disruptions in power, utilities, and transportation, he said. NWS Eastern Region Director Dean Gulezian told *CQ* that

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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	1⅛ x 6 x 9	3.4
SS-18	15	18	1⅛ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	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 9¾	4.2
SS-30M*	25	30	3¾ x 7 x 9¾	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 9¾	6.5
SRM-30	25	30	3½ x 19 x 9¾	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9¾	6.5
SRM-30M	25	30	3½ x 19 x 9¾	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 9¾	10.5
SRM-30-2	25	30	3½ x 19 x 9¾	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9¾	10.5
SRM-30M-2	25	30	3½ x 19 x 9¾	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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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

although weather forecasting technology has improved over the years, there will always be a need for ham radio and the spotter network.

–...–

TSA puts Army MARS e-mail to Test in "Operation Sidewinder"

Hurricane season was officially still a few weeks off in early May, but the National Hurricane Center had already issued a statement on Subtropical Storm Andrea, located off of the southeastern U.S. coast.

To make sure its teams around the country were prepared for the upcoming hurricane season, the Transportation Security Administration headquarters sent special teams of emergency responders scurrying to duty stations from Miami to Houston and beyond. Their mission was to test a new backup communications link for airports in case weather or a terrorist event ever wipes out commercial phone and data lines, as Hurricane Katrina did two years ago.

"Operation Sidewinder" provided the first comprehensive demonstration of the TSA's partnership with the Army Military Affiliate Radio System (MARS). Most people know the TSA, part of the Department of Homeland Security, for its role in screening airline passengers and luggage. However, its mandate extends well beyond that. Army MARS, which is part of the Network Enterprise Technology Command/9th Army Signal Command, signed a comprehensive mutual-aid agreement with TSA last year.

This exercise simulated a category 3 hurricane crossing Florida into the Gulf of Mexico and heading toward Houston. By the time the drill was over, MARS

Weather Software Makes Storm Monitoring Easier

Now you have the ability to monitor local weather radar, spotter reports, and National Weather Service watches and warnings as they happen for any point in the United States.

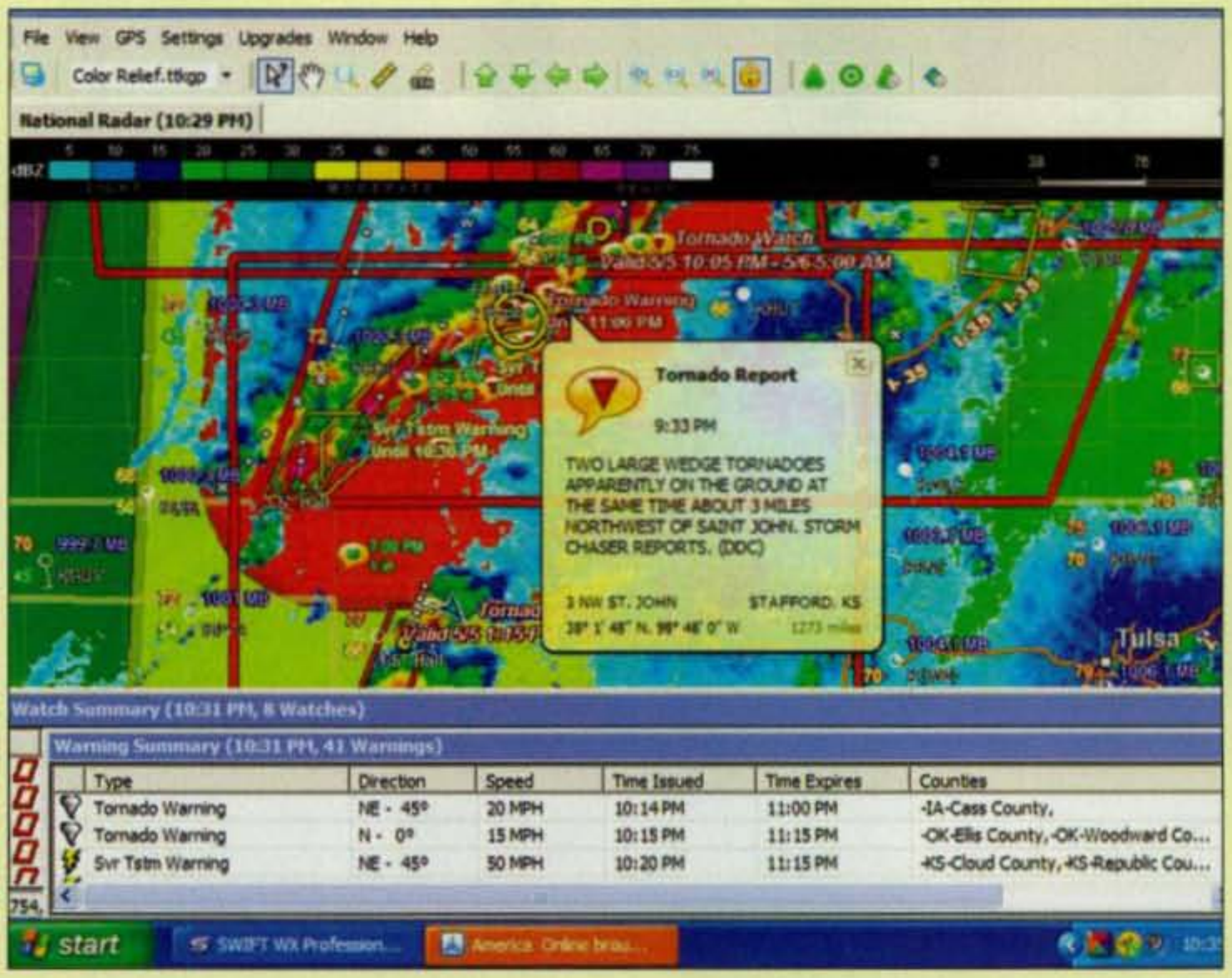
Swift WX Professional is an automated internet downloading and GPS integration tool written for storm chasers, storm spotters, and emergency management personnel that is now available for consumers.

If you have an internet connection you can use Swift WX. The new software for consumers allows you to stay ahead of deadly weather and keep your family protected with advance warnings—even before the weather person makes public announcements.

Swift WX, which was designed by tornado chasers, features more than 1100 weather maps, weather radar down to the street level, GPS tracking, perimeter alerts/first alerts, and up-to-the-minute data feeds from 140 weather-service offices. The software allows you to track your position over any weather map by plotting your current position over radar, satellite, or surface maps by using GPS technology. If you are a storm chaser, you will know where the storm is and how to intercept it.

With Swift WX's storm-tracking technology, you will be able to see the path of severe storms, including thunderstorms and tornadoes, on any weather map, indicating bearing, intensity, and velocity. You can also drill down into storm data, viewing reporting stations, cell ID, direction, speed, and other important variables.

Swift WX is geared for storm chasers in pursuit of severe weather, spotters observing and reporting, and emergency managers acting with safety. Using predefined catalogs, users can download only the pertinent weather data without browsing through pages of irrelevant information. Users also can animate a time series of maps to view a storm's progression. Swift WX includes a layer of interstates and major highways, but you may add more detailed, county-level streets by importing GIS (Geographic Information System) mapping



Swift WX gives you the opportunity to track severe weather in any part of the country. (Screen capture by WA3PZO)

files. One source of these files is the U.S. Census Bureau. *Note:* The program does *not* integrate with other mapping software.

Whether you are a seasoned meteorologist or just someone interested in studying the weather, the Swift WX support staff participates in a user forum where questions can be asked or even suggestions offered for new features. One feature that is being developed by a user is an overlay map showing various radio frequencies in use in an area. These can include NOAA weather radio frequencies, as well as amateur radio repeaters and SKYWARN frequencies. In fact, the software user community regularly contributes modifications to the program. Besides the mapping overlays, you can have tables appear with different watches and warnings. When information appears, you can click on a link to see the actual information from the National Weather Service. Plus, those who are interested in learning more about the weather can receive e-mail with weather tutorials.

For the two weeks that I had the opportunity to use Swift WX, the weather in Texas, Kansas, and other states brought death and massive destruction. Having the mapping tools at my desk enabled me to see the path of the severe storms, reports of tornadoes on the ground, reports of hail and flash-flooding, and other information before it was on the local TV news. It gave me one source on the web to find the information I was interested in without having to search various weather service websites. For further information, visit <www.swiftwx.com>.

members from the East Coast to Arizona had established emergency nets with a steady flow of hypothetical "situational awareness reports."

Meanwhile, Wayne Staats, WS8RM (MARS call AAR5QX), in northern Ohio reacted to the TSA's terrorist activity warning. As part of the drill, he reported (fictitious) incidents on the Ohio Turnpike that triggered air and communications interruptions across the Cleveland area. "Area cellular service has been shut down to prevent detonation by cell phone," Staats messaged.

For this first major trial, Army MARS mobilized its new Winlink digital communications system, with Air Force and Navy-Marine Corps MARS members in active support. Winlink combines HF radio and the internet for seamless, virtually instant transmission of digital messages. Long-distance radio sidesteps the vulnerability of ground-based infrastructure. The internet gives it automatic "last mile" connectivity to any installation with a functioning e-mail address.

The multi-state exercise demonstrated that the Army MARS Winlink system readily meets the requirements of a major government agency coping with an emergency, that alternative MARS HF and VHF radio channels are equally adaptable to tactical command and control needs, and that MARS can set up quickly for remote operation almost anywhere. The TSA's summary report said the deployment capabilities were fully demonstrated and performed without error. Army MARS Chief Stuart Carter put it succinctly in a message to his 2600 members at day's end: "You were awesome."

In his report up the chain of command, Carter said, "Army MARS provides an unparalleled emergency response capability which is low cost, accessible from anywhere in the continental U.S., always available, has no competition for bandwidth, has 2600 licensed operators, and has Army MARS-developed HF e-mail capability."

During Operation Sidewinder, he added, "Army MARS demonstrated its long-haul HF connectivity, local VHF communications, HF e-mail, WiFi computer interface with HF radio for e-mail transmissions, a TSA mobile house trailer with Army MARS HF radio in operation, an Army MARS volunteer's vehicle capable of indefinite HF operations, and two small/light/portable HF suites."

For some hams, at least, Sidewinder definitely marked the debut of a new kind of amateur connectivity—via handheld wireless devices. Reported Carter: "E-mail sent to the TSA attendees' Blackberr(ies) showed them first-hand that ... the messages got through."

With Thanks

We reported on activity in many parts of the country this month. We had input from ARES SKYWARN Coordinator for NWS Taunton, Rob Macedo, KD1CY; Bill Sexton, N1IN, Army MARS Public Affairs; and Larry Staples, WØAIB, ARRL Kansas Public Information Coordinator.

How did your Field Day operations go this year? Do have any interesting stories to tell? Drop us a note. Until next time...

73, Bob, WA3PZO

Note

1. Additional, less ham-specific, portions of Bob's interview and Hurricane Hunter tour will be featured in the August 2007 issue of *Popular Communications* magazine.

What does it take to win the multi-op category in the CQ World-Wide VHF Contest with an all-time record score? Good ops, good planning, a good location, and a competitive spirit helped K3EAR—the South Mountain Contest Club—as did possibly the best 6-meter band conditions ever on a contest weekend.

The Underdog Rises

K3EAR in the 2006 CQ WW VHF Contest

BY WALT NERO,* WA1HHN

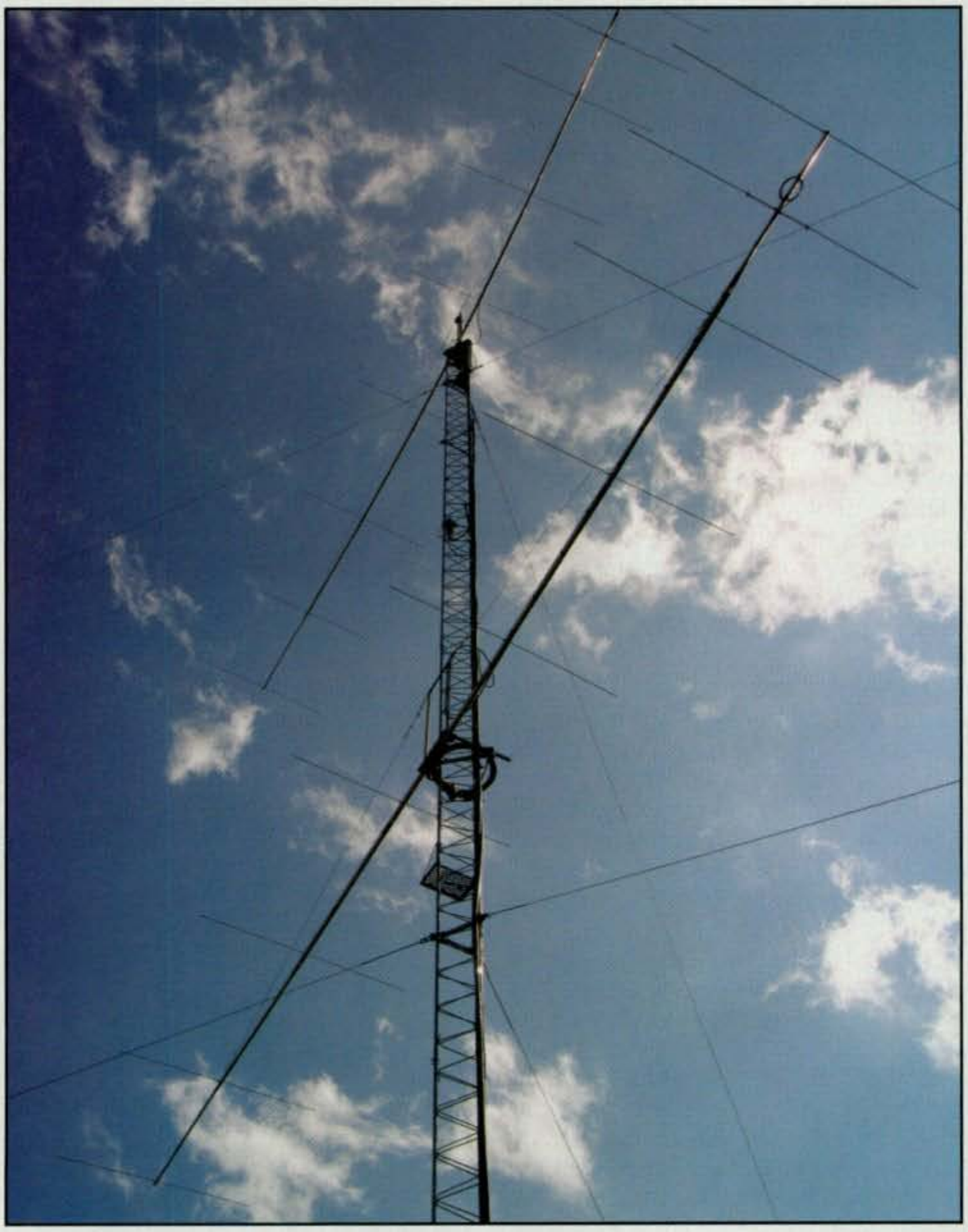
A rare treat was in store for those hams who turned on their radios and selected 6 meters to listen on during the third weekend of July 2006. The conditions, simply put, were amazing all across the U.S. In addition, foreign stations were heard and worked from many locations. But wait. . . . Not only were things that good, but there was a VHF contest going on as well. These monster band openings coincided with the annual CQ World-Wide VHF Contest.

A serious VHF contest operation requires considerable advance planning (even though you can't plan band conditions). You also have to motivate people to do something, not always an easy task. Many members of the South Mountain Contest Club, including myself, had dabbled in CQ events before, but we had yet to take one head-on in full competition as a group. We decided that 2006 was the year to make a major multi-op effort.

The K3EAR Station

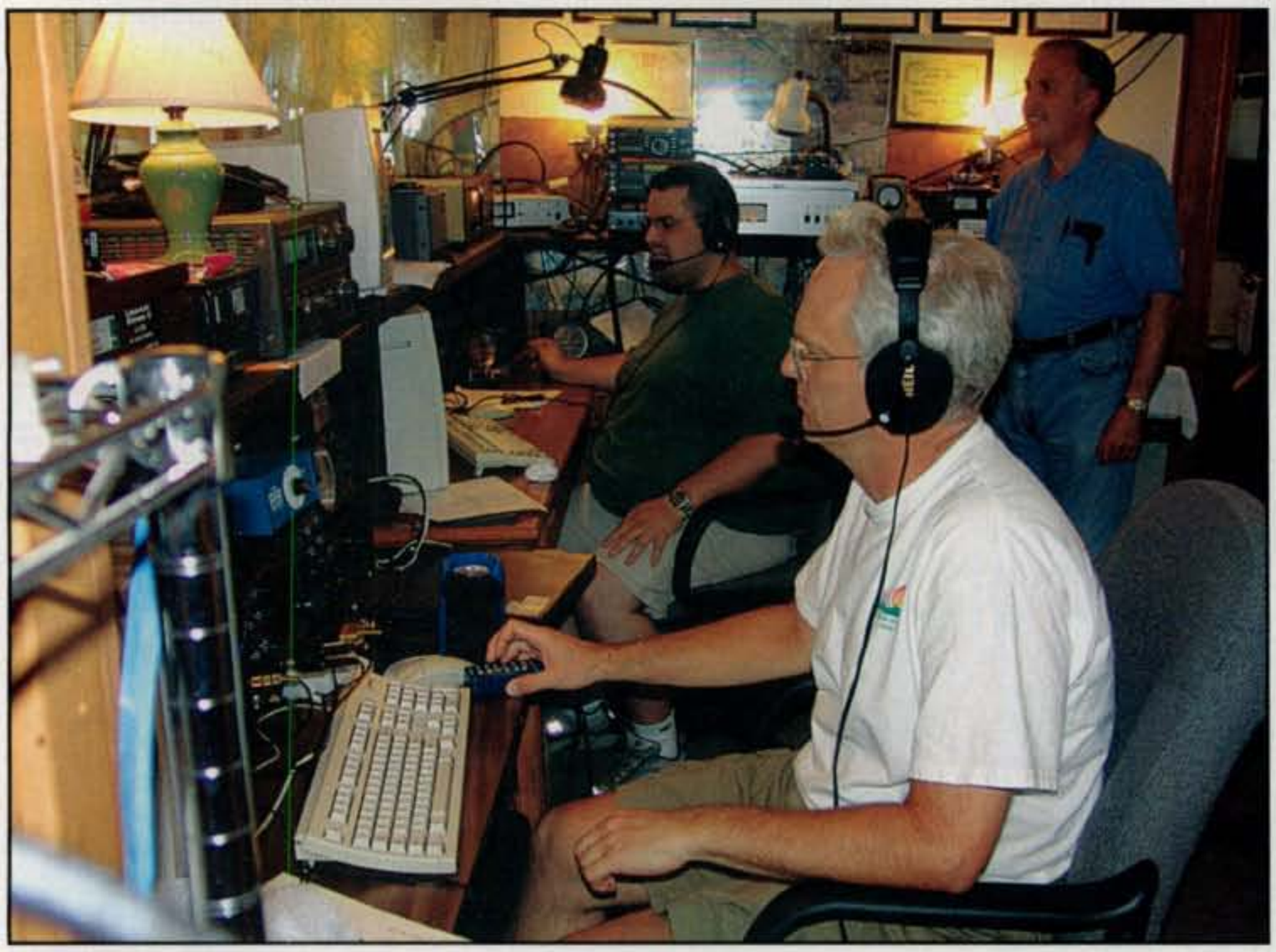
Our VHF contest station is located near Shippensburg in central Pennsylvania, between Carlisle and Chambersburg, about 34 miles south of Harrisburg, the state capital. We are at 2100+ feet on South Mountain in an area called Big Flat by the locals (it is a plateau on the top of the ridge) in between two state parks.

There are 12 towers at the site, 11 of which are shown in the cover photo of this issue of *CQ*, and eight are in active



The beams that won the west—and the east. A pair of stacked 6-meter beams above South Mountain in central Pennsylvania was instrumental to K3EAR's success on the "Magic Band" in the 2006 CQ WW VHF Contest. The platform near the lower Yagi was N3EMF's vantage point for his photo of the rest of the antenna farm that is featured on this issue's cover. (N3EMF photo)

*P.O. Box 368, Shippensburg, PA 17257
e-mail: <wa1hhn@aol.com>



Getting ready for a change of shift. Pete, K9PW (foreground), is at the controls of the 6-meter station, while Steve, N1JFU, operates 2 meters. Walt, WA1HHN, stands by to provide relief for one of the operators. (N3EMF photo)

use (populated in some form). The tallest, 110 feet high, currently is used for 2 meters, putting the stacked antennas at over 120 feet. Everything is fed with hardline. The site also has a very elaborate ground buss system. Power and phone lines to the station are fed underground.

The station configuration changes for nearly every event, but there is a possible total of seven fully-equipped operating positions. As the CQ WW VHF Contest is a 6- and 2-meter only event, the gear used was an ICOM IC-7800 on 6 and a heavily modified ICOM IC-746 on 2. Our computer network was used for logging and interstation communication and features a customized version of WriteLog. All cables to it are in conduit and armored flex to the CPU towers and hub.

Organizing Our Assault

Once we decided to make a major effort in the 2006 CQ VHF Contest, we first needed to recruit operators. This turned out to be more difficult than we had expected. Some members had already taken time out of their busy schedules in June to operate the ARRL events, such as Field Day and the June VHF contest. Others were going on vacation with their families or had other similar commitments. It became like pulling hens' teeth to get enough potential operators. In fact, it was looking like the operation that would not be.

However, when we got a commitment from one of the heavy hitters in our little group, we began to push forward. Up to the last two weeks, the lineup of operators was unclear, but a plan was developing. We would use individuals who could only commit to small time slots to fill the roster. This would allow some "Elmering" of newer ops and relieve the more seasoned guys. It was to be a real team effort. Our team for this event ended up including Pete Walter,K9PW, from Illinois; Steve Meuse, N1JFU, from Massachusetts; George Harris, N3GH, a "local" from Shippensburg; Jim Sikorski, N3PBH, of Wapwallopen, Pennsylvania; Russ Lamm, NN3Q, of Wernersville, Pennsylvania; and me, Walt Nero, WA1HHN, of both Massachusetts and Shippensburg. The station was to be manned around-the-clock, non-stop.

Exceeding Expectations

What expectations did we have going in? Realistically, our best advantage is our rather central location in the northeast. It is easily accessible year round, and it is on a good-size hilltop. However, it is only half the elevation of Spruce Knob, West Virginia, from which our main competition, K8GP and W3ZZ, have operated. We do not run full-bore power on any one band, although we do have the capability. Our antennas are reasonably large, but constrained by the reality of survival on our hilltop. Everything has been heavily customized.

We do have a good group of core operators and have worked hard to recruit locals into our operation. Our prospects against the incumbent multi-op station in Pennsylvania looked good, but it would be a Rocky Balboa event for sure against our southern competition, and more if the band opened to give the Midwest an advantage.

And open it did. As the contest unfolded, it took on the characteristics of "Eye of The Tiger" from *Rocky 4* (a favorite of mine), and it was the thrill of the fight that kept us moving forward. When the dust settled at the end of the contest period, we knew we had done well (no visits from Murphy, lots of contacts and grids), but had no idea just how well. On 6 meters, we made 1150 contacts in 303 grids, something that has never been done in any VHF contest in history. On 2 meters, we made 305 contacts in 62 grids. This is below our average performance, but as explained below, most of the single-ops reasonably spent most of their time on 6. When the counting was done, we had a record-setting total of 642,400 points, more than 100,000 points above K8GP's second-place score.

A new champion arose that weekend as a result of everyone's extreme effort,

Part of the 6-meter selectable array at K3EAR in south central Pennsylvania. (N1FJU photo)

teamwork, and sheer persistence . . . helped along, of course, by band conditions, but those helped everyone. *(Editor's note: The overall record score, 700,701 points, was racked up by a single-op station, K2DRH in Illinois.)*

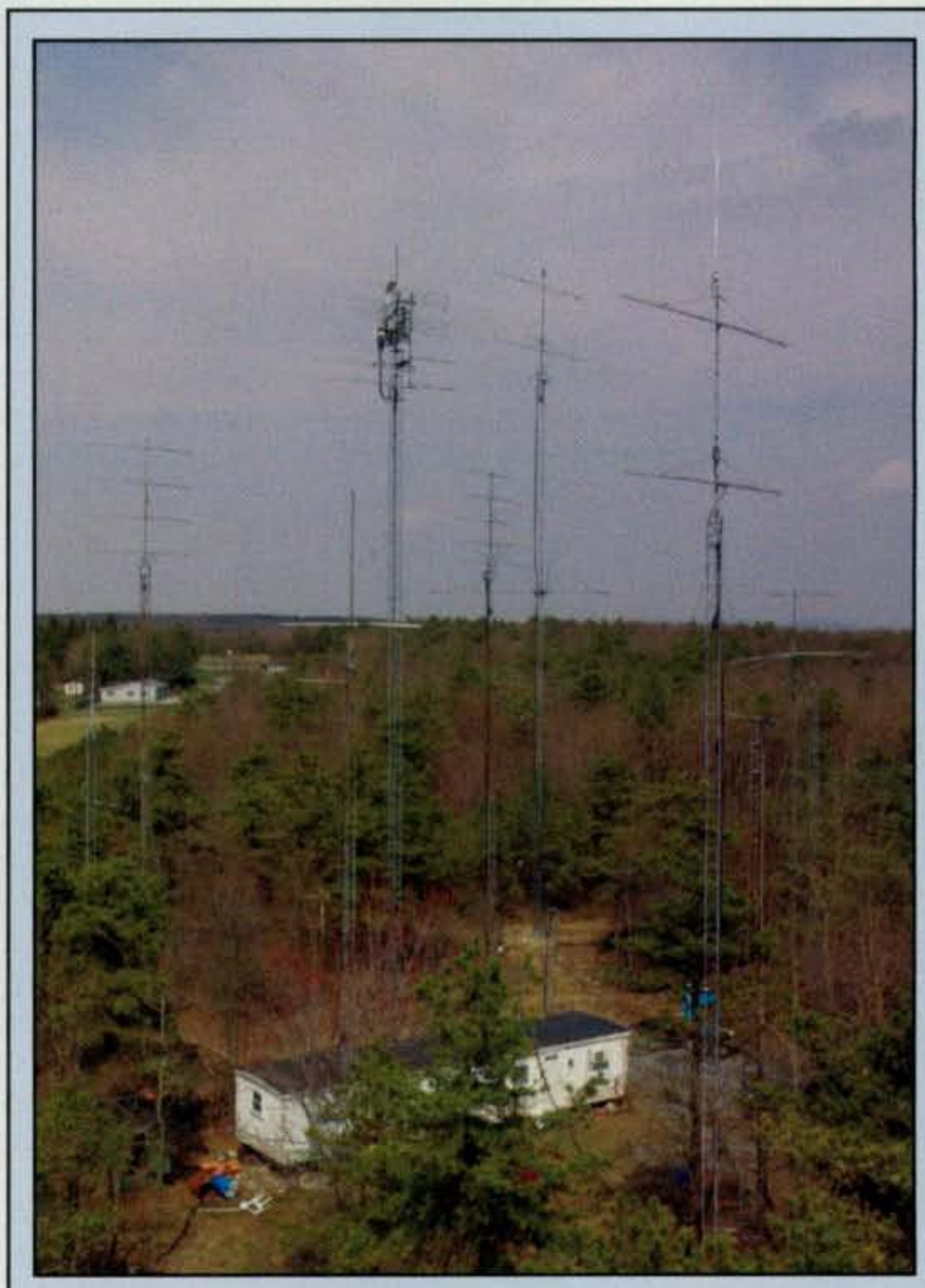
Observations

A large-scale effort in a VHF contest generally includes a good foundation of schedules, or skeds, especially in the overnight hours, when random QSOs are less likely. In this case, our efforts to make overnight skeds were most tedious, perhaps because the CQ VHF Contest doesn't (or didn't before last year) have the same level of recognition as the older ARRL competitions. We usually pack our schedules for other VHF events, and our lack of late-night skeds worried us going into the contest. Who could have known that 6 meters would be so good?

Our next frustration was 2 meters, where we usually do rather well. Beginning late Saturday, overnight, and through Sunday, conditions were excellent. We were hearing many beacons, and the stations we did hear from the west were very strong. However, the activity just was not there for large numbers of contacts. If you look at the results (April *CQ*, p. 20), you'll see that the vast majority of entrants were single-ops, who had to choose whether to be on 6 or on 2. With 6 meters being so hot for so long, it fully occupied the single-ops, and you can't really blame them.

Wrap-up

It is my hope in writing this article to promote more interest in this event. It does show that persistence, coupled with good old-fashioned hard work and effort, can pay off. Thanks to *CQ* and the contest committee for running this most interesting event. *(The 2007 CQ WW VHF Contest is July 21–22. See June* CQ *or the* CQ *website for complete rules.—ed.)*



On the Cover

A nearly-aerial view of the antenna farm at K3EAR, the South Mountain Contest Club's VHF contesting station outside Shippensburg, Pennsylvania. There are 12 towers on the site, 11 of which are visible in this photo (can you find them all?). You can't see the 12th, the 6-meter tower, because the photographer climbed up it to take this photo! If you look at WA1HHN's article, "The Underdog Rises," starting on page 26, you'll see a photo of a tower holding two stacked 6-meter beams. In between them is a small platform, which was the vantage point for this photo. The highest tower, at 110 feet, holds the 2-meter antennas. See WA1HHN's article for more details about the station and K3EAR's record-setting multi-op performance in last year's CQ World-Wide VHF Contest. *(Cover photo by Russell Biltz, N3EMF)*

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The MFJ-993B *IntelliTuner*™ lets you tune any antenna *automatically -- ultra fast.*

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600 Watt MFJ Automatic Tuner

Like MFJ-993B but handles 600 Watts SSB /CW, matches 12-800 Ohms. 10,000 memories. Does not have LCD display, antenna switch, 4:1 current balun, audio SWR meter/feedback. 10Wx2¾Hx9D in.

MFJ-994B
$359.95

No Matter What™ Warranty

Every MFJ tuner is protected by MFJ's famous one year *No Matter What*™ limited warranty. We will repair or replace your MFJ tuner (at our option) for a full year.

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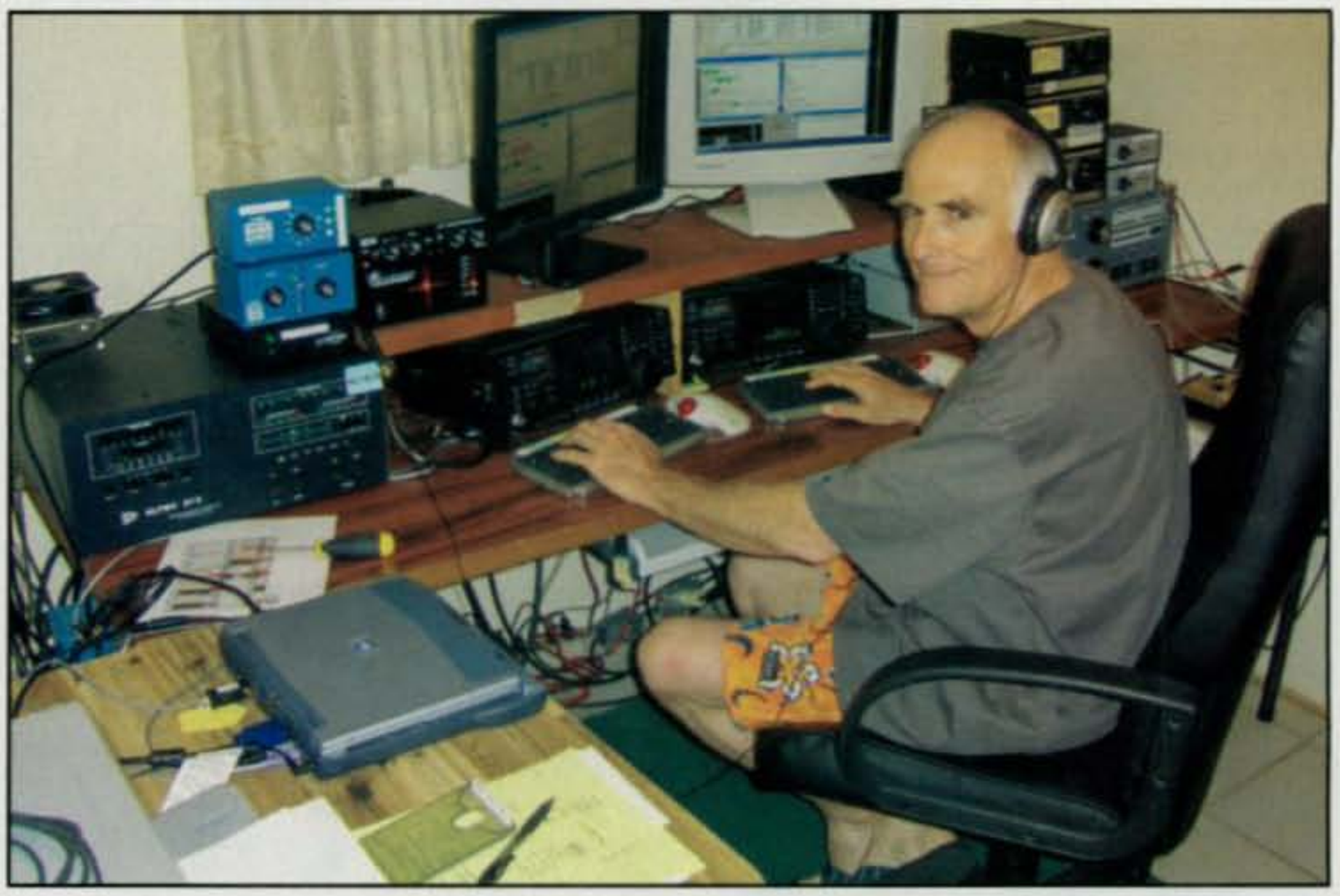
Results of the 2007 CQ WPX RTTY Contest

BY GLENN VINSON,* W6OTC, AND PAOLO CORTESE,† I2UIY

The 13th Annual CQ WPX RTTY Contest was held February 10–11, 2007, with a record 1697 logs submitted—up 27% from 2006, and by far the largest number of entries ever for any RTTY contest. Again, many new world records were set, including Single Op High Power (SOH), Single Op Low Power (SOL), Single Op 14 MHz (SO14), Single Op 7 MHz (SO7), Single Op 3.5 MHz (SO3.5), Multi-Op Single Transmitter (MOS), Multi-Op Two Transmitter (M2), and Multi-Op Multi-Transmitter (MOM). Despite being near the bottom of solar Cycle 23, total QSOs increased from about 500,000 in 2006 to 681,000 this year (up 26%), with 14,231 callsigns (up 28%) in the database for this year. For log checking, Paolo, I2UIY, was aided by the veteran and expert team of I2EOW, IK2DUU, EA3DU, and N5KO. They greatly appreciated the fact that virtually all of you now submit your log in Cabrillo format via e-mail; only three paper logs were submitted this year!

Geomagnetic conditions were mediocre worldwide throughout the contest. While there were no solar storms, the solar flux level sank to 74 (versus 85 in 2006 and 205 in 2000), but the continuing and significant increase in participation (combined with double points for 80- and 40-meter contacts, which continue to increase with lower solar flux) pushed 80–20 meter scores higher. Recent NOAA predictions are that the solar flux will bottom sometime this summer, at about the same level as during this contest. Accordingly, geomagnetic conditions for 2008 and subsequent years should be better and better, and by 2010–2011 they should return to the 200-plus level.



Single Op High Power world winner and new record holder Ed, WØYK, at the controls of P49X.

Single Operator

Single Operator, High Power (SOH). While the top scores in SOL were impressive, the scores in SOH were even more so. First, Ed, WØYK, operating as P49X, smashed Paolo's (P40G/I2UIY) world record (7,253,712 pts) set just last year by scoring 9,981,738 pts (3023 Q's, 13,806 pts, 723 mults). This is an astonishing score by a single op in WPX RTTY. Both the QSO and the point numbers are tough to match outside of a location such as P4, which can work both NA and EU on 40 and 80 meters for double points. However, Tyler, K3MM, operating from the N3HBX superstation, substantially increased his own USA/NA records (4,060,062 pts) set last year with a great score of 5,512,960 points (2378 Q's, 7552 pts, 730 mults). UA9CLB added to these impressive SOH results and set a new Asia record with a score of 4,489,683 points (1832 Q's, 7701 pts, 583 mults). EN9M (op. UR5MID) next set a new European record with a score of 4,181,148 points (2070 Q's, 6364 pts, 657 mults). K4GMH (four-time USA winner) also broke last year's USA/NA record with a score of 4,118,076 points, but could not match K3MM's effort. In Canada, VE3AP set a new Canadian SOH record with a score of 3,059,528 points (1536 Q's, 5444 pts, 562 mults).

Single Operator, Low Power (SOL). Both of the two top finishers in SOL beat P43P's 2003 world record of 3,506,198 points. Four-time winner Wanderley, ZX2B (op: PY2MNL), repeated as world champion and set the new world record with 4,149,486 points (1760 Q's, 6618 pts, 627 mults). Not far behind (and also breaking the old world record) was 5C5W (another veteran op, CN8KD) who scored 3,677,202 points (1541 Q's, 6222 pts, 591 mults)—and set a new Africa record. World third, doubling the old Canadian record, and establishing a new North America record as well, was VE1OP who scored 2,397,915 points (1372 Q's, 4099 pts, 585 mults).

Single Operator, Single Band 28 MHz (28). Ten meters saw very little single band activity, with the winner, LU8ADX, scoring only 1960 points.

Single Operator, Single Band 21 MHz (21). Single band activity on 15 meters substantially exceeded that on 10 meters, but no new records were established. The top three in the world were LW9EOC at 1,751,175 points, not far behind the 2002 world record of 5U8B (op: I2UIY), followed by LV5V (op: LU5VV) with 1,604,020 points, and LR4E (op: LW4EU) with 290,576 points.

Single Operator, Single Band 14 MHz (14). This year all three top scores exceeded last year's world record set by VE2RYY (1,782,030 pts). The winner and new world (and Europe) record holder was last year's world second: 9A5W, scoring 2,409,963 points (1436 Q's, 3657 pts, 659 mults). While VE2RYY exceeded his own world record, he was second this year with a score of 2,076,003 points (1279 Q's, 3343 pts, 621 mults). ZC4LI (last year's 40-meter world winner) next set a new Asia record with a score of 1,869,350 points (1176 Q's, 3430 pts, 545 mults). Finally, WG8Y set a new USA record with a score of 1,026,378 points (888 Q's, 2061 pts, 498 mults).

Single Operator, Single Band 7 MHz (7). The conquest of new SO7 records continued this year with 2005's winner, I4IKW, returning as the champion while setting a new SO7 world record of 3,411,720 points (1195 Q's, 5832 pts, 585 mults). Also beating last year's world record set by ZC4LI was RTTY veteran 7XØRY, who this year was world second and the new SO7 Africa record

*e-mail: <w6otc@garlic.com>
†e-mail: <i2uiy@cqww.com>

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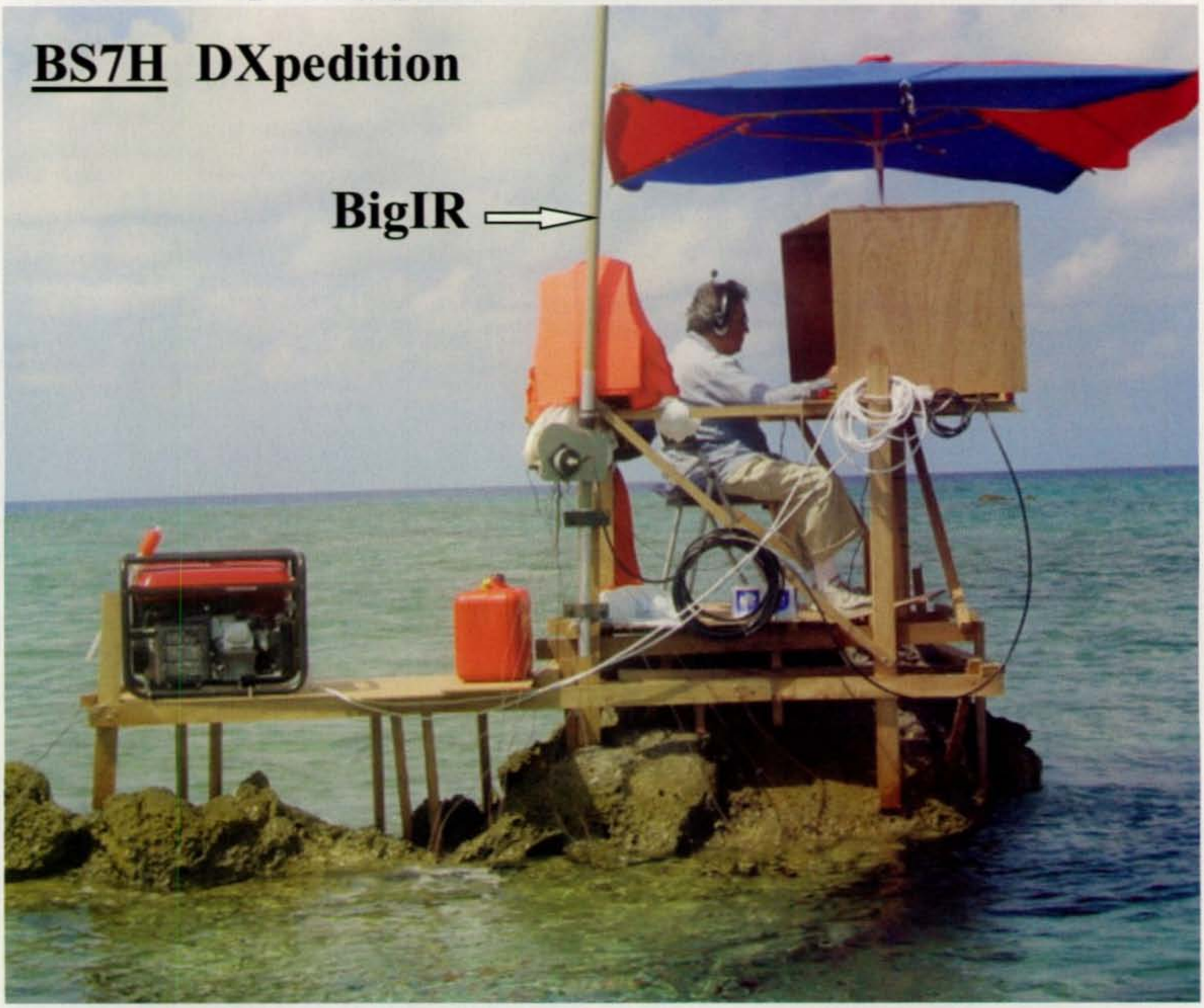

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Fred, WW4LL, head of the WW4LL U.S. champion Multi-Op Multi-Transmitter team.

Charlie, KI5XP, veteran RTTY contester who joined the WW4LL U.S. champion Multi-Op Multi-Transmitter team this year.

2007 WPX RTTY CONTEST PLAQUE SPONSORS AND WINNERS

Single Operator High Power

World: Sponsored by John (Bob) Orton, WA6BOB. Winner: **P49X (Op: Ed Muns, WØYK)**
Africa: Sponsored by Andrei Stchislenok, EW1AR/NP3D (in Memory of EU1MM). Winner: **Barry Murrell, ZS2EZ**
Europe: Sponsored by DL-DX RTTY Contest Group. Winner: **EN9M (Op: Serge Redkin, UR5MID)**
N.A.: Sponsored by Charles Anderson, KK5OQ. Winner: **Tyler Stewart, K3MM**
Canada: Sponsored by Fabi Bertolotto, VE2FBD. Winner: **Claudio Fernandez, VE3AP**
USA: Sponsored by Glenn Vinson, W6OTC. Winner: **Mike Sims, K4GMH**

Single Operator Low Power

World: Sponsored by Mike Sims, K4GMH. Winner: **Wanderley Gomes, ZX2B**
Asia: Sponsored by Trey Garlough, N5KO. Winner: **Dimitry Borzenko, 4Z5CP**
Europe: Sponsored by Paolo Cortese, I2UIY. Winner: **Oscar Luis Fernandez Lanza, ED1BXN**
N.A.: Sponsored by Wayne King, N2WK. Winner: **Scott Nichols, VE1OP**
USA: Sponsored by Jim Reisert, AD1C. Winner: **NP3D/WE1 (Andrei Stchislenok, EW1AR)**

Single Operator Single Band

3.5 MHz World: Sponsored by Doug Faunt, N6TQS. Winner: **SO4M (Op: Mirek Razny, SP4MPG)**
7 MHz World: Sponsored by Don Reed, KF2XF. Winner: **Marco Venturi, IK4IKW**
7 MHz USA: Sponsored by Earl Smith, N5ZM. Winner: **AE5AA (Op: Earl Smith, N5ZM)**
14 MHz World: Sponsored by Neal Campbell, K3NC. Winner: **Nikola Percin, 9A5W**
21 MHz World: Sponsored by Dean St.Hill. Winner: **Silvio Martin, LW9EOC**
28 MHz World: Sponsored by Steve Hodgson, ZC4LI. Winner: Diego Salom, LU8ADX

Multi-Op Single Transmitter

World: Sponsored by Steve Merchant, K6AW. Winner: **CT9M (Ops: CT3BD, CT3DL, CT3DZ, CT3EE, CT3HK, CT3IA, CT3KY, CT3KU, CT3IQ)**

Multi-Op Two Transmitter

World: Sponsored by HC8N RTTY Team. Winner: **EA8AH (Ops: OH1RY, OH2BP, YL1ZF, YL3DW)**

Multi-Op Multi-Transmitter

World: Sponsored by Steve (Sid) Ceasar, NH7C. Winner: **OM8A (Ops: 9A7R, OM2KW, OM3RM, OM7JG)**
N.A.: Sponsored by KA4RRU RTTY Team. Winner: **WW4LL (Ops: WW4LL, KI5XP, K4ZJ, K9JS, K4AQ, WF4W, K5ZM, NN4RR)**

Club Competition

World: Sponsored by Potomac Valley Radio Club. Winner: **Bavarian Contest Club (DL)**

holder, with 3,380,346 pts (1064 Q's, 6366 pts, 531 mults). World third was DL3TD, who scored 2,451,826 points. Another notable score was AE5AA, who set a new USA SO7 record with a score of 1,363,440 points, a large increase over N5ZM's 2006 USA record score of 806,932 points.

Single Operator, Single Band 3.5 MHz (3.5). Like 40 meters, 80-meter competition is intense with low solar flux numbers. This year the top four finishers beat S54E's 2005 world record score of 1,545,740 points. The winner and new world record holder is SO4M (op: SP4MPG), who scored 1,936,118 points (924 Q's, 4042 pts, 479 mults). Very close behind was four-time winner S54E, who beat his own world record but fell slightly short of winning this year with 1,889,966 points (893 Q's, 4082 pts, 463 mults). World third was 9A2DQ, who scored 1,808,184 points. From Hawaii, KH7X (op: KH6ND) again found an Oceania record in need of establishing and scored a fine 379,326 points.

Multi-Operator

Multi-Operator Multi-Transmitter (MOM). As in many other categories, the top finishers in MOM all exceeded the prior world record of 8,881,740 points set in 2005 by LY5A. The new MOM world record holder is OM8A (ops: 9A7R, OM2KW, OM3RM, OM7JG), which scored 10,402,097 points (3092 Q's, 11,861 pts, 877 mults). In world second, UU7J (ops: UR5NX, UR7EU, UT4ZX, UT9NA, UUØJM, UU1AZ) scored 9,620,520 points (3205 Q's, 11,453 pts, 840 mults). Very close behind in world third was Z37M (ops: Z31MM, Z32ID, Z33F, Z33ZOD, Z35W, Z35T, Z36W, Roberto), which scored 9,257,246 points (3254 Q's, 11,659 pts, 794 mults). Five-time U.S. winner and U.S. record holder KA4RRU was displaced as U.S. champion by WW4LL (ops: WW4LL, KI5XP, K4ZJ, K9JS, K4AQ, WF4W, K5ZM, NN4RR), which set a new U.S. MOM record of 4,699,200 points (2472 Q's, 6675 pts, 704 mults).

Multi-Operator Single Transmitter (MOS). Continuing the explosion of multi-operator station scores, all three top finishers here also broke the old TI5N world record of 5,936,870 points. The winner and new world record holder is CT9M (ops: CT3BD, CT3DL, CT3DZ, CT3EE, CT3HK, CT3IA, CT3KY, CT3KU, CT3IQ), which scored 8,071,506 points (2630 Q's, 10,937 pts, 738 mults). In world second, EF8A (ops: EA8AAG, EC8ABQ, EA8AUW) scored 6,508,260 points (2297 Q's, 9405 pts, 692 mults). Former MOS winner HG1S (ops: HA1TJ, HA1DAI, HA1DAC, HA1DAE) was close behind, finishing third this year, and scoring 6,340,285 points (2287 Q's, 8465 pts, 749 mults).

Multi-Operator Two Transmitter (M2). Having seen the big scores in MOM and MOS, one might expect to see big scores in M2. However, "big" is an understatement. EA8AH simply blew away all entrants in all classes and scored twice as many points as the old HC8N record of 8,411,106 points. This year EA8AH (ops: OH1RY, OH2BP, YL1ZF, YL3DW) scored an incredible

17,001,420 points (4558 Q's, 18,996 pts, 895 mults). LX8M (ops: LX1ER, DF7ZS, DJ9KM, DL1ZBO, DJ5BX, DK9FEC, LX8M) scored 8,121,314 points (2885 Q's, 10,814 pts, 751 mults) and set a new Europe M2 record. In world third place, KI1G (ops: KI1G, K1JN, N1HRA, NG1G, KO1H) set a new U.S. record with a score of 7,054,126 points (2880 Q's, 9067 pts, 778 mults).

Rookie of the Year

Forty operators entered as Rookies this year, but no new world record was set in this category. The world winner was IW7EFC, who entered in SOH and made 1,475,768 points. In world second place was K3MQ, also in SOH, who scored 1,404,810 points, a new U.S. Rookie record. World third was RK9AJZ, SOL, who scored 1,187,280 points.

Single Op All Band Low Power entrant and certificate winner Suat, TA1FA, relaxing after the contest.

SWL

The SWL winner this year was OK1-11861, who logged 752 Q's for 1,095,438 points.

Clubs

This year is the first time that we had club competition in CQ WPX RTTY—thanks to Mike, K4GMH, and the Potomac Valley Radio Club, which sponsors the club plaque. Fifty-five clubs were represented, and as in 2006 CQ WW RTTY, the Bavarian Contest Club was the big dog in this challenge, amassing 32,183,694 points. The next three clubs all exceeded 20-million points: PVRC was second with 25,382,975 points; Contest Club Finland was third with 22,724,117 points, and Northern California Contest Club was fourth with 21,671,140 points. All of the club results are listed in an accompanying box.

Summary

CQ WPX RTTY participation and scores were exceptional this year, and suggest that future growth in RTTY contesting will be very impressive as the solar flux now begins to increase. Again this year about 60% of all logs were submitted within the first week after the

contest, and more than 85% within the first two weeks after the contest. As noted before, in both WW RTTY and WPX RTTY the master call files created for each contest are split about one-third U.S. calls and two-thirds non-U.S. calls. Strong international participation is clearly a significant factor in increasing scores. This year logs were received from 100 countries and 6 continents.

If you operate using a special callsign, please submit your log using that callsign and show your normal callsign in the Cabrillo header on the "operator" line. **Do not submit the log under your own callsign.**

The 30 hour time limit for SO classes: Remember that in CQ WPX RTTY, all single operator classes are limited to 30 hours of operation, with minimum breaks of 60 minutes. When submitting Cabrillo-format logs, nothing need be marked in the log to show off-times. The log-checking software will automatically calculate the operating time. However, if you exceed 30 hours of operation (as about 60 operators did this year), we will delete all contacts made after 30 hours for purposes of calculating your score.

To check all-time CQ WPX RTTY Records, look at <www.rttycontesting.com/records/cqwpxrtty.html> hosted and maintained by Don, AA5AU, a great friend to all RTTY contesters. For comments by participants, see the QRM below.

The 2008 CQ WPX RTTY Contest

The 14th Annual CQ WPX RTTY Contest will be run on February 9–10, 2008 (the second full weekend of February). *Please note that Cabrillo-format logs are highly encouraged for all entrants with e-logs required from all potential high scoring entrants in any category. Also, any computer-generated log with more than 100 contacts must be submitted via e-mail or on a 3.5-inch diskette via snail mail.* For those who submit diskettes, please remember to send the diskettes in a protective envelope. E-mail is clearly the most reliable and easiest mode for log submissions, but we welcome all logs, including (subject to the restrictions described above) paper logs, no matter how they may be sent. Finally, **the deadline for log submissions is March 7, 2008.** The full text of the 2008 rules will be published in the January 2008 issue of *CQ* and on the *CQ* website at <www.cq-amateur-radio.com>. Please read the rules carefully prior to the contest, and please note that **all logs submitted via e-mail go to <wpxrtty@kkn.net>.**

Plaques. The plaque program for CQ WW RTTY and CQ WPX RTTY is chaired by four-time SOH USA CQ WPX RTTY winner Mike Sims, K4GMH. Be sure to contact Mike (k4gmh@arrl.com) if you would like to sponsor a plaque for either contest.

DX QRM

5C5W: I got a license for a new contest call, 5C5W, and it is my first operation with it. We had very good propagation on 40m and I think it helped very much for the score. For the other bands 20m was good, small opening on 15m, and 10m was dead. The worked time was 30 hours. **7N2UQC:** I was able to enjoy this contest. Tnx for a fine contest again. **8P2K:** Fell way short of my goals but will be back next year God willing. **9A7T:** The best RTTY contest ever. **DL3HXX:** First RTTY contest having fun. I'm a newcomer to the digimodes. I'm a keen CW op. Thanks for the contest. **DL4PY:** Nice contest. Many contacts, even some DX. Met a couple of good guys on all bands. **EA3ALV:** Not many chances to get true DXing with a vertical. High noise and poor propagation, but anyway it was a nice weekend! **EB5KB:** Thank you so much to everyone who came to the contest. Although not maybe to win, every QSO counts. Thanks guys! This is first contest from the new EA5KB station. Thanks to Pepe (EA5KB) and his wife Ana (EA5CY) to let me be the first contester. **F5RD:** My fifth RTTY WPX Contest and the best. Good conditions on 80m to 15m. Contacted a new country (many thanks XW1LLR). Calling CQ on 10m during half an hour Sunday morning, nobody, nobody. Thanks to all who worked me. **GØMTN:** Activity goes up and up. **G4ZOB:** First entry in a RTTY contest. Had to miss first 16 hours but then really enjoyed it despite a few bloops using the S/W. Addicted to RTTY now! **G5YC:** Interesting contest on QRP at the bottom of the cycle. Kudos to all who worked me from the U.S. on 40m on Sunday evening. Not really DX, but satisfying from my city plot. Elecraft K2 and inverted L antenna at 20 feet.

GUØSUP: Excellent fun! And what a buzz to see the bands so full of RTTY. Plenty of new calls to work this time, plus some nice DX. Thanks to the CQ crew for the contest. **HF50IU:** QSL via SP2IU. Generated for IARU HF contest by IARU-gen software© SP7DQR. I worked only 19 hours. **HG4I:** Thanks for all QSOs. I had problems with my rotator (it's out of work now). This way I used my two stacked TH7DXX's as "bi-directional antennas," one to JA (upper) and one to USA, (the lower) loaded with only 300 watts out from Drake L4B. Hi! The second day noon time and afternoon (at local time) was a surprice for me. **HK3W:** My first contest with my new callsign (ex-HK3SGP). My best CQ WPX contest. and many tnx to all stations for QSOs and very fine good score for me.Thanks for creating this contest. **IW3IKX:** First experience. Few QSOs but I had fun. Thanks to all the stations I worked. **JA1XRH:** I had fun in gud condx in spite of low sunspot season. **JF9KVT:** This contest was in good condition so that I could enjoy the wonderful contest. **MØEDH:** Instead of a KW and 5/5/5 I used an ICOM IC-7000 at 80 watts, a tiny MFJ-902 tuner to a Yoyo 20m dipole strung against the wall between two windows in the flat in Oxford. Each QSO was a thrill. **M3CVN:** Missed most of Saturday due to the first day of my 2E0 training course! First RTTY contest for over a year! Pleased to give the "M3" multiplier out to many participants. Win-test was amazing! Thanks to LTØH who took 4 minutes to get my NR, FB op.

OE9R: We had a lot of fun. First big RTTY contest at our station. We will be back for sure next year. **PX8I:** Very fun on RTTY. Few contacts but exciting. **RV4LC:** It is my first WPX contest on RTTY mode. Much pleasure for me. Thanks for the contest. **SF6D:** No big effort this time but what a lot fun we had. Tremendous amount of stations on 20m. **TF3AM:** Running from home on single vertical dipole. I got more QSOs than ever. Mainly Asia and Europe in the morning and U.S. in the afternoon. Highlights include JF1OPL, which I managed to work on 20m at 6:20Z Sunday morning. **TI5N:** Better condx than expected. Hard to compete with EU stns when it comes to a WPX contest, especially on the low bands. **VA3DX:** The activity level was enor-

TOP SCORES

Single Op High Power

P49X (op: WØYK)	9,981,738	EN9M (op: UR5MID)	4,181,148
K3MM	5,512,960	K4GMH	4,118,076
UA9CLB	4,489,683		

Single Op Low Power

ZX2B (op: PY2MNL)	4,149,486	HI3TEJ	2,319,450
5C5W (op: CN8KD)	3,677,202	4Z5CP	2,012,283
VE1OP	2,397,915		

Multi-Op Single Transmitter

CT9M	8,071,506	4L8A	5,187,388
EF8A	6,508,260	TM4P	4,938,669
HG1S	6,340,285		

Multi-Op Two Transmitter

EA8AH	17,001,420	DG7RO	6,053,780
LX8M	8,121,314	TI5N	5,652,120
KI1G	7,054,126		

Multi-Op Multi-Transmitter

OM8A	10,402,097	RWØA	8,601,012
UU7J	9,620,520	SPØDXC	8,136,710
Z37M	9,257,246		

Single Op 3.5 MHz

SO4M (op: SP4MPG)	1,936,118	IV3SKB	1,553,160
S54E	1,889,966	I4AVG	1,480,836
9A2DQ	1,808,184		

7.0 MHz

I4IKW	3,411,720	UXØFF	2,392,590
7XØRY	3,380,346	UW5Q	2,327,350
DL3TD	2,451,826		

14 MHz

9A5W	2,409,963	9A5D (op: 9A5DU)	1,527,784
VE2RYY	2,076,003	OL6X (op: OK1DIG)	1,519,857
ZC4LI	1,869,350		

21 MHz

LW9EOC	1,751,175	EA1ACP	135,172
LV5V (op: LU5W)	1,604,020	RA6AFB	110,252
LR4E (op: LW4EU)	290,576		

28 MHz

LU8ADX	1,960		

CLUB COMPETITION

BAVARIAN CONTEST CLUB (DL)	32,183,694
POTOMAC VALLEY RADIO CLUB	25,382,975
CONTEST CLUB FINLAND (OH)	22,724,117
NORTHERN CALIFORNIA CONTEST CLUB	21,571,140
UKRAINIAN CONTEST CLUB (UR)	13,374,446
SPDXC (SP)	13,013,425
BLACK SEA CONTEST CLUB (UR)	12,268,107
CONTEST CLUB ONTARIO (VE3)	9,889,758
HA DX CLUB (HA)	9,084,111
YANKEE CLIPPER CONTEST CLUB	8,737,005
SOCIETY OF MIDWEST CONTESTERS	7,913,106
WILLAMETTE VALLEY DX CLUB	7,638,181
LATVIAN CONTEST CLUB (YL)	7,209,679
TENNESSEE CONTEST GROUP	6,863,861
URAL CONTEST GROUP (UA9)	6,826,986
FRANKFORD RADIO CLUB	6,238,983
SOUTH EAST CONTEST CLUB	5,084,661
WORLD WIDE YOUNG CONTESTERS (*)	4,848,981
KYIV CONTEST GROUP (UR)	4,732,493
FLORIDA CONTEST GROUP	4,708,771
SLOVENIA CONTEST CLUB (S5)	4,668,944
RAAWG (SV)	4,338,648
MARITIME CONTEST CLUB (VE)	4,335,425
SOUTH URAL CONTEST CLUB (UA9)	4,248,384
RUSSIAN CONTEST CLUB (UA)	3,798,876
CONTEST GROUP DU QUEBEC (VE2)	3,791,203
ROCHESTER DX ASSOCIATION	3,105,611
MINNESOTA WIRELESS ASSOCIATION	2,562,889
LUCG (LU)	2,555,018
GUARA DX GROUP (PY)	2,442,019
TEMIRTAU CONTEST CLUB (UN)	2,219,131
SPOKANE DX ASSOCIATION	2,104,975
CONTEST CLUB KRASNODARSKOGO KRAYA (UA6)	2,100,478
DL-DX RTTY CONTEST GROUP (DL)	2,082,973
GRAND MESA CONTESTERS OF COLORADO	2,064,630
EAST COAST CANADA CONTEST CLUB (VO1)	1,742,011
RTTY CONTESTERS OF JAPAN (JA)	1,606,517
ORDER OF BOILED OWLS OF NEW YORK	1,600,512
CHILTERN DX CLUB (G)	1,354,432
TOEC (SM)	1,321,156
RHEIN RUHR DX ASSOCIATION (DL)	1,281,737
SIAM DX GROUP (HS)	1,228,424
KENTUCKY CONTEST GROUP	1,054,570
SOUTHERN CALIFORNIA CONTEST CLUB	912,863
STERLING PARK ARC	870,900
LOW COUNTRY CONTEST CLUB	841,763
CENTRAL TEXAS DX AND CONTEST CLUB	804,601
BARTG (G)	685,814
VK CONTEST CLUB (VK)	683,554
WESTERN WASHINGTON DX CLUB	658,092
ALABAMA CONTEST GROUP	636,652
MAD RIVER RADIO CLUB	449,040
DAUBERVILLE DX ASSOCIATION	366,722
METRO DX CLUB	343,542
IVANOVO DX CLUB (UA3)	222,795

(*) Listed for completeness; however, not within Club Competition rules.

mous!! **VE3SS:** It was yet another part-time effort here. Family commitments made it impossible to operate full time, so decided to go S & P around the bands. Ii had a lot of fun as usual working some good DX like Cyprus, Iceland, and Senegal. **VE3TES:** Good clean fun, the way it should be! **VE7KPB:** Had a good time on RTTY. New to this mode and had a few good DX contacts. A good way to see what can be done with RTTY. **VQ9X:** Fun having the VQ9X contest team on the air again. **YB2ECHG:** Enjoyed the contest; much better result than last year! **YTØA:** Our first Multi-Op, Single Transceiver RTTY contest. See you again. **ZC4LI:** Thanks to all concerned in running the con-

(Continued on page 106)

Important On-Line Resources

To prepare for the 2008 contest, please refer to the following on-line resources:
Contest rules: <www.cq-amateur-radio.com>
Contest records: <www.rttyjournal.com/records/wpx.html>
Cabrillo specifications: <www.kkn.net/~trey/cabrillo/spec.html>
Cabrillo template for this contest: <www.kkn.net/~trey/cabrillo/wpx-rtty.txt>
Log submissions: <wpxrtty@kkn.net>

Announcing:

2007 Inductees CQ Amateur Radio, Contest, and DX Halls of Fame

CQ is proud to regularly honor the most accomplished members of the amateur radio community through three "Halls of Fame": the CQ Amateur Radio Hall of Fame, the CQ Contest Hall of Fame, and the CQ DX Hall of Fame. We are pleased to introduce you to this year's inductees.

CQ Amateur Radio Hall of Fame

Our seventh annual "class" of inductees to the CQ Amateur Radio Hall of Fame includes 15 individuals in one of the following two categories: (1) Those individuals, whether licensed hams or not, who have made significant contributions to amateur radio; and (2) those amateurs who have made significant contributions either to amateur radio, to their professional careers, or to some other aspect of life on our planet. This year, once again, all are or were licensed hams. Please note that callsigns were as issued to these individuals when they were alive/active, and may have been reissued under the vanity callsign program.

We welcome the following members (listed alphabetically) of the 2007 "class" of the CQ Amateur Radio Hall of Fame:

Catona, Phillip, W2JAV (SK). RTTY pioneer, inventor of the modern-day terminal unit.

Flaherty, Paul, N9FZX (SK). Co-inventor of Alta Vista search engine.

Geloso, John, I1JGM. Italian amateur radio manufacturer.

Griffin, Michael, NR3A. NASA Administrator.

Hillier, James, ex-VE3SH (SK). Co-inventor of scanning electron microscope; former head of RCA Labs.

Johnson, Herb, W6KQI (ex-W7GRA). Founder of Swan Electronics.

Lewallen, Roy, W7EL. Developer of EZ-NEC antenna modeling software.

Lindquist, Rick, N1RL. As ARRL Senior News Editor, he has been responsible for the past decade for keeping the amateur community updated on new developments via the *ARRL Letter* and the ARRLWeb news pages.

MacDonald, Copthorne, VY2CM. Developer of slow-scan TV (SSTV), author, philosopher.

McArthur, Bill, KC5ACR. Astronaut who set various ham radio operating records from the International Space Station, including being the first person to complete DXCC from orbit.

Miller, Don, W9NTP. SSTV pioneer; developed (with KB9VAK) the first high-definition digital SSTV protocol and program.

Tristao, Louis, KG6VY (SK). Inventor of the crank-up tower.

Tucker, Durward J., W5VU (SK). Helped promote and popularize RTTY in the 1950s; oilman and Managing Director of WRR Radio, Dallas.

Weiss, Adrian (Ade), WØRSP (ex-K8EEG). Leading proponent and promoter of QRP (low-power communications) in the 1970s and '80s.

Winder, Farrell, W8ZCF. Transmitted first SSTV signals to MIR space station. Active with MAREX (MIR Amateur Radio EXperiment) and Suitsat-1 planning teams.

CQ DX Hall of Fame

This year, for the first time, we are inducting three new members each into the CQ DX and Contest Halls of Fame. Our newest DX Hall of Fame members are:

Roger Western, G3SXW, and **Nigel Cawthorne, G3TXF.** Roger and Nigel are avid DXpeditioners and have activated many rare locations with their two-man, CW-only expeditions. They were nominated together. To date, Nigel has operated from 44 DX locations, while Roger has been on the air from 37. Nigel owns what may be the world's largest collection of QSL cards. In fact, he recently completed an addition to his home solely to house his QSL collection!

In addition to his trips with Nigel, Roger is a founding member of the "Voodudes" contest DXpedition group, a member of the CQ Contest Hall of Fame, and an international adviser to the CQ World-Wide DX Contest Committee. He has also authored two books, *Up Two: Adventures of a DXpeditioner* and *Contesting in Africa: Multi-Multi on the Equator.*

Mauro Pregliasco, I1JQJ, is co-editor (with his wife, Valeria, IK1ADH) of *425 DX News,* the leading DX bulletin in Europe and one of the most popular in the world. The newsletter is published online in both Italian and English, with some 15,000 subscribers to the English version alone. Mauro is also a very active DXer, holding most of the major DX awards, sits on the Radio Society of Great Britain's IOTA committee, and is Vice Secretary General and HF Award Manager for ARI, the Italian national amateur radio association.

CQ Contest Hall of Fame

The CQ Contest Hall of Fame inducts three new members this year as well, **Fred Capossela, K6SSS; Phil Goetz, N6ZZ (SK),** and **Tom Taormina, K5RC.**

Fred is a past CQ World-Wide DX Contest Director and, for the past 40 years, has maintained and annually updated the CQ WW All-Time Records list. It was under Fred's direction that the CQ WW became the world's most popular and most professionally run amateur radio contest. The first contester to run the contest, Fred introduced the rigorous verification standards for contacts and multipliers, developed the All-Time Records list, set the current contest dates, and introduced the Band-by-Band top scorers' matrix. It was Fred's dedication to running the contest in a fair, honest, and professional manner that laid the foundation for the CQ WW's current stature.

Phil had the distinction of having operated the CQ WW DX Contest from each of the world's 40 CQ zones—one of only two amateurs ever to accomplish this feat (Dick Norton, N6AA, is the other)—and missed operating in the CQ WW only three times in the 47 years between 1960 and 2006. Phil was a member of the first ARRL Contest Advisory Committee and served three separate times on the CQ WW Contest Committee. In addition, he was a judge at every World Radio Teamsport Championship (WRTC) event, except in 2002, when he was a contestant. Phil became a Silent Key earlier this year.

Tom has been contesting since 1959, when he entered the ARRL Sweepstakes and made a whopping 35 contacts. His scores improved dramatically since then, and he has held several records and won several national and divisional championships. He has also mentored a string of world-class contesters, who themselves have gone on to record-setting performances. Tom helped develop the Multi-Two category in the ARRL DX contests and helped create the North American QSO Party. He is also a past member of the CQ WW Contest Committee and a past Editor of the *National Contest Journal*. Tom is also active in DXing and public-service communications.

Congratulations to all of our new inductees on their outstanding accomplishments!

Announcing:

The 2007 CQ WW RTTY DX Contest

September 29–30, 2007

Starts: 0000 GMT Saturday Ends: 2400 GMT Sunday

Logs are due no later than October 26, 2007

Send logs to: <rtty@cqww.com>

I. Period of Operation: All stations may operate the entire 48-hour contest period.

II. Objective: The object of the contest is for amateurs around the world using RTTY to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 3.5, 7, 14, 21, and 28 MHz bands may be used. No 1.8 MHz or WARC bands.

IV. Terms of Competition (for all categories): All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. Transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant. All high power categories must not exceed 1500 watts total output power on any band. Only the entrant's callsign may be used to aid the entrant's score. No self-spotting on any form of DX spotting nets is permitted for any category. Self-spotting includes, but is not limited to, generating packet spots for your contest callsign by (a) using your own callsign; (b) using another callsign; or (c) other stations as a result of prearranged solicitation by you.

V. Categories:

1. Single Operator (Single Band and All Band)

(a) Single Operator stations are those at which one person performs all of the operating, logging, and, for the Assisted category only, spotting functions. Only one transmitted signal is allowed at any time.

(b) Low Power: Same as V.1.(a) except that (i) output power is 150 watts or less and (ii) only All Band entrants may enter the Low Power category. Stations in this category compete only with other low power stations.

(c) Assisted (all band operation only): Same as V.1.a. except the passive use of DX spotting nets is allowed (see IV above). No power subcategories.

(d) Single Band: All contacts are made on one band, regardless of power level. However, entrants may make contacts on other bands for the benefit of other contestants if they submit logs in Cabrillo format and clearly mark in the log header which band is to be counted as the single-band entry (see Rule XII below). No power subcategories.

2. Multi-Operator (All band operation only)

(a) Single-Transmitter: Only one transmitted signal at any time. Limited to 6 band changes in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the 6-band change rule will result in reclassification to the Multi-Multi category. Two power categories: Low Power (150W or less) and High Power (greater than 150W).

Exception: One and only one other band may be used during the same time period if and only if the station worked is a new multiplier. Violation of the 6 band-change rule by either transmitter will result in reclassification of the entry to the Multi-Multi category.

(b) Two-Transmitter: A maximum of two transmitted signals are allowed as long as each signal is transmitted on a different band. Entrants in this category are allowed a total of 6 band-changes per transmitter in any clock hour (0 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters constitutes two band changes. Violation of the 6 band-change rule may result in reclassification of the entry to the Multi-Multi category. No power subcategories.

(c) Multi-Transmitter: No limit to the number of transmitters, but only one signal and "running station" allowed per band. No power subcategories.

VI. Modes: Baudot only. No unattended operation or contacts through gateways or digipeaters permitted.

VII. Exchange: Stations operating within the 48 continental United States and the 14 Canadian areas transmit RS(T) report plus State or Area (Canada only) plus CQ Zone. All other stations transmit RS(T) and CQ Zone.

Valid Contacts: A given station may be contacted only once per band. Additional contacts are allowed with the same station on each of the other bands used in the contest.

VIII. Identification of Transmitters: Multi-Single and Multi-Two log entries must identify which transmitter made each QSO in the log (column 81 of Cabrillo QSO template for CQ contests). Multi-Multi entries that submit logs in other than Cabrillo format must provide a separate log for each transmitter.

IX. QSO Points: One QSO point for contacts within your own country. Two QSO points for contacts outside your own country but within your own continent. Three QSO points for contacts outside your own continent.

X. Multipliers: One multiplier point for each US state (48) and each Canadian area (14) on each band. Please use only official U.S. Postal Service abbreviations to identify states (e.g., Michigan = MI; Massachusetts = MA, Ohio = OH). One multiplier point for each DX country in the ARRL and/or WAE country lists on each band. *Note:* KL7 and KH6 are counted as country multipliers only and not as state multipliers. One multiplier point for each CQ Zone worked on each band. Maximum of 40 Zones per band.

Canadian areas (14 total) are as follows: NB (VE1, 9), NS (VE1), QC (VE2), ON (VE3), MB (VE4), SK (VE5), AB (VE6), BC (VE7), NWT (VE8), NF (VO1), LB (VO2), NU (VYØ), YT (VY1), PEI (VY2).

XI. Scoring:

Final score = total QSO points × the total multipliers (US states + VE areas + ARRL/WAE countries + CQ zones).

XII. Awards: First-place certificates will be awarded in each category listed under Section V in every participating country and in each call area of the United States, Canada, Australia, and Japan. All scores will be published. To be eligible for an award a Single Operator station must operate at least 12 hours. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. (Single-band entrants who also operate on other bands are encouraged to submit their logs to aid in the log-checking process. *Note:* Logs containing more than one band will be judged as all-band entries unless they are submitted in Cabrillo format and the single-band entry is specified in the Cabrillo header.) All certificates and plaques will be issued to the licensee of the station used. To the extent sponsors or winners purchase plaques through the Contest Director,

plaques will be awarded in the following geographical areas for each of the categories listed in Rule V: World, North America, USA, Canada, South America, Africa, Europe, Asia, and Oceania.

XIII. Club Competition: A plaque will be awarded each year to the club that has the highest aggregate scores from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area defined as within a 275-km radius from center of club area (exception: DXpeditions specially organized for operation in the contest and manned by club members; club contributions of DXpedition scores are proportioned to the number of club members on the DXpedition). Indicate your club affiliation in the Cabrillo file. To be eligible for an award, a minimum of three logs must be received from a club, and if requested by the Contest Director a club officer must verify a list of participating club members.

XIV. Instructions for Preparation of Logs:

All logs should be submitted in Cabrillo format via e-mail to <rtty@cqww.com>.

1. Logs must be submitted no later than **October 26, 2007.**

2. Electronic Submissions.

(a) In the "Subject:" line of your e-mail message please include your callsign and the category you entered—e.g., SOABL, M2, MS, etc. Logs should be sent as an e-mail attachment, not in the text of the e-mail, and the **filename** for the log should be **yourcall.log**.

(b) Entries from **Multi-Single, Multi-Two** and **Multi-Multi** stations must be merged into a single chronological log that *clearly* indicates which transmitter made each QSO (column 81 of Cabrillo QSO template for CQ contests).

(c) If the Cabrillo format is unavailable, contact the log checker, Paolo Cortese, I2UIY, at <i2uiy@cqww.com>.

Other questions pertaining to the CQ WW RTTY Contest may be sent to the Contest Director, Glenn Vinson, W6OTC, 488 Locust Street – #401, San Francisco, CA 94118 USA; e-mail: <w6otc@garlic.com>.

XV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. An entrant whose log is deemed by the CQ WW RTTY Contest Committee to contain a large number of discrepancies may be disqualified as a participant operator or station for a period of one year. If within a five-year period the operator is disqualified a second time, he will be ineligible for any CQ contest awards for three years.

XVI. Deadline: All entries must be e-mailed NO LATER than **October 26, 2007.** Logs received after the deadline may be listed in the results but will be ineligible for any award.

What You've Told Us...

Our April survey asked about your on-air activity and how you balance your hamming with other demands on your time. First of all, *CQ* readers are incredibly active hams, with 93% of the survey respondents reporting that they get on the air at least several times a month (35% are on several times a week, and 45% say they're on the air every day!). The vast majority of you (73%) primarily operate at random rather than scheduled times, with your on-air time determined mostly by "having time while at home" (47%), followed by "a specific event, such as a net or a contest" (31%), seeing something you need on the DX Cluster (18%), having time while driving (13%), and a tie between "a specific time, such as weekend mornings" and "other" (12% each).

When you are on the air, nearly half of you (48%) get on without a specific goal in mind, except tuning around and looking for activity; while 29% get on to participate in a specific event, 18% go looking for a specific station or group of stations; 12% get on to operate a specific mode, 10% a specific band, and 7% go looking for a specific geographic area.

While you're on the air, the rest of your family generally is doing other things at home (67%), followed by a tie between doing other things away from home or being at work or school (8% each), other (5%), and sitting in the shack, listening, or participating (4%). In addition, 17% of you say you live alone.

Finally, two thirds of you (65%) say your operating generally does not conflict with other things you need or want to do; 18% say there are conflicts and the other things generally win, while 12% say operating usually wins and 6% say their spouse *always* wins!

This month's free subscription winner is Jeff Jones, K3KYR, of Bombay, New York.

Reader Survey
July 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 we'd like to hear about your experiences with mentoring in ham radio.

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

1. How long have you been a ham?
Not currently licensed 1
Less than 1 year 2
1–5 years 3
5–15 years 4
15–25 years 5
Over 25 years 6

2. When you first became a ham, did you receive help from a more experienced ham in getting your station set up and on the air?
Yes 7
No 8

3. When you first became a ham, did you receive help from a more experienced ham in learning proper operating techniques?
Yes 9
No 10

4. As you have explored new facets of ham radio, have you generally been offered getting-started help by hams already active in that activity?
Never 11
Sometimes 12
Always 13

5. How frequently have YOU helped a new ham get his/her station set up and on the air?
Never 14
Once 15
Occasionally 16
Frequently 17

6. How often have YOU helped a new ham learn proper operating techniques?
Never 18
Once 19
Occasionally 20
Frequently 21

7. How often have you offered getting-started help in one of your activity areas to hams just starting in that activity?
Never 22
Occasionally 23
Frequently 24

8. How would you compare the level of help available to hams starting something new today to when you first became active in the hobby?
Less help is available now 25
Availability of help is about the same 26
More help is available now 27
Don't know 28

9. Have you made it known in your club or other group that you are willing to help other hams get started in the hobby or in a new activity?
Yes, in a formal mentor registry 29
Yes, informally 30
No, but would be willing to if asked 31
No, unable due to physical limitations 32
No, not interested 33

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

Enjoy HF even more with HF Digital!

AOR offers new HF licensees a CLEAR difference with the amazing audio clarity of HF digital. The ARD9000 Mk2 and ARD9800 are both great ways to join in the fun because there's "no assembly required".

Add a whole new mode to your HF operation with a couple of quick connections and be part of the digital voice excitement that's sweeping the SSB bands. Once you hear the audio quality, you'll be a believer! Whenever these digital voice modems are demonstrated, looks of amazement pass through the crowds.

Using the open G4GUO protocol, the ARD9000 Mk2 or ARD9800 allows any ham to convert any existing HF analog transceiver to work digital voice in one easy step! The unit automatically detects digital signals and decodes them, but you also maintain full analog capabilities. Whether a contact comes in as digital or analog, the ARD9000 Mk2 and ARD9800 can handle it.

It's a real breakthrough in communications technology that uses the same audio frequencies (300 Hz ~ 2500 Hz) as microphone audio to transmit digital SSB voice signals.

Enjoy the clean, clear audio that makes HF digital so much fun!

- NO transceiver modifications necessary
- Digital voice communications using existing analog transceivers
- Works on Single Side Band (SSB) mode.
- Automatic digital receive
- Optional interface cables for most popular transceivers
- 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)

Be sure to check the website at www.aorusa.com for FAQs, links to user groups and more!

Special Purchase Discounts Available for Ham Radio Clubs!

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Special Report

FCC Trashes Two Interference Management Proceedings

BY FRED MAIA,* W5YI, WASHINGTON EDITOR

The FCC has quietly terminated two rulemaking proceedings begun in 2003 that looked toward better management of the noise floor and background interference. Both were a result of recommendations from a 2002 report by the FCC's Spectrum Policy Task Force.

Receiver Immunity Standards

On March 13, 2003, the FCC asked for comment on whether the Commission should "...incorporate receiver immunity performance standards" when making spectrum policy decisions (ET Docket 03-65).

The Spectrum Policy Task Force felt that "...greater opportunities for spectrum access would be facilitated if the minimum performance characteristics of the receiver were known. ..." It recommended that the FCC "...make receiver performance a more prominent part of [FCC] spectrum policy."

The FCC seemed to agree, saying: "...incorporation of receiver performance specifications could serve to promote more efficient utilization of the spectrum and create opportunities for new and additional use of radio communications by the American public. From a technical standpoint, a radio receiver's susceptibility to interference is largely dependent on the interference immunity of the device, particularly with regard to its rejection of undesired radio-frequency (RF) energy and signals. If the receivers used in connection with a radio service are designed to provide a certain immunity or tolerance of undesired RF energy and signals, more efficient and predictable use of the spectrum resource can be achieved."

*1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

The ARRL also agreed: "[The FCC] ... should implement either mandatory receiver immunity standards, or at least guidelines, in most services. ...The real need for receiver immunity specifications is in the area of consumer electronics," the League said in its comments, adding, "With the current explosion of consumer electronics and unlicensed devices, the Commission must—concurrently with consideration of receiver immunity standards in licensed radio services—establish interference rejection standards for unlicensed home electronic equipment and systems as well."

At the same time, the ARRL said, development of any receiver immunity standards or guidelines "should not be used as a means of justifying the overlay of otherwise fundamentally incompatible spectrum sharing partners."

"Interference Temperature"

On November 13, 2003, the FCC asked for comment on another recommendation developed by the Spectrum Policy Task Force ... a "background interference temperature" measurement of existing noise and other sources (unintentional radiators). Both private and government measurements would be used (ET Docket 03-237).

This "temperature" would be used as a starting point to determine if any new unlicensed transmissions would cause the noise floor to exceed some predetermined acceptable level. New unlicensed services could be authorized if approval resulted in not exceeding the acceptable "interference temperature." Different threshold levels could be set for each band, geographic region, or service. The new system would focus on the actual RF environment surrounding receivers.

The Commission believed that this new approach could open up new uses for currently assigned spectrum, especially for unlicensed, low-power users. By "quantifying acceptable levels of interference," it said, there would be "more certainty for licensees" and "...more opportunity for [new unlicensed] consumer devices."

Increased access would help overcome the scarcity of spectrum, since most has already been assigned. In short, the idea was to come up with a system that would promote spectrum sharing by unlicensed devices. The FCC initially wanted to implement the concept in two microwave bands.

Commenting parties, including the ARRL, generally argued that the interference temperature approach was "not a workable concept" and "would result in increased interference in the bands where it would be used." The League called the concept "highly premature" and said it "should not go forward."

According to the ARRL's comments, "...localized noise studies in various bands are a prerequisite to putting an interference temperature metric into place, along with a comprehensive evaluation of the differences in receiver sensitivities and emission modes across various services and bands." The League added that "...the FCC doesn't have enough information to put such a model into place, and it should not try to take a shortcut."

Never Mind...

On May 2, 2007, the FCC abruptly terminated both of the proceedings. The FCC said the "Interference Temperature" concept met with general opposition and that "...with passage of time," the inquiries, NPRMs, and comments in both dockets "...have become outdated." The ARRL called the actions "a mixed blessing."

MFJ-259B Antenna Analyzer

The world's most popular antenna analyzer gives you a complete picture of your antenna performance 1.8 to 170 MHz. Super easy-to-use -- makes tuning your antenna quick and easy. Read antenna SWR, complex impedance, return loss, reflection coefficient. Determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open in feet. Read inductance in uH and capacitance in pF at RF frequencies. Large easy-to-read two line LCD screen and side-by-side meters clearly display your information. Built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

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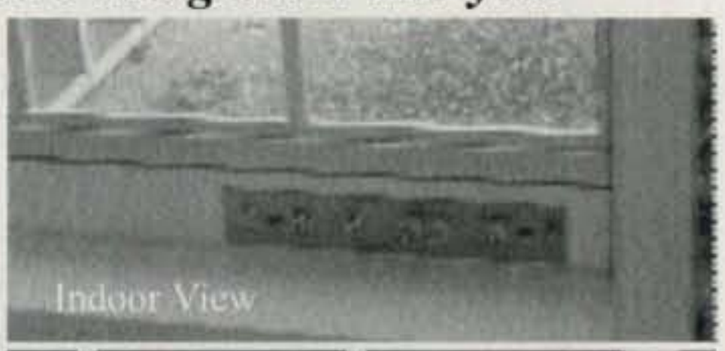

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MFJ-1704. Like MFJ-1702C but has 4 positions. 6$^{1}/_{4}$x4$^{1}/_{4}$ x1$^{1}/_{4}$ in. 50 load. SWR 1.1: 1 to 30 MHz; 1.5:1, 30-650 MHz. SO-239.

MFJ-1704 **$74.95**

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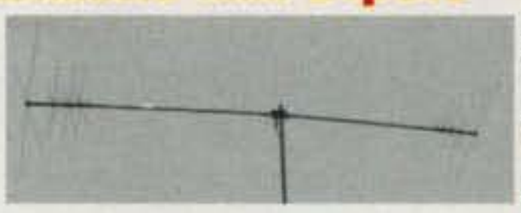

Low-profile mini 14 foot rotatable dipole has tiny 7-foot turning radius. Fits on smallest roof -- perfect for town houses, apartments and condos.

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math's notes

BY IRWIN MATH,* WA2NDM

Basic Inexpensive Transistor and Diode/LED Testers

If you do any experimenting at all, you have a need for some test equipment. If the prices for used test equipment are a bit beyond your budget, we have a couple of suggestions for inexpensive equipment that you can build yourself. In the "old days," a lot of the test equipment used by amateurs was home built, so don't be afraid to "roll your own." The rewards and satisfaction you will gain (as well as the ease on your wallet) can be well worth it.

A Transistor Tester

Fig. 1 is a schematic of a simple transistor tester that can be used to evaluate most small-signal bipolar PNP or NPN types. It is simple and inexpensive, but capable of fairly accurate readings and will be quite useful for matching devices as well as for general testing purposes. As you can see from the schematic, the transistor under test is connected in series with a 0- to 1-milliampere meter and a 9-volt battery. A DPDT switch is provided to switch from PNP to NPN devices simply by switching the battery polarity. A shunt selector switch is also provided to change the full-scale range of the meter from 1 ma to 10 ma, which, as we soon will see, allows us to read hfe (current gain) in two ranges, 0 to 100 and 0 to 1000. A LKG/GAIN (leakage/gain) pushbutton completes the controls. You will note that an ON/OFF switch was not included, since the unit draws no power unless a transistor is connected.

In operation, the PNP/NPN switch is set accordingly and a transistor is placed in the socket. The RANGE switch is initially set to X100 and LKG/GAIN pushbutton is not pressed. The meter now measures collector to emitter leakage current, since the base is not connected. This reading should be a small fraction of a milliampere (or no movement at all) if the transistor is good. Now the LKG/GAIN pushbutton is pressed. This applies (roughly) 10 microamperes of current to the base (8 volts/800K). The meter now indicates collector current (and hfe directly) for the following reason: If the current gain of the transistor under test is 100, for example, 10 microamperes in the base will produce 1 milliampere (1000 microamperes) in the collector and the meter will read full scale (10 µA × 100 = 1 ma, or an hfe of 100—hence the "X100"). If the current gain of the transistor is only 50, the meter will read half scale (10 µA × 50 = 500 µA = 0.5 milliamperes = an hfe of 50). In the X1000 position, R1 is switched across the meter. This changes its sensitivity from 0 to 1 ma full scale to 0 to 10 ma full scale and the subsequent hfe range from 0 to 1000.

*c/o CQ magazine

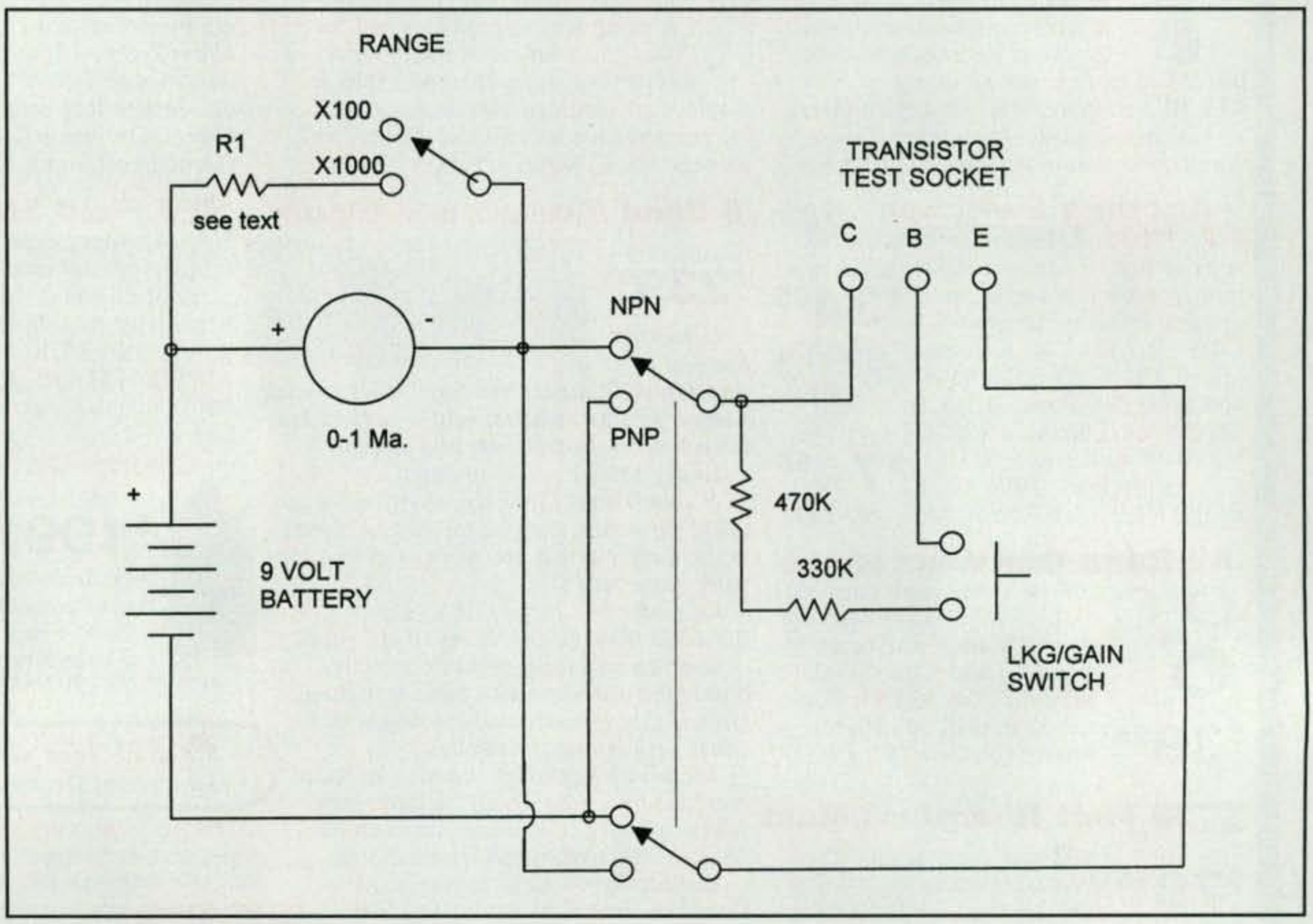


Fig. 1– A simple bipolar transistor tester.

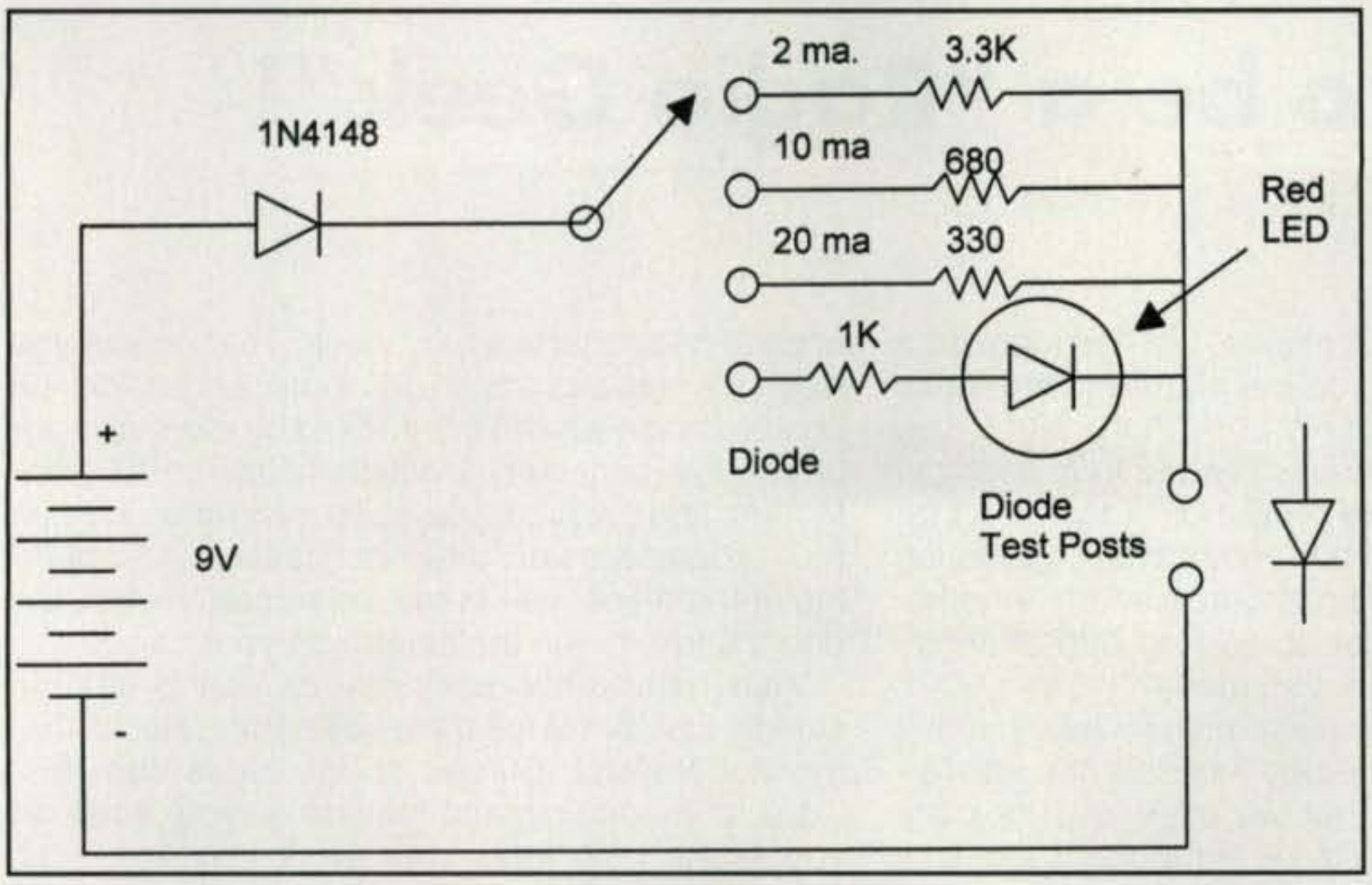


Fig. 2– A simple LED and diode tester.

The value of R1 must be chosen before building the tester and will vary with the particular meter used. The procedure for determining the value of R1 is as follows:

1. Connect the meter to be used in series with an adjustable power supply and a 1K resistor.

2. Set the power supply so that the meter just reads full scale (1 miliampere).

3. Now shunt the meter with various resistors (or resistor combinations) until the meter reads exactly one tenth of a milliampere. Since most 0–1 milliampere meter movements have an internal resistance ranging from 30 to 100 ohms, this resistor combination will be in the neighborhood of 3 to 10 ohms.

4. Next place a DVM set to current in series with the power supply and adjust the power supply until the meter/shunt resistor combination reads full scale and the actual current flow is equal to 10 milliamperes. If the current is not exactly 10 milliamperes at full scale, slightly "trim" the resistor combination until it is.

5. Finally, reduce the current to 1 milliampere and check that the meter now reads one tenth of 10 milliamperes (or 1 milliampere).

Use this resistor combination as the meter shunt in the circuit shown.

Now before the purists start to attack, let me point out a couple of facts. The voltage used to calculate the 800K resistor/10-µA base current was 8 volts. This is a compromise between a brand-new 9-volt battery and one near the end of its life. This means that all hfe readings are really only approximate (±10 to 15%). Although this is nowhere near labatory accuracy to be sure, it is certainly good enough for most routine tests, since most applications do not really require exact numbers.

Next, the hfe is only measured at a base current of approximately 10 µA. Many transistors have significantly different hfe values at different base currents. Again this is a compromise value that should be okay for most routine testing. Most important, this tester allows you to check the operation of all of those bipolar devices you have in your junk box without spending a fortune for a commercial tester.

A Diode/LED Tester

Fig. 2 is a very simple diode tester that can be used to evaluate LEDs as well as conventional diodes. As you can see from the schematic, it consists of a 9-volt battery and a handful of easy-to-obtain inexpensive components. The first three positions of the rotary switch are used to test LEDs and provide various currents in the ranges usually employed. In operation, you simple select the current range of interest and connect the LED across the terminal pins. If it is good it will light. If it is bad (or if it is reversed in polarity) it will not light. The fourth position is intended for testing conventional diodes. Here an indicator LED and current-limiting resistor are switched in series with the diode to be tested. If the diode is good (and of the correct polarity) the LED will light. Note that the current in this position is only 8 to 9 ma, making it suitable for most small-signal diodes as well as rectifiers.

By the way, a 9-volt battery was used to allow testing blue and white LEDs, as these have higher breakdown voltages than conventional LEDs. When testing these devices, the current through the LED will be less due to the higher breakdown voltage of these types of diodes. For a 3-volt-drop blue or white LED, for example, the 2-ma range will only pass approximately 1.5 ma, the 10-ma range will only pass approximately 7 ma, and the 20-ma range will only allow about 15 ma of diode current to flow. As in the case of the first tester, an ON/OFF switch was not included, as the tester draws no current unless a diode is actual connected.

While this tester might appear to be very simple, it can be quite useful, especially when evaluating a bag of "bargain" LEDs. I built my version in a small plastic "project box" and fitted it with a couple of binding posts. For a quick check it can't be beat.

Although very simple, both of these testers will allow you to easily evaluate most common devices. If you have never built anything, you should give one (or both) a try, as the investment will not be too high and the results might convince you to move on to more complicated devices.

If these types of projects interest you, please let me know and we will try to publish similar "get your feet wet" projects in this column. 73, Irwin, WA2NDM

in the sky

BY JEFF REINHARDT,* AA6JR

Proud to be a "Radio Geek"!

Like many of you, I'm sure, I've had more than a few friends chide me about the antennas on my car and at my home. One friend saw my home and said, "Looks like the tuna fleet just sailed in." Rather than be put off, I took it as an acknowledgement of my commitment to having well-equipped mobile and home stations. Another neighbor asked, "What do you do with all those radios? Who could use that many?"

Some polite patio conversation followed, along with beverages that helped lubricate the conversation. I mentioned that we often overlook the notion that radio is with us throughout the day, often in ways we don't realize. I recounted the unfounded story of a homeowner association that reportedly went overboard in trying to avoid having antennas on homes in the development, including in its covenants that there would be "no radio-emitting devices in the homes." Whether or not that story is true, here's a partial list of how radio is embedded in our everyday lives, and perhaps an illustration of how different life would be without radio devices.

So Who's the Geek?

You can awaken to a clock radio that brings you time, weather, news, music, and other information that helps you start your day. I continue the information flow with a nifty "shower radio." You may watch the TV over your morning toast and coffee, perhaps taking in one of the news programs or perky "infotainment" morning anchors. A look at your home weather station with remote temperature sensor tells you an overcoat is not necessary as you reach for the breakfast bar that was warmed in the microwave oven. Off you go to the car, where you play some soothing music from your MP3 player through a mini-transmitter that sends the music to the car's FM radio. Ooops . . . don't forget to close the garage door with that radio transmitter on your sun visor.

On the way to work, your cell phone rings, and being a careful driver, you answer using a hands-free Bluetooth device hanging on your ear. You don't need the GPS guidance system in your car today, but it's on and accurately showing the progress along your route. As you turn onto the highway that leads to your office, you pass a police cruiser that's using traffic-enforcement radar. Fortunately, you're under the speed limit, but the car behind you is not and the police officer uses his radio to alert the "pick-up" car ahead.

That cell-phone call was from the office, saying you'd been selected to attend a training conference at headquarters next week. That means you need to make plans to fly there and back. Of course, those aircraft are tracked by radar and are under the constant direction of air traffic controllers, and the pilots use radio navigation to mark their progress toward their destinations. After parking at the office, you press the remote to lock the doors and arm the theft alarm on your car.

Your nine-to-five work day routine is seldom exactly that, but at least the self-setting clocks that monitor National Bureau of Standards transmissions at your office, and the one on your wrist, let you know how long your work day really is. Through the day, your Blackberry device forwards important e-mail and text messages. One of them requires you to direct a field support person to a client; his visit was dispatched via two-way radio. You bump into a co-worker who asks if you saw that radar trap on the way to work this morning. He says he was alerted to it by the radar detector in his car. He's the same person who told you that last week his car doors were remotely opened by his manufacturer's service provider after he had accidentally locked his keys inside the car. Just before the daily deadline, you send out an overnight express package that will be tracked on its cross-country trip.

On the way home you have some errands to run. As you stop for fuel, you wave a fob in front of the gas pump that reads your billing information, which is immediately transmitted to the company's headquarters. You go over to the air pump because one of your RF tire pressure monitors indicates a tire is getting a bit soft. A trip to the shopping mall for a new shirt and tie for the trip to headquarters is easily done, after the clerk removes the anti-theft RFID tags from the merchandise. The process is so routine you don't even notice. You sit down in the coffee shop with wireless internet access and open your notebook computer. There you are able to track the progress of that overnight package. Good. It was picked up and is on its way to the airport. Back to the car for the trip home, you pull over to give way for an ambulance. You don't know who's inside, but the patient's vital signs are being conveyed by telemetry to the emergency room that's prepared to receive him or her.

Arriving home, you unconsciously press the door opener and pull into the garage. As you come through the door, you notice the home phone is ringing. You pick up the cordless phone as you put down your packages. As you walk toward the kitchen, your son's remote-controlled race car zips by your foot, chased by the puppy that has the new RFID tag implanted under his coat. You remind yourself that later you should transfer the photos you took of them last weekend to the computer, using the camera's wireless link. You sift through

*5904 Lake Lindero Drive, Agoura Hills, CA 91301
e-mail: <aa6jr@cq-amateur-radio.com>

the mail and sigh at the sight of the water and electric bills, the meters having been read by radio-reading devices. At least you didn't have to be home when the meter reader came. After dinner and bedtime stories, you again open the notebook computer that's now online through your home's wireless internet connection. The package made it onto the airplane. You make the air travel, hotel, and rental car reservations for your business trip. Flipping on the TV news, you notice the weather radar shows some showers moving in tonight, but tomorrow should be fair; the picture from the weather satellite shows clear weather to the west, which means it will be nice for the big car race this weekend. Better remember to pick up fresh batteries for the scanner so you can follow the action by listening to the teams communicate with their respective drivers.

Before going to bed, it's time to recharge the cell phone and hands-free earpiece. Press the remote to reduce the speed of the ceiling fan. Set the clock radio for 30 minutes of sleep-inducing music and get ready for another *day of not using* radio devices like some ham radio geek!

So how many radio-related devices do we use each day? It seems every day there are more, and in the example above, I counted over 35.

Sometimes Simpler is Better

Even with all the sophisticated RF devices present in our lives, many emergency-response authorities in the USA seem intent on ignoring some of the recent hard lessons arising from the attacks on New York and Washington, Hurricane Katrina, and most recently the shooting incidents at Virginia Tech. In every one of those instances the cell-phone system serving each respective area was overwhelmed.

In addition, newer public-safety digital communications systems use narrower bandwidth, but in most instances those systems are repeater-dependent. They also carry a processing delay, and with digital the signal is either there or it is not; there's no in-between "marginal copy" zone as with analog transceivers. Following Hurricane Katrina, hams once again demonstrated the strength of a robust analog system with decentralized components, which is exactly the opposite of cell-phone- and repeater-driven digital systems, some of which add trunking as an additional layer of complexity.

Years after the September 11th attacks, public-safety agencies continue to have interoperability issues, and private communications companies have not been given a firm interoperation standard. Their hope, of course, is to hold their clients (in this case, you, the taxpayer) captive to their lucrative "exclusive provider" status. Meanwhile, public-safety agencies across the country are being convinced that even their routine communications need to be digitally encrypted "for security." Never mind that scanner listeners, including the media and you, the person who foots the bill, are ill-served by mismatched systems that cloak the actions of those who are charged with serving and protecting you. If we can't communicate following a hurricane, or neighboring jurisdictions can't communicate in a mutual aid situation, what exactly have we achieved? Sometimes, simpler is better.

In the meantime, as we head into another year of tornadoes, hurricanes, wildfires, floods, blizzards, and earthquakes, keep your ham radio charged and programmed, your club's emergency repeater at the ready, and your emergency-response skills up to date. There's a good chance that your response to an emergency may be needed, because public-safety agencies will be calling on amateur radio operators to get the job done—again.

A Ham Holiday?

We'll close this visit with my modest proposal for the observance of a ham radio holiday on July 3rd, fittingly tacking it onto the celebration of our nation's birthday. Why July 3rd? Hey, that date is 7-3, a most fitting occasion to put some "Magic In The Sky"!

73, Jeff, AA6JR

Practicing What Jeff Preaches . . .

As I was editing this month's "Magic" column, I was also trying on two different computers to tune in my son's radio show from his college station, which is also a webcast. Neither computer wanted to cooperate. Then it struck me after reading Jeff's column: I walked over and turned on the radio! The station, which is local, was coming through just fine! Good old, "old-fashioned" analog radio to the rescue again! —*W2VU*

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

The Case for the Code

All of the hoopla over the new FCC rules and the elimination of Morse code exams made me think of the good things Morse code communication brings. In addition to this, we recently had a "Bring Your Child to Work Day" event at the office. My presentation included a short section on radio communications, and of course, a demonstration of ham radio. Since most of the kids were fairly young teenagers, I included a video clip of the "text messaging versus Morse code challenge" that appeared on "The Tonight Show with Jay Leno" on May 13, 2005.

While there are many arguments for and against knowing the meaning of the "dits" (dots) and "dahs" (dashes) of the Morse code, let's concentrate on what the advantages are in terms of what it can do for us as a communications mode, especially since all low-band transceivers (and many VHF and UHF rigs, too) have a "CW" function switch on the front panel. Let's not let that function button go to waste and put some CW signals into the air.

All things being equal, a CW signal will be copyable over longer distances than a non-CW mode signal, meaning voice. This is because the CW signal is "narrower" than an SSB (or other voice mode) signal. This is called *bandwidth*. If you want to prove this to yourself, try this simple experiment:

Turn on your broadcast radio or stereo system or television and listen to a news or talk station. You can also try this with your ham radio receiver by finding an SSB contact taking place. Turn up the volume just high enough for you to hear it comfortably in the room you are in.

Now walk away from the room and listen to the radio. Notice that at some point you will not be able to understand what is being said, although you can still hear the muffled sounds and noises from the radio. In other words, you have lost "intelligibility." Continue walking away from the room, and at some farther point the sounds will disappear completely.

Now switch to a music station (or, on your communications receiver, tune to a CW station) and do the same thing. Depending on what kind of music is playing, you should notice that you can go a little bit farther away from the music than the talk station. In addition, you should notice that the higher pitch musical notes (higher frequency) will carry over a farther distance than the lower pitch notes. This is the difference a narrower bandwidth makes: There is more intelligibility in the narrowband signals.

Here is another everyday example of this: Let's say that you are watching a basketball game along with 20,000 other screaming fans. Since you cannot whistle, you yell and cheer when your team makes a "three pointer" basket. Others whistle, and you can hear the whistling from the other side of the arena, while people yelling are difficult to impossible to understand.

Having CW capability is even more important if you must use "compromise" equipment and antennas. For example, there are hundreds of excellent used rigs for sale at dealerships and at hamfests and other ham radio gatherings. Just like a used car, buying a used and older radio can be a good value, but also offers a compromise in performance in some aspects. Antennas are also a place of sacrifice, especially in these days of antenna-restricted residential areas. Therefore, one must work on optimizing the chances of "contact success" in as many places as possible. Using Morse code is one of the best ways to help you complete the difficult contacts that may be impossible to make on phone.

Breaking Barriers

Speaking of things that are difficult to understand, one of the first things everyone will realize is that CW can break language barriers. Although hams in almost all countries have some knowledge of English, there are many non-English-speaking hams who know only the very basics of establishing a voice contact and not much else. I still remember one of my early SSB QSOs (contacts) with an Eastern European station, and I wanted to know what sort of rig he was using and what the weather was like over there. He was able to give me a signal report ("five-by-nine plus") and we exchanged callsigns, so we both knew we had a short, but valid contact for ham radio purposes. However, after asking the same question at least twice, and receiving no answer, I finally figured out that he did not understand what I was saying.

On the other hand, in the CW mode a major communications "tool" is included—the set of internationally recognized radio communications procedures and abbreviations called *Q Signals.*

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

Here is a look over the shoulder of Dave Glawson as he sends a message using a straight key. Notice the firm grip on the knob, and his forearm rests on the tabletop. Dave is WA6CGR, located in Diamond Bar, California.

QRA What is the name of your station?	**QSL** Can you acknowledge receipt?
QRG What is my exact frequency?	**QSM** Shall I repeat the last message sent?
QRH Does my frequency vary?	**QSO** Can you communicate with _____ direct?
QRI How is my tone? (1–3)	**QSP** Will you relay to _____?
QRK What is my signal intelligibility? (1–5)	**QSV** Shall I send a series of V's?
QRL Are you busy?	**QSW** Will you transmit on _____?
QRM Is my transmission being interfered with?	**QSX** Will you listen for _____ on _____?
QRN Are you troubled by static?	**QSY** Shall I change frequency?
QRO Shall I increase transmitter power?	**QSZ** Shall I send each word/group more than once? (Answer, send twice or _____)
QRP Shall I decrease transmitter power?	**QTA** Shall I cancel number _____?
QRQ Shall I send faster?	**QTB** Do you agree with my word count? (Answer negative)
QRS Shall I send slower?	**QTC** How many messages have you to send?
QRT Shall I stop sending?	**QTH** What is your location?
QRU Have you anything for me? (Answer in negative)	**QTR** What is your time?
QRV Are you ready?	**QTV** Shall I stand guard for you _____?
QRW Shall I tell _____ you're calling him?	**QTX** Will you keep your station open for further communication with me?
QRX When will you call again?	**QUA** Have you news of _____?
QRZ Who is calling me?	
QSA What is my signal strength? (1–5)	Other abbreviations, including procedural signals, are explained on the ARRL website. See the References section for more information and links.
QSB Are my signals fading?	
QSD Is my keying defective?	
QSG Shall I send _____ messages at a time?	
QSK Can you work breakin?	

Table I– A list of international Q Signals. A Q Signal followed by a question mark asks the question. A Q Signal without the question mark answers the question as a "yes," unless otherwise indicated.

These signals compress and translate a wide array of questions and answers into simple three-letter codes that every radio operator can understand, no matter what language they use (see Table I).

Even more clever is how these Q Signals are used: When the Q Signal is followed by a question mark, the signal turns into a question. When there is no question mark, it is usually a reply meaning "yes." Here is what a CW contact could sound like, with a "translation" for each line:

CQ CQ CQ DE WA1POI WA1POI WA1POI K

(Station WA1POI is "calling CQ," or seeking a contact with any station on frequency. "DE" means "from," and "K" means "go ahead.")

WA1POI DE K1CE K1CE K1CE K

(*Station* K1CE heard the call and answers WA1POI, hoping for a response.)

K1CE DE WA1POI R R R UR SIG 559 559 559 NAME HR BROOSE BROOSE BROOSE K

(WA1POI heard K1CE's response, and says, "Roger, your signal report is 559, name here is Broose.")

WA1POI DE K1CE QSL TNX BROOSE UR SIG 589 589 NAME IS RICK RICK RICK HW IS WX AT UR QTH? BK

(K1CE says, "I confirm, thanks Broose, your signal report is 589, and name is Rick. How is the weather at your location? Break." The "BK" is a procedural signal meaning break, and is sometimes used instead of "K.")

BK WX HR SUNNY ES WARM RIG IS HOME BREW QRP RIG FROM CQ MAGAZINE ARTICLE KN

(Broose responds to Rick and says, "Weather here is sunny and warm. Rig is home brew low-power rig from a *CQ* magazine article." The procedural signal "KN" means "go only" and notifies other stations listening that they are not invited to join the conversation.)

Notice several things in the short QSO above. Since CW is sort of like typing, in which words must be individually spelled out, it is a standard practice to send the same thing several times. In general, sending specific facts two or three times is enough. After stations have identified each other, the callsigns may be dropped from the contact. Of course, the FCC 10-minute rule for identification must still be followed.

Readability
1 Unreadable
2 Barely readable, occasional words distinguishable
3 Readable with considerable difficulty
4 Readable with practically no difficulty
5 Perfectly readable

Signal Strength
1 Faint signals, barely perceptible
2 Very weak signals
3 Weak signals
4 Fair signals
5 Fairly good signals
6 Good signals
7 Moderately strong signals
8 Strong signals
9 Extremely strong signals

Tone
1 Sixty-cycle AC or less, very rough and broad
2 Very rough AC, very harsh and broad
3 Rough AC tone, rectified but not filtered
4 Rough note, some trace of filtering
5 Filtered rectified AC, but strongly ripple-modulated
6 Filtered tone, definite trace of ripple modulation
7 Near pure tone, trace of ripple modulation
8 Near perfect tone, slight trace of modulation
9 Perfect tone, no trace of ripple or modulation of any kind

Table II– The RST reporting system is a standardized system of reporting signal reports between stations. On CW, three characteristics are noted: "readability," or how clearly the signals are heard, "strength," usually as indicated on the receiver S-meter, and "tone," which is how the CW note sounds. These days almost all transmitting equipment has a pleasant CW tone, but this can degrade if there is a problem with the transmitter. This system is also used on phone, with the third number (tone) eliminated. For example, a clear and strong SSB signal would be called "five and nine."

Within the first few QSO exchanges, signal reports are among the first pieces of information that are exchanged between stations. On CW, the RST reporting system is used, as mentioned in the above example. Table II summarizes the RST system.

Some of the Q Signals can be used on phone, either in casual and local contacts, or long-distance (DX) contacts. However, many of them may be cumbersome to use on voice.

Other "radio abbreviations" are available, as well, and will help increase the efficiency of sending and receiving messages.

If I Can Learn the Code, Anyone Can

I thought I would never be able to understand and use the Morse code when I studied for my Novice license in the 1970s (when code was still required). However, my ham radio mentor, Bob Miles, WA6LLW, encouraged me and helped me to work through it. To my amazement, I learned the letters and the numbers within "a couple to three weeks," exactly as Bob predicted I would do.

Bob loaned me a set of cassette tapes, and he said that I should listen to them for only a few minutes at a time, but to do this each and every day. I followed his advice for a couple of days, but then started to slack off and then cram in several hours at a time on the weekends. This only confused me

The Code Practice Oscillator (CPO)

For many years, people learning the Morse code in preparation for their ham license exam used a *code practice oscillator*, or CPO, connected to a code key. The CPO is an inexpensive way to send out Morse code characters to a speaker without sending any RF energy into the air.

My first CPO was a doorbell button and a buzzer mounted on a piece of wood. The sound was irritating, and using the doorbell button instead of a code key made learning how to send a challenge. I recommend getting a nice Morse code key from your favorite ham radio dealer, rather than struggling with a switch. The advertisers in *CQ* magazine will be happy to help you select your first key.

Standalone CPOs are getting hard to find these days. My local electronics store used to carry simple CPO kits, along with the "blinky-light" electronic and science fair kits, but no longer. Some *CQ* advertisers, such as MFJ <www.mfjenterprises.com> and Morse Express <www.MorseX.com>, offer CPOs via mail-order or the internet.

If you already own a rig with CW capability, you can also try this: Turn your rig into a CPO. In most transceivers, if you place the "transmit-receive change-over control" switch to the off position, this will turn off the transmitter section of the rig when the transceiver is in the CW mode. *(On other rigs this can be accomplished simply by turning off break-in keying, or QSK.—ed.)*

Set up your rig for CW: Plug the key into the key jack, move the mode switch to CW, turn off the VOX/QSK function, and adjust the sidetone control for comfortable volume. (VOX means voice-activated relay, used to provide hands-free operation on voice. When you say something into the microphone, the rig goes into transmit mode. When you stop talking, the rig automatically goes into receive mode. On CW, when you press the key the rig goes into transmit mode, and when you stop sending the rig goes into receive mode. You can adjust a delay time control to keep the rig "locked" into transmit so that the dits and dahs are not cut off.)

As an extra precaution, move the RF power control fully counterclockwise to prevent sending signals out over the airwaves, and plug a "dummy load" into the antenna jack.

Go to the ARRL website and take a look at a good description on how to build a CPO: <http://www.arrl.org/tis/info/pdf/NYT.pdf>.

Here is a CPO kit. It refers to an article in July 1996 *Nuts & Volts* magazine: <http://electronicsusa.com/o-2schematic.html>.

Note: I have not built either of these circuits, so this is an information source and not an endorsement. It would be a good idea to check with a fellow ham or your favorite radio dealer for some advice.

and I always dreaded the sessions. Thus, after a very short while I went back to studying the code tapes for a half-hour at a time every night, and that really worked.

These days we have the internet and our personal computers to help us learn the Morse code. Do an internet search on "learning Morse code" to find sources of learning materials. Take a look at those sites and choose something that suits you. Several advertisers in this magazine sell Morse code learning materials, so take a look at what they have to offer. Also, as always, check with your local ham radio club for some help. There are "CW forever fans" in almost any radio club, and I am sure they will be happy to help you with advice and training hints.

There are many techniques and methods to learn the Morse code, but just like learning to drive a car, ride a bicycle, hit a golf ball, or ski down a mountain, there are no shortcuts, and it only takes practice and time. It may be more fun to learn the code with a partner, so you can challenge each other, or at least send and receive CW with each other for more practice.

What About Transmitting?

As you are learning your new language skill, you should include sessions of sending the characters as well as listening to them. This will help reinforce what the characters sound like and will help you learn how to handle a CW key at the same time. If you have been reading *CQ* for a while, you know that there are hundreds of different types of Morse code keys around the world. From plain to fancy, from homemade to store-bought, and manual-mechanical to automatic-electronic, keys have been around in one form or another for a long time. However, I highly recommend the plain, old-fashioned "straight key" when starting out.

Just like holding a pencil or silverware, each person has his/her own way of holding a code key. The most important thing is to have a firm but comfortable grip. The most often recommended advice is to rest your forearm on the table and "press" rather than "tap" the knob to make contact and form proper characters (see photo).

As you learn to send the code, concentrate on making your sending as clear as possible and ignore speed. Speed will come with practice, but if you emphasize speed, you may sacrifice your accuracy. This is important to remember, because sending improper or hard-to-understand characters will make you less efficient in getting your message across, as you will have to send the same message many times. Besides, when operating in CW mode, your global reputation will be judged by the way you receive and send the code, so strive to be the best that you can be.

As you gain experience and proficiency in using the code, you can experiment with various other contraptions for sending and receiving, such as the electronic keyer, a semi-automatic ("bug") key, or using your personal computer to work CW. However, please save these accessories and gadgets until after you are comfortable with sending and receiving the code with the basic, straight key. Remember, too, proficiency comes with practice, and the best and most fun way to practice is to get on the air with your new language skill!

73, Wayne, KH6WZ

References and Resources

CW abbreviations and procedural signals: The ARRL has a nice summary of ham radio communications procedures, including the list of Q Signals, the RST reporting system, time conversion, and other information. It is called form FSD-220 and is available online at: <http://www.arrl.org/FandES/field/forms/fsd220.pdf>.

antennas

BY KENT BRITAIN,* WA5VJB

Many Transmitters, One Antenna . . .

or Getting the Most Out of an Antenna in a Good Location

This time we will look at some of the tricks broadcasters use to save on tower expenses, and how you can apply what *they've* learned to *your* ham station.

"Vertical Real Estate"

Tower rent is very expensive by ham standards. Even an antenna in a relatively out of the way part of the country can easily cost a broadcaster $10,000 to $15,000 a month for rent. Tower rental, or as they like to call it in the industry, "vertical real estate," is an economic model unto itself. As a tower owner, if you can figure out how to run two transmitters on that antenna, you have just doubled your monthly income. Split it three ways and triple your money. Four ways, perhaps? The magical income-doubler is called a *multiplexer* (or in some cases more than one multiplexer). The antenna owner can save as well, since a multiplexer can allow two or more transmitters to use the same antenna simultaneously.

In photo A we have the multiplexer feeding the antenna in photo B. A total of eight high-Q passband filters are combined to a single feedpoint. This way each transmitter thinks it is the only transmitter on the antenna. A review of the tuned frequencies on those filters showed the closest transmitters were 1.4 MHz apart. Therefore, even with eight transmitters in the 30,000-watt class, they could be spaced 1.4 MHz apart. Take a closer look at the antenna in photo B. See the fuzz in the picture? No, those are not video-compression artifacts, nor did the magazine printer need to clean its rollers. With seven TV transmitters and eight FM transmitters on that tower, plus other services, there was nearly a megawatt of RF running around. It's darn lucky the RF didn't fry my camera!

*1626 Vineyard, Grand Prairie, TX 75052
e-mail: <wa5vjb@cq-amateur-radio.com>

Photo A– Combining eight transmitters on one antenna.

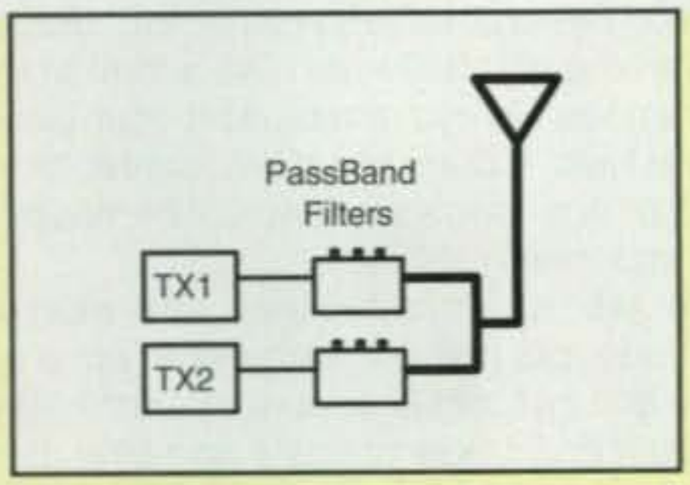


Fig. 1– A basic multiplexer system.

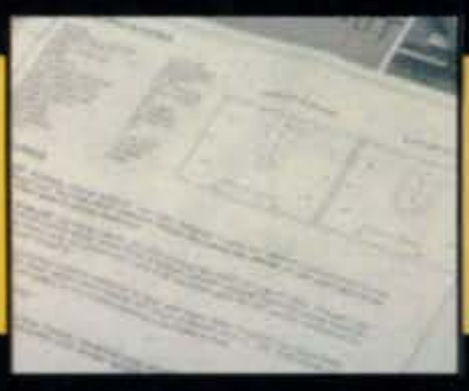
For hams this gives us the possibility of putting several repeater outputs, and even several links, all on the same antenna.

In fig. 1 we have the basic multiplexer system. A passband filter is tuned to the frequency of each transmitter. For a ham repeater system at a very choice site, you could have something like the setup shown in fig. 2. Now several repeaters can share the same site and the same antenna.

Another way would be as shown in fig. 3. There we have one high-power amp and several low-power exciters. As an example, let's say you are

Photo B– A circularly-polarized FM broadcast antenna (center), shot from inside the tower at 1500 feet, looking up toward a horizontal "candelabra" section at 1800 feet.

Attention New and Seasoned Ham Operators...

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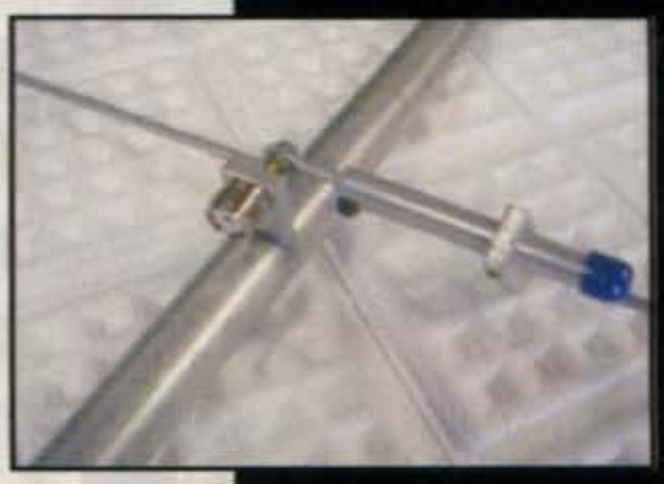
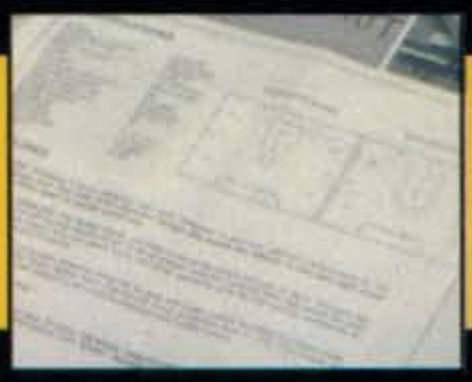


Attention 2.4 GHz antenna users...

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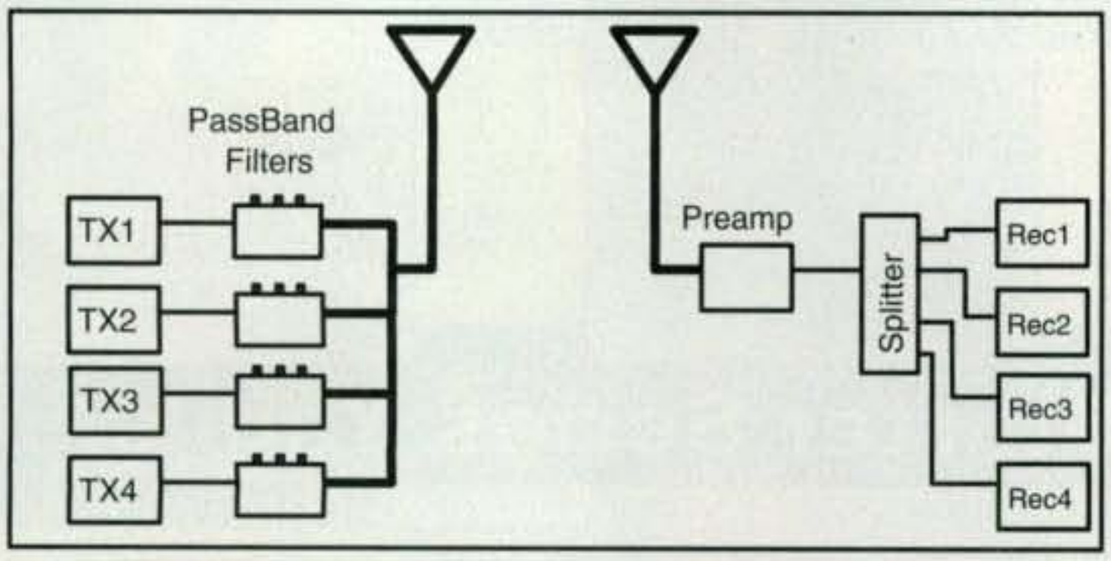

Fig. 2– Multiple transmitters and multiple receivers.

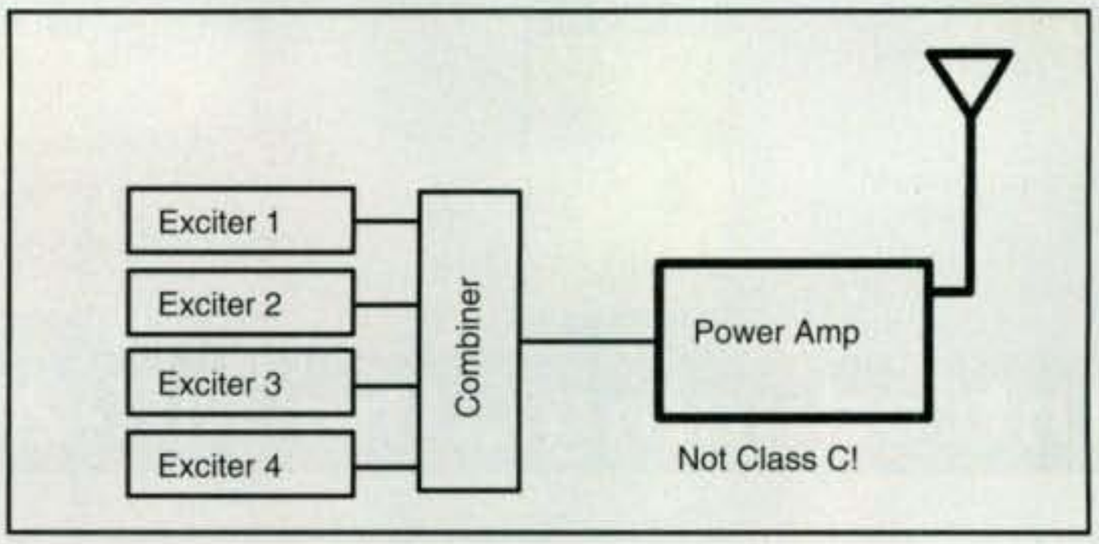

Fig. 3– Multiple transmitters on the same antenna.

Photo C– Ham-band ferrite circulators.

Photo D– Combining transmitters on the same frequency.

using a 100-watt amp and each of the low-power exciters can drive the amp to 25 watts. If all four of the exciters are in use at the same time, then the amp is driven to its full 100 watts. This is not very energy efficient. You really need to have a 100-watt linear amp, but you have multiple signals on one amp and one antenna. Heck, if your exciters are in the 1-watt range, you could use a TV four-way splitter as your combiner. Yes, they are used in 72-ohm video systems, but the splitter itself has no impedance. They are just as happy combining 50-ohm signals as they are 72-ohm systems. This arrangement of exciters and a power amp was quite popular back in the 1980s at many of the analog cell-phone sites.

Now we get to the really slick way that even lets you put two transmitters on the same antenna at the same time on *the same* frequency.

First you need a circulator or two like the ones shown in photo C. A ferrite circulator is sort of the RF equivalent of a diode—that is, the signal only goes in one direction. In fig. 4, we show how the signal only goes from port 1 to port 2, and port 2 to port 3, and port 3 back to port 1, in a circle. I guess that's why it's called a circulator. If you put a termination or dummy load on port 3, then a signal from port 1 goes to port 2 and on to the antenna. Any power coming back ends up in the termination. These could be very handy on 20 meters; the antenna could fall down and the rig would still see a 1 to 1 SWR. Of course, it would be hard to hear anything with that circulator in line, but we will kind of skip over that at the moment. Also, it is hard to build circulators below 100 MHz or so.

Also in photo C you will note a magnet stuck on the right circulator. The ferrite material is tuned on frequency using a magnetic field, so you can change the frequency of a circu-

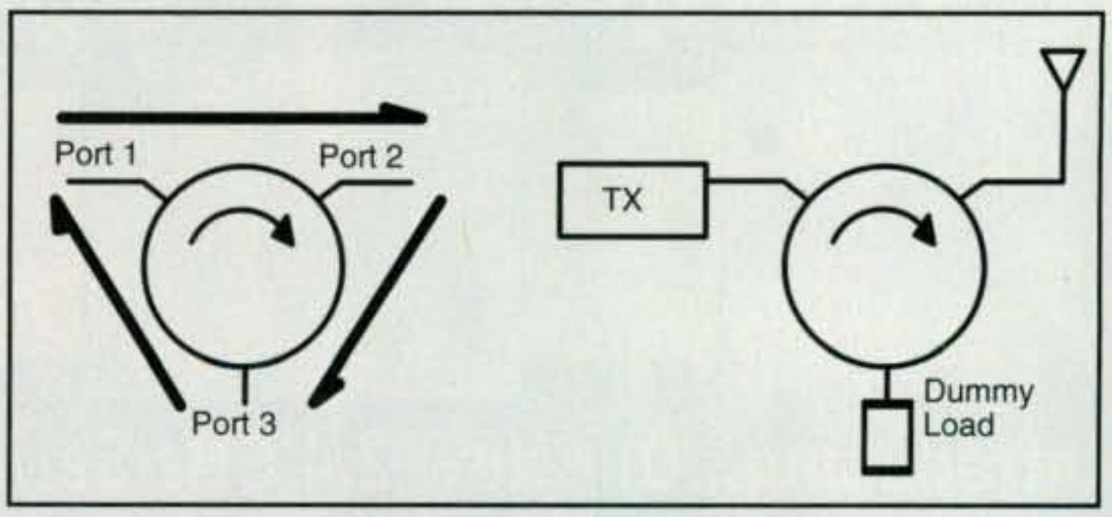

Fig. 4– Signal paths in a circulator.

lator about ±10% by changing that magnetic field. A few magnets carefully spaced while watching the reverse isolation will often tweak them into the ham band. If the circulator tuning goes the wrong way, just flip over the magnet and try again.

Note in photo C there is a warning to keep tools away from the circulator. That's not because you would magnetize your tool, but because you could change the circulator tuning.

In photos D, E, and F we have the filter arrangement for three new HD (high definition) FM transmitters. These stations have two transmitters—one running about 30 KW on the normal analog channel, and a second transmitter on the same frequency running 300–1200 watts from the digital transmitter. There are some spirited discussions among broadcast engineers as to just how much power you can put into the digital signal before the analog listeners start complaining about a buzz on their signal.

Fig. 5 starts out in the standard way with three passband filters for the three analog FM stations. The signals are com-

bined and run though 1800 feet of 6-inch line. At the antenna the signal goes into a 90–180° hybrid with one output to the horizontal elements in the antenna array, and the other output to the vertical elements in the antenna array. This phasing generates a circularly polarized signal. If everything is perfectly balanced in the hybrid and antennas, then there is very little power at the fourth port of the hybrid and that port is normally connected to a *big* termination or dummy load.

Now we get to the slick part. In fig. 6 you can see that fourth port of the hybrid

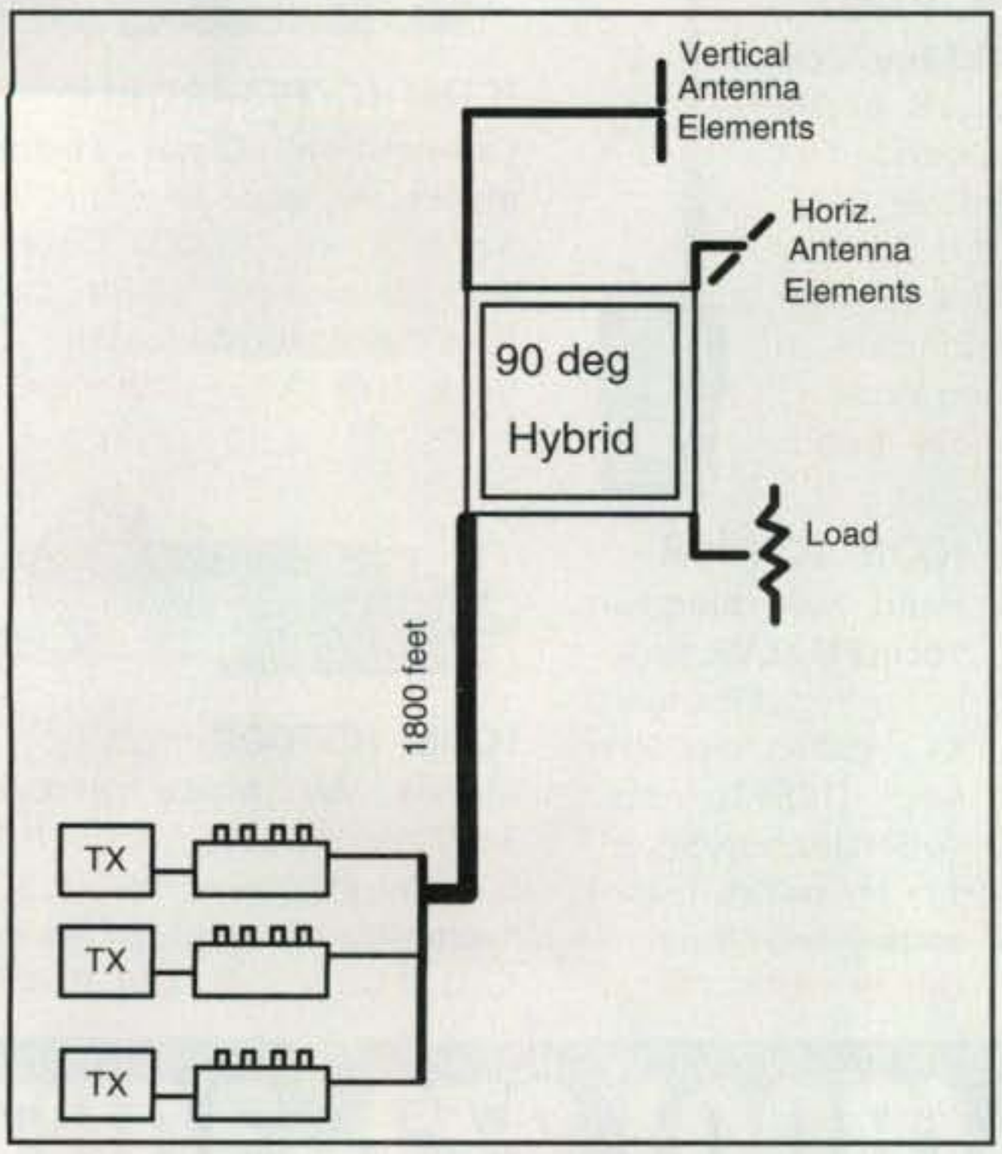

Fig. 5– Multiplexed FM transmitters.

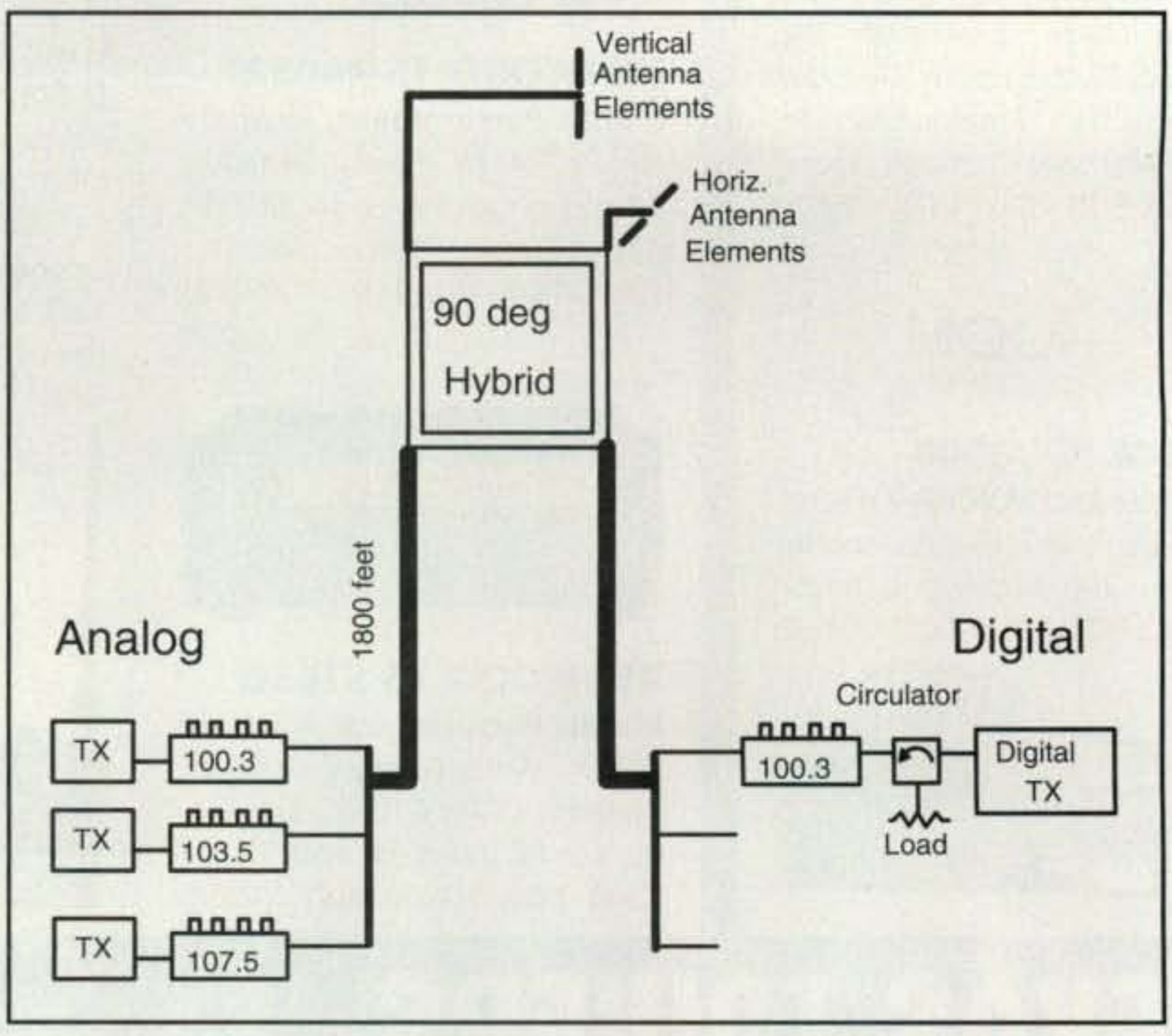

Fig. 6– Analog and digital transmitters on the same frequency.

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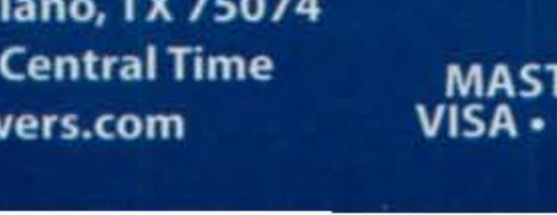

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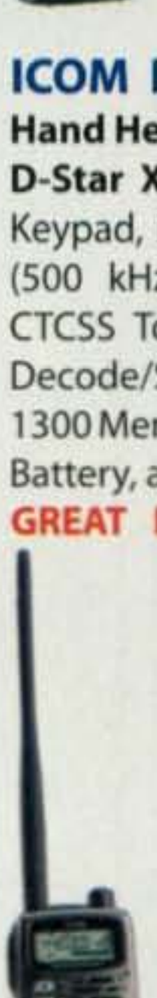

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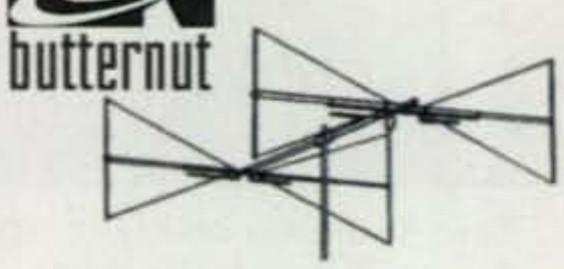

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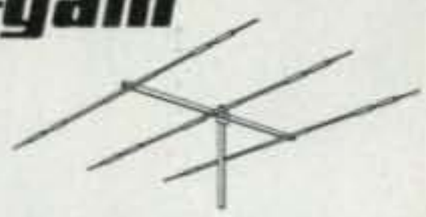

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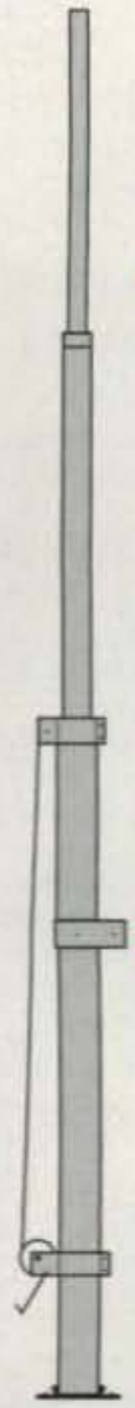

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Photo E– High-power interconnections.

has been connected to another 1800 feet of 6-inch line and run it back to another set of filters. Instead of a dummy load, a circulator is used going to the dummy load. Now the digital signal goes into that third port of the circulator, through the filter, and up to the hybrid. At the hybrid the phases all are reversed 90° and the signal again goes out circularly polarized. However, it's the opposite circular polarization. Three signals are right-hand circular polarization, and the other three signals are left-hand circular polarization. Slick trick!

With a similar ham system it would be possible to have two 2-meter repeaters on the same channel, or very close in frequency, using the same antenna.

There are many creative ways in which hams can maximize their limited "vertical real estate."

Cheap Non-Conductive Guy Wire

Keep an eye out for fiber-optic cable (photo G) at surplus stores and flea-markets. The standard cable has the optical fiber surrounded by a protective sheath of Kevlar™. In effect, this cable is Kevlar™ rope. It is very, very strong, it doesn't stretch, and years ago we even pulled a truck out of the mud with some of the larger fiber-optic cable. It's a great way to support a floppy boom, or an end section for that Field Day 80-meter inverted-V. However, you're on your own if you want to weave it into a bullet-proof vest!

Keep those letters and column ideas coming. You can e-mail me at <wa5vjb@cq-amateur-radio.com> and you can visit my website, <www.wa5vjb.com>, for other antenna construction articles. Now go out and get some more antennas in the air!

73, Kent, WA5VJB

Photo F– High-power 100.3-MHz ferrite circulator.

Photo G– Using surplus fiber-optic cable as guy wires.

our readers say

Scouts and Code

Editor, *CQ*:

I just finished reading the excellent article about NASA Administrator Michael Griffin, NR3A, in the March 2007 issue of *CQ*. It was a wonderful article, but there was one error that I noticed. The Morse code requirement was for the First Class Rank for the Boy Scouts, not Second Class. The requirement was to send and receive a message of a certain length, which I cannot remember, using either Morse or semaphore. There was no speed requirement and the Morse method used could be light, sound, or wig-wag flag, a system that used a single flag overhead. I remember it well, because wig wag was the method I used to complete the requirement for the First Class Rank. The Morse or semaphore requirement was the "big one." If a Scout could get past that one, chances were good that he would make it to Eagle. I made it.

The exposure to Morse and discovering crystal sets, etc., led to my amateur radio license in 1957 and later to a career in electronic engineering. It is a familiar story. I find remarkable similarities in the stories of many of my friends who are hams and engineers. Like Michael, I am also a pilot with commercial, multi-engine, and instrument ratings. Many of my ham friends are also pilots. I am also a musician and have found high correlation to music and Morse code ability in many ham friends.

By the way, the requirement for Morse was removed from the path to Eagle Scout several years ago, and I find little or no deterioration in the quality of the young men who have achieved the rank in subsequent years. Achieving the rank of Eagle Scout remains one of my life's most significant accomplishments. The things I learned along the path to Eagle have been invaluable, perhaps more so than any other activity I have participated in.

There may be a corollary to amateur radio here. Removing the code requirement doesn't necessarily have to result in a deterioration of the amateur radio service.

Dave Sublette, K4TO

Dave: That correlates with my memory as well ... in 20/20 hindsight. The important thing, of course, was that Mike was introduced to ham radio through Scouting. That connection still exists today, through various merit badges, despite there no longer being a code requirement in either Boy Scouts or ham radio.—W2VU

Finally . . . Extra Class

Editor, *CQ*:

After literally 51 years of hacking away trying to learn Morse code, the FCC finally liberated us, and in the space of one weekend I went from no-code Tech to Extra. I didn't want to get too loud in public about it, but I did mention it to my adult daughter with some glee in my voice. Her comment, with some glee in *her* voice: "Pop, I always knew you were an extra-class ham!" I guess I raised her right!

John A. Amos, KC6TVM

5A7A and the Fake QSL Card

Editor, *CQ*:

With reference to "Zero Bias" (April 2007) and the situation that arose over the 5A7A QSOs and QSLs, DXpeditions seeking funds and equipment from the international community should make their QSO and QSL policies known at the time they are soliciting assistance. Then those who are considering whether or not to

(Continued on page 106)

how it works

BY DAVE INGRAM,* K4TWJ

A Behind-the-Dials Look at Transmitters – Part II

Our study of amateur radio transmitters that began in the May "How It Works" column with an overview of Spark, CW, FM, and AM continues this month with an in-depth look at single sideband and its associated circuits, such as those used in modern transceivers. We will consider how SSB signals are generated and frequency-converted for transmission on various bands and also trace their path of signal flow in a modern transceiver. A creditable amount of useful information is included in this discussion, so earmarking it for future reference is a good idea. Let's begin with a ground-floor look at single sideband.

Some Basic Facts

First let's visualize how CW and AM signals might appear if you could see them on a receiver's dial or a spectrum analyzer (fig. 1). (*Note:* A spectrum analyzer displays frequencies on the horizontal plane and amplitude variations on the vertical plane.) CW is produced by switching a transmitter fully on and off with a telegraph key to send Morse code, so its signal (often called a "carrier") is either present (on key down) or not present (on key up).

AM is produced by varying or modulating the amplitude of voltage and current applied to a transmitter's power-amplifier stage. As a result of varying the transmitter's input (and output) power 500, 1000, 2000, or 3000 times per second, something interesting happens. New frequencies on each side of the main/carrier signal—frequencies called "sidebands"—are produced. When we take a closer look at these sidebands, we see their spacing from the carrier is also equal to the modulating frequencies and each sideband is a mirror image of the other. With the carrier on 7200 kHz, a 1000-Hz tone would thus produce sideband signals on 7199 and 7201 kHz, , and complex speech encompassing not one frequency but all frequencies between 100 Hz and 3000 Hz would produce sidebands of frequencies filling the full range of 7197 to 7203 kHz. There is no special significance to 7200 kHz here. I only chose it as a random example and a common frequency recognized by many.

Now look at fig. 2 and consider this point: Since the carrier's level is constant and contains no intelligence (but represents 50 percent of the transmitted signal's power), and the two sidebands each representing 25 percent of the transmitted signal's power are mirror images of one another, why not eliminate the carrier and one sideband? Then 75 percent more power can be added to the remaining sideband. That is the logic behind the use of SSB. Here's another point: The concept of AM signal demodulation or detection typically involves using a diode to rectify a modulation envelope, and then bypassing the remaining RF energy

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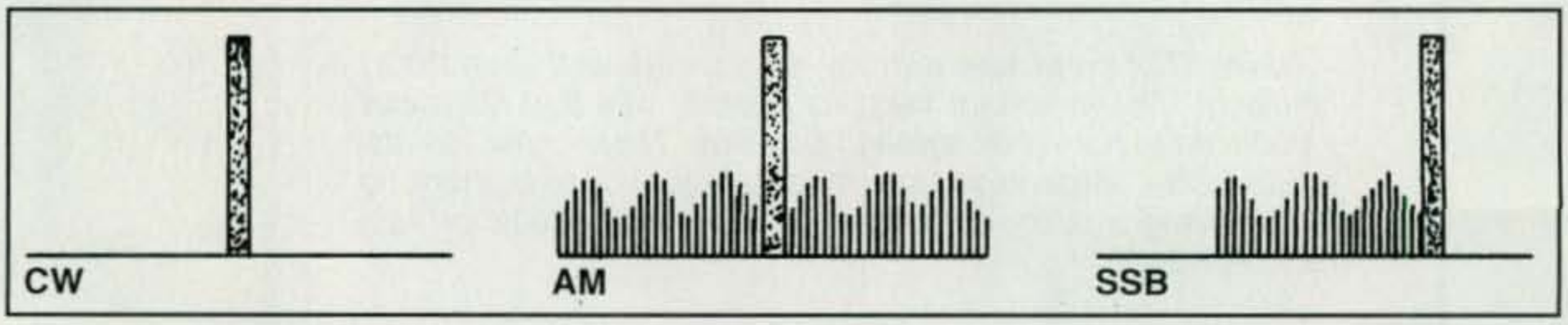

Fig. 1– An example of how CW, AM, and SSB signals might appear on a spectrum analyzer. Frequencies are displayed on the horizontal plane, while amplitude is displayed on the vertical plane. Note: The AM and SSB signals are shown modulated by a single 1000-Hz tone for simplicity rather than complex speech (you can see the semi-apparent sine wave across the top of the sidebands).

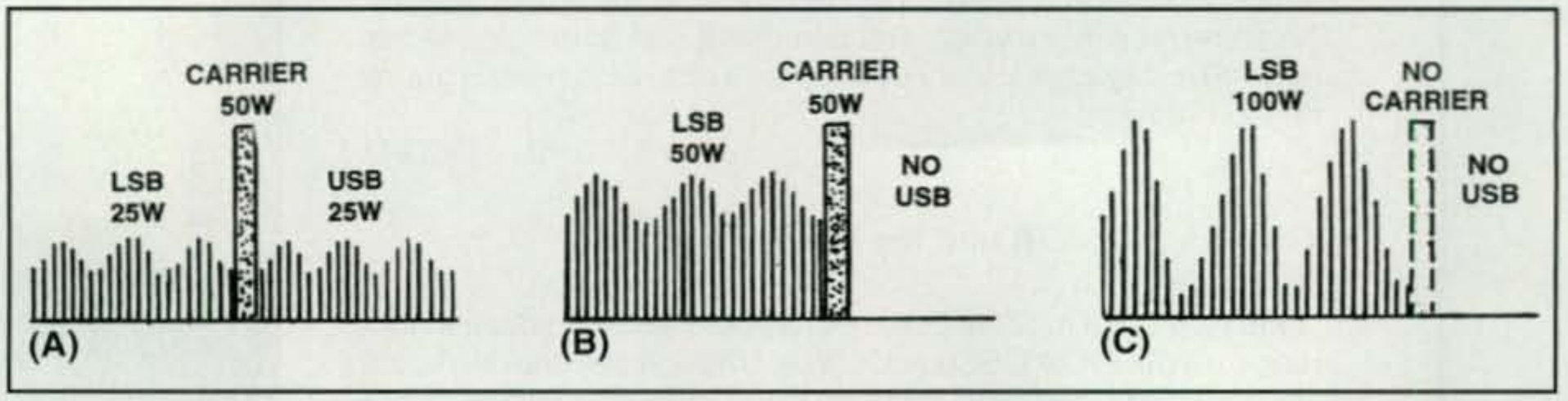

Fig. 2– This illustrates the benefits of using SSB rather than AM. In (A) the constant-level or "key down" carrier represents half of the transmitted power and each sideband represents one-fourth of the power. In (B) one sideband has been eliminated and its power applied to the other sideband. In (C) the carrier has also been eliminated and its power has been applied to the other sideband. As an overall result, power in the SSB signal is four times greater than in the AM signal.

to ground while passing resultant/detected audio to a following AF amplifier stage. A diode also functions as a mixer, however, so we could also say it beats a varying-level sideband with a fixed-level carrier, and resultant audio difference is then passed to a following AF amplifier stage. However, since SSB signals lack a carrier for beating or heterodyning with a sideband, how are they detected at a receiver? The (incoming) SSB signal and a carrier-synthesizing signal from a BFO (beat frequency oscillator) within the receiver mix in a stage called a product detector, and the resultant difference (audio) is passed to a following AF amplifier stage.

That covers the basic "why and how" of SSB. Now let's focus on the working concept and finer points of SSB.

Generating SSB Signals

As you may recall from your ham radio license exam studies, the two main requirements and/or circuits for production of SSB signals are a balanced modulator, which "balances out" the carrier and leaves both sidebands, and the crystal filter, which filters out one of the remaining sidebands. The resultant 75-percent increase in power is then contained in the single remaining sideband, which is normally the lower frequency sideband for 160, 75, and 40 meters or the upper frequency sideband for 20, 17, 15, 12, 10, and 6 meters. The actual generation of SSB signals is slightly more complex, however, especially in modern transceivers that share crystal filters for both transmitting and receiving and share oscillators for single-knob frequency tuning. As an easy approach to understanding this concept, the block diagram of a typical SSB transmitter, such as you might see on the General Class license exam, is shown in fig. 3. Let's follow its theory of operation.

Starting at the microphone, incoming sounds or speech is converted to small voltage equivalents, boosted in level, and applied to one input of the balanced modulator. An RF signal, generated by a carrier oscillator and operating at the frequency of the crystal (IF) filter rather than the desired output/transmit frequency, is applied to the other input of the balanced modulator. The balanced modulator then nulls the carrier, leaving both sidebands that are RF equivalents of the microphone-derived audio.

The crystal filter typically has a bandwidth of 2.4 or 2.6 kHz and will pass only one sideband, so a single-sideband suppressed-carrier signal appears at its output. That signal is then amplified and applied to one input of an IF mixer. A second oscillator signal is applied to the mixer's other input, and then a following IF amplifier is tuned to, and consequently boosts, the sum of those two frequencies. That signal is directed to one input of a second mixer that beats it with the VFO's tuned frequency and produces an output signal for power amplification and output to the antenna.

An Actual Transceiver Study

We have covered the basic concepts, so let's now use our acquired knowledge to follow actual signal paths through the maze of wires and circuits in a modern transceiver. I selected a Kenwood TS-570 for the following discussion, because it and/or its big brother, the TS-2000, are outstanding performers with a wealth of really useful features and fairly easy-to-understand circuitry, and are two of the all-around best buys in amateur radio today. With

Photo A– Kenwood's popular TS-570S was selected for this month's behind-the-dials study because it is a high-performance and economically priced transceiver with straightforward and easy-to-understand circuitry.

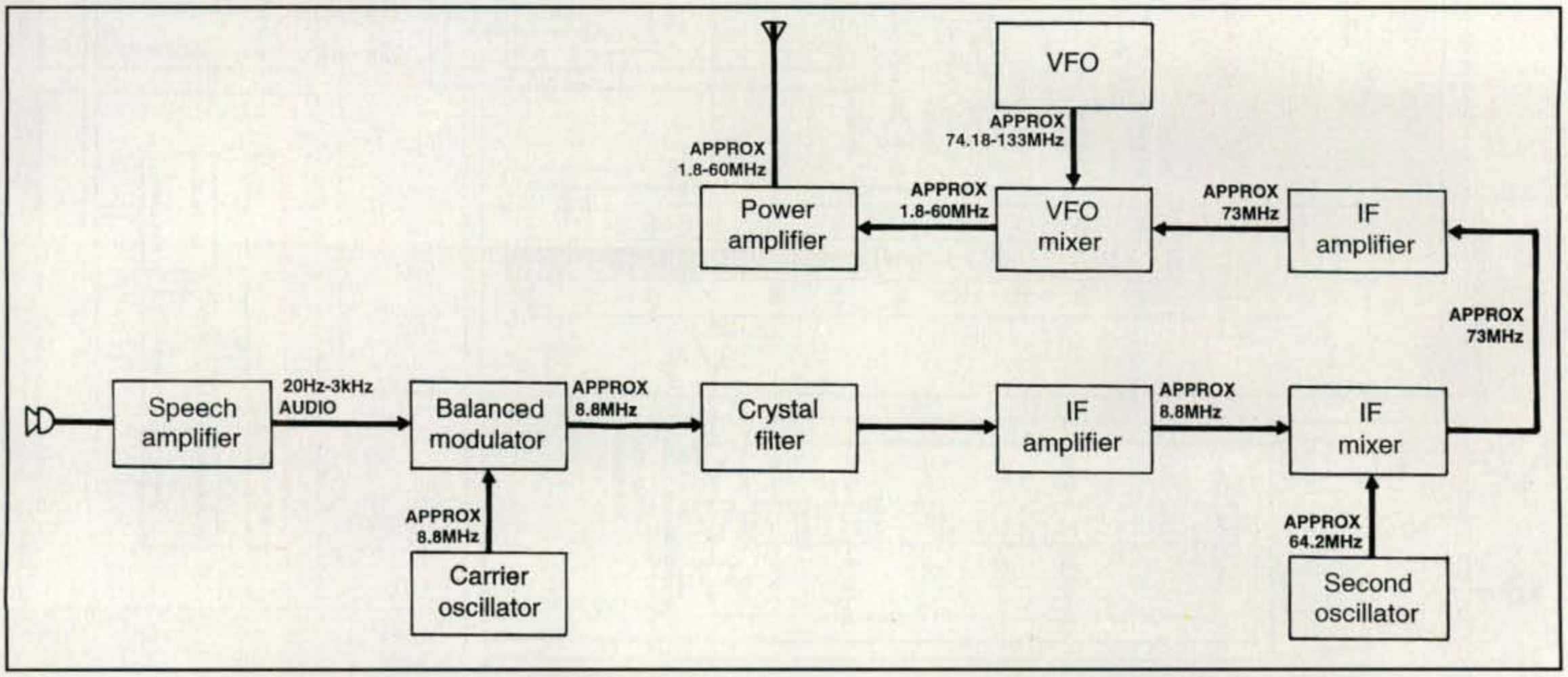

Fig. 3– Block diagram of a typical SSB transmitter, less special features such as DSP, IF tailoring, etc.

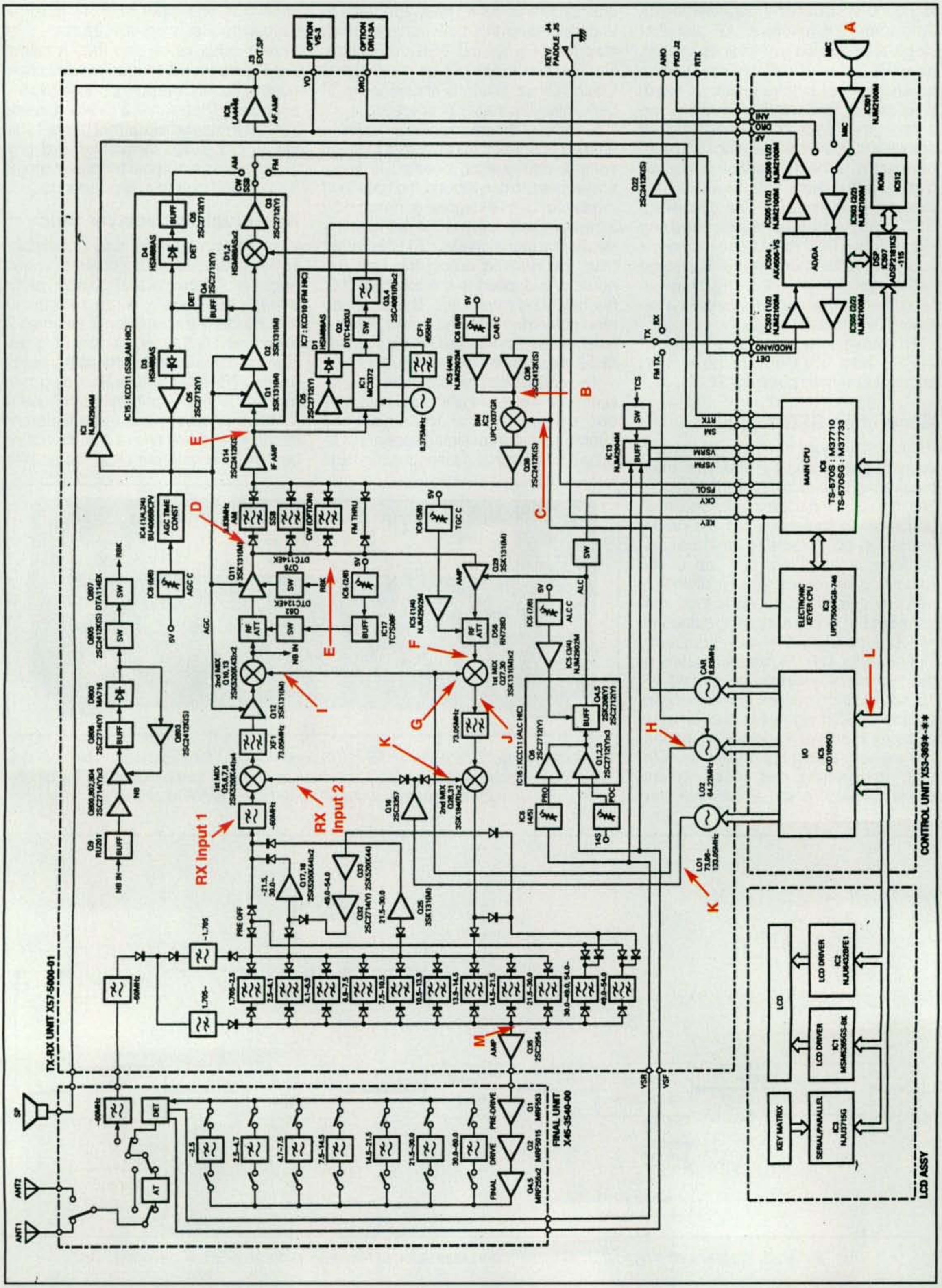
TX-RX UNIT X57-5000-01
CONTROL UNIT X53-369*-**
FINAL UNIT X45-3540-00
LCD ASSY
MAIN CPU
ELECTRONIC KEYER CPU
RX Input 1
RX Input 2
OPTION VS-3
OPTION DRU-3A
AF AMP
IF AMP
AGC TIME CONST
AGC C
ALC C
CAR C
TGC C
RF ATT
LCD DRIVER
KEY MATRIX
SERIAL/PARALLEL
PRE-DRIVE
DRIVE
FINAL

Fig. 4– Block diagram of a Kenwood TS-570S HF transceiver reduced in size to fit available magazine space. Use your pocket magnifier to study it and to follow signal paths discussed in the text and marked here as points A, B, C, D, etc., and you can acquire a good idea of how modern SSB transceivers work. ←

an affordably priced HF rig you can work the same stations in the U.S. and around the world that you can work with a super-expensive transceiver.

Our study begins, appropriately enough, at the microphone, where sounds are converted to extremely low-voltage equivalents (point A in the lower right corner of fig. 4). The resultant audio signal is then amplified, converted to a digital equivalent, applied to a DSP (digital signal processing) unit (IC-507), converted back to analog form, passed through two amplifiers, and applied (as audio) to one input of a balanced modulator (point B, IC-2). A carrier signal from an 8.83-MHz oscillator is applied to the balanced modulator's other input (point C, IC-2). The output, a double-sideband suppressed-carrier signal is buffered by Q38, and forward-biased diodes direct it (from right to left) through a 8.83-MHz SSB crystal filter, which filters-out/drops one sideband and produces an SSB signal.

I will point out at this time that the forward-biased diodes would also pass a CW signal (produced by unbalancing IC-2 and disabling its audio input) through the SSB filter on transmit—and also on receive, if an optional CW filter is not installed. If the optional CW narrow filter is installed, diodes switch it in only during receive. The SSB filter continues in use during transmit. Notice that here a received signal (arriving from Q11 at point D) travels left to right through the crystal filter and on into IC-15, the product detector (point E), although a transmitted signal travels right to left through the crystal filter. This is called bi-lateral operation and it works because quartz crystals and crystal filters do not have specific input and output connections (or ports, if you prefer computer terminology).

Continuing on from the SSB filter's output (point E), the signal proceeds through amplifier Q29 and into balanced first mixer Q27, 30 (point F). Why a balanced mixer? It exhibits exceptionally "clean" and low-noise operation and ensures an excellent-quality transmitted signal. The mixer's second input (point G) comes from local oscillator 2 (point

H), and up-converts the transmit signal to 73.05 MHz. Notice here that the signal from local oscillator 2 also feeds the receiver's second balanced mixer, Q10, 13 (point I) for down-converting 73.05 MHz received signals to 8.83 MHz so they can pass through following crystal filters. The concept of up-converting on transmit and down-converting on receive may sound wild, but it is necessary for reducing reception of interference on image frequencies and for producing single-knob tuning with transceivers.

Returning to the first mixer (points F and G), the output transmit signal passes through a 73.05-MHz filter and is directed into the transmitter's second balanced mixer, Q28, 31 (point J). Notice that mixer's second input comes from local oscillator 1 (point K). This oscillator is also tunable from 73.08 to 133.05 MHz, and it feeds both the receive and transmit mixers. That is because the front panel's main tuning knob changes the frequency of local oscillator 1 (and thus the "second input" of the second transmit mixer Q28, 31 plus the "second input" of the first receive mixer Q5, 6, 7, 8) to select operating frequencies. Changing bands and/or recalling frequencies from memory simply involves punching buttons that direct the rig's main CPU (IC-6) to output a preset digital count to I/O chip IC-5 (point L). In turn, IC-5 sends an equivalent voltage to local oscillator 1 and shifts to the selected frequency.

Now returning to the second mixer (point J), the resultant signal passes through one of 11 diode-specified band filters over the 160–6 meter range and into amplifier Q35 (point M). The signal is then RF amplified by Q1, Q2, Q4, Q5 and passed left to right through one of seven bandpass filters; passed through an SWR detector, a T/R switch, an antenna tuner (or bypass line), a "1-2 switch"; and output to the antenna. Hopefully you are still with us and did not experience a case of severe whiplash at this point!

Space is now limited, but let's briefly step back and add some fine points of significance. First, look back at LO-2 (point H) and notice how its 64.22-MHz signal feeds the receiver's second mixer of Q10, Q13 (point I). Since this oscillator is under microprocessor control by the main CPU (IC-6), its frequency can be shifted ever so slightly and only during receive. As a result, the mixer's output (on a second IF of 8.83 MHz) shifts the receive passband up or down with respect to the crystal filter. That's what happens when you adjust the TS-570's IF Shift control. Similarly, changing the frequency of LO-2 approximately 3 kHz reverses the position of a received sideband within the crystal filter's bandwidth and changes between lower and upper sideband. In other words, slightly changing the span of signals going into a filter determines whether treble or bass tones "get through" best, and noticeably changing the span of signals determines whether tones to the "right" or "left" of a "missing carrier" pass through a filter.

Conclusion

We have covered significant ground in this month's column—in understanding the basic concepts of SSB transmission (and reception), covering the techniques of tracing signal paths in modern transceivers, and in understanding the transceivers' general theory of operation. Looking forward from this point, we have yet to discuss how different bandwidth filters affect both receive and transmit operation, how and where IF-level DSP circuits fit into a transceiver's circuitry, and how AF-level DSP can co-exist and complement either crystal filters or IF DSP. Those topics will be the focus of our next "How It Works" column coming in two months. Watch for it!

73, Dave, K4TWJ

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the weekender

BY PHIL SALAS,* AD5X

An AC Line-Isolated High-Voltage Vacuum-Tube Power Supply

Photo A– Remounted power supply in larger box compared to original inverter case.

A resurgence in the interest in vacuum-tube transmitters and receivers has resulted in a surprising number of vacuum-tube circuits described recently here in *CQ,* as well as in other ham radio publications. In most cases, these vacuum-tube circuits require a high DC plate voltage. While you can still buy high-voltage plate or isolation transformers, now they are quite expensive (as are the filament transformers). A popular alternative to a plate transformer is to just directly rectify the AC wall-outlet source. However, this can be very dangerous in that you must ensure that the AC hot, neutral, and ground connections are *always* correctly connected or a shock hazard will occur.

How can you inexpensively generate an AC line-isolated high-voltage DC power supply for that vacuum-tube receiver or low-power vacuum-tube transmitter? Read on.

I recently was faced with this power-supply problem, as I had obtained an old military ARC-5/BC-455 6–9 MHz receiver that I wanted to bring to life. These are neat little receivers that were used in bombers and fighter planes during WW II. The ARC-5 receivers use six tubes with 12-volt filaments, with the tubes paired up and each pair's filaments wired in series so as to operate from 26 VDC. Since most hams have a 13.8-VDC power supply, the filament problem can be solved by rewiring all the tube filaments in parallel for operation directly from a 13.8-V power supply. However, I still had to generate the high DC plate voltage needed by the receiver.

Recently, while I was flipping through my All Electronics catalog, a listing for one of those inexpensive 13.8-VDC/120-VAC inverters jumped out at me. Since I was already planning to use my 13.8-VDC power supply for the receiver tube filaments, why not use this same source to power an inverter and then rectify the inverter output for the high-voltage DC needed? This would give me the AC line-isolated DC output that I wanted! Thus, with a few key strokes my All Electronics order was placed online.

Upon receiving the inverter, I opened up the plastic box and removed the inverter printed-circuit-board assembly. I remounted this assembly in a larger plastic box (5.6" × 3.25" × 1.9") so that I could easily fit in everything. With a little work, you could probably fit the rectifier/filter circuitry (shown in fig. 1) in the original box after removing the AC output connector, but I elected to use the larger box. Of course, your plastic-box size will depend on the dimensions of the inverter you choose to use. Photo A shows my new-box/old-box comparison. Photo B shows the All Electronics inverter mounted in the new box with the added rectifier circuitry, and photo C shows a close-up of the rectifier circuitry. The in-line fuse is not visible in photo C, as I decided to put it inside the ARC-5 receiver. Table I details the power-supply parts and the part sources. The ARC-5 receiver works great with a plate supply of 125-250 VDC, so the full-wave bridge is perfect for this application, as this provides about 170 VDC. For other applications, you may wish to half-wave rectify the AC output, or use voltage doublers or triplers, depending on your particular high-voltage requirements.

This power supply works great. It is inexpensive and gives you an AC line-isolated high-voltage DC supply. *Of course, you must exercise precautions whenever you work with high AC or DC voltages, as these can be lethal.* However, if you do need to generate a high DC voltage for a vacuum-tube receiver or transmitter, give this idea a try.

That's it for this month. Until next time . . .

73, Phil, AD5X

Photo B– Internal view of the inverter mounted in the new box with the rectifier circuitry.

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

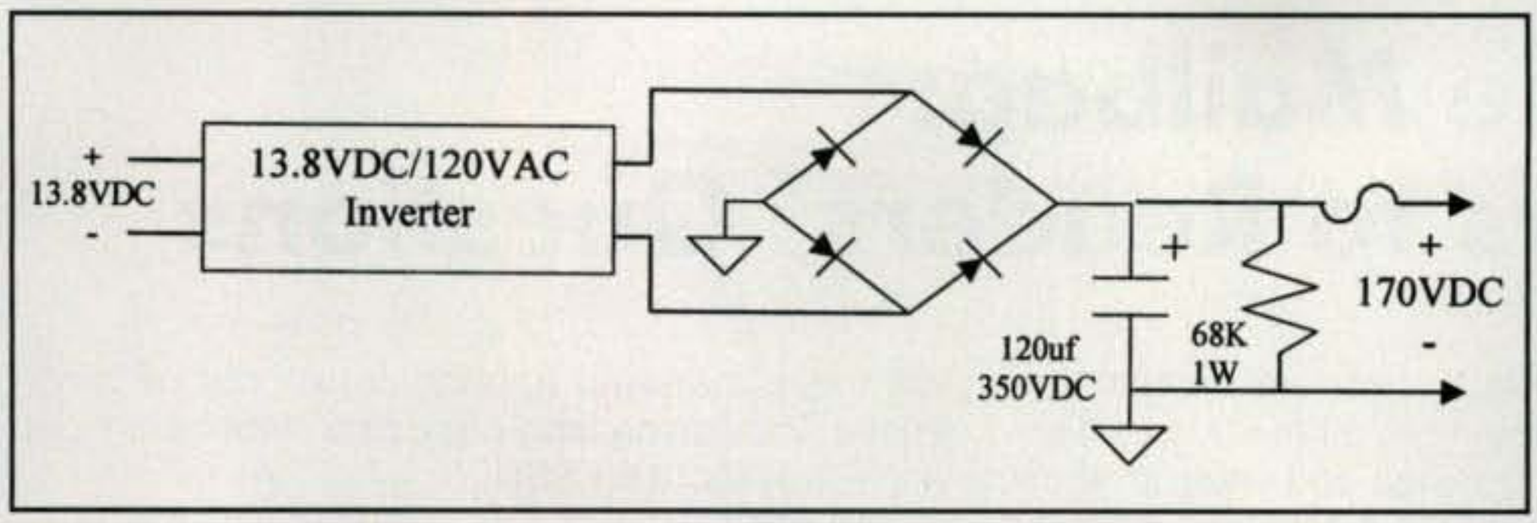

Fig. 1– High-voltage DC power supply.

Qty.	Description	Source/Part No.	Price ea.
1	Molex 2-pin plug	Mouser 538-03-06-2024	$0.20
2	Molex 0.062 pins	Mouser 538-02-06-2103	$0.18
1	Molex 2-pin recept.	Mouser 538-03-06-1011	$0.20
2	Molex 0.062 sockets	Mouser 538-02-06-1103	$0.18
1	68K 1-watt resistor	Mouser 594-5073NW-68K00J	$0.16
1	0.375A in-line fuse	Mouser 576-0251.375MXL	$0.62
1	Plastic Box	Mouser 635-053-B	$8.00
1	Terminal Strip	Mouser 158-1005	$0.55
1	13.8V/120V inverter	All Electronics INV-80	$17.00
1	120uf/315V cap.	All Electronics EC-1235	$1.10
1	Bridge rectifier	All Electronics FWB-15	2/$1.00
2 pairs	Anderson connectors	Powerwerx PP-RB-15-10	10/$10.00

Note: Mouser Electronics (www.mouser.com/); All Electroncs (www.allelectronics.com/); Powerwerx (www.powerwerx.com/).

Table I– High-voltage power-supply components.

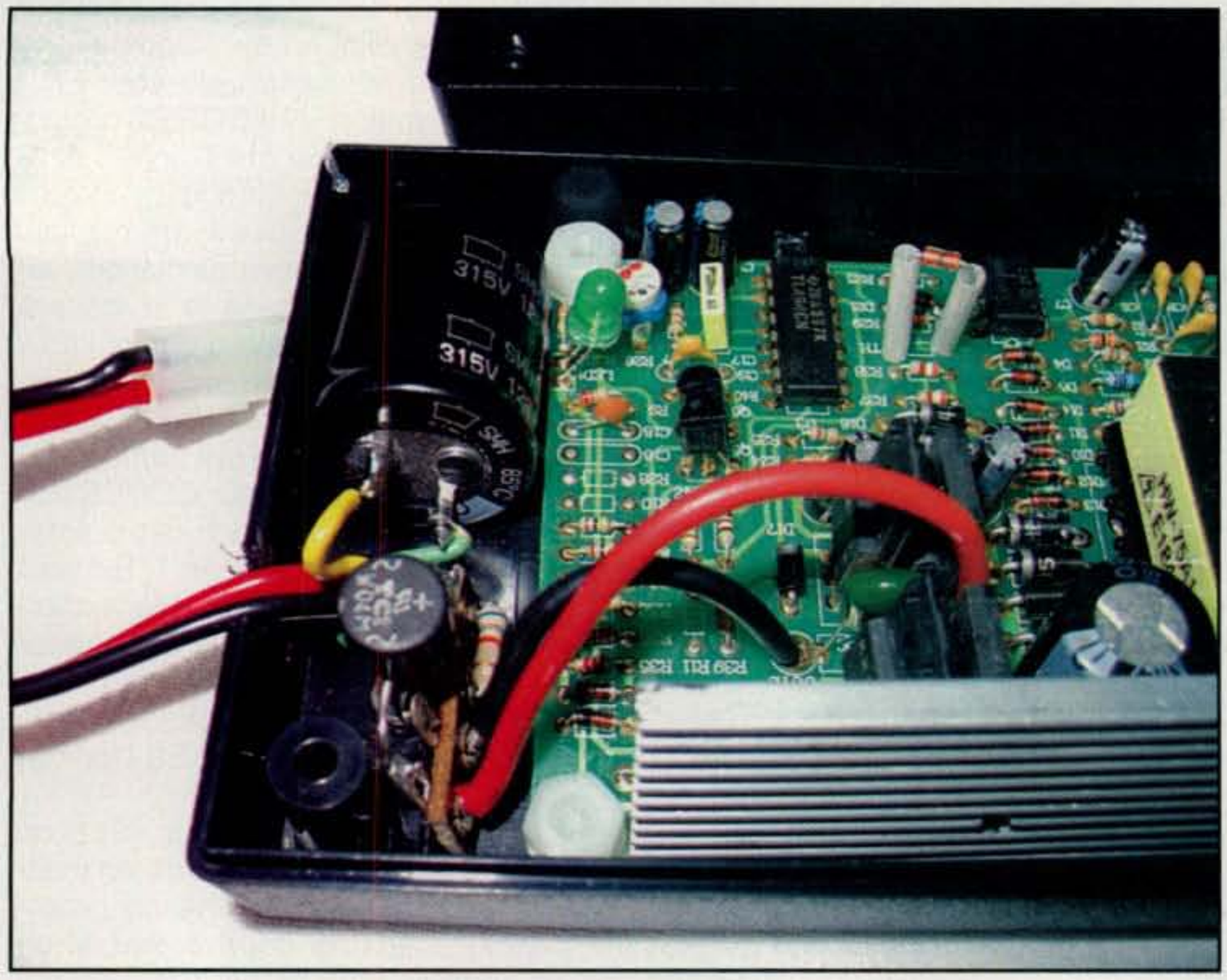

Photo C– Close-up of the rectifier circuitry, all mounted on the All Electronics tie-point strip.

BY FREDERICK O. MAIA,* W5YI

From the Mailbag: Answers to Readers' Questions

We save questions of general interest from readers and every so often we write a column covering things you want to know. The two subjects we get the most inquiries about concern the confusion surrounding amateur radio station callsigns and dealing with FCC procedures. This month let's cover a few of these questions. The first concerns FCC administrative policies.

Q: "What is an FCC Registration Number ... and why is it necessary?" Another reader asked: "It seems that the FCC is obsessed with acronyms. What do they all mean?" Still another asked about FCC databases: "I know about the Universal Licensing System database. What is the CORES database?" Let's try to answer all of these questions at the same time.

A: The FCC Registration Number, or FRN as it is called, is a unique ten-digit publicly available customer identification number. Use of FRNs began in 2001 when the Commission concluded it needed to streamline its fee-paying and debt-collection activities.

FRNs also assist the Commission in complying with the Debt Collection Improvement Act of 1996 (DCIA), which requires the FCC to withhold any benefit—including the processing or granting of any license, application, or other authorization—when the applicant has a delinquent non-tax debt owed to the federal government.

Every FCC licensee is automatically assigned an FRN by the COmmission REgistration System (CORES) when they initially apply for a "benefit," such as a new license. CORES is basically a database that contains your personal information data: name, address, telephone and fax number, e-mail address, and Taxpayer Identification Number (TIN).

The TIN for individuals is your nine-digit SSN (Social Security Number). It is just not the FCC that requires you to divulge your SSN. A provision of the DCIA, a law enacted by Congress, requires that all federal agencies collect your SSN and turn it over to the Treasury Deptartment for any needed non-tax debt-collection action.

The SSN is always requested as part of the original license application. If you do not want to put it on your application, you must submit to CORES a separate FCC Form 160 (CORES Registration Form), which must contain your TIN, and CORES will assign you an FRN. (The form is online at <http://www.fcc.gov/omd/pra/docs/3060-0917/3060-0917-05.pdf>). U.S. citizens can't get or renew a license, or apply for a vanity callsign, without an FRN. Failure to supply your SSN to the FCC will mean that your application will not be processed. Foreign nationals and club stations can get an FRN without an SSN.

You can't conduct any business with the FCC unless you have an FRN. As a general rule, once you have an FRN, you do not have to supply your SSN to the FCC again. The exception to that is when someone forgets the password that protects the FCC licensee (Universal Licensing System [ULS]) database and needs to apply for a new password.

The CORES database is completely separate from the FCC's password-protected Universal Licensing System database of licensees. The CORES database really has just become a listing of applicants and their SSNs (the only component of an FRN that never changes), since few radio amateurs know that by law they must keep their CORES listing updated.

Although there is a way for the public to keep their CORES customer database record updated, there is no mention in the Part 97 rules that says it must contain current information. The regulations concerning FRNs are contained in the Part 1 rules, which cover FCC "Practice and Procedure." Extremely few radio amateurs ever correct their CORES listing or even know that it exists.

You can (and should) update your CORES listing by going online to <http://www.fcc.gov/> and clicking on the CORES link on the top left-hand side of the page. Then click on the "Update" link on the next page. You will need both your FRN and ULS password to amend your CORES record.

You will find your FRN on most of the online amateur radio licensee databases, including <http://www.qrz.com/> and <http://www.arrl.org/fcc/fcclook.php3>. The password assures that only an authorized person can gain access to or make a modification to your FRN data. If you do not know your password, you can get assistance by calling FCC Tech Support (weekdays 8 AM to 6 PM Eastern time) at 877-480-3201 (a toll-free number).

FCC Regulations require that your CORES listing be accurate, something of which radio amateurs seem to be totally unaware. (Part 1, Subpart W – Section §1.8002(b)(2) reads: "Information provided when registering for an FRN must be kept current by registrants either by updating the information on-line at the CORES link at <www.fcc.gov> or by filing FCC Form 161 (CORES Update/Change Form.")

The Part 97 Amateur Service rules (Section §97.23) only require that licensees keep their mailing address correct in the FCC's Universal Licensing System. Most amateurs believe that when they submit an address change all FCC records are updated. That is not really the case. The CORES database is maintained by the FCC's

*1020 Byron Lane, Arlington, TX 76012
e-mail: <w5yi@cq-amateur-radio.com>

Office of Managing Director (OMD); the ULS licensee database is maintained by the Wireless Telecommunications Bureau (WTB). The two systems do not talk to one another.

Q: "The FCC says it is going to reduce the fee for vanity callsigns from $20.80 to $11.70 in September. How did it determine this cost?"

A: A good question indeed! On April 18, the FCC proposed reducing the regulatory fee to obtain or renew an amateur radio vanity callsign by more than 40 percent starting this September. The amount paid to the FCC for vanity callsigns is called a "Regulatory Fee."

These assessments (authorized by Section 9 of the Communications Act) are paid by users of the radio spectrum to reimburse the government for regulatory costs associated with the FCC's enforcement, policy and rulemaking, user information, and international activities. The total fees paid by users are determined annually.

Each year, as part of the passage of the federal budget, Congress establishes an amount that the FCC must collect in regulatory fees. For Fiscal Year 2007, the FCC must collect some $290 million to fund its operations—about a 3-percent reduction from last year's $299 million.

In the spring of every year, the FCC issues a Notice of Proposed Rulemaking alerting the public of the amount of these regulatory fees. Nearly every spectrum user pays the fee, which is usually passed on to the public in higher costs. Interstate telecom (especially telephone and cellular) companies, land mobile (business radio), cable TV companies, and broadcasters pay the most in total dollars.

The law does not specifically exempt any group from paying this fee, although it does allow the Commission the right to waive, reduce, or defer payment of a fee "for good cause shown, where such action would promote the public interest." The FCC has interpreted this to mean that regulatory fees will not be applied to non-commercial users such as state and local governments, amateur radio operator licensees (other than amateur vanity callsigns), and non-profit organizations.

A little known fact is that the fee amount that the FCC assesses its spectrum users is not based on their actual costs. Instead, all Regulatory Fees are determined by the amount of the Commission's annual budget, and the fees each user group pays is adjusted up or down accordingly.

The FCC estimates that some 14,700 radio amateurs (the FCC calls them "payment units") will request and receive, or renew, a ten-year term vanity callsign during FY-2007, which begins October 1, 2007. The vanity callsign Regulatory Fee is payable not only when applying for a new vanity callsign, but also upon renewing a vanity callsign for a new 10-year term—something that started just last year.

Last year vanity callsign recipients were asked to recover $177,000, which worked out to $20.80 based on the FCC's estimate of 8500 callsigns. For FY-2007, vanity callsign recipients are being asked to chip in $171,600—a lesser amount in line with the overall budget reduction of about 3 percent.

The FCC, however, estimates that 14,700 radio amateurs will apply for or renew a vanity callsign in FY-2007, a substantial increase over FY-2006's estimate. Apparently, the FY-2006 estimate of 8500 callsigns was low and did not include renewals, because the

1 letter, 1 digit, 1 letter except X:	K1A–KØZ, N1A–NØZ, and W1A–WØZ
1 letter, 1 digit, 2 letters:	K1AA–KØZZ, N1AA–NØZZ, W1AA–WØZZ
1 letter, 1 digit, 3 letters:	K1AAA–KØZZZ, N1AAA–NØZZZ, W1AAA–WØZZZ
2 letters, 1 digit, 1 letter:	AA1A–ALØZ, KA1A–KZØZ, NA1A–NZØZ, WA1A–WZØZ
2 letters, 1 digit, 2 letters:	AA1AA–ALØZZ, KA1AA–KZØZZ, NA1AA–NZØZZ, WA1AA–WZØZZ
2 letters, 1 digit, 3 letters:	KA1AAA–KZØZZZ (except KA2XAA–KZ9XZZ), WA1AAA–WZØZZZ (except WA2XAA–WZ9XZZ). The excepted 2-by-3 calls are allocated to "Experimental" stations.

Table I– How U.S. amateur radio callsigns may be assigned.

FY-2007 estimate was increased by a whopping 73 percent.

The end result is that more vanity callsign recipients (14,700 versus 8500) will be recovering the $171,600 cost. Dividing $171,600 by 14,700 users yields an individual vanity callsign fee of $11.67, which the FCC has rounded up to $11.70. This is $1.17 annually for the ten-year callsign term, a 44-percent reduction over the present $2.08 yearly (or $20.80 ten-year) cost. This is the lowest vanity callsign regulatory fee ever! The bottom line is that as the total number of vanity callsigns increases, the cost for each will go down.

The new $11.70 fee is scheduled to begin in mid-September if the NPRM is approved by the Commission, and judging by past years it will be. As usual, the comment periods are extremely short and appear to be only a legal formality. Comments on the proposal outlined in MD Docket 07-81 were due May 3 (only two weeks after release of the NPRM) and reply comments were due only a week later, on May 11.

Q: "The FCC now prohibits the filing of multiple applications for the same vanity callsign, yet I notice it is still continuing. How come?"

A: Last fall the FCC adopted an Order (WT Docket No. 04-140) which, among other things, precluded radio amateurs from submitting more than one application for the same vanity callsign on the same day. Previously, applicants could file an unlimited number of applications, provided that they paid the filing fee for each application.

This gave them an unfair advantage in getting a specific callsign, since the FCC uses a lottery system to decide which application to process first. For example, if two applicants want the same callsign and one files ten applications and the other files one, the applicant with ten applications (and more lottery entries) would probably be awarded the callsign.

The new revision (effective December 15, 2006) of Section § 97.19(d)(1) now reads: "In the event that the Commission receives more than one application requesting a vanity callsign from an applicant on the same receipt day, the Commission will process only the first such application entered into the Universal Licensing System. Subsequent vanity callsign applications from that applicant with the same receipt date will not be accepted."

This new rule was implemented in an unusual way. Rather that preventing applicants from submitting more than one application, the new FCC vanity callsign processing software allows applicants to submit several applications for the same callsign, but only the first application will be processed. The additional applications for the same callsign will be dismissed (trashed) when the application is processed by the FCC's computer 18 days later. The end result is that multiple vanity callsign applications for the same callsign are accepted, but only the first application is eligible for the callsign. It would have been better if the FCC had a software safeguard to prevent the same callsign from being entered into the system on the same day.

Q: "Why aren't there any 2-by-3 format NA–NZ and AA–AL prefixed callsigns?"

A: In a sentence, because these formats were never activated by the FCC as being eligible for U.S. amateur radio callsigns. By international agreement, the first characters of a callsign indicate the country in which the station is authorized to operate. The International Telecommunication Union (ITU) has allocated the prefix letter blocks AA–AL (except single letter "A"), KAAA–KZZZ, NAAA–NZZZ, and WAAA–WZZZ to the United States.

The FCC then uses some or all of these characters to begin U.S. radio station callsigns. The FCC rules (Part 2, Subpart D, Section §2.301) spell out the station callsign formats and identification requirements for the various radio services. Interestingly, only amateur radio stations use the AA–AL prefix. The other K, N, and W prefixes are shared with other radio services. Table I specifies how U.S. amateur radio callsigns may be assigned.

The FCC implemented the new Group Call Sign Assignment System on March 24, 1978. It provided for:

Extra Class obtaining Group A station callsigns containing all 1-by-2, 2-by-1, and "A" prefixed 2-by-2 call signs; Advanced Class getting Group B calls containing all K, N, and W prefixed 2-by-2 callsigns; Tech/General Class getting Group C calls containing all 1-by-3 callsigns; and Novice Group D being eligible for most K and W prefixed 2-by-3 callsigns.

Radio amateurs were authorized to hold callsigns from a lower callsign group. That is, Extra Class amateurs may hold any callsign—Group A, B, C, or D; Advanced Class—Group B, C, or D; Technician/General—Group C or D; and Novice—Group D (2-by-3 format) only. Certain two-letter prefixes (specifically AH, AL, KH, KL, KP, NH, NL, NP, WH, WL, and WP) were reserved for radio amateurs with mailing addresses outside of the continental (contiguous 48) United States.

The FCC began by issuing N-by-3 call signs to new Technician/General Class amateurs, but elected not to issue available K-by-3 or W-by-3 as a first callsign. (These later became available under the vanity callsign program.) When the N-by-3 format callsigns ran out, first-time licensed Tech/General amateurs were then assigned callsigns from the next lower group—(Group D) KA–KZ-by-3 callsigns—and that policy continues to this day.

The new Group Call Sign Assignment System used all of the formats authorized by Section §2.301 except two: AA1AAA–AL0ZZZ and NA1AAA–NZ0ZZZ. The reason given was that they were not needed, since the other 2-by-3 formats provided more than 9-million combinations. The 1-by-1 format was later allocated to the Special Event callsign system.

Do you have any questions that you would like answered? If so, send us an e-mail (w5yi@cq-amateur-radio.com). We'll answer the general-interest ones in an upcoming column. See you next month. 73, Fred, W5YI

what's new

BY KARL T. THURBER, JR.,* W8FX

Control Station Combiner, Amplified Mobile Speaker, New Antennas, and more

This month we focus our attention on accessories for the radio shack, antennas, what's new on the net, software, 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, beginning with an interesting shack accessory from the folks at Bird® Technologies.

Accessories for the Road/Shack

The TX RX® Control Station Combiner (CSC) Product Line. Bird® Technologies Group, a leading manufacturer of RF measurement and management equipment, has released a new TX RX Control Station Combiner (CSC) product line that, although designed more for public-safety and related uses, may also have ham applications.

Photo A– Bird® Technologies Group offers a new TX RX® Control Station Combiner (CSC) product line that, although designed more for public-safety and related uses, may potentially have ham radio applications. See the column text for details. (Photo courtesy of Bird Technologies Group)

Designed for use with VHF, UHF, and 746–960 MHz communications systems, the innovative line of products (see photo A) simplifies cabling installation and antenna mounting for control-center facilities as well as mobile command vehicles. Additional product features include superior thermal design and low-profile units for space-efficient applications.

"This new product line reinforces Bird Technologies Group as the premier provider of innovative solutions for the RF industry," said Minfei Leng, Product Manager. "We think our customers will find our new line of TX RX Control Station Combiners helps them significantly reduce tower clutter and loading issues by providing frequency agility without the tuning requirements needed previously."

The Control Station Combiner, as the name implies, combines the outputs of the control stations, which are commonly used in public-safety dispatch centers. Control stations are basically two-way radios co-located on the dispatcher's desk. Without CSC, each control station needs a separate antenna, which creates a "porcupine look" on the roof of the dispatch center. However, with CSC multiple control stations can have their antenna ports tied together, reducing the number of antennas required to one or two.

While designed specifically for non-amateur purposes, there may be some amateur radio applications. Technically, if the amateur radio operator has multiple radios and wants to combine them together to save antennas, he/she reportedly can use the CSC system, as long as the radios fall within the CSC frequency range, the radios don't transmit more than 50 watts, and the operator understands the concept of isolation and is aware of the limitation of the typical 70 dB of isolation provided by the CSC. This may also be useful for club stations or clubs with comm vans.

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>).

MFJ-383 Mobile Amplified Communications Speaker. MFJ Enterprises is pleased to announce its new mobile amplified communications speaker (see photo B). It is said to be perfect for mobile use, with great clarity and clear tones on CW and SSB—and it has an excellent mounting bracket. It works

Photo B– MFJ Enterprises has introduced the versatile new MFJ-383 Mobile Amplified Communications Speaker, which is said to offer great clarity and clear tones on CW and SSB—and it works great in the base station, as well. (Photo courtesy of MFJ)

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

Alinco delivers more operating fun for less.

Dual Band Dynamos for your pocket or your car!

DR-635T 2M/440MHZ Mobile/Base Transceiver

Dual Band Transceiver with Full Duplex Capability

Alinco's new DR-635T is an easy-to-use, high-quality transceiver for simplex and repeater operations on the VHF and UHF bands. With cross-band repeat, full duplex capability and a remote mountable control head, the DR-635T features newly designed RF circuitry that delivers increased resistance to interference from adjacent signals. Plus, a new protection circuit automatically lowers the power setting whenever the internal temperature rises. This protects the radio when used as a cross-band repeater. But, that's just the beginning:

- Large, 6 character alphanumeric display with freely and separately selectable three color display illumination in blue, violet or orange for TX/RX/stand-by
- TCXO that is stable to ±2.5 ppm
- Narrow FM mode
- Power supply voltage display
- Ignition key on/off feature & theft alarm feature
- CTCSS, DCS encode/decode and DTMF encode functions plus European Tone Bursts
- Multiple scan modes and extended receive capabilities including broadcast FM
- Backlit DTMF microphone allows direct frequency entry and more
- VHF: 50/20/5, UHF: 35/20/5 watt power output settings
- 200 Memory channels that can operate in splits of 80ch/VHF, 80ch/UHF and 40ch freely programmable with 1 call channel each for VHF and UHF operation
- Extended receive from 108.000 ~173.995MHz / 335.000 ~ 479.995MHz / 87.5 ~ 107.995MHz, transmits from 144.000 ~ 147.995MHz / 430.000 ~ 449.995MHz, plus reception on AM aircraft band and the ability to operate on MARS frequencies
- Can also operate with Alinco's optional EJ-50U digital data packet board that fits inside or the EJ-47U digital voice board

Thanks to Alinco, you can have a dual band dynamo in your pocket AND in your car!

DJ-C7T 2M/440MHZ "Pocket-size" HT

Hams are packing some serious radio power in their pockets with the DJ-C7T, the new dual band mini HT. Alinco led the way in breakthrough miniature electronics technology with its revolutionary "credit card" size transceivers. Now, the DJ-C7T offers a "pocket size" HT that's small in size but BIG in added memories and modes.

Check out the features of this "new generation" DJ-C7T

- Internal speaker with great audio!
- 200 Memories
- VFO, Memory and Scan modes
- 39 CTCSS tone squelch (encode+decode) settings
- Split function
- SMA antenna port
- As thin as 0.57in. and just 3.59 oz. total weight with antenna and battery
- Cloning feature
- Lithium-ion battery
- Wide-band receive; includes FM broadcast and AM aircraft bands
- Auto repeater setting

The DJ-C7T can fit in a pocket or purse, but it's a versatile dual band HT with an enhanced receiver. So, you can enjoy twice the operating fun in half the size.

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great in the base station also, and you can plug it directly into the cigarette-lighter socket of your power supply. The large 2 3/4-inch speaker with a 3-inch fine-metal mesh grill brings out speech fidelity that you may have never known existed. It even restores the smooth sound of sine waves that CW naturally generates and makes it easy to understand and copy code.

The MFJ-383 was carefully designed to improve the intelligibility of speech in the frequency range of 600 to 4000 Hz while reducing undesirable noise, static, and hum. With excellent audio clarity and depth, it produces 6 watts output through an 8-ohm speaker. It features a handy 12-VDC cigarette-lighter plug with an 8-foot cord, a 3.5-mm mono jack plug with a 13 foot cord , an on/off power switch, and a gain control knob. The speaker also includes a free swivel mobile mounting bracket with thumbscrew locks. The MFJ-383 weighs less than one pound. It's both powerful and compact, at 5"W × 4"H × 1 3/4"D inches, with bracket. It requires 12 VDC for operation.

As always, the unit 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 amplified communications speaker 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>).

Antennas and Accessories

G-WHIZ 2-Meter and Dual-Band (DDRR) Antennas. The G-WHIZ is a DDRR (Directional Discontinuity Ring Radiator) style antenna, available in both 2-meter and dual-band antenna designs. The antenna (see fig. 1) exhibits both horizontal and vertical radiation, involving essentially the same principle of operation as in commercial FM broadcast antennas.

Also available is the G-WHIZ Gain Antenna. It's a dual-polarization antenna as well, radiating both vertical and horizontal components. All the antennas offered are made in the USA, and are manufactured from stainless steel and aluminum for years of trouble-free operation. Details on both antennas are found on the firm's website.

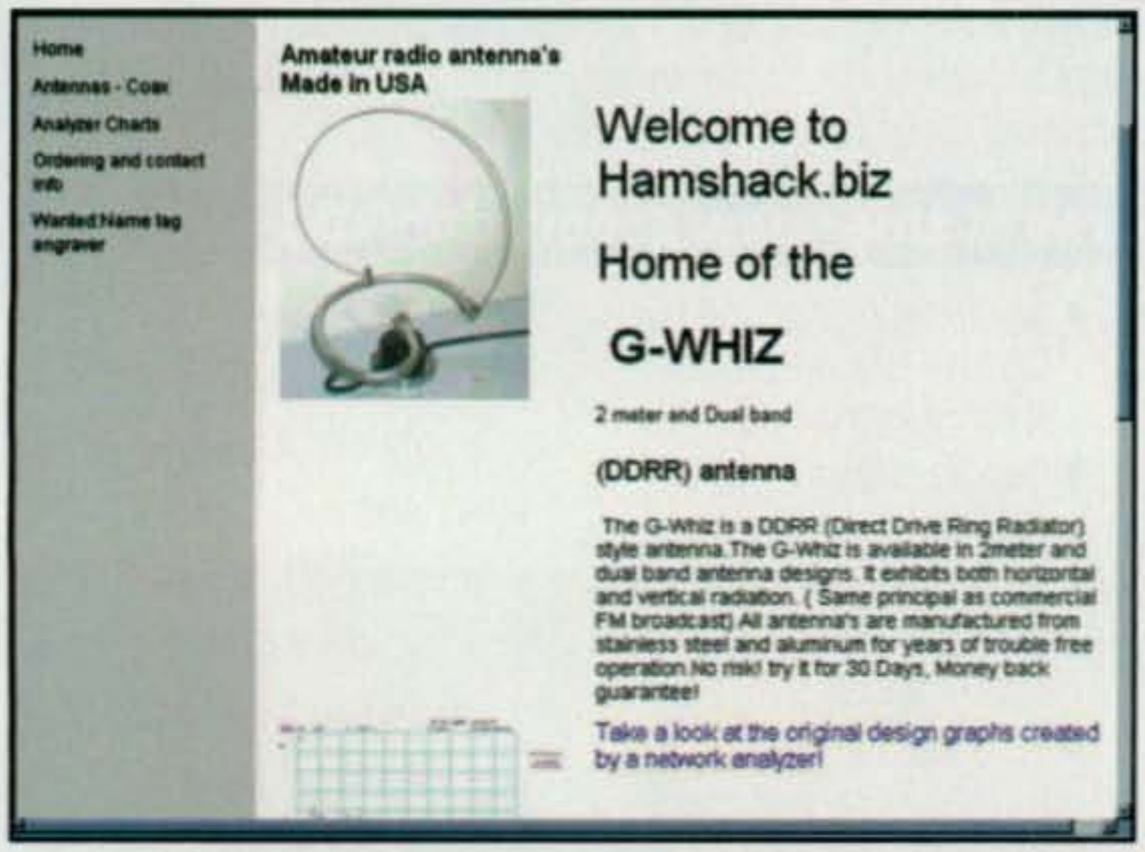


Fig. 1– The G-WHIZ is a DDRR (Directional Discontinuity Ring Radiator) style antenna, available in both 2-meter and dual-band antenna designs. Details on it and the G-WHIZ Gain Antenna are found on the Hamshack.biz website, so check them out. (Image from the Hamshack.biz website)

For more information, contact Brian Gerber, N3GUC, 108 W. Sutter Rd., Glenshaw, PA 15116 (412-537-2439; e-mail: <N3GUC@yahoo.com>; on the web: <http://www.Hamshack.biz>). The antennas are sold on a no-risk basis: You may try them for 30 days, with a money-back guarantee.

High-Performing HT HF Antennas. Two HT/ handheld HF antenna models are available from Performance HF, Inc., for great HF fun with your handheld HT. Available in ham (HT/HF-HAM) and shortwave (HT/HF-SW) versions, both antennas (fig. 2) are the same except for tuning characteristics. According to the manufacturer, band/ frequency coverage for each of these patent-pending versions is extremely good, and the circuits can be combined to cover a multitude of tuned bands and frequencies on each antenna.

Also according to the manufacturer, "fantastic HF reception" can be achieved with this HT HF antenna, "fantastic" referring to the great gain experienced over untuned (for HF) VHF/UHF antennas such as those ordinarily provided with HTs.

Fig. 2– Two HT/handheld HF antenna models are available from Performance HF, Inc., for great HF fun with your handheld HT. Available in ham and shortwave versions, both antennas are the same except for tuning characteristics. (Image from the Performance HF, Inc., website)

The HF-reception antenna boasts tuned circuits that considerably increase gain, coupled with an extra-long antenna that employs a 33.3-inch whip for added performance. The antennas feature "no fidgeting" pushbutton operation, and the antenna packages include the tuned antenna system, PL-259 and BNC adapters, and a pocket reference card.

What might you actually do with these new HT HF antennas? On the firm's website the manufacturer playfully suggests a number of important uses. These include listening to 80 meters just before bed (or in bed, depending on house construction); listening when running errands and the wife (or husband) is busy for just a few minutes; listening to favorite shortwave stations; practicing copying "rusty" CW; checking HF band conditions while away; listening to the "required daily amount" of HF while on vacation; and listening while at the beach, park, and campouts—among other applications.

For more information and pricing, Contact Performance HF, Inc., 11925 Meriden Lane, San Diego, CA 92128 (858-487-8050; e-mail: <Sales@PerformanceHF.com>; on the web: <http://www.PerformanceHF.com>).

New on the Net

Specialized Search Engine for Gadget Geeks. Although not designed specifically for ham radio applications, this new search engine has some very useful possibilities for those among us who might be labeled "gadget geeks."

The specialized search engine, Retrevo, is designed to provide support for those who need it after purchasing a new

electronic gadget. As most of us know, rounding up "electronics help" information on the web can be very frustrating, fragmented, and difficult. The new search site tries to provide an answer to the very real problem of sorting through reams of consumer electronics web help. You also can find pre-purchase information, get technical support documentation, research consumer electronics, and obtain product documentation for technical support and troubleshooting.

While not specifically oriented to amateur radio, using Retrevo you can readily find complete coverage for 12 product categories. These include camcorders, cameras, cell phones, smartphones, home audio, home video, portable audio and video, printers, wireless networking (WiFi), and the like. You can even find posts from blogs about current problems that users have with their gear, and considerably more.

To check out Retrevo, go to <http://www.retrevo.com> and put this unusual search engine through its paces. You may be surprised at how useful this specialized search engine is.

Software and Computers

SWIFT WX Professional. If you are a serious user of weather-tracking software, listen up. SWIFT Weather Co. has released what it considers to be the most comprehensive weather-tracking software tool available, SWIFT WX Professional.

For those who have lived through Hurricanes Katrina, Rita, and Wilma—and the more recent ice storms of the past winter—it's is a very welcome product for those who want to be prepared well in advance for twisters, hurricanes, mud slides, flash floods, ice storms, blizzards, and other "nasties" Mother Nature may throw our way.

The good news is that if you have an internet connection, you can use SWIFT WX. The new software, designed for consumers only, allows users to stay ahead of deadly weather and keep their families protected with advance warnings, even before the weather person makes any public announcements.

Designed by the tornado-chasers of SWIFT Weather Co., the software is said to offer unlimited weather data seamlessly integrated into an easy-to-use interface. It's designed specifically for consumers, and it features more than 1100 weather maps, weather radar down to the street level, GPS tracking, perimeter alerts/first alerts, and up-to-the-minute data feeds from 140 weath-

Fig. 3– The ARRL Periodicals on CD-ROM lets you access all of the 2006 issues of the League's membership journal, QST; its technical magazine and forum for communications experimenters, QEX; and its bimonthly National Contest Journal. *(Image courtesy of the ARRL)*

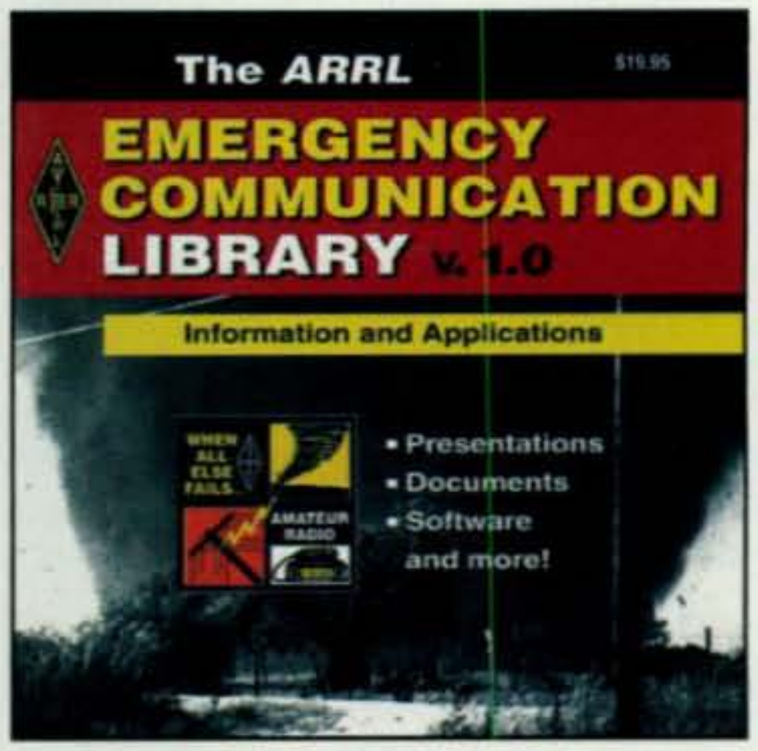


Fig. 4– The "ARRL Emergency Communications Library V1.0" on CD-ROM provides quick access to information, presentations, documents, software, applications, and more, all relating to aspects of emergency communications. (Image courtesy of the ARRL)

er-service offices. Now you can be one step ahead of local weather news departments.

According to the manufacturer, SWIFT WX combines thousands of weather-tracking elements into a simple, easy-to-use interface that provides the same technology used by U.S. government agencies for less than 50 cents per day. Its subscription fee is $14.50 per month, and you can cancel your sub at any time. A yearly subscription option also is available. For more information, visit the SWIFT Weather Co. website at <http://www.swiftwx.com>.

Two new Software Products from the ARRL. Has dealing with mountains of paper copies of your favorite amateur radio and technical magazines become a problem? Fortunately for many radio amateurs, the ARRL's popular journals are available on compact, fully searchable CD-ROMs. Case in point, the "ARRL Periodicals" on CD-ROM (fig. 3) lets you access every word and photo published throughout the year.

With the most recent CD-ROM edition, you can access all of the 2006 issues of the League's membership journal, *QST*; its technical magazine and forum for communications experimenters, *QEX*; and its bimonthly *National Contest Journal* in one convenient package.

With the $19.95 (plus s/h) CD-ROM, you can search the full text of every article by entering titles, callsigns, and names—almost any word. You can see every word, photo (including color images), drawing, and table in technical and general-interest features, columns, and product reviews, and in all advertisements. You can print what you see or copy it into other applications. In addition to the complete text and illustrations for all articles, the CD-ROM conveniently includes source code for software projects and PC-board etching patterns. Back copies of the "ARRL Periodicals" on CD-ROM also are available, to 1995.

The League also has announced "The ARRL Emergency Communications Library V1.0" on CD-ROM (fig. 4), which provides quick access to information, presentations, documents, software, applications, and more, all relating to aspects of emergency communications—a part of what we are about as radio amateurs. The new $19.95 CD-ROM is divided into topic folders, and it provides quick access to informative PDF documents and Microsoft® PowerPoint® presentations on many aspects of emergency radio communication and operating; *ARES® Field Resources Manual* in PDF format; *The ARRL Public Service Communications Manual,* also in PDF format; APRS and WinLink 2000 software; and "Simulated Emergency Test" (SET), a video created by Bob Doherty, K1VV. The Microsoft PowerPoint viewer and the Adobe Acrobat Reader® software are included on the CD-ROM. However, note that the ARRL does not support the software in this collection; for support questions, consult the program authors directly.

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.

From the Bookshelf

Microsoft® Windows® Vista™: Visual QuickStart Guide. It's been a long time since Microsoft has introduced a new operating system (OS); Windows XP seems to have been around almost forever. Now, however, a new OS is on the street in the form of Windows Vista, and it's here to stay.

New operating systems can be notoriously difficult to learn. However, Peachpit Press has introduced *Microsoft Windows Vista: Visual QuickStart Guide* (fig. 5), by Chris Fehily, which hopefully will ease the transition to the new OS. The 604-page, $21.99 paperback is said to offer a quick and easy

way to learn the new OS. Not a highly technical textbook, being designed for beginning and intermediate users, it features an easy visual approach that uses pictures to guide you through Microsoft Windows Vista, and shows you just what to do. It also offers concise steps and explanations that help you to "get up and running" in no time.

We should also mention that author Fehily, a writer and consultant who lives in San Francisco, admits to having used Windows even before version 1.0, when it was called "Interface Manager." Another of his books for Peachpit Press is *Visual QuickStart Guides to Windows XP*.

If this new book sounds like a "must read" for you, then visit your local bookstore, or for more information, contact Pearson Education, 200 Old Tappan Road, Tappan, NJ 07675 (1-800-283-9444 or 1-800-922-0579; e-mail: <info@peachpit.com>; on the web: <http://www.peachpit.com>).

We Get Letters

Your "What's New" column editor would very much like to acknowledge some of the good folks who took the time and trouble to correspond with us in recent months. We do appreciate your input for the column.

In no particular order, a tip of the ol' W8FX hat goes to Jim Walroth, N3AWS; Paul Lentz, K8PL; Bob Heil, K9EID; Dan Young, KD5ZSX; Dwayne Kincaid, WD8OYG; Jay Slough, K4ZLE; Chris Ripley; Marta Marasz; Isidor Buchmann; Don Arnold, W6GPS; Bill Kantz, N2VZ; Ann Noder; Rich Stubbs, KC5NSZ; Jeff Reinhardt, AA6JR; and Jim Tabor, KU5S.

A special note to our column readers: If you e-mail us, please be sure to include with your e-mail your full name and amateur radio callsign, if you hold one. While you certainly need not hold an amateur callsign, it would be nice to know we're corresponding with a real, live person who actually reads the column, and not just acknowledging an impersonal e-mail address! To contact your "What's New" column editor, just e-mail us at our *CQ* e-mail address, <productnews@cq-amateur-radio. com>. And, yes, if you have a new product to offer to the amateur community, by all means let us know. While we don't normally review products, there is no charge for mentioning new products in the column.

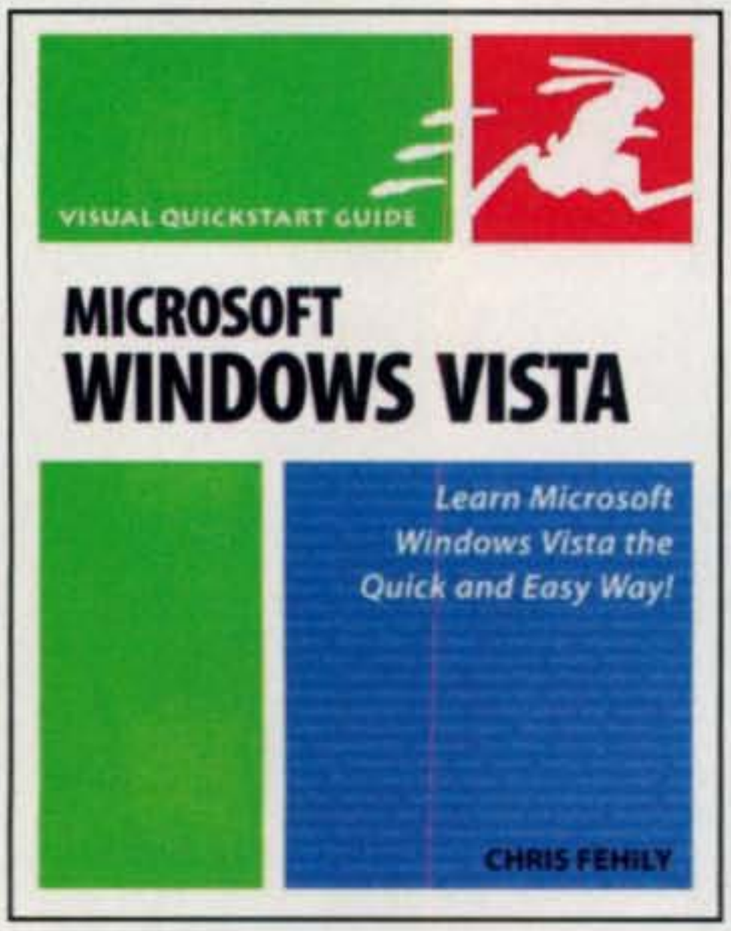


Fig. 5– New operating systems can be difficult to learn. However, Peachpit Press has introduced Microsoft® Windows® Vista™: Visual QuickStart Guide, *by Chris Fehily, that hopefully will ease the transition to the new Microsoft OS. (Image courtesy of Peachpit Press)*

Short Bursts

News from LDG Electronics. In a letter from LDG Electronics, Chief Engin-

eer Dwayne Kincaid, WD8OYG, notes that the recent changes in the FCC rules regarding ham radio indeed bode well for us over the next couple of years. He also says that LDG Electronics has positioned itself well for these changes.

Dwayne notes that his company has been highly innovative in the industry, and the products LDG Electronics offers today are designed to solve many of the problems hams have in their day-to-day operations. For example, the LDG autotuners are very quick, they cover a very broad spectrum, and they are highly reliable. Plus, the two-year warranty gives users confidence in the reliability of the product they are buying.

LDG also has now begun including all of the necessary cables with every autotuner it sells, a move that has been enthusiastically received by both customers and distributors alike.

In Dwayne's view, this year promises to be the best year yet. The FCC rule changes, coupled with another year of many new product introductions and aggressive marketing, will drive sales of LDG products this year, kicked off initially by the new and improved FT Meter for the popular Yaesu FT-857 and FT-897 transceivers and the totally new DM-7800 Dual Meter System made exclusively for the Yaesu FT-7800 transceiver.

For more information on the LDG Electronics product line, contact your favorite dealer, or contact LDG Electronics, 1445 Parran Road, St. Leonard, MD 20685 (410-586-2177; e-mail: <ldg@ldgelectronics.com>; the web: <http://www.ldgelectronics.com>).

MFJ: Linking the World to Your Back Yard. Many are familiar with the extremely diversified range of products offered by MFJ Enterprises—a firm your column editor likes to refer to as "the accessory kings." Today, MFJ products of some sort or the other—either under MFJ's own name or that of its four sister companies (Ameritron, Mirage, Vectronics, and Hy-Gain)—are found in many radio ham shacks, as they have been for some years. However, few hams really know the interesting history of MFJ Electronics, from its 1972 startup by Martin F. Jue, K5FLU. You can tune into this background by visiting the "Linking the World to Your Back Yard" page on the MFJ website. Just point your browser to <http://www.mfjenterprises.com/about_mfj.php> for a very interesting and instructive visit down memory lane.

Wrap-Up

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

Overheard: I have found that genuine wisdom accrues when I both learn to speak my mind and, at the same time, mind my speech. 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.*

Mobiling to the Max

BY DAVE INGRAM,* K4TWJ

Ah, summertime . . . and time to go mobile! Yes indeed, there is nothing like getting on the road, perhaps opening the sunroof on your vehicle, or driving on the sand at the beach or up a mountain trail. Nothing except enjoying the sheer pleasure of hamming from the vehicle, that is. Need I point out the delights and rewards? A mobile setup has its own antenna and ground system, a car's interior is akin to a sound-buffered studio, and the whole kit-and-caboodle can go with you almost anywhere and anytime!

Condo living cramping your style? Snap a Super Antennas' multiband MP-1 coil on a 21-inch or 54-inch Hustler mobile mast, top it with an MFJ-1954 10-foot retractable whip/stinger, use an antenna analyzer to quickly tune the coil to the desired bands (mark those spots with a felt pen), and get home-station performance right from the vehicle. Just do not attempt motoring down the street with that cool-going antenna fully extended and towering 16 or 17 feet above terra firma. Removing the coil, retracting the whip, and storing the 20-inch-long combo in a vehicle door's side pocket takes only a minute. Who could ask for more? That is, unless you strap a 24-foot-tall Hy-Gain AV-640 multiband vertical to your vehicle. Not too practical, but a killer idea!

The previously mentioned MP-1 coil is available from <www.superantennas.com>, MFJ whips (and antenna analyzers) can be ordered from MFJ Enterprises (<www.mfjenterprises.com> or 1-800-647-1800), and Hustler masts are available at <www.dxengineering.com>. If you are interested in more unusual mobile ideas, read on.

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

Photo A– Now this is what we call a big-time mobile! It is the cruise ship Holiday Dream *of Pullmantur Cruises in Spain preparing to leave its home port in the Dominican Republic for a weekly cruise around Martinique, Antigua, St. Martin, and the Virgin Islands. The 660-foot mobile (err . . . ship) carries 800 passengers and 400 crew members, including Chief Communications Officer Marius Alexandru, YO4HGX/MM. (Photo courtesy of YO4HGX/MM)*

One Big Mobile!

We usually think of mobiles in terms of cars, SUVs, trucks, and possibly bicycles, but another and quite unusual idea recently caught my attention on 30 meters. A short QSO with YO4HGX/Maritime Mobile revealed the operator was Marius Alexandru, the chief communications officer aboard the lavish cruise ship *Holiday Dream* (photos A, B, C, and

Photo B– A "bright lights and glamour" view of the Holiday Dream *in port at night. Marius's T2FD antenna is strung above the top deck near the ship's rear/aft area (note tall support). (Photo courtesy of YO4HGX/MM)*

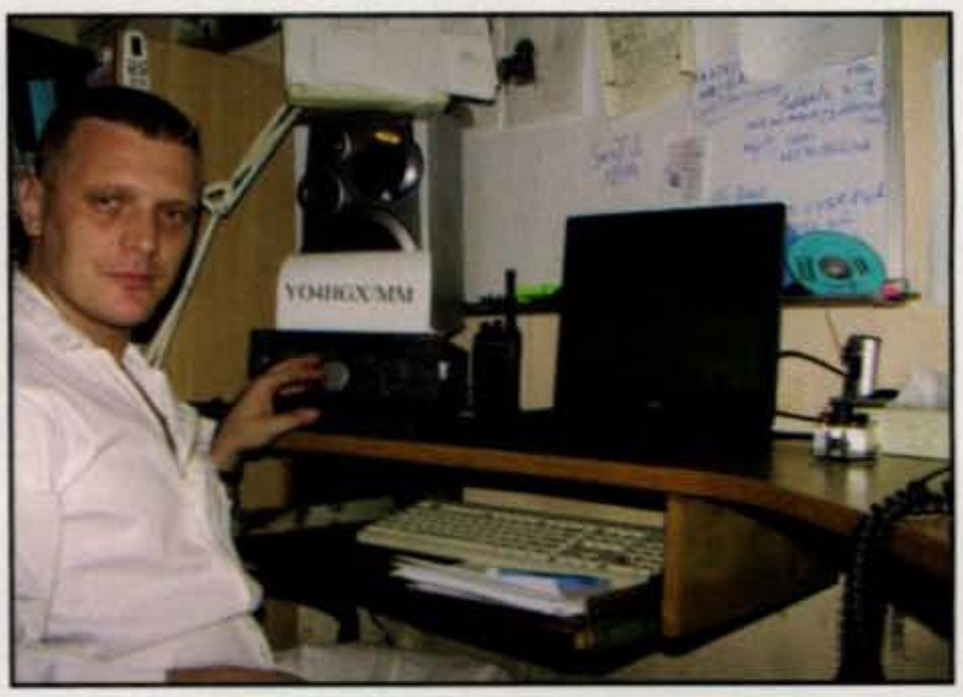


Photo C– Marius at his off-duty/ham setup aboard the Holiday Dream. *Gear consists of a Kenwood TS-690, homebrew power supply and keyer, a small QRP rig, and a laptop computer with an extra keyboard for logging. Listen for YO4HGX/MM on 40 and 30 meters. He is a sharp CW op!*

Photo D– Look carefully and you can see Marius's T2FD antenna strung between two tall supports. It is approximately 42 feet long and positioned slightly above a long line of international flags. The white dome below the center of the antenna is also visible in photo A, and the rear support is vividly illuminated in photo B.

D). Marius is responsible for all radio communications and navigation equipment; plus internal communications systems, satellite TV reception, and distribution; and two maritime Telecom networks that provide international telephones and internet access for passenger cabins. He is also the main radio operator in charge of distress situations and drills. His work schedule thus is quite hectic, but he is also able to enjoy big-time mobile hamming from the Caribbean during quiet times, and quiet it is. Marius says the industrial noises most of us live with on land diminish after leaving port and signals begin standing out like shining stars against a clear night sky.

We can agree with that statement, as our second QSO with YO4HGX/MM was a few days later while running a little Yaesu FT-817 at 5 watts to check out a rebuilt antenna system on my XYL, WB4OEE's Chevy Cavalier (more details on that story in part two next month). My mobile signal was weak, but Marius copied it perfectly—and for at least 20 minutes. Incidentally, if you have never worked "small mobile to monster mobile," I can say first hand that it is a treat, especially when you receive a photo of the other station's vehicle for your QSL collection.

When asked about his more memorable QSOs, Marius said that while serving aboard the cruise ship *Oceanic* near Monaco (and while running CW QRP), he worked PAØVLA/aeronautical mobile, also running CW QRP. Another time he worked a truck driver operating CW in France; that QSO paused each time he passed a vehicle.

Marius' station consists of a Kenwood TS-690 operating from a homebrew (ship-brew?) power supply and running 80 watts to a multiband T2FD antenna strung between two tall supports above the ship's uppermost deck. Does it reach out? Judging by his consistently good signal into Alabama, I'd say yes, indeed—and the T2FD antenna is probably responsible for that.

If you are not familiar with the T2FD, it is a classic wire antenna some folks describe as a miniature rhombic (fig. 1). It is interesting because it is compact, works several bands, and typically exhibits performance comparable to a center-fed Zepp or an extended Double Zepp. The antenna actually consists of two wires RF-fed through a 4:1 balun, folded back at the ends, spaced widely apart and terminated at (each end of) a common 390-ohm non-inductive resistor. The resistor (or bank of resistors connected to produce 390 ohms at one-third to one-half of the transmitter's output power/wattage) typically is enclosed in a weather-resistant housing such as a length of PVC pipe. Spacing between upper and lower wires varies according to the lowest band of operation, so spreaders are homemade from wood or plastic dowels.

The physical length of the antenna for each side (A to B) is calculated by 163.8 ÷ by F (MHz) = length in feet (example: 163.8 ÷ 7.050 = 23.2 feet). The wire "folds back" at each end, so the total wire length for each side (from points A to C) is 2 × 23.2, or 46.4 feet. Total end-to-end antenna length (B to B) is also 23.2 × 2, or 46.4 feet. Spacing between lower (A) and upper (C) wires is calculated as 9.83 ÷ F (MHz) = length in feet (example: 9.83 ÷ 7.050 = 1.39, or 1.4 feet. These dimensions (46 feet long with 1.4-foot spacing between wires)

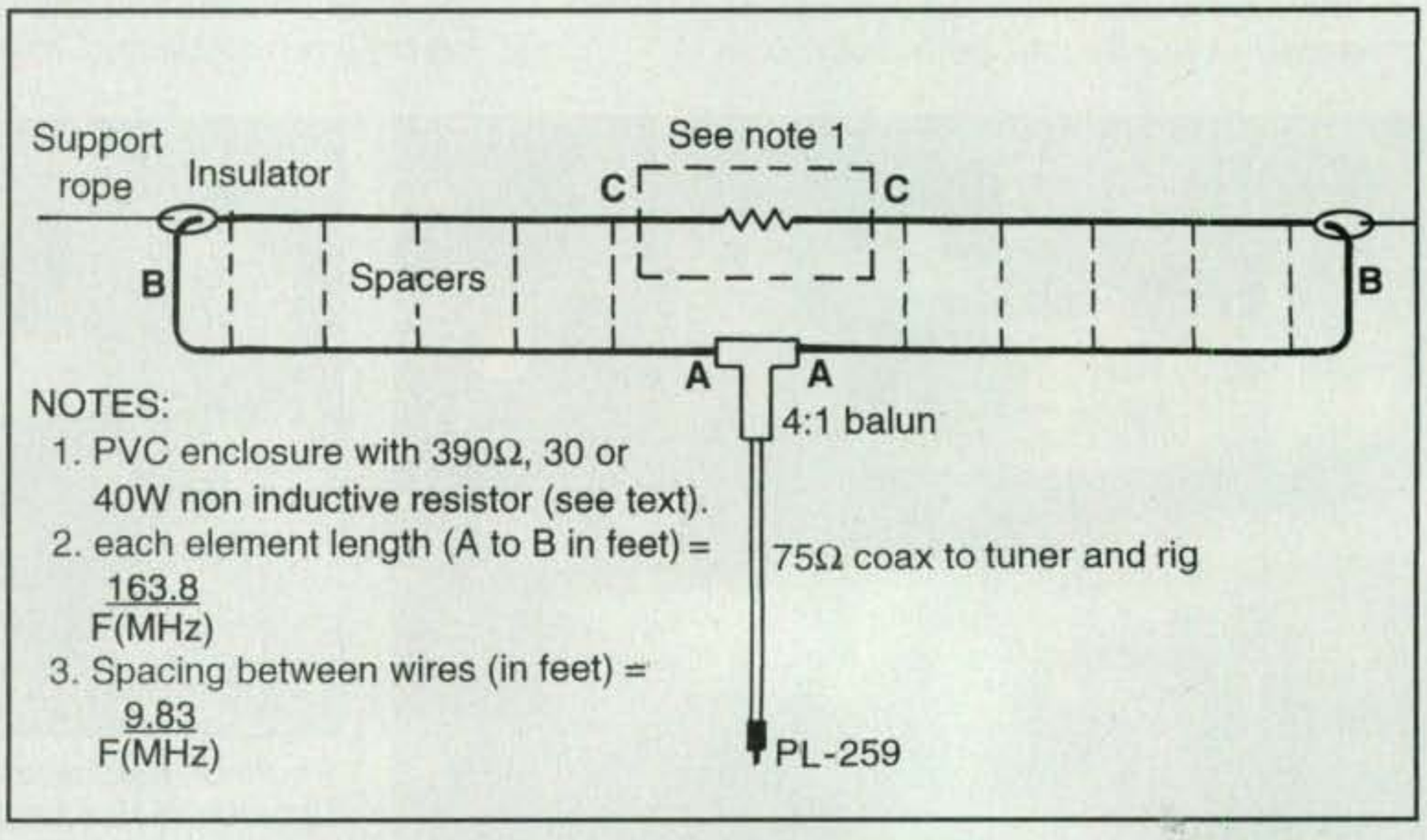


Fig. 1– Outline of the classic T2FD multiband antenna such as the one Marius, YO4HGX/MM, uses aboard the Holiday Dream. *This antenna is usually installed at a 20- or 30-degree angle and produces an omni-directional radiation pattern. Marius installed his T2FD straight horizontally and it works out great. (See discussion in text.)*

produce a T2FD that (with a simple antenna tuner) works 40, 30, 20, 17, 15, 12, and 10 meters quite effectively. On its "weakest band," 40 meters, it performs akin to two 3/8-wave radiators. On 20 meters it performs like two 3/4-wave radiators. On upper bands, radiator lengths are even longer for more signal punch. Those are impressive "specs" from any viewpoint!

Why am I spotlighting a wire antenna in a mobile column? It is easily stored in a vehicle's trunk and is an easy-up "no ground required" antenna for vacationing or overnight stops. It's a gem! Questions? You can e-mail Marius at <YO4HGX@yahoo.com>.

Unique Mobile Accessory

Is wimpy audio hampering your mobile pleasure? Would you like to reverse that situation and add a unique touch to your setup? Check out the 88-MHz FM-band mini transmitter shown in photo E. Plug this little delight into the earphone socket of a mobile rig (HF, VHF, or FM handheld), and it transmits the transceiver's audio through your vehicle's FM stereo system just as if it is a hardwired connection. Also, when you consider the car's stereo has a 20- to 60-watt amplifier with four or more big 6" × 9" coaxial speakers plus bass and treble controls or a fancy graphic equalizer, your rig acquires some big-time clout.

Do you occasionally go mobile in a rental car or think about mobiling from the backseat of someone else's car with a small QRP rig or FM handheld and a mag-mount antenna? This mini transmitter instantly converts the vehicle into a custom ham shack, and as an extra benefit, it adds some clever out-of-car capabilities. How? Although the transmitter is specified as having a relatively short range, I find the distance is slightly more than 300 feet. If you stop at a restaurant or gas station while traveling and carry a pocket FM radio, you can continue to monitor ham-band action in high style. Nearby

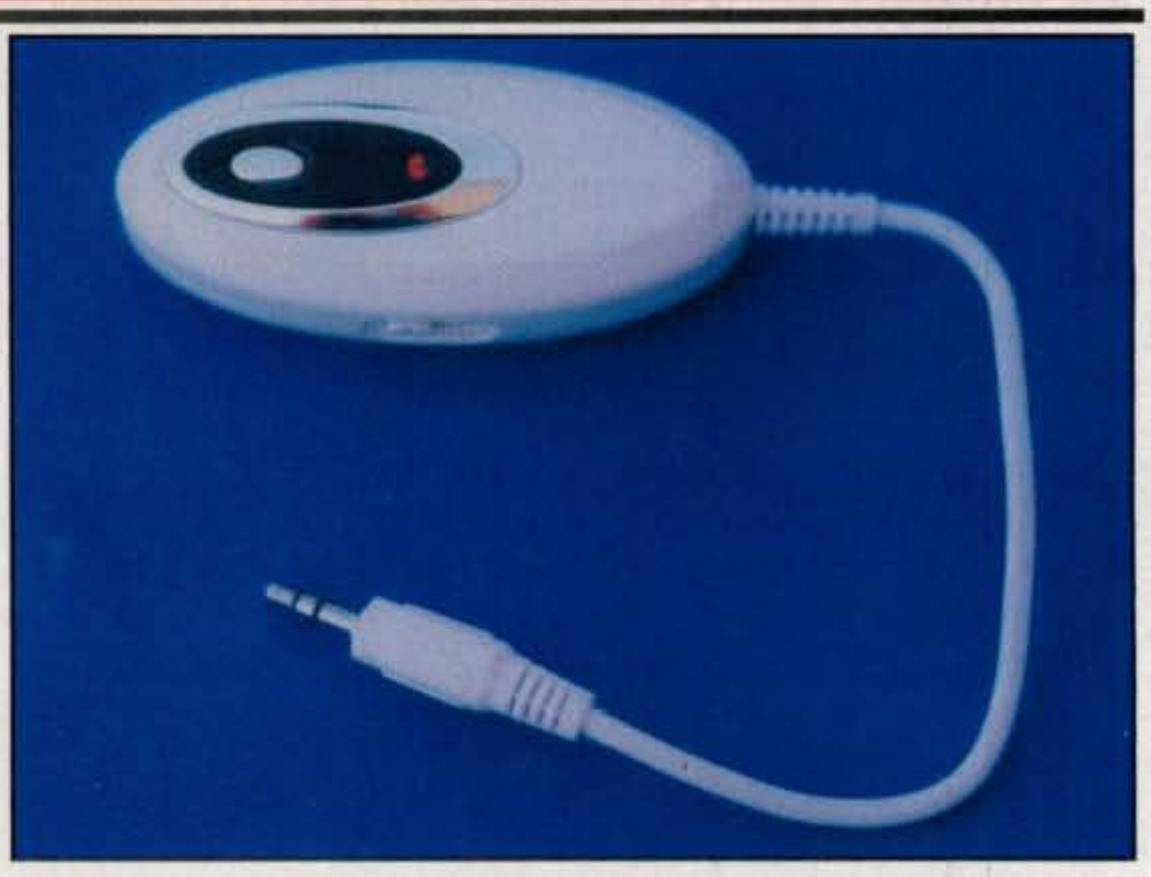


Photo E– Would you like to spice up your mobile activity? Plug this low-cost, miniature, 88-MHz-band FM stereo transmitter into the earphone socket of your mobile transceiver and it will radiate the rig's audio through your vehicle's FM radio for "big station" sound. Plug it into a full-duplex dual-band FM handheld and you can monitor one band on the left-side speakers and another band on right-side speakers. Transmitters are available from <www.HamRadioFun.com>.

Photo F– The driver's seat view of the TS-480SAT in a GMC Tahoe setup put together by Rick Hilding, K6VVA. The front/control panel tilts left or right for operation from either seat or removes and hides in a flash for security. The main body of the transceiver is mounted in the rear of the vehicle. Rick has two more transceivers; they are mainly used at home, and they are both TS-480s!

Photo G– A High Sierra 1800 screwdriver mobile antenna is rather large and heavy, so Rick had this special mount custom-made for securing it "trailer hitch style" to his GMC Tahoe. It also includes a standard 3/8-24 base fitting for accepting standard mobile whips.

friends can even tune in your ham activity on their vehicle's FM radio just as if they were sitting in the car with you.

Ah, but the real excitement starts when you add a bit of creativity into the mix. If you have two HF rigs in the car or a dual-band FM rig with full-duplex capability, you can monitor one band's activity through the car stereo's left speakers and another band's action through the stereo's right speakers—simultaneously. That's right! SSB DX on one side of the car and CW QRP on the other side. Your ham friends should go wild when tuning in those sounds on their cars' radios. How to do it? Make up a cable connecting the audio from one transceiver to the mini FM transmitter's plug ground/shell and tip, and the audio from the other transceiver to the plug's ground/shell and center ring. Then switch on the car's radio and tune it to 88.1, 88.3, 88.5, or 88.7 MHz as selected by a switch on the mini-transmitter. It's that easy—and there's still more.

You can join the fun of working some low-orbit and FM-repeating OSCAR satellites right from your full-duplex-capable vehicle. Simply slightly tilt your dual-band antenna to help optimize transmitted and received signal energy, use your car stereo's fader/balance control to avoid feedback yet introduce a light amount of "Carnegie Hall" reverb, and enjoy a fascinating new experience in mobiling. These 88-MHz mini FM transmitters are available from Bill Lauderbach, WA8MEA, of <www.HamRadioFun.com>. Questions? E-mail Bill at <tinytenna@hotmail.com>.

Photo H– Rick, K6VVA, enjoys IOTA (Islands On The Air) expeditioning during his spare time, so he rebuilt this workshop trailer into a portable shack and pulls it with his Tahoe. The setup is complete with a sleeping bag, linear amplifier, and, of course, a Kenwood TS-480 transceiver. (Photo courtesy of K6VVA)

Super-Smooth Mobile

From sunny California and Rick Hilding, K6VVA, come views of the smoothest installed mobile setup we have seen in several years—a Kenwood TS-480 SAT and High Sierra 1800 antenna mounted in a 2007 GMC Tahoe (photos F, G, and H). The transceiver's control panel fits perfectly in the Tahoe's center-console cutout, and its included mount lets it tilt in any direction for perfect in-line viewing. The control panel can be removed in a just a minute when leaving the vehicle unattended, too. Incidentally, the transceiver's main body is mounted on a piece of plywood on the Tahoe's back floor.

There's more to this story. Rick liked the TS-480 so much that he purchased not one, not two, but three of them—one for mobiling and two for double-handed contesting from his home station. Rick says the TS-480 noticeably outperforms other rigs he has owned, and it is very user friendly. After operating one in my own shack, I agree it is one of the best buys for the money in amateur radio today. I particular like its function-display menu set (no guessing, as it directly reads out each function), the dual cooling fans (a real asset during extended CW operations), and the rich, full-bodied audio for which Kenwood is legendary. Our compliments to Rick on a most impressive mobile station!

Conclusion

That fills available space for this time, but there are more cool views and helpful notes still to share. Thus, we will continue this mobile discussion next month. Meanwhile, enjoy some good on-the-air time and listen for me on 30 meters CW week nights or on 20 SSB on weekends.

73, Dave, K4TWJ

BY TED MELINOSKY,* K1BV

County Hunting – City/Town

In past columns, I've mentioned that the use of CQ's USA-CA *Counties Award Record Book* is optional and that computer-generated lists are equally acceptable when you apply for USA-CA. The only requirement for computer lists is that they contain, as a minimum, the same data fields as found in the booklet. This requires the following: (1) Call Worked, (2) Band/Mode, and (3) Location. If the station is a mobile, you can leave the location blank, or just note "mobile." However, if the station in this county was fixed, we require you to fill in the city or town. Why? It allows us to conduct a spot check to make sure that the location entered is actually in the county claimed. Before you send in your application, please make sure that your computer program or spreadsheet for recording counties includes a field for City/Town. In this way, you can help to maintain the high standards of the USA-CA Award.

DX Awards

This month, we present the rules for a varied collection of awards, some of which are new, while a couple are old favorites. I'm hoping that one or two of these will prompt you to check your QSL card collection and will result in an application being sent to the sponsors. We can't speed up the return of good propagation, but we can put our existing card collection to work right now.

The Greater Saint John Award. Saint John, New Brunswick, Canada is only a short drive from the state of Maine and is located on the northern side of the Bay of Fundy. Nearby is the Fundy National Park of Canada, which encompasses some of the last remaining wilderness in southern New Brunswick. Many of us have heard about the famed tides of the Bay of Fundy, which are the highest in the world.

The award is sponsored by the Loyalist City Amateur Radio Club of Saint John, NB, and it has three levels of achievement, making it fairly easy to earn. You must work stations within 15 miles of downtown Saint John. Post offices in this region include Saint John, Lancaster, South Bay, Ketepec, Grand Bay, Westfield, East Riverside, Rothesay, Gondola Point, Quispamsis, Ben Lomond, Musquash, etc. SWL OK. No date or band limitations. Endorsements are available for single band or mode or mixed endorsement at the time of the original award application for no extra charge. Later band/mode endorsements are $1.00, or 2 IRCs. The number of contacts needed, depending on your location, for each of the three levels of the award are as follow:

Applicant Location	Class A	Class B	Class C
VE1, VE9, VY1	24	16	8
North America	12	8	4
Rest of the World	6	4	2

Send GCR list and fee of $C3.00 or 10 IRCs. Endorsements for $C1.00 or 2 IRCs. Apply to: Awards Custodian, Loyalist City Amateur Radio Club Inc., P.O. Box 6552, Saint John, NB E2L 4R9, Canada (e-mail: <ve1anh@arrl.net>; on the web: <http://www.lcarc.ca/>

Amsterdam DX Certificate. The Amsterdam (Netherlands) DX Certificate is an authentic "oldie"

USA-CA Honor Roll

500		1500	
KØRCJ	3404	HB9DAX	1453

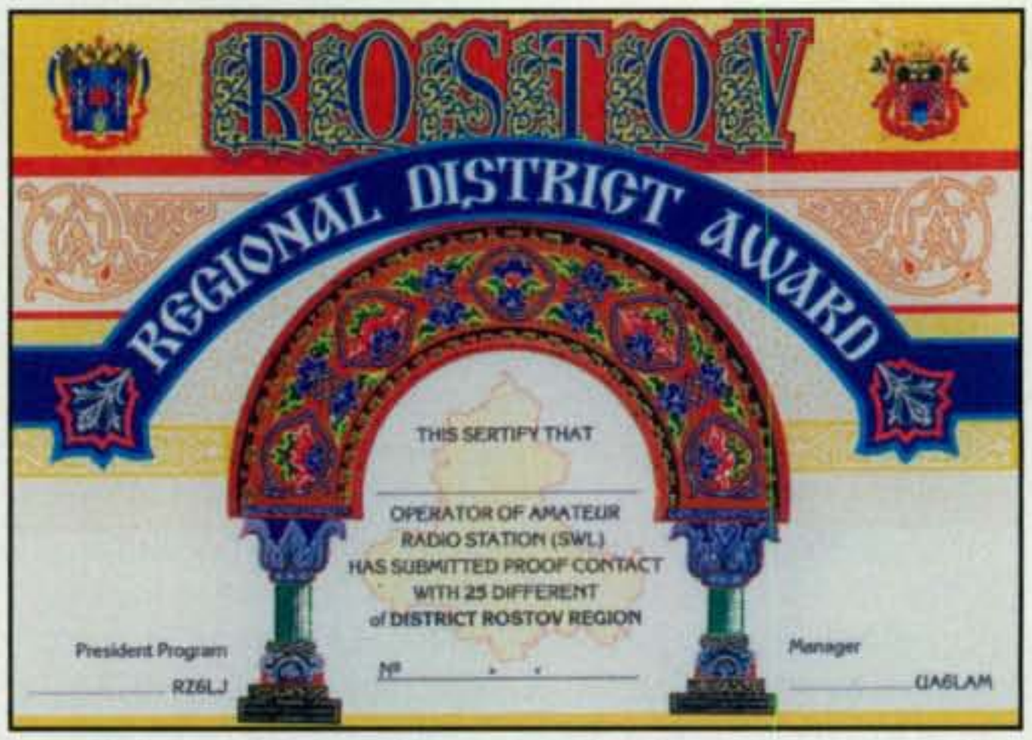
The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application 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.

The Greater St. John Award is sponsored by the Loyalist City ARC of St. John, NB, Canada.

The Amsterdam DX Club has issued the Amsterdam DX Certificate since 1957, and it requires proof of contact with six members of the club.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

Contact at least 25 Rostov-on-Don Russian districts to earn the Rostov Regional District Award.



going back to 1957. It is also one of the earliest awards I earned when I first became interested in awards hunting. The requirements are modest, the design of the certificate is handsome, the Amsterdam DX Club members are very good about identifying that their cards are good for this award, and the fee is pretty reasonable as well. This club is doing a good job to promote and publicize a very nice award.

The award requires proof of contact with six members of this club since 1957. Any contact with a station that was a club member at the time of the QSO is valid for the award. Many PA stations will have an indication on their QSL such as member ADXC or valid for ADXC. The cards also may have on them one of the publicity labels issued during various years. Also valid are contacts with ADXC members when they operate /P or /A from a second QTH in The Netherlands. There are no mode, date, or band restrictions. The award is also available to SWLs. Contacts you have made under any valid callsign count for the award.

Send GCR list and fee of $US5, 5 Euros, or 6 IRCs to: Jan Visser, PG2AA, Wethouder in 't Veldstraat 28, 1107 BJ Amsterdam, The Netherlands (e-mail: <PG2AA@amsat.org>).

Current Member List (as of February 20, 2006)

PAØ: ACM, ANH, ASD, AWJ, BEA, CHN, END, FCM, FL, IF, IWO, JVB, JWA, KST, LGJ, LRK, MFC, MIR, NLC, OI, PJE, PRY, RDY, RHA, VDW, WFB. **PA1:** MM. **PA2:** JSL, RPC, SWL. **PA3:** ACC, ADA, ADI, AJW, ASD, AWX, BFK, BFX, BKW, BLV, CQJ, CUP, CYA, CYM, CYN, DLK, DRZ, EAL, EAT, ECT, EHA, EMN, EPL, EQG, EWD, FBC, FBW, FTF, GFI, HEO. **PA4:** T, SDV. **PA5:** MM. **PB2:** DD. **PDØ:** BAK, HAV, HFB, LBD, MIZ, OZB, VOS. **PE1:** BMS, GOA, GXY, IBA, IXP, JAN, KDM, KZK, LZG. **PG2:** AA. **PH8:** GB. **PI4:** AML, RCA, VLA. **PI9:** ZKA. (Cards of ex-members whose QSLs show the club affilation count for the award.)

Rostov Regional District Award (RRDA). Vlad, UA6LAM, recently sent me a sample copy of the Rostov Regional District Award. The artwork is about the nicest I've seen in a long time. Rostov is located in southern Russia, not far from Turkey, Azerbaijan, and Georgia. The Near East influence is very noticeable. The award requires contacts with Russian Districts in the Rostov Region as defined in the Russian District Award rules. Many Russian awards are beginning to refer to this award, which has defined districts in Russia in about the same detail as our USA-CA Counties Award. See <http://rdaward.org/rda_rules_eng.htm> for a complete list of eligible districts for this award, among others.

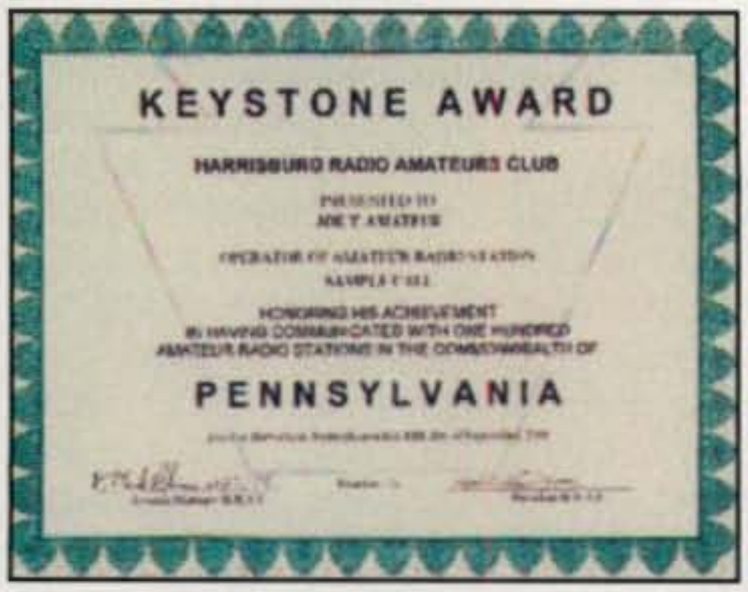
This award is issued by Rostov-on-Don radio amateurs for all amateur radio operators and SWLs. Contact at least 25 different Rostov-on-Don districts (Russian District Award numbers RO-01 . . . RO-66) after June 2, 1991. All bands and modes OK.

Send GCR list and fee of 5 Euros, $US6 or 6 IRCs (for Russia, 90 rubles) to: Vlad Strelkov, UA6LAM, P.O. Box 892, Rostov-on-Don, 344002, Russia (e-mail: <ua6lam@mail.ru>).

U.S. Awards

Keystone Award. Another old favorite is the Keystone Award offered by the Harrisburg Radio Amateurs Club. The rules are pretty simple, it's easy to earn, and the cost is low. A modest effort in the annual Pennsylvania QSO party will clinch the award.

The basic award is issued for contacting 100 different Pennsylvania stations after January 1, 1957. No repeater or digital retransmissions allowed. Two endorsements are available: (1) Novice —contact 25 PA Novices in a calendar year, (2) 100 PA

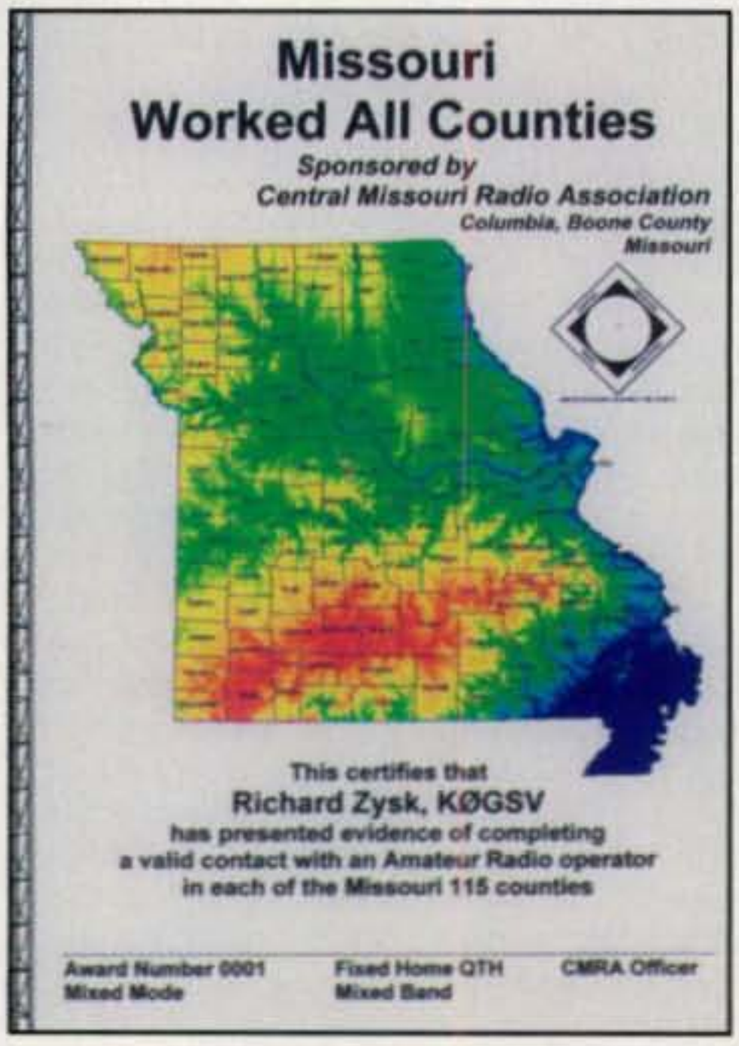


The Keystone Award, sponsored by the Harrisburg Radio Amateurs Club, is issued for contacting 100 Pennsylvania stations after January 1, 1957.

Stations—contact 100 in a calendar year. The basic certificate must be earned before the endorsements.

Send GCR list and fee as follows: Fee for the basic award is $US3 for the U.S. and possessions with no charge for endorsements. For DX stations the basic award is $US3 or 3 IRCs; endorsements are $US1 or 1 IRC. Apply to: Mark Robinson, WB3JIS, 1235 Middletown Road, Hummelstown, PA 17036-8929 (e-mail: <DmarkRobinson@excite.com>).

Missouri Worked All Counties Award. We're getting closer to the goal of having at least one "all counties" award for each state. A recent addition was provided by the Central Missouri Radio Association's sponsorship of a county award for Missouri. The group



The Missouri Worked All Counties Award is sponsored by the Central Missouri Radio Association to encourage HF radio activity involving Missouri counties.

has used a colorful topographic map of the state overlaid on a county grid for the certificate.

Contact each of the 115 Missouri counties (including St. Louis City). The award is offered for CW, Digital (PSK31, RTTY), Phone, or Mixed modes and endorsed on any single band from 160 through 2 meters or Mixed, five HF bands (10, 15, 20, 40, and 80 meters), or QRP. The applicant may make the contacts from either a single location, all mobile, or as a rover, making a QSO from each Missouri county. The sponsor also recognizes USA-CA completers who only need to send their certificate number and issue date in order to receive the Missouri award. In addition, e-QSLs or a LoTW file may be used, as well as the traditional GCR list signed by two licensed amateurs. Applicants must use the PDF application found on the club website: <http://oak.snr.missouri.edu/MO-WAC/MO-WAC.html>. Apply to: Central Missouri Radio Assn., c/o Dave Larsen, KVØS, P.O. Box 283, Columbia, MO 65205-0283 (e-mail: <KV0S@arrl.net>).

Looking for some help in publicizing your group or club's award? *CQ* magazine can help. Please send all details and samples to me for review. 73, Ted, K1BV

Mark McMullen, KM6HB

USA-CA All Counties #1149, February 10, 2007

My odyssey with radio started when I was a youngster. I saw an advertisement in a magazine for a shortwave radio. I asked my parents if I could have one. To my surprise, they said yes! At such an early age I was fascinated listening to foreign broadcasts. From there I got caught up in the CB craze of the mid-1970s. During high school I installed CBs in my friends' cars and we all had a great time.

From there, marriage, career, and life took over, but I was always into the magic of radio. I dreamed of getting an amateur radio license someday. Finally, in 1991 I signed up for a ham radio course at a local college and a lifelong dream was fulfilled. I was first licensed as KC6TQV and later upgraded to Extra class with the callsign KM6HB at the old 20-wpm requirement. My first radio was a Uniden HR 2600 10-meter rig. When I started in ham radio, 28 MHz was red hot!

Now I use a Yaesu FT-990 and an Alpha 78 amplifier. Because of antenna restrictions, I only use wire antennas at my QTH. In the photo note the old CB rigs from the '70s—11-meter boatanchors!

Once licensed, I knew I had found a hobby that I have come to love. My friend and Elmer at the time, Chris Kielch, K6CF (USA-CA All Counties #930) started to talk to me about county hunting. We had spent the previous few years chasing late-night and early-morning DX on 40 and 80 meters in our quest for 5 Band DXCC. Once we both hit that goal, what was next? Up to that point I had achieved Worked All States on SSB, CW, and RTTY. The same was true with DXCC. Honor Roll would be there someday. K6CF suggested I give county hunting a try.

A survey of my confirmed contacts revealed I already had about 1500 counties confirmed. The chase was on. For the last eight years I have searched frequently for counties on 14.336 SSB and 14056.5 CW. I also participated in radio contests. However, the bottom line is you have to put in the time for this award. I officially started eight years ago, but life's other obligations also cut into radio time. Through the grapevine I have heard that it takes about one to two years of daily effort to achieve USA-CA All Counties, so don't let my eight years discourage you from county hunting.

The home station of Mark McMullen, KM6HB, USA-CA All Counties #1149.

I would like to thank all the mobiles who provide a big service to county hunters by spending long hours on the road, not to mention their personal expense in time and money. It is very common for county hunters to backtrack and go off their planned route just to deliver a needed county. My log is full of contacts with mobiles who did just that. In fact, often my telephone would ring as on-the-road mobiles called me to be sure I was around the radio for that elusive county contact.

From the mobile station I only worked once, to the many who are in my log over and over again—such as KC1NA, AA9JJ, N4CD, ND9M, KIØJD, N8STL, W3CR, and others—thank you.

A special thank you to Jim Bogue, KN6ZB, and the superb QSL bureau he operates, as well as to Ed Bunch, N4UJK, and his county hunting supply service. Instead of charging me for a minimum of 500 mobile reply cards when I only needed a few to finish up, Ed sent them out free. Jim Grandinetti, KZ2P, has been a great help in running the net on 14336.

Special thanks, too, to Rufus Burdett, KD4HXM, who went to Randolph County, Georgia for my last county for "the whole ball of wax." Rufus was 5/9 during most of his runs in the counties prior to getting to Randolph, but of course when he got into Randolph he was in the noise! Just my luck, but we were able to make a direct QSO and he was in the log! The odyssey finally had come to an end.

The great thing about county hunting is that it doesn't have to end with USA-CA All Counties. It opens a door that can lead you down a path to many other awards. Check out MARAC.org. There are many county hunters who have worked all counties several times over. There are also several awards to work toward. The odyssey doesn't have to end. It's just getting started for me, I think!

I also will be upgrading my mobile HF setup and start getting out on the road and passing out some counties, for that is what county hunting really comes down to . . . giving back to others what so many have given to me. *—73, Mark, KM6HB*

Scarborough Reef Report, "Most Wanted" Statistics & Upcoming Events

BY CARL SMITH,* N4AA

The last few months have been an interesting time for DXers. We have had the opportunity to work new ones such as Swains Island and Scarborough Reef, both ranked at the top of the Most Wanted list. I don't recall the last time such events were timed so close together. Swains Island logs came in with nearly 115,000 QSOs, making it one of the largest QSO totals for any DXpedition.

Scarborough Reef, BS7H

Scarborough Reef was finally activated on April 29th, and operation ceased on May 5th at 2359Z. It was not a long DXpedition by today's standards, but the team did provide around 45,000 QSOs to those who were lucky enough to have propagation and/or patience. It is doubtful that the BS7H operation will drop Scarborough far down on the Most Wanted list, but it should come down a notch or two. For many of those who managed to get in the log, it was the *last one* for that coveted #1 Honor Roll spot.

There was no RTTY operation during this trip, only CW/SSB. As I write this in mid-May, I have not yet seen a breakdown by mode, but CW seemed to be doing a better job of getting through under far less than ideal propagation conditions. Many who needed Scarborough were disappointed at not being able to work them, but nevertheless gave credit to the brave souls who made the effort. There were the usual complaints, but for the most part we have come to ignore comments that are without any foundation. Others comments are at least read, even if we don't necessarily agree or disagree.

"Most Wanted" Statistics

A few interesting statistics for you this month. In the 2006 Most Wanted Survey by *The DX Magazine,* Scarborough Reef was "needed" by 98.9% of the respondents. Swains Island was not on that survey, but it was estimated that it would have been in the top five on the list for 2006. Thus, the N8S operation will surely drop Swains far down the list for 2007. Since the QSL cards were not out in time for the survey for 2006, VU7-Lakshadweep was needed by 96.8% of the respondents, while P5-North Korea was needed by 93.7%. 7O-Yemen came in at 86.8% and KP1-Navassa at an even 75%. VKØ/H-Heard Island, ranked at #10 on the survey and was needed by 50.5%. Looking further down this list to #100, I find that V8-Brunei is only needed by 16.9% of those who responded to the survey. Thanks to Roger, G3SXW, and Tim, G4VXE, for coming up with these statistics.

The 16 ops who brought us BS7H, Scarborough Reef, at the end of April are shown here on one of the "rocks." (Photo courtesy of the BS7H website)

This one may be a little hard to comprehend. It's an interesting BS7H shot showing Rock 4 under the moonlight as seen by Joe, AA4NN, from Rock 1. This photo exemplifies the loneliness and isolation felt while operating during nighttime shifts. (Photo courtesy of Don, N1DG)

Upcoming DXpeditions

What DXpeditions do we have to look forward to in the foreseeable future?

YJ-Vanuatu will be activated in mid-July by Hank, WØCZE. WØFF is handling the QSLing chore for Hank.

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

CQ DX Awards Program

SSB

2495 .....KM6HB 2497 .....N5KDA
2496 .....IØYKN

CW

1080 .....KM6HB

RTTY

38 .....KM6HB 39 .....K8SIX

SSB Endorsements

330 .....W4UNP/336 300 .....YC9WZJ/300
330 .....K8SIX/336 300 .....K7SAM/300
330 .....WA4WTG/334 150 .....W1PX/168
320 .....N1ALR/328 28 MHz KM6HB
320 .....KM6HB/321 3.5/7 MHz KM6HB
310 .....IØYKN/310 1.8 MHz K8SIX
300 .....KU4BP/303 QRPp KM6HB

CW Endorsements

330 .....K8SIX/331 200 .....KM6HB/237

RTTY Endorsements

300 .....K8SIX/300 150 .....KM6HB/168

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

3180 .....N8BJQ

SSB

2974 .....N8BJQ

MIXED

1983 .....N8BJQ 1985 .....LA2LI

CW: 1800 N8BJQ. 2800 KF2O. 5050 K9QVB.
SSB: 450 EW1ABF. 1450 N8BJQ. 1600 K9UQN. 3200 KF2O.
Mixed: 1000 WB5JID. 1300 G3OCA. 2250 N8BJQ. 2950 K9UQN. 3900 KF2O.

160, 80, 40, 20, 15, 10 Meters: N8BJQ

Award of Excellence: EW1CQ
160 Meter Bar: EW1CQ

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, 7K3QPL.
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, 7K3QPL.

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.

Coming along in September for a three-week run will be the Five Star DX Association DXpedition to St. Brandon as 3B7C. Oh . . . St. Brandon was ranked #45 on the Most Wanted list last year with a 28.1% "need." Here is the latest update:

FSDXA St. Brandon DXpedition Bulletin No.4

Plans for the September 2007 Five Star DXers Association (FSDXA) DXpedition to St. Brandon are progressing well.

A suitable boat has been chartered to take the team and its six tons of equipment to the island, the license has been received, and all permits are in place for our stay on the island.

The team will be operating from Isle du Sud, the southern end of what is shown on the charts as Cocos Island (not to be confused with Cocos Island in TI9 or the Cocos-Keeling Islands VK9!). Lighthouse on the Air enthusiasts might be interested to note that Cocos Is. has a beacon for WLOTA-Ref. LH 1017. This will be an all-time new one for lighthouse collectors, assuming the light is accessible from Isle du Sud.

Team Changes: Some of the previously announced members have, unfortunately, had to drop out of the expedition. These include G3VMW, G4KIU, SM5AQD, WF5T, and W3WL. However, we are delighted to announce that they will be replaced by Bob, MDØCCE (also known as N2BB); Pete, SM5GMZ (recently QRV from 6W); Gordon, G3USR; and Clive, GM3POI (well known as a low-band expert living in the Orkney Islands).

3B7C Brochure: We now have a four-page full-colour brochure setting out more information about our expedition. This can be downloaded in both high- and low-definition PDF format from our website, <www.3b7c.com>, which is now up and running.

FSDXA Awarded Calcutta Key: At the meeting on Saturday, 16 March the RSGB

Can you hear me now? At the International DX Convention in Visalia this past May the crew from SteppIR listens for movement of antenna elements while owner Mike Mertel, K7IR, tests the motors of the three-element SteppIR Yagi with a 30–40 meter dipole outside the convention hotel. (Photo by W2VU)

5 Band WAZ

As of May 1, 2007, 723 stations have attained the 200 zone level and 1542 stations have attained the 150 zone level.

New recipients of 5 Band WAZ with all 200 zones confirmed:
W5VX

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:

RZ3DJ (160 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

15 Meter SSB

634 ..... WA7AR

20 Meter SSB

1159 ..... AD7J 1160 ..... WA7AR

17 Meter CW

65 ..... F9XL

20 Meter CW

572 ..... RX4HZ

6 Meters

81 ..... PY2RO

160 Meters

242 ....UAØFDX (31 zones) 243 ....RU6YY (31 zones)

All Band WAZ

Mixed

8453 ..... W8VE 8454 ..... KC5LK

SSB

5032 ..... F6EWX 5033 ..... RW3QHN

CW

510 ..... DM1TT 512 ..... HB9DQJ
511 ..... G4EHT

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>.

Board unanimously agreed that the Five Star DXers Association be awarded the "Calcutta Key" for the association's outstanding service to International Friendship.

FSDXA Approach to DXpeditioning: Having now QSLed nearly 100,000 3B9C QSOs, we calculate we achieved an average busted call rate of 0.5%. We believe this to be a good figure, although we shall try to improve on it at 3B7C. Learn about the techniques we use. Get "DXpeditioning Behind the Scenes" from Nevada Communications, now available for a special price of £12.95. <www.nevada.co.uk> (Amateur Radio/Books).

Don Field, G3XTT/NK1G
FSDXA Publicity Officer
(g3xtt@lineone.net)

The end of September will find Ulli, DL2AH, beginning a "tour" with **ZK2-Niue**, Sept. 29 to Oct. 12, then moving on to **ZL7-Chatham**, Oct. 17–30, followed by a two-week operation from **VK9N-Norfolk**. He will be working SSB/RTTY. Niue was ranked #75, needed by 20.8%, and Chatham was #106, needed by only 15.6%.

Ham Gatherings

Conventions coming up include the W9DXCC gathering in Chicago, September 15 (http://www.w9dxcc.com). There is always a great program on Saturday. N4AA sponsors the Friday evening Welcome Reception, followed by late-night hospitality suites on Friday and Saturday following the banquet.

Two weeks later we can look forward to the Ten-Tec Hamfest (http://www.tentec.com) September 28–29, and SEDCO III-2007 (http://www.sedco.homestead.com) September 29, in the Smoky Mountain town of Pigeon Forge, Tennessee.

All of these are really fun events that will see a multitude of DXers, and for SEDCO contesters will join DXers for a

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 337 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K9BWQ 336	WB4UBD 336	WA4IUM 334	K9IW 334	N5ZM 333	G3KMQ 329	N7WO 325	YT1AT 317	K4IE 291
N7FU 336	K9MM 336	EA2IA 334	K7LAY 334	K8LJG 332	N5HB 329	YV5ANT 324	W6YQ 314	G3DPX 284
N4JF 336	W8XD 335	PA5PQ 334	K4JLD 334	K5RT 332	K1HDO 329	KE3A 323	UA9SG 310	DJ1YH 281
K4IQJ 336	F3TH 335	K3UA 334	N4AH 334	YU1AB 332	K7JS 329	KF8UN 323	W9IL 309	XE1MD 280
K2TQC 336	W4OEL 335	DL3DXX 334	K9OW 334	HB9DDZ 332	W6OUL 329	F6HMJ 323	EA3ALV 309	WD9DZV 277
K2FL 336	N4CH 335	K2ENT 334	WØHZ 333	K3JGJ 332	W7IIT 328	IKØTUG 321	YU7FW 306	W2JLK 277
N4MM 336	WØJLC 335	NC9T 334	N5FG 333	VE3XN 331	KA3S 328	W3II 320	WA4DOU 305	
K4MQG 336	OK1MP 335	W2VJN 334	K4CN 333	K2JF 331	SM5HV/HK7 327	IKØADY 320	LU3DSI 302	
N7RO 336	W7CNL 335	G4BWP 334	W4MPY 333	WA8DXA 331	K6CU 326	WG5G/QRPp 320	N1KC 302	
W7OM 336	K4CEB 335	W1JR 334	K5UO 333	K8SIX 331	W4LI 325	F5OIU 320	RA1AOB 300	
K2OWE 336	K2JLA 334	I4LCK 334	KA7T 333	W2UE 330	N4OT 325	PY4WS 320	VE7KDU 300	
NØFW 336	F3AT 334	PY2YP 334	N6AW 333	W4UW 329	K1FK 324	OZ5UR 319	KT2C 300	

SSB

K6YRA 337	OZ5EV 336	K7JS 335	W4UW 335	W7FP 334	CT1AHU 331	NI5D 327	XE2NLD 315	K4IE 300
IK1GPG 337	K9BWQ 336	YU1AB 335	W2FKF 335	4N7ZZ 333	EA3JL 331	K7TCL 326	VE7SMP 315	RA1AOB 300
K5TVC 337	WB4UBD 336	N5FG 335	WDØBNC 334	VE1YX 333	K1HDO 331	HB9DDZ 326	IZ6CST 314	K7SAM 300
NØFW 337	K2FL 336	PY4OY 335	WØYDB 334	W2JZK 333	N7WR 331	YV4VN 326	W6NW 314	YC9WZJ 300
KZ2P 337	W8AXI 336	VE3XN 335	W4NKI 334	K8LJG 333	ZL1BOQ 331	WR5Y 325	WØROB 313	WA1ECF 295
K4MZU 337	K4JLD 336	IØZV 335	VE2GHZ 334	VE4ACY 333	AE5DX 330	KC4MJ 325	W7GAX 312	KW1DX 295
N4JF 337	VE2PJ 336	EA2IA 335	OE2EGL 334	VE2WY 333	KB2MY 330	PY2DBU 325	KA1LMR 312	W4EJG 295
W4WX 337	W3AZD 336	IN3DEI 335	WA4IUM 334	WB3DNA 333	K3PT 330	YT1AT 325	WA5MLT 310	XE1MW 293
K2TQC 337	OK1MP 336	EA4DO 335	K5RT 334	K9PP 333	WS9V 329	KE4SCY 325	RW9SG 310	K1RB 292
K5OVC 337	EA3BMT 336	PA5PQ 335	W6SHY 334	DL3DXX 333	W9OKL 329	K6GFJ 324	XE1RBV 310	W9ACE 291
W6BCQ 337	K9HQM 336	XE1VIC 335	W5RUK 334	EA3EQT 333	W2FGY 329	KD5ZD 324	IØYKN 310	W5PVE 288
DJ9ZB 337	W9SS 336	K2ENT 335	K4CN 334	YV1KZ 333	CT1CFH 329	W6WI 323	KK4TR 306	KKØDX 285
W6EUF 337	KE5K 336	IK6GPZ 335	EA3KB 334	KE3A 333	EA1JG 329	EA3CYM 323	WB2AQC 305	VE7HAM 285
K4MQG 337	K3JGJ 336	NC9T 335	K3UA 334	W7BJN 333	W9IL 329	WA4ZZ 322	K3BYV 303	N8LIQ 284
N7BK 337	W4UNP 336	KØKG 335	AA4S 334	YV1AJ 332	F6HMJ 329	WN9NBT 322	JR4NUN 303	WØIKD 283
N4MM 337	N5ZM 336	K1UO 335	CT3DL 334	KSØZ 332	KF8UN 328	W6OUL 322	YV2FEQ 303	KBØRNC 282
XE1L 337	K8SIX 336	I8KCI 335	VE7WJ 334	LU4DXU 332	WØULU 328	CT1ESO 321	KU4BP 303	XE1MEX 282
4Z4DX 337	K2JLA 335	I8LEL 335	YZ7AA 334	VE4ROY 332	K1EY 328	KD2GC 321	VE7KDU 302	IK8TMI 281
W6DPD 337	IK8CNT 335	DU9RG 335	CT3BM 334	CT1EEN 332	K3LC 328	N1KC 320	W5GZI 302	F5INJ 279
N4CH 337	VK4LC 335	DU1KT 335	N6AW 334	N2VW 332	K4DXA 328	W5GZI 320	W4PGC 302	WD9DZV 278
N7RO 337	OE7SEL 335	CT1EEB 335	WS9V 334	K5UO 332	LU5DV 328	SV3AQR 320	N2LM 302	W5GT 276
K7LAY 337	VE3MR 335	W1JR 335	W2CC 334	DL9OH 331	N1ALR 328	KD2GC 320	AC6WO 301	HSØ/EA4BKA 276
W7OM 337	VE3MRS 335	I4LCK 335	K9IW 334	YV1JV 331	XE1MD 327	LU3HBO 317	4X6DK 301	K9DXR 275
OE3WWB 337	ZL3NS 335	PY2YP 335	AB4IQ 334	K3JGJ 331	DK5WQ 327	WB4GMR 317	4Z5FL/M 301	
K9OW 337	OZ3SK 335	ZL1HY 335	WA4WTG 334	N5ORT 331	CP2DL 327	N8SHZ 316	N5WYR 300	

RTTY

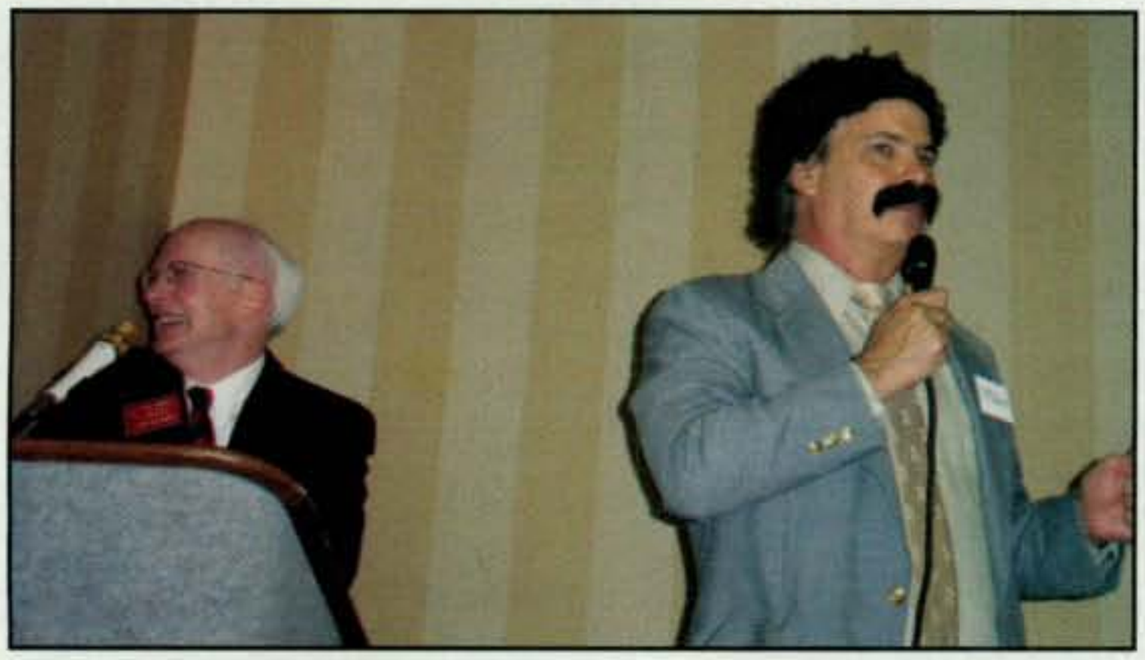
WB4UBD 334	NI4H 333	N5FG 325	N5ZM 324	OK1MP 323	EA5FKI 320	PA5PQ 311	K8SIX 300	W4EEU 297
K2ENT 333	K3UA 328	G4BWP 325						

day of presentations and a great buffet dinner after a day of enjoyment at the hamfest Ten-Tec.

Speaking of conventions, Rich, W2VU (Editor of *CQ*), provided a write-up of the events at the International DX Convention in Visalia in May. Here's what Rich reported:

Visalia – Getting the Job Done

"Elmering New DXers is JOB #1" was the theme for this year's International DX Convention in Visalia, California, and all indications are that achieving that goal got off to a good start. Some four dozen of the several hundred attendees at this year's gathering were registered as new DXers, and attendance was excellent at the four forums specifically intended for them: "DXing from a City Lot," by N6BV; "Ionospheric Propagation Simplified," by NE5EE; "Why Do We DX?" by W9KNI; and "Working Your First 100 Countries," by W2VU.



"UN7Borat" (otherwise known as banquet emcee Chip Margelli, K7JA) steals the stage from ARRL Executive Vice President Dave Sumner, K1ZZ, at the beginning of Dave's presentation on DXing from Montenegro at Visalia. (Photo by W2VU)

In addition, there was the usual assortment of forums for the more-seasoned DXers, as well as a banquet presentation by Dave Sumner, K1ZZ, on last year's 4O3T operation from Montenegro. The program was briefly—and hilariously—interrupted by a "visitor" from Kazakhstan, "UN7Borat" (according to his name tag). Plus, the Sunday morning breakfast crowd heard from Dave Collingham, K3LP, on the 5A7A DXpedition to Libya.

A large group at Friday night's contest dinner got a virtual tour by Tim Duffy, K3LR, of his contest superstation in western Pennsylvania, and saw the "world premiere" of ICOM's latest video, this one on contesting, shot at K3LR during last year's CQ WW SSB and CW contests. Speaking of world premieres, Elecraft introduced its new KX-3 transceiver at Visalia, and Flex-Radio showed its new Flex-5000 in public for the first time.—*W2VU*

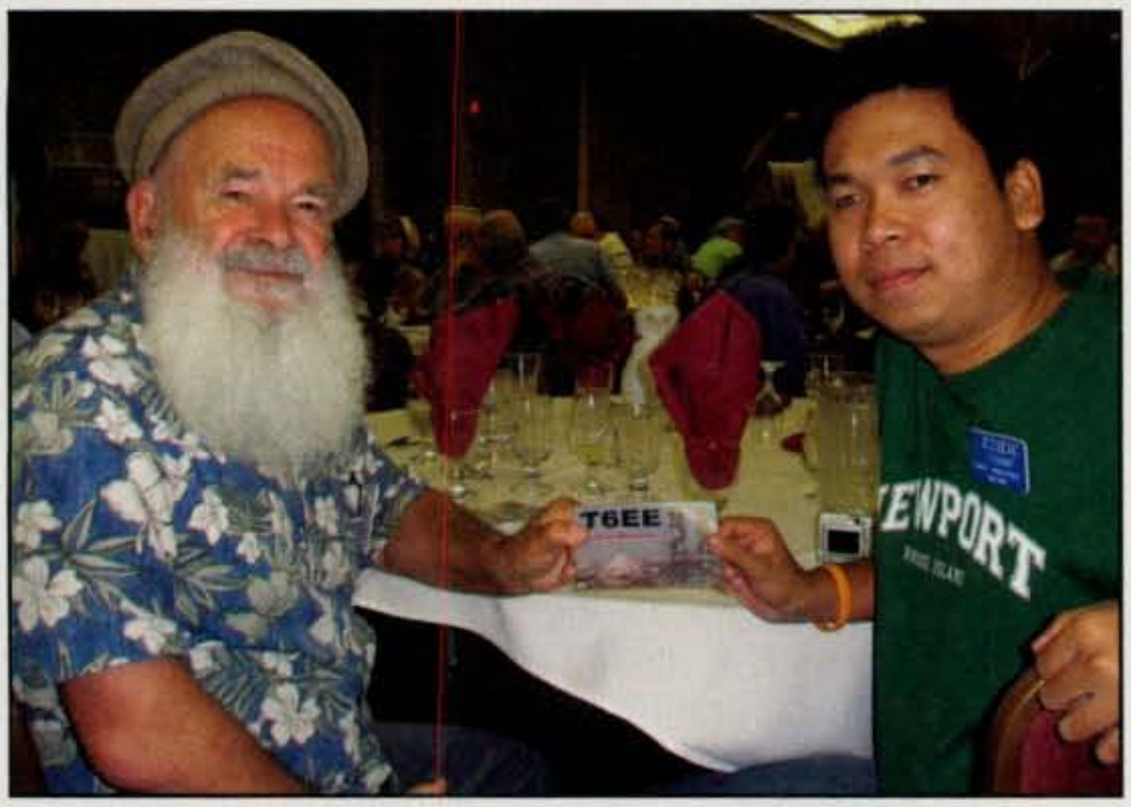
Summary

I may be "out of commission" on the air for a bit later this year. We are having a new house built (all on *one* floor) just down the road from my present QTH. Thank goodness I planned ahead and my antenna support (a 60-foot wood pole) was placed at the very top of the property and will *not* have to be

QSL Information

C6ASE via W2IRT
C6AWB via WA2IYO
CE1HBI via EA5KB
CE1YI via EA5KB
CE2GLR via EA5KB
CE2LZR via EA5KB
CE2SQE via EA5KB
CE4CT via EA5KB
CE5CSV via EA5KB
CM6GMC via EA5KB
CM6QN via EA5KB
CM6YD via EA5KB
CM8WAL via EA5KB
CN2R via W7EJ
CN2ZR via W7ZR
CO2AJ via EA5KB
CO2AV via EA5KB
CO2CR via EA5KB
CO2FN via EA5KB
CO2FU via EA5KB
CO2GL via EA5KB
CO2GP via EA5KB
CO2QX via EA5KB
CO2SX via EA5KB
CO2VQ via EA5KB
CO3JR via EA5KB
CO3ME via EA5KB
CO5FR via EA5KB
CO6BR via EA5KB
CO6DF via EA5KB
CO6DW via EA5KB
CO6FU via EA5KB
CO6RD via EA5KB
CO6TH via EA5KB
CO6TY via EA5KB
CO6XE via EA5KB
CO6YY via EA5KB
CO8CH via EA5KB
CO8CY via EA5KB
CO8EJ via EA5KB
CO8OT via EA5KB
CO8UN via EA5KB
CO8XI via EA5KB
CP4AY via EA5KB
CP4BT via EA5KB
CP4IC via EA5KB
CT3/DL3KWF via DL3KWF
CT3/DL3KWR via DL3KWR
CU1AAD via EA5KB
CU1CB via EA5KB
CU5AM via EA5KB
CU5AOA via EA5KB
CU6NS via EA5KB
CU6YB via EA5KB
CVØZ via EA5KB
CV1F via EA5KB
CV1T via EA5KB
CV1Z via EA5KB
CV5Y via EA5KB

(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>.)



John Kountz, KE6GFF (left), who periodically operates from Afghanistan as T6EE, took advantage of a visit to Visalia by Champ, E21EIC, from Thailand, to present Champ with the first QSL from his operation during last year's CQ WW DX SSB Contest. (Photo by W2VU)

moved at all. All I need to do is get a crew to move the 2-inch plastic pipe (hardline and control cables) 180 degrees to reach the new house, some 300 feet away from the pole. The pipe never got buried, but it will be after it is moved to the new location. At my age, this will absolutely be my last house-building adventure!

One final comment about Scarborough: Yes, I worked BS7H on 20 meters CW and SSB, my *last one* for the Mixed award. I still need a few for CW and SSB to hit #1 there.

Until next time, enjoy the chase and Have Fun!

73, Carl, N4AA

contesting

BY JOHN DORR,* K1AR

The Dangers of Packet Spotting

July's Contest Tip

Concentration is one of the most significant differentiators among contest operators. Those who have the ability to stay focused will outperform others whose minds tend to drift. One of the best contests in which to practice your focusing abilities is the North American Sprint (see http://www.ncjweb.com/sprintrules.php). It's a four-hour affair that tests every bit of operating ability you have to offer in contesting. Think about concentration as a key aspect of your operating skill set and make sure you do everything you can to maximize it before the next big contest!

Calendar of Events

All year	**CQ DX Marathon**
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 7–8	Venezuelan Independence Day Contest
July 7–8	DL DX RTTY Contest
July 14–15	IARU HF World Championship
July 21–22	**CQ WW VHF Contest**
July 28–29	RSGB IOTA Contest
Aug. 4	European HF Championship
Aug. 4–5	North American CW QSO Party
Aug. 5	SARL HF Contest
Aug. 11–12	Worked All Europe CW Contest
Sept. 29–30	**CQ WW RTTY DX Contest**

Whether you love it or hate it, most will agree that packet spotting is here to stay. The proponents of packet will tell you that it's just another tool of the trade that has come from the evolution of technology into our sport. In contrast, others will claim that packet has dumbed down contesting, making us dependent on what we see on the screen as opposed to what is found on the air with good, old-fashioned tuning.

We were fortunate to have had Scott Tuthill, K7ZO, conduct some in-depth analysis of the spotting environment from this year's ARRL SSB DX contest, originally published on the CQ Contest e-mail reflector. Whether you are a proponent of packet or not, the message is the same: Never accept what's on your screen as true and accurate. If you do, your score and operating investment will suffer, pure and simple.

It's amazing to me how many contesters violate this basic operating philosophy. They are willing to risk penalties and score reductions simply because they are too lazy or lack the motivation to take the time to actually copy the calls of stations they work via a packet spot. This month we're going to talk about, maybe for the first time, how that aspect of poor operating can affect your score, and the results aren't pretty. Thus, operators beware. Scott has some interesting data for us to contemplate. Here is what he found:

Analyzing Packet Spotting

For those of you who have operated in a multi-op situation, you know that chasing spots is an important way to add to the multiplier and QSO totals. You also know how frustrating it can be to chase down busted and erroneous spots. After the 2007 ARRL SSB at NK7U, I decided to see what I could learn about bad spots that might help us in the future.

Let me begin by describing how I identified busted spots. I started with a full list of spots made in the contest as captured by Dave Robbins, K1TTT. I then reduced the list to a subset of DX stations spotted by US/VE stations, as that is the area of primary interest for this analysis. At that point, I started to examine the file in several ways to identify spotted stations that might include broken callsigns. I looked for spots that were generated only once or twice, with the idea being that a busted callsign is not going to appear as often as a good one. I'm sure I missed some busts by limiting the examination to only one or two, but most of them have been captured.

Sometimes a bad spot obviously was based on known callsigns being actively spotted in the contest. If not, I then looked at the suspect call in three different ways to see if it might be busted: (1) Was the callsign in our NK7U log; (2) Was it in the supercheck partial master file; and (3) Could the callsign be verified via an on-line look-up? Another method I used was to look for comments in spots that identified prior spots as being busted. There were several operators who played the role of "spot police" during the contest, noting busted spots for others to see. With this background in mind, my findings follow:

Overall Totals

The database I received from K1TTT had a total of 29,485 spots in it. Of those, 20,202, or 68%, were of US/VE stations spotting DX stations. A total of 1139 different stations submitted spots, for an average of about 18 spots per callsign. The number of spots per station was pretty broad, with AA3B making 992 spots, W3LPL 362, and K3LR 314, ranging all the way down to 373 stations that only made one spot in the entire contest. The top 1% of spotters made 3527 spots, or 17%, of the overall total. Also, true to an old rule of thumb, the top 20% of spotters did, in fact, make exactly 80.2% of the total number of spots.

Busted Spot Numbers

Within the 20,202 spots, I was able to identify 467 busted spots, or 2.3% of the total. In other words, approximately one in 44 spots was a busted callsign. Of the 1139 operators who made spots, 896, or 79% of the total, had "golden logs" generating no busted spots. These operators made 7695 spots, or 38% of the total. Notable operators in this group are K3CT, who made 310 spots; KA4RRU,

*2 Mitchell Pond Road, Windham, NH 03087
e-mail: <K1AR@contesting.com>

who made 155; and KØRC, who made 137. The 467 busted spots were spread across 243 operators, for an average of 1.9 busted spots per operator. For these operators their busted spot rate was 3.7%, or one in 27 spots.

I then considered whether there were specific spotters who posted a substantially high number of busted spots. If so, it might be possible to fil*ter their spots* out of the spot stream being fed to the computers, the idea being you could reduce the number of bad spots while not missing good spots. What I found was a clear pattern, but it might not be that useful in a contest. To make this particular concept work, you need to identify spotters who are both making a high number of spots and who have a high busted spot percentage. For this contest, there were 49 operators who made three or more busted spots. Of these, 21 stations had a busted spot rate of 5% or higher, and they represented a total of 118 busted spots, or 25% of the total. They had an average busted spot rate of 8.9%, which is astoundingly high, or almost four times the overall average busted spot rate. Thus, in theory, if you filtered out spots from these 21 operators, you could reduce the total number of busted spots by 25%, while reducing the overall spot count by just 6.5%.

Reducing bad operator behavior may or may not be that useful. On the surface, it does not seem to make that big a dent in the overall busted spot count. What needs to be managed are the "long tail" situations. In other words, if we wanted to reduce the overall busted spot count by 50%, we would have to filter out spots from 51 operators who represented 31% of the total spots. Unfortunately, this is probably overkill, throwing out too many good spots to limit the bad ones. Of course, too, these operators may or may not be the same ones making busted spots in the next contest.

Patterns of Busted Spots

One of the other goals of this study was to see if I could identify the root cause(s) of busted spots, or if there were certain patterns in the spots that were busted. As it turns out, it was interesting to review the spots for unique callsigns. I found a few operators who were posting the callsigns of stations they worked while running. This generated a high number of uniques, which of course were good callsigns. However, the spot is more or less useless for others, except maybe to say the band is open to some part of the world. Many operators know that already. In addition, if there are operators out there who grab spots, QSY, and dump their call into the airwaves, these operators posting their running QSOs are just generating QRM for themselves. They also could be guilty of self-spotting.

After further examining the log file, I found 539 uniquely spotted callsigns, of which I estimated 337 were busted, or 62%. Therefore, there is a pretty good chance that a unique callsign was a busted one. Of the 38% that were good callsigns, 17% of them appeared to be generated by operators posting their own run QSOs.

When I studied callsigns that were in the log file twice—a total of 140—I estimated that 47 of them, or 33%, were busted. Thus, the chance that a callsign that was spotted only twice was actually busted is still pretty high, but it is much less than that of uniques. I did not do an in-depth study beyond this point. However, it appears the trend continues. There were 89 calls spotted three times, 60 four times, and 45 five times. My incomplete examination showed 8 busted callsigns in the three-spot grouping, for a 9% rate. Also, I only ran across one example in the spotted four and five times group (e.g., an HZ1KEF spot for actual OZ1KEF that took a long time to die out).

These patterns, while interesting, are one factor in preparing for and operating during a contest. If a new, unique callsign gets spotted, it may have a nearly two out of three chance of being a busted call, but you probably can't afford to ignore it. What is needed is a way of examining the spotted callsign in real time to see if it has a high likelihood of being busted. I will leave this idea for others to think about for now.

Causes of Busted Spots

Finally, I spent some time looking at the busted spots themselves to investigate what causes a spot to be busted. The major category seems to be typos, with about 25% appearing to be what one would consider a typing mistake. The spotted callsign was only one character off the correct call, with the mistyped character being next to the correct one on the keyboard. Since there are far more letters than numbers in calls, the error rate on typing letters is much greater than numbers. Other error categories include:

- Transpositions—about 5% of the time all the correct characters were in the spot, but the operator transposed a couple of letters.
- Busts and Miscopies—about 65% seemed to be total busts. The operator heard and/or typed something different than the correct callsign.
- Dropped last character—about 5% of the busted spots were because the last character of the call was missing. This was the cause of all the busted spots from NK7U.

There's much more that can be analyzed, but the most important message is that what you see on the screen may not be what you should put in your log! See you in the next contest.

—73, Scott, K7ZO

Final Comments

Clearly, Scott has given us food for thought as we operate our next contest multi-op or assisted. The message is simple: Use of packet still requires the skill of listening and copying callsigns and getting all of the required information correctly entered into your log!

73, John, K1AR

vhf plus

BY JOE LYNCH,* N6CL

Tapping into the Space Grant Consortia: A Follow-up Story

In May's column I encouraged all of us to look into our regional space grant consortium to find out what sort of amateur radio involvement might be under way. I also gave a presentation on this topic on March 31st at the Hanging Judge Hamfest in Ft. Smith, Arkansas. At that presentation I gave information on a forthcoming symposium sponsored by the Arkansas Space Grant Consortium. My presentation piqued the interest of Billy Graham, N5QEM, who is the Chair of the Electronics Technology Department, Northwest Technical Institute, in Springdale, Arkansas. In reporting on his own experience with the ASGC, Billy sent me the following:

Dear Joe,

When we met at the Hanging Judge Hamfest in Ft. Smith, Arkansas in March I told you how ham radio had motivated my students to learn electronics communication. As a result of our conversation, I am sending you this story of my newfound motivation. I want to add that because my students were so hyped up by my motivation that in turn they motivated me as well.

As a result, in April I attended the 15th annual Arkansas Space Grant Consortium symposium and was able to meet people who were doing near-space ballooning. From that conversation I was able to acquire a grant to start our own near-space balloon program. Therefore, not only did the students benefit from the class, it also got me back into ham radio as well and gave our school something that no one else in this area has. The following is my story:

Ham Radio and Motivation

By Billy Graham, N5QEM

As the chair and lead instructor of the Electronics Technology Department of the Northwest Technical Institute in Springdale, Arkansas, I had tried everything that I could think of to get my electronics communication class interested in the class material. We had gone to radio stations and police departments, yet nothing seemed to work.

Then one day my lab assistant, Mark Huffman, N5OTD, and I were talking about ham radio and getting ready to upgrade. Mark was working on his Extra class license exam and I was working on my General. Some of my students overheard us talking about whom we had talked to and the different places all over the U.S. and the world we were able to hear. They wanted to know what ham radio was all about, and some wanted to know how they could get into ham radio.

The stage was set. In class we switched to discussing ham radio instead of electronic communications. Little did they know that the two topics were very much the same. Sensing their growing interest in ham radio, I ordered some Tech books and away we went.

Over the course of the next few weeks we talked and worked our way through the books. My students were eager to learn this "new" field of communications. We discussed antennas, how ham radio works, what it is all about. We even had Hal Long, K5NOW, one of the hams who also works here at the school, come over and give a great demonstration on his Yaesu 2-meter handheld. That was a fun day. Hal discussed repeaters and how they worked and why we use them.

The students' interest continued to grow. Next they wanted to have a way to actually listen to hams talking, so I dusted off the old Kenwood TS-530 that was in the closet and set about installing a new G5RV dipole on top of the school.

The students took the lead in installing that antenna. They worked on the stand for the pole, put the stand and pole on the roof, and did all the rest of the work. When we turned on the set, we were able to listen to stations talking back and forth. As a result of this stimulation the students wanted to go on and get their licenses. I requested a testing time with the Amateur Radio Klub of the Arkansas Northwest (ARKAN), the local ham club. In response, they sent three of their VEs to the campus to test the students. Two of the five students in the class passed the Technician test. One even made it to General on the same day.

Now the class wanted to have a club of its own, so I applied for a school club callsign, which we got a few weeks later. If you hear a station transmit "CQ, CQ, this is KE5NCQ," you will know that it all started because two hams were taking about how much fun it was to talk to people all over the U.S. and around the world.

This is only the beginning of my story. As an added note, my students were not the only ones to benefit from the class. If you have ever taught something, you know you learn more than your students. Because my students got hyped up about ham radio, I again found the real joy of ham radio and really started looking for new opportunities for the school. While at the Hanging Judge Hamfest, I attended the VHF forum given by *CQ VHF* magazine Editor Joe Lynch, N6CL. He encouraged me to attend the 15th annual Arkansas Space Grant Consortium symposium, which was held at the Winthrop Rockefeller Center in April of this year. While there, I met

e-mail: <n6cl@sbcglobal.net>

VHF Plus Calendar

July 1–31	Six Club Contest (See text for details.)
July 1	Very poor EME conditions.
July 6–8	Great Plains Super Launch 2007 (See text for details.)
July 7	Last Quarter Moon
July 8	Good EME conditions
July 9	Moon Perigee
July 14	New Moon
July 15	Good EME conditions
July 21–22	CQWW VHF Contest (See text for details.)
July 22	First Quarter Moon and Moon Apogee; Poor EME conditions
July 26–29	Central States VHF Society annual conference (See text for details.)
July 28	*Southern Delta Aquarids* Meteor Shower Peak
July 29	Poor EME conditions
July 30	Full Moon

—EME conditions courtesy W5LUU.

with Mr. Ed Roberts from Pottsville High School. He was doing a near-space program at his school and using ham radio to track the balloon. I had always wanted to do that, but I never could get the funds. While there, I talked to Dr. Keith Hudson of the ASGC. He told me of some grants that were available. When I got back from the symposium, I sat down with Mark and we gave it some thought. We then wrote a grant proposal and sent it off. After waiting a few weeks, I got a call and learned that we had won a grant. Now we are working on our own near-space balloon program. We will be working with local schools to launch their experiments into near space.

The bottom line is that not only did ham radio motivate my students to learn electronic communications, but it also gave me the boost I needed to keep learning and reaching out.

Now that you have read Billy Graham, N5QEM's story as it relates to the space grant consortia, I have a question for you: What is your story? Please let me know so that I can publish it here.

Another happy balloon hunting party, TigerCUB-2. From left to right: Matt Allen; Erik Pearson, KI4UZY; Aaron Jones; Max Thomason; and Justin Ingersoll, KI4HOW. (Photo courtesy of KI4CQK)

TigerCUB-2 Successfully Launched and Recovered

Speaking of educational balloon launches, the following is from Gerald Lehmacher, KI4CQK, via the Clemson University website: <http://people.clemson.edu/~glehmac/balloon/>:

The high-altitude balloon experiment TigerCUB was launched for the second time on April 23 at 9:00 AM EDT from Kite Hill on the Clemson University Campus and recovered at around 3:00 PM in a pine forest near Clinton, South Carolina. The 1200-gram weather balloon was filled with helium for a nozzle lift of over 9 lbs. and carried a payload similar to last year's. A significant improvement was a cut-down system that severed the balloon about 75 minutes after launch, for a smoother descent by parachute. Also, the camera took 113 small movie clips instead of still pictures. Adding to the excitement, the GPS stopped delivering positions near 65,000 ft. on ascent. Thanks to the Morse code beacon, we could determine the direction to the landing site, and soon we received the GPS position again. The recovery operation took a few hours, but was much fun. ...

Many thanks go to Clemson undergraduates Erik Pearson (physics and recently KI4UZY), who took charge as his physics senior project, Max Thomason (ME), Matt Allen (physics), Aaron Jones (physics), and graduate student Justin Ingersoll (ECE/physics, and KI4HOW). The entire physics machine shop helped with transporting the helium, filling the balloon, and launch. The project was supported by the Creative Inquiry program of Clemson University.

Hawaii on the Moon

The following is By Al Ward, W5LUA, from the May/June issue of *Feedpoint*, the bi-monthly publication of the North Texas Microwave Society:

Bruce Clark, KØYW, with the support of the Oahu Contest Club, K5GW from Texas Towers, W5LUA, K5JL, WD5AGO, WA5WCP, K1RQG, and many others activated Hawaii on 23 cm and 13 cm EME for the first time since the early 1960s. The first 1296-MHz EME contact from KH6 was when KH6UK operated by W2UK worked W1BU, which happened shortly after W1BU and W6HB made the first 1296-MHz EME QSO in 1960. Shortly after, other notables made 1296-MHz EME QSOs, including G3LTF, who, by the way, is still active on 1296-MHz EME! Prior to this recent Hawaiian operation, there had been no other EME operation on 13 cm from Hawaii.

The location of the recent operation was the contest station of Alex Benton, KH6YY, near Haleiwa, Oahu, Hawaii in grid BL01xp. With the generous help of numerous Hawaiians, it took Bruce a couple of days to build the station from the materials on hand and with hundreds of pounds of equipment shipped in. The expedition began operation on April 20 and ended on April 24, at which point Bruce and his wife Patty spent several well-deserved days on the beach. The call used was KH7X. Bruce made about 25 QSOs on 23 cm and about 10 QSOs on 13 cm. The dish used was a resurrected 12-foot TVRO dish that Alex, KH6YY, had lying in the weeds on his property.

The 23-cm equipment consisted of a TS-2000 with INRAD RX filter for the 144-MHz IF, driving an SSB Engineering LT-230S 23-cm transverter (thanks, Les Cockram, KU4F). This drives a KD5FZX GS-15B tetrode power amplifier at 400 watts, neatly packaged into a Dentron MLA-2500 case (thanks, K5GW and K5JL). The 23-cm RF passes through a short run of Andrew 7/8-inch heliax with LDF 600 jumpers to the antenna, which is a full auto-tracking AZ-EL 12-foot (3.67-meter) dish. Its F/d is 0.37. The feed is a round waveguide Septum feed with VE4MA design scalar ring. The RX preamp is a WD5AGO unit with .28-dB NF, protected by an RLC Y relay (thanks, K1RQG).

Equipment for 13 cm was donated by Al, W5LUA; Gerald, K5GW; Tommy, WD5AGO; and Steve Hicks, N5AC. The equipment consisted of a DEM 2304 transverter, interfaced on 144 MHz to the TS-2000. The RX preamp was a WD5AGO unit with a 0.4-dB NF. The feed was also a WD5AGO, VE4MA design, cleverly adapted for easy replacement into the 23-cm feed support. The power amplifier was a Spectrian amp at 150 watts, loaned to us by N5AC.

Check out the following link for more information on the operation: <http://aditl.com/ham/kh7x-eme-2007/index.html>. Come to the Central States VHF Society conference in San Antonio, Texas, where Bruce, KØYW, will give a full report and presentation on his very successful EME operation.

First ZL to 9H 6-meter EME QSO

Philip Aquilina, 9HPA, reports the following via the Magic Band EME listserv: "After many months and nearly giving up due to noise from 33-KV high-tension lines, on May 13, I worked Rod, ZL3NW, for the first ZL to 9H 6-meter QSO ever made. Moon conditions were very good and noise was very low. After many tries we finally completed in about

8 minutes. Thanks, Rod, for new DXCC and a lot of patience. Antenna is a 2-wl K5GW mod design and GS35B with SSB Electronics pre-amp mounted on the tower."

Eagle Prototype UHF Receiver Powered Up

The following is from AMSAT-NA (http://www.amsat.org), May 6, 2007:

Jim Sanford, WB4GCS, Eagle Project Manager, has good news this week. Jim reported the completion of construction of the first prototype of the Eagle 70-cm Uplink Receiver. The receiver has been powered up, with testing and evaluation starting on May 5.

The receiver was designed by John Stephensen, KD6OZH. Juan Rivera, WA6HTP, and the Project Oscar Team implemented the design and produced the first prototype. Juan and John have provided extensive documentation on the receiver design and construction, which is available on AMSAT's EaglePedia. See: <http://www.amsat.org/amsat-new/eagle/EaglePedia/index.php/U-Band_Receiver>.

Support for the CAN-Do! command bus interface was provided by Stephen, KC0FTQ. For details go to EaglePedia: <http://www.amsat.org/amsat-new/eagle/EaglePedia/index.php/ Category:CanDo>.

John described his receiver design: "This is a key component of the Mode B linear transponder and provides higher dynamic range than Phase 3 satellite receivers. Our 70-cm band is shared and this minimizes interference from the military radiolocation service and provides improved performance for users in the amateur radio service."

Juan wrote: "Look for more details on my blogs on EaglePedia over the weekend. My special thanks to everyone who made this possible. It was a team effort from beginning to end."

Jim concluded by saying, "I wish to express my thanks and gratitude to the entire team for reaching this significant Eagle milestone!"

Current Contests

Six Club Contest: The Six Club Contest runs throughout the month of July. All logs are due 30 days from the ending date of the contest and they go either by e-mail or snail mail to: Joey Fiero, W5TFW, 30155 Napoleon Circle, Denham Springs, LA 70726 (e-mail: <w5tfw@cox.net>). For further information see the club's URL: <http://6mt.com/contest.htm>.

CQ WW VHF Contest: This year's CQ WW VHF Contest will be held between 1800 UTC July 21 and 2100 UTC July 22. Complete rules can be found in last month's issue of *CQ* magazine, in the Spring 2007 of *CQ VHF* magazine, and on the *CQ* website: <www.cq-amateur-radio.com>..

Current Conferences

The **Great Plains Super Launch 2007** will be the weekend of July 6–8, hosted by the Central Nebraska Near Space Program (CNNSP). The events will be held in Grand Island, Nebraska. Friday's balloon conference will be held in a meeting room of the Howard Johnson Riverside Inn. Launch sites have yet to be finalized, but will be within 45 minutes of Grand Island. For more information check out the website: <http://www.custom-ds.com/gpsl/>.

This year's **Central States VHF Society Conference** will be held in San Antonio, Texas, July 26–29, at the Omni San Antonio Hotel. For more information, go to: <http://www.csvhfs.org/conference/lodging.html>. Also, please see the article written by former CSVHFS President Bill Tynan, W3XO, which starts on page 47 in the Spring 2007 issue of *CQ VHF* magazine.

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 a call for papers for their forthcoming events:

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, 2007 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.

2007 AMSAT Space Symposium and Annual Meeting: This is the first call for papers for the 2007 AMSAT Space Symposium and Annual Meeting to be held October 25–28, 2007 in Pittsburgh, Pennsylvania. Proposals for papers, symposium presentations, and poster presentations are invited on any topic of interest to the amateur satellite program. An emphasis this year is an educational outreach to middle and high school students. In particular, papers on the following topics are solicited: Students & Education, ARISS, AO-51, P3E, Eagle, and other satellite-related topics.

Camera-ready copy on paper or in electronic form is due by September 1 for inclusion in the printed symposium *Proceedings*. Papers received after this date will not be included in the printed *Proceedings*. Papers should be sent to: Daniel Schultz, N8FGV, by e-mail: <n8fgv@amsat.org>.

The Wireless Association of South Hills Amateur Radio Club will serve as the host for this year's event. The Space Symposium will attempt to attract local middle and high schoolers to the Saturday sessions and is offering programs by local educators. In connection with this initiative, a fully operational satellite station will be available on site. For more information, see the website: <http://www.amsat.org/amsat-new/symposium/2007/index.php>.

Current Meteor Showers

This month there are a number of minor showers. The most intense, the *delta-Aquarids*, is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around July 28. The *α-Capricornids* are expected to peak on July 30.

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 . . .

There is an ancient story of a king, his queen, an officer of the king, and the queen's uncle. In this story the officer of the king is working on a plan to attack and essentially wipe out the tribe of which the uncle and the queen are members. However, this officer does not know that the queen is a member of this tribe.

The uncle tells his niece, the queen, of the officer's plot and adds that it is up to her to alert the king to the attack. The queen initially is intimidated by the king and subsequently refuses to alert him, because she views herself as being powerless before the king. Her uncle then turns the tables on her perception of herself by asking her to consider this thought: "Who knows if perhaps you were made queen for just such a time as this?"

With that question, the uncle changes the queen's perception from one of powerlessness to one of immense power. She musters the courage to go to the king. As a result, the king orders the hanging of the officer and the arming of the tribe to defend itself against the attack. In the end the tribe is so well fortified that the order to annihilate the tribe cannot be carried out.

You may be asking, "What does this story have to do with ham radio?" It's a good question. Here is my answer:

With this issue I complete 16 years of writing this column. Perhaps the saddest part of writing this column is the increasing number of Silent Keys that I include in it. This part of writing the column is not only sad, but of deep concern because of our dwindling ranks. Many of us continue to wonder where our hobby will be in the not too distant future.

Here is where I become the uncle in the above story and turn the tables on our concerns by stating that as long as I possibly can, I will continue to make this column and *CQ VHF* magazine venues for you to be able to tell your stories. For example, in this column is Billy Graham, N5QEM's story of going from an inactive ham to becoming an instructor in a vocational-technical institute who is leading his students into our hobby by way of his classroom illustrations. He is also planning to expand his outreach to local schools in his community by way of using balloons carrying amateur radio payloads. His story was made possible in part because I told him and others some of your stories of successes in the hobby.

Another story in this column is the TigerCUB balloon launch from Clemson University. This is their second successful balloon launch and recovery. Upon completion of their first launch and recovery, Gerald received the following congratulatory e-mail from Clemson University's president, Dr. James Barker:

I saw the news item about TigerCUB and its successful launch of a high-altitude balloon that took pictures and sent data back to Earth below. What a fantastic project and a real accomplishment! Congratulations to you and the students who worked so hard to make this feat a reality.

Please forward this message to all involved and tell them, "President Barker is very proud of you!"—*best wishes, Jim Barker*

I would say that it is quite an accomplishment to get the president of the university to take notice of those students' accomplishment, and to reinforce their story by congratulating them and telling them how proud he is of them.

Continuing in my role as the uncle in the above story, now I ask you a variation of the question he asked his niece: "Who knows if perhaps you were made active amateur radio operators for just such a time as this?" Your amateur radio success story, properly told by you and retold by your supporters, may inspire others to also become successful. Therefore, my challenge to you is to please continue to send me your stories so that I may use them—and ultimately you—to become the inspiration for the continuation of this, our great hobby.

Until next month . . .

73 de Joe, N6CL

propagation

BY TOMAS HOOD,* NW7US

Basics, Part III: The Ever-Fluctuating Solar Flux

A Quick Look at Current Cycle 23 Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2007: 4
Twelve-month smoothed, October 2006: 14

10.7 cm Flux
Observed Monthly, April 2007: 72
Twelve-month smoothed, October 2006: 79

***Ap* Index**
Observed Monthly, April 2007: 9
Twelve-month smoothed, October 2006: 9

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2007

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 3-13, 1-17, 22-27 30-31	A	A	B	C
High Normal: 1-2, 14, 18, 21, 28-29	A	B	C	C-D
Low Normal: 19, 20	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 2 will be fair on July 1st and 2nd, good from July 3rd through the 13th, and so forth.

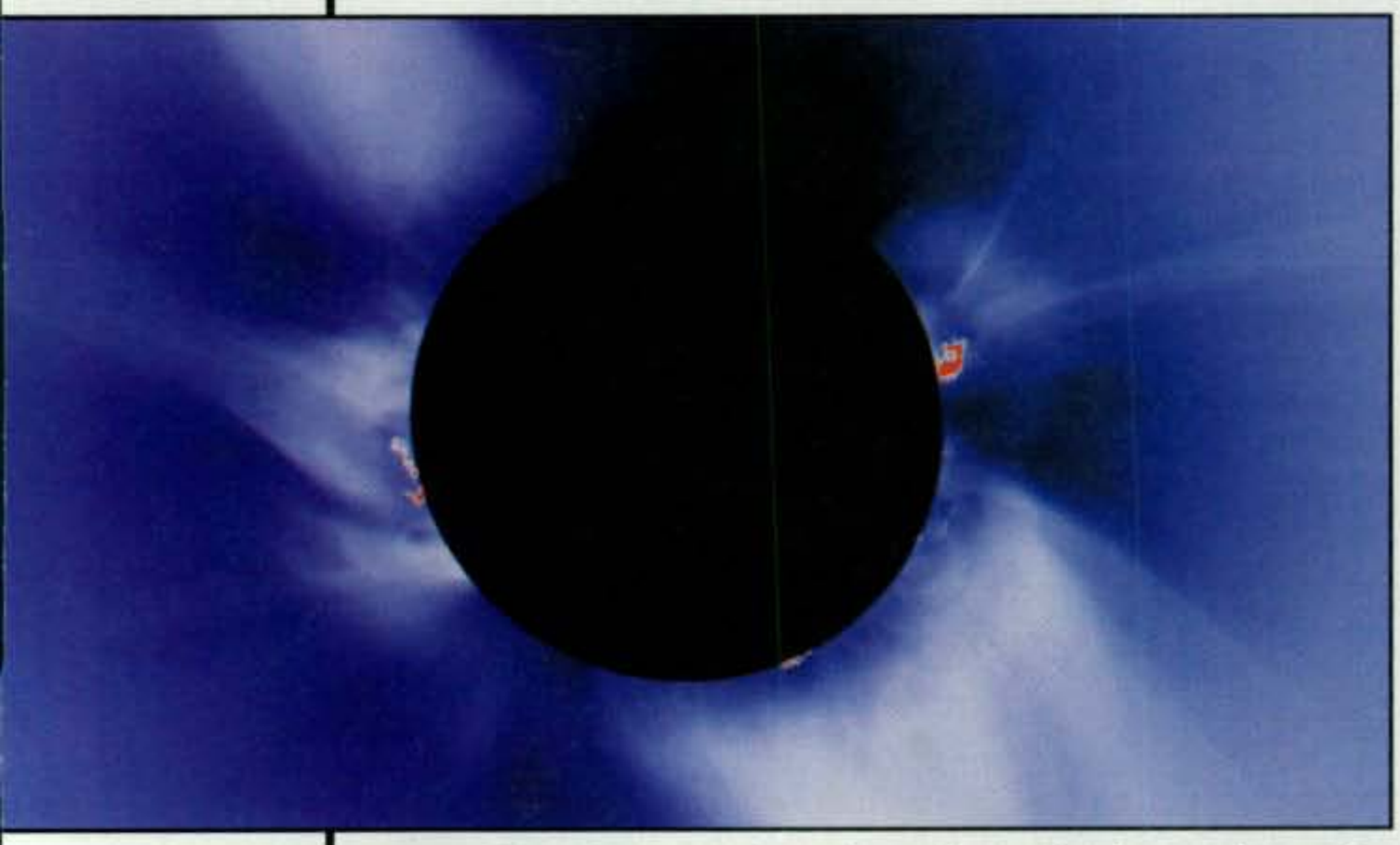
3. As an alternative, the Last-Minute Forecast may be used as a general guide to space weather and geomagnetic conditions through the month. When conditions are Above Normal, for example, the geomagnetic field should be quiet and space weather should be mild. On the other hand, days marked as Disturbed 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.

Last month we took a look at one of the key components of your radio system, the antenna, and how it affects the propagation of your radio's transmitted signal. The antenna is the one component in the system over which you have direct control. Other "components" of a radio circuit are out of your control. Sunspots and the ionosphere are parts of any high-frequency radio circuit that are out of our control. When you attempt to "work" a distant station in another country by transmitting on, say, 20 meters, the ionosphere is a fundamental, necessary part of the mechanism that propagates your transmitted signal beyond the horizon.

We've explored how the ionosphere is created and affected by the energy radiating from the sun. We've looked at the role of sunspots, and what sunspots are. This month we're going to look at one of the ways solar energy is measured—the 10-centimeter radio flux index. This particular measurement is used as an index of the level of solar energy which is closely correlated with ionospheric density and ionization.

As many of you know from past columns, the density of the different layers of the ionosphere is responsible for the refraction of a radio wave. If the *F*-layer of the ionosphere is highly ionized, the higher HF signals are refracted. On the other hand, signals on those same frequencies will pass right through the ionosphere and into space when the *F*-layer is much less energized.

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



The chromosphere is an irregular layer above the photosphere where the temperature rises from 6000° C to about 20,000° C. At these higher temperatures hydrogen emits light that gives off a reddish color (H-alpha emission). This colorful emission can be seen in the prominences that project above the limb of the sun during total solar eclipses. This is what gives the chromosphere its name (color-sphere). (Source: UCAR/NCAR/High Altitude Observatory)

The Ever-Fluctuating Flux

The sun emits radio energy with a slowly varying intensity. This ever-present radio energy originates from layers low in the sun's corona and high in the sun's chromosphere. This solar radio energy changes gradually from day to day.

The levels of this radio energy consist of emissions from three solar sources: the undisturbed solar surface, developing active regions, and short-lived enhancements above the daily level. Enhancements such as X-ray flares are the well-known events that most of us associate with solar

radio energy. However, other enhancements such as solar prominences are also factors in solar radio energy levels.

On Earth, research has revealed that the solar radio energy at the 2800-MHz frequency, at the wavelength of 10.7 cm (often called "the 10-cm flux") has been found to correlate well with the sunspot number. The sunspot number is arrived at by a calculation involving the number of individual sunspots as well as the number of sunspot groups, and the final number must be reduced to a standard scale, taking into account the differences in equipment and techniques among observatories. The radio flux at 10.7 cm, however, can quickly and easily be measured. For this reason, for many purposes the flux index has replaced the sunspot number as an index of solar activity.

In addition, the frequency of 2800 MHz is close to the wavelength of ultraviolet emissions. Ultraviolet energy causes the ionization in the ionospheric layers of our atmosphere. Because of this, we use the 10-cm flux level along with current ionospheric models to estimate the ionization of Earth's upper atmosphere, the ionosphere, at a given period of time.

The 10.7-cm radio flux index is written as "the $F_{10.7}$ index," or simply, $F_{10.7}$. The global daily value of $F_{10.7}$ is measured at local noon at the Penticton Radio Observatory in Canada.

$F_{10.7}$ can be used as a daily index or it can be averaged over longer periods of time to more smoothly plot the trends in solar activity. Typically, $F_{10.7}$ is averaged over one of three ranges: a month, a 90-day period, or a year. Even though $F_{10.7}$ and the sunspot number both indicate the level of solar activity (specifically the solar energy that directly influences the ionosphere), they each have significantly different scales. For example, $F_{10.7}$ never drops below a value of approximately 67, even during solar minimum when the sunspot number is very close to zero, as we often are seeing now at the end of sunspot Cycle 23.

The following equations allow you to convert between a 10.7-cm flux index number (F) and a sunspot number (R). The equations are valid on a statistical (i.e., average) basis.

$$F = 67.0 + 0.572R + (0.0575R)^2 - (0.0209R)^3$$

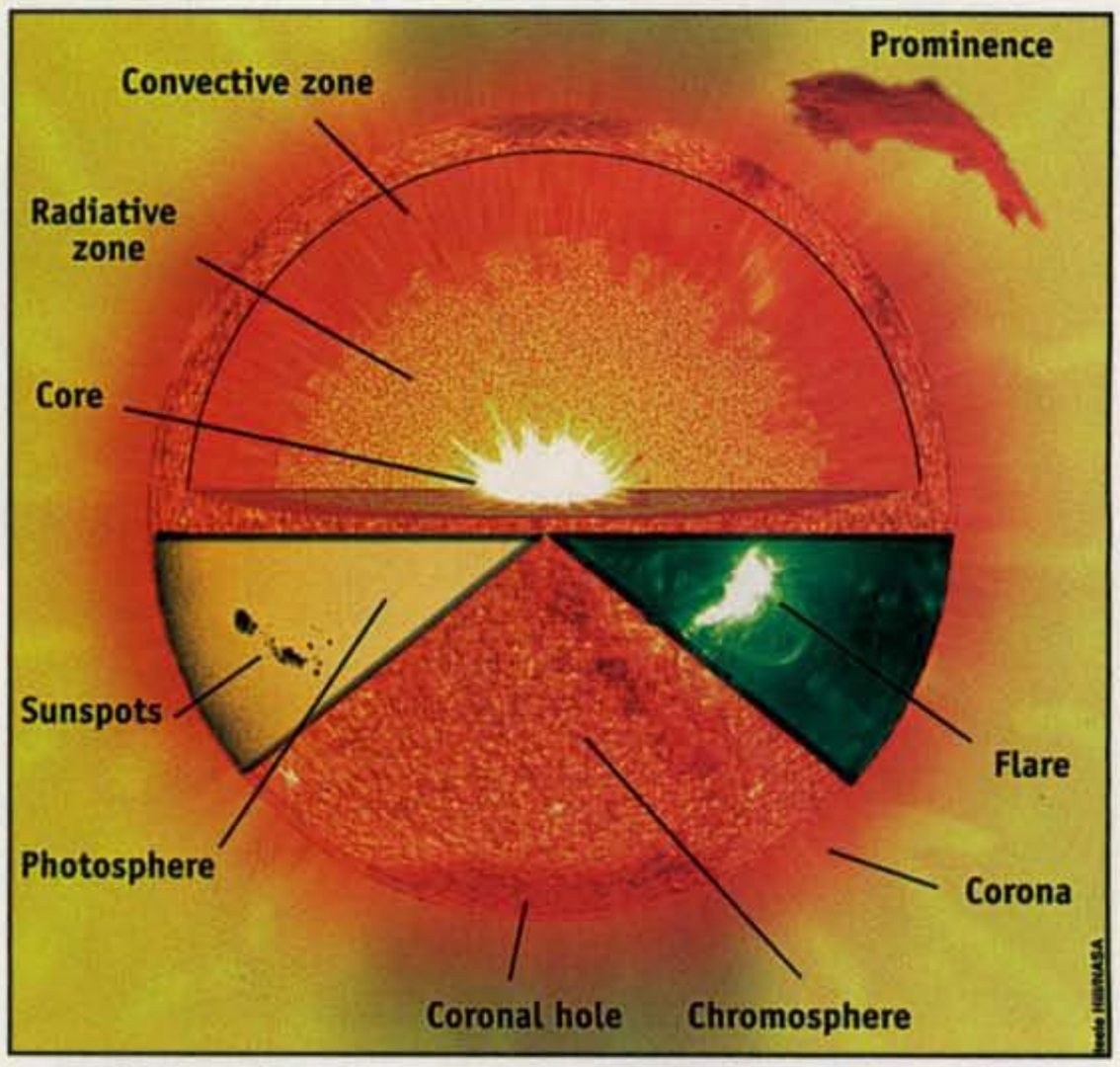
$$R = 1.61FD - (0.0733FD)^2 + (0.0240FD)^3$$

where: $FD = F - 67.0$

$F_{10.7}$ was been recorded routinely by radio telescopes near Ottawa from February 14, 1947 until May 31, 1991. Radio telescopes at Penticton, British Columbia have recorded $F_{10.7}$ since the June, 1991. Each day, $F_{10.7}$ levels are determined at local noon, which is 2000 UTC at Penticton, and are then corrected for factors such as antenna gain, atmospheric absorption, major solar events (such as a flare that is in progress), and other factors.

How Accurate is the Flux Average?

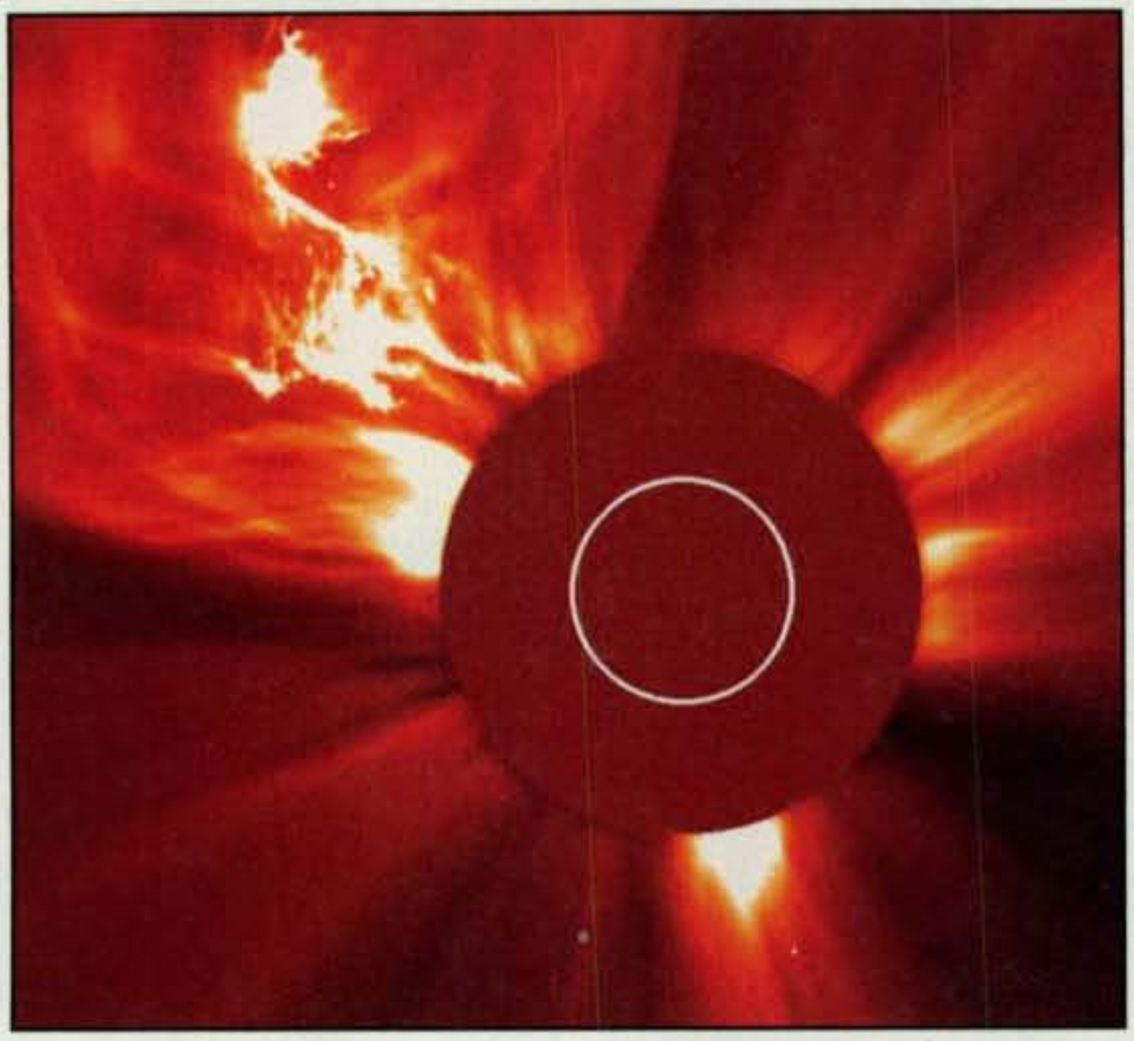
In the study "Limits to the Accuracy of the 10.7 CM Flux" published in 1994 in *Solar Physics,* volume 150, authors K. F. Tapping and D. P. Charrois of the National Research Council, Penticton, BC, Canada conclude that in general, spot measurements are usually within a percent or so of the daily-average fluxes. They explain that the daily 10.7-cm flux data are actually spot measurements of the solar flux density at the 10.7-cm wavelength. These values are frequently used as the average flux for that day. Since each spot measurement takes about one hour to make, and the sun's emissions at that wavelength can vary over time scales shorter than the intervals between the measurements, the data are unavoidably under-sampled. Does this mean that the daily spot measurement is not accurate as an index of daily flux activity?



This graphic illustrates the three major interior zones of the sun. These are the core (the innermost part of the sun where energy is generated through nuclear reactions), the radiative zone (where energy travels outward by radiation through about 70% of the sun), and the convection zone (in which convection currents circulate the sun's energy to the surface). The chromosphere is a narrow layer above the photosphere that increases in temperature with height from the sun. Normally, it can't be seen by the naked eye because it is overpowered by the light from the photosphere. During a natural or artificial eclipse, this photospheric light is blocked, and the features of the chromosphere can be seen. In addition, special filters allow us to see the chromosphere. In this graphic, the flare, sunspots and photosphere, chromosphere, and prominence all are from actual images on the sun. (Source: NASA)

Radio emissions from transient events, such as flares, are defined as contaminants of the flux, and largely empirical procedures have evolved which are used to filter them from the data. The utility of the $F_{10.7}$ index over more than 40 years suggests that the consequences of the under-sampling and the use of largely empirical data filters are not serious. Rather, researchers have found that the daily measurement is very useful when used with current models of ionospheric behavior. That, in turn, means that analysis and forecasts using these models (by software such as ACE-HF Pro <http://hfradio.org/ace-hf/>, WinCAP Wizard, <http://www.taborsoft.com/>, or other such programs using the VOACAP engine), and the 10.7-centimeter flux index, are reliable and practical.

You can find the daily 10.7-cm flux index in the reports offered by the National Oceanic and Atmospheric Administration (NOAA), such as the report found at <http://www.sel.noaa.gov/ftpdir/indices/DSD.txt>. Another related phenomenon that influences the ionosphere is "background radiation," also referred to as "X-ray background flux." Extreme Ultraviolet, or EUV, is thought to be a component of the background flux. This energy contributes to the dynamic energy levels of the ionosphere. The higher this background energy, the more disturbed the ionosphere may



The solar corona is a thin layer of the sun's atmosphere that extends upwards from the chromosphere. An artificial eclipse, as shown in this image, allows us to see the sun's corona. The corona ranges in temperature anywhere between one-half million and two million degrees in temperature. This compares with the 600K visible surface of the sun. By studying the corona, scientists can observe physical processes above active regions, such as sunspots, and also gain insight into how solar energy can be transferred out into space. In this image a coronal mass ejection (CME) is occurring. (Source: SOHO/NASA)

become. This background energy is reported in various indices, such as the GOES-11 X-ray background flux reported at <http://www.sec.noaa.gov/ftpdir/indices/DSD.txt>. In this column, the monthly indices are reported.

July Propagation

Many DX hunters view July as the least exciting month of the year. With generally lower daytime Maximum Usable Frequencies (MUFs), the highest of the amateur HF bands are mostly unusable for long-distance *F*-layer propagation during the summer. Added to this seasonal change is the lower solar activity of the ever-declining cycle. We are clearly at the end of solar Cycle 23, if not already in the beginning of Cycle 24. However, the 10.7-cm flux levels have been ranging from the mid-70s to nearly 90. This level of solar energy *is more* than we expected for the very bottom of the cycle. It is enough to wake up some of the higher amateur radio HF sub-bands.

While *F*-layer propagation of the highest HF frequencies will be poor, radio signals near the Best Usable Frequency (BUF) will be stable over paths that could remain open for longer periods than during the winter and early spring seasons. In addition, July's sporadic-*E* (*Es*) ionization is near the year's seasonal peak. This should result in a considerable increase in short-skip openings on almost all of the HF amateur bands and on 6 and 2 meters as well.

Twenty meters should continue to be the best band for DX propagation during the month. When conditions are at least Low Normal, the band is expected to remain open to one area of the world or another from sunrise through the early evening. Peak conditions on 20 meters are expected for a few hours after local sunrise and again during the late afternoon and early evening, when the band should open in almost all directions. When conditions are at least Low Normal, expect 20-meter openings towards South America, the South Pacific, and Oceania until as late as midnight. When conditions are High Normal or better, the band should also remain open to most other areas of the world until as late as midnight.

During July, considerably fewer *F*-layer path DX openings are expected on 15 meters, and very few, if any, on 10 meters than during previous years. This is due to a combination of changing seasonal conditions and the current level of solar activity in the decline of this solar cycle. When conditions are at least Low Normal, 15 meters should occasionally open towards the south. Look for some short-skip openings into the Caribbean area and Central America as early as 10 AM, with a peak expected to all areas of Latin America between 3 and 5 PM local daylight time. When conditions are High Normal or better, the band may also open to Africa during the late afternoon from the eastern half of the country, and to Australasia and the South Pacific area during the late afternoon and early evening from the western half of the country. Seventeen meters will act somewhat the same as 15, but openings will tend to be longer and signals perhaps stronger and more stable.

Expect short-skip openings on 10 and 12 meters during July towards the Caribbean and possibly Central America as a result of sporadic-*E* ionization. When conditions are High Normal or better, an occasional opening deeper into South America may be possible, especially during the afternoon hours.

Overall, look for frequent short-skip openings on 10, 12, 15, and 17 meters between distances of 500 and 1300 miles. During the afternoon hours skip may extend to beyond 2300 miles as a result of *F*-layer reflection. Short-skip openings should range between 250 and 2300 miles on 20 meters. Peak conditions are most likely to occur during the late morning and again during the late afternoon and early evening hours. Daytime openings on 40 and 30 meters should range between 100 and 600 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the maximum short-skip (one-hop *F*-layer reflection) of 2300 miles during the hours of darkness.

Nighttime openings into many areas of the world are possible on 20, 30, and 40 meters. However, seasonally high static levels may often make DX reception difficult on both 30 and 40 meters. High static levels are also expected to result in somewhat poorer DX conditions on 80 meters, although some long-distance openings are forecast during the hours of darkness. One-sixty meters is virtually shut down due to the high static levels of summer. The best bet for 40-, 80-, and 160-meter DX openings is an hour or two before midnight for openings towards the north and east, and just before local sunrise for openings towards the south and west. Expect some 160-meter openings between sunset and sunrise for distances up to approximately 1300 miles, if the seasonally high static levels permit.

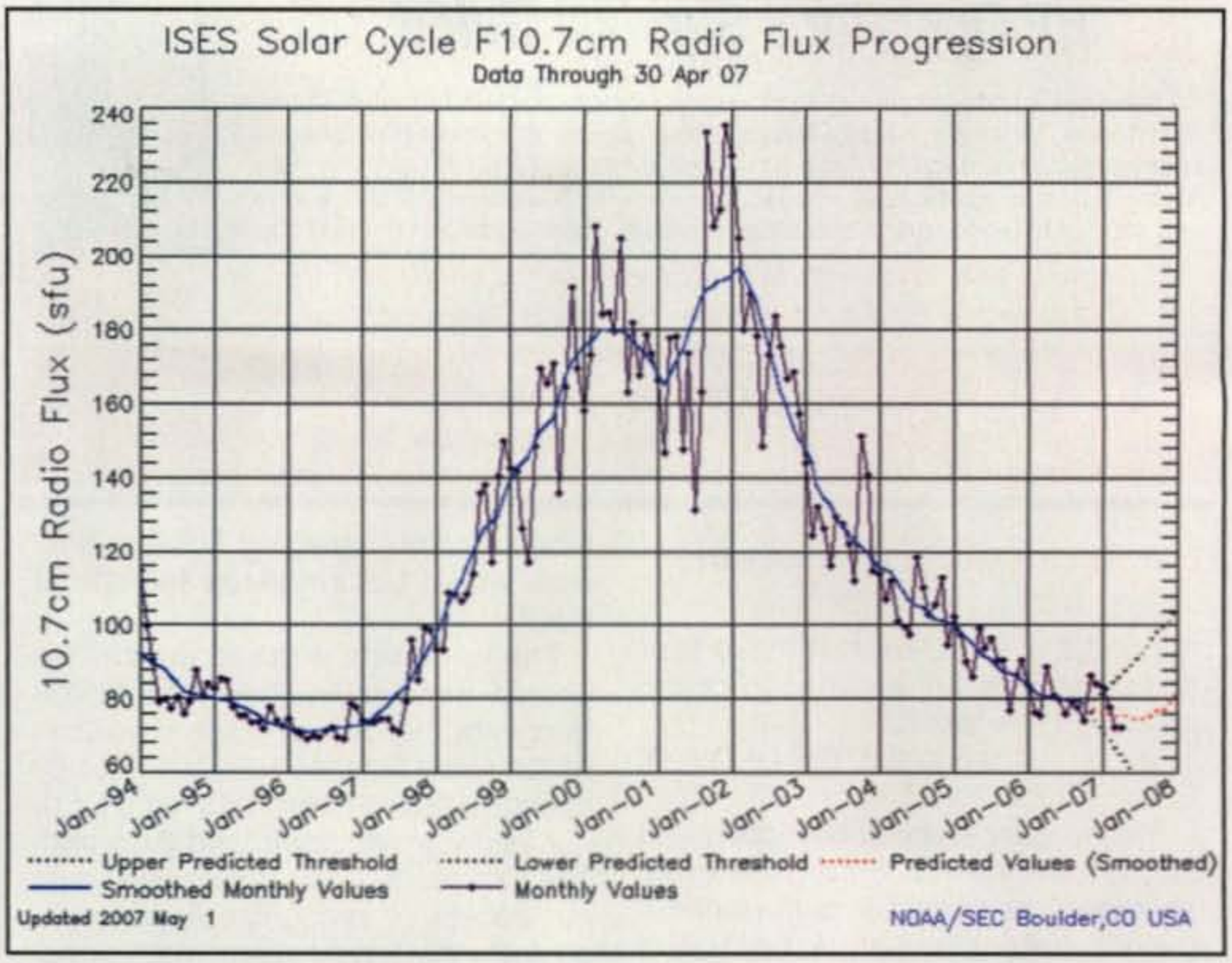
Peak Sporadic-*E* Propagation

Optimum short-skip propagation conditions are expected during July as a result of a seasonal peak in sporadic-*E* ionization. Expect an increase in the number of short-skip openings on HF, and often on 6 and 2 meters. During the daylight hours, considerable short-skip openings are forecast for 10 and 15 meters over distances ranging between approxi-

mately 400 and 1300 miles, with openings occasionally extending out to beyond 2000 miles. Around-the-clock short-skip openings should be possible on most days on 20 meters, with the skip often as short as 300 miles and as long as 2300 miles. Short-skip conditions on 20 meters should peak during the late afternoon and the early evening.

Good daytime openings on 40 and 30 meters should range between 100 and 750 miles, increasing to between 250 and 2300 miles after sunset. Look for openings up to about 300 miles on 80 meters during the day, extending out to the one-hop limit of 2300 miles during the hours of darkness. However, these bands could be quite noisy.

While no short-skip openings are likely on 160 meters during the daylight hours of July, expect some openings between sunset and sunrise for distances up to approximately 1300 miles, if the static levels are low.



The 10.7-cm solar radio energy flux index, averaged monthly, is graphed in this chart of solar Cycle 23. This clearly illustrates the approximately 11-year solar cycle activity, from solar activity minimum to minimum. During the peak of the cycle, the ionosphere is greatly energized, while it is minimally energized during the minimum periods of solar activity. (Source: NOAA/SEC)

VHF Conditions

Statistical studies show that a sharp increase in sporadic-*E* propagation takes place at mid-latitudes during the late spring and summer months. During July and August, short-skip propagation over distances ranging between approximately 600 and 1300 miles should be possible on 6 meters. Openings may also be possible on 2 meters during periods of intense sporadic-*E* ionization with stations up to 1300 miles away. While sporadic-*E* short-skip openings can take place at just about any time of the day or night, statistics indicate that conditions should peak for a few hours before noon and again during the late afternoon and early evening. During July you can expect 6-meter sporadic-*E* on at least three out of every four days. Openings may last from a few minutes up to hours.

Current Solar Cycle Progress

The Royal Observatory of Belgium reports that the monthly mean observed sunspot number for April 2007 is 3.7, down from March's 4.8. The lowest daily sunspot value recorded was zero (0) on April 2, April 4–16, and April 18–24. The highest daily sunspot count was 21 on April 30. The 12-month running smoothed sunspot number centered on October 2006 is 14.2, down from September's 15.6. A smoothed sunspot count of 12, give or take 12 points lower to 12 points higher, is expected for July 2007.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 72.4 for April 2007. The 12-month smoothed 10.7-cm flux centered on October 2006 is 79.4, down from September's 80.2. The predicted smoothed 10.7-cm solar flux for July 2007 is 75, give or take about 15 points.

The observed monthly mean planetary *A*-index (*Ap*) for March 2007 was adjusted from 7 to 8. The observed monthly mean planetary *A*-Index (*Ap*) for April 2007 is 9. The 12-month smoothed *Ap*-index centered on October 2006 is 8.6. Expect the overall geomagnetic activity to vary greatly from quiet to disturbed during most days in July.

Signing Off...

Please take a look at what's new at my 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 capability, 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

Our Readers Say: *(from page 61)*

support the endeavor can make their decisions with full knowledge of the sponsor's intentions.

Theodore J. Cohen, N4XX

Editor, *CQ*:

Please cancel my subscription and refund the remainder of the price to me. My reason for canceling is the tenor of the editorial (in) the April issue by Rich Moseson. Although I do agree that the fake QSL card should not have been produced and circulated, the editorial tries to justify the decision of the Germans to operate in Libya. Certainly they have the right to make that decision on their own. I just happen to disagree with their decision and the editorial.

Arthur K. Davenport, K7WST

Editor, *CQ*:

I have just finished reading your "Zero Bias" editorial in April 2007 *CQ*, and am afraid that you have rather "skated over" the most important issue: It was not ethically proper for the expedition to accept a license with a politically motivated pre-condition.

The fact that most of the expedition members were German nationals and that the prohibition applied only to Israel makes a bad situation *appear* even worse, though there is no evidence of anti-Semitic intent or behavior on the part of the expedition. However, the expedition did err in not revealing ahead of time the prohibition on contacting Israeli stations.

Yes, Libya is one of the tough "rare ones," and in my case, one of the last three CQ Zones on 80. But consider this: Suppose another "rare one" hits on a slightly different policy. Suppose, for example, that Yemen decides to issue a license to an expedition group, only the restriction is that because Yemen disagrees with some aspect of US foreign policy, the expedition is prohibited from contacting US stations. How would US amateurs feel about that?

The worldwide amateur community should not become involved in the quagmire that is international politics. At the same time we should not tacitly accept discrimination against any of our fellow amateurs around the world. The simplest solution is that we should not accept or recognize licenses or contacts that have political restrictions.

Vince Van der Hyde, K7VV

Ted, Arthur, and Vince:

Whether we like it or not, the reality is that because amateur radio is international in scope and is an internationally-regulated hobby, ham radio has always been involved to some extent in the quagmire that is international politics. Keep in mind that the ITU rules specifically permit any government to prohibit contacts between amateurs in its country and those in specific other countries. For years, the U.S. had a "banned list" of countries whose hams we were not allowed to contact. No one suggested that operations from the United States not be accepted or recognized because our government was discriminating against the citizens of another country. No one, to my knowledge, refused to accept an FCC amateur license because it did not permit contacts with amateurs in specific other countries.

In retrospect, perhaps it would have been better if the 5A7A group let it be known beforehand that their license did not permit contacts with stations in Israel. But hindsight is always 20/20. And no matter how you feel about Libya's policy or the 5A7A team's decision to reluctantly accept the limitations, none of it justifies the actions of the U.S. ham who created and distributed the fake QSL card suggesting that the 5A7A ops were Nazis and/or anti-Semites. THAT was the main point of my editorial.—W2VU

Results of the 2007 CQ WPX RTTY Contest *(from page 35)*

test. **ZM3R:** Tnx fer contest. Only average propagation here!

USA QRM

AA7FK: Fun time. Couldn't operate as much as I wanted, but I did pick up some new DXCC countries on RTTY. Thanks! **AB0RX:** 80 meters was outstanding, 323 QSOs. I did not ever hear a single signal on 10 meters. **AE5AA:** Great conditions on 40m. Good EU and AS openings both days. Thanks to all who helped me break last year's record. **AF9J:** I had a blast! There were nice openings to Europe on both Saturday and Sunday morning. I think I might have set a personal all-time high score for contesting. Rig used: Yaesu FT-897D at 50W output power, loading the rain gutter of my apartment building (it's 125–150 feet long and three stories above the ground). **K0EWS:** My first contetst in a while. The bands sounded pretty good. This was fun! **K3NK:** I haven't operated RTTY in over 21 years. The contest was a fun way to get back on RTTY and figure out how to operate my new equipment. I will be back next year. **K7RE:** Conditions were great for me to try out my new SDR-1000 software defined radio. This entirely new way of operating worked well for me. Still a few minor kinks to work out for me though. Thanks to the folks at *CQ* magazine for putting this one on. Can't wait for the next one!

KA1C: Wow! What a contest! Made almost 100 more QSOs than any other contest. My Alpha Delta sloper has had a problem on 80m, but I accidently tuned up on my Mosley triband beam and it was great on 80m. Maybe the sloper was working with it? Made 81 Q's this way and broke a couple of pileups! Looking forward to next year. **KC2NMZ:** Gary's (W2VQ) first time operating RTTY. Great conditions on 20m with the new setup here. Enjoyed the WPX contest the most. See you on SSB/CW with new call WQ2N. **KE0L:** Lots of QSB on the band Friday night. I tried a couple of antennas but couldn't get my rates up to the usual level. I enjoy the relaxing pace of the RTTY contests. **KE7AJ:** Wow! Great fun. Good conditions for a change and nice openings to Europe and Japan. K7EKM in only his second RTTY contest was a great help with the graveyard shift. **N0UNL:** This was our club's first try at a RTTY contest. We had a fun time and plan to do it again.

N8BJQ: Great time. Lots of activity, growing every year. Worked two new countries and several new band countries. Nice to work some 6 pointers on 80. First time with SO2R. Still need to work on the setup. Used two computers. Did help to kill some dead time and saved lots of tuning of the amps. **W0TUP:** Had fun. This is my first WPX contest. Looking forward to next year. **W5JAY:** I noticed many new RTTY ops even towards the last part of the contest! Maybe some Elmering was going on over the weekend, even during the contest? Dennis, N5DRB, came by to see. **W6ZZZ:** Only had one person tell me how sleepy ZZZ made them feel (nicely). **W7HJ:** This contest is a keeper! Lots of fun for all and some very serious ops near and far. My score while nowhere competitive with only 251 QSOs, is from my "no antenna" QTH with CC&R's. I believe there may be hope for hamming even in the poorest locations! **WG8Y:** Great opening to EU for bottom of the cycle. Had a great time. Tnxs to all. **WW4LL:** Awesome crew assembled for this one and station performed reasonably well with the exception of one antenna problem early Saturday morning just as 15 started to open. It was the first time operating with Charlie, KI5XP, and it was an extreme pleasure.

Number groups after callsigns denote the following: QSOs, Points, Prefixes, and Final Score. Certificate winners are listed in boldface.

2007 WPX RTTY RESULTS

Single Operator All Band High Power

P49X	**3023**	**13806**	**723**	**9,981,738**
K3MM	**2378**	**7552**	**730**	**5,512,960**
UA9CLB	**1832**	**7701**	**583**	**4,489,683**
EN9M	**2070**	**6364**	**657**	**4,181,148**
K4GMH	**1975**	**6268**	**657**	**4,118,076**
NB1B	**1760**	**5922**	**674**	**3,991,428**
LZ8A	**1838**	**5967**	**664**	**3,962,088**
RD3A	1782	5693	692	3,939,556
LB8IB	**1704**	**5574**	**627**	**3,494,898**
DL1IAO	**1664**	**5734**	**607**	**3,480,538**
OM5ZW	**1435**	**5510**	**601**	**3,311,510**
I2UIY	**1572**	**5662**	**561**	**3,176,382**
VE3AP	**1536**	**5444**	**562**	**3,059,528**
KU1CW	1779	4642	630	2,924,460
YR9P	**1466**	**4858**	**598**	**2,905,084**
VA3DX	1370	5063	573	2,901,099
KD1N	1637	4942	585	2,891,070
DQ9M	1443	4736	582	2,756,352
RW4PL	1530	4579	594	2,719,926
AD1AKS	**1514**	**4715**	**565**	**2,663,975**
UT2II	1411	4879	539	2,629,781
UT5UML	1286	4387	529	2,320,723
YL7A	**988**	**4456**	**513**	**2,285,928**
DP5M	1279	4206	538	2,262,828
W3FV	1330	4345	516	2,242,020
RU9TO	1166	4749	463	2,198,787
AI9T	**1572**	**3755**	**560**	**2,102,800**
IW1ARB	1185	4003	514	2,057,542
WA2ETU	**1409**	**3706**	**555**	**2,056,830**
WB9Z	1351	3699	533	1,971,567
K4RO	1547	3809	516	1,965,444
W3MF	1329	3618	540	1,953,720
JH4UYB	**1125**	**3907**	**475**	**1,855,825**
VE3UTT	1112	3551	521	1,850,071
EU1AZ	**1163**	**3903**	**467**	**1,822,701**
W4GKM	1429	3504	510	1,787,040
SV1DPP	**1149**	**3938**	**453**	**1,783,914**
UW5U	1094	3562	498	1,773,876
N2XD	1208	3661	484	1,771,924
LU7HN	**1005**	**3522**	**496**	**1,746,912**
UV5U	1044	3386	503	1,703,158
SP4TXI	**1005**	**3511**	**483**	**1,695,813**
YL2CI	1082	3604	469	1,690,276
NF3/NH7C	1122	3168	527	1,669,536
OH2LU	**1055**	**3211**	**505**	**1,621,555**
RN3BD	1139	3659	438	1,602,642
YL9T	1081	3316	473	1,568,468
WB4YDL	1136	2951	515	1,519,765
EA5DKU	941	3465	435	1,507,275
UA4HOX	1213	3293	453	1,491,729
IW7EFC	1053	2888	511	1,475,768
3Z9U	929	3367	438	1,474,746
AD4EB	1171	3026	484	1,464,584
N2QT	**1052**	**3093**	**470**	**1,453,710**
N2BJ	1193	2871	505	1,449,855
KZ5D	**1375**	**3086**	**469**	**1,447,334**
RN3ZC	1030	3199	443	1,417,157
IQ1SM	932	3131	451	1,412,081
K3MQ	1028	2838	495	1,404,810
N8BJQ	**1110**	**2900**	**483**	**1,400,700**
UA9MA	930	3247	426	1,383,222
G2F	**921**	**2776**	**483**	**1,340,808**
RA9SC	888	3339	395	1,318,905
S58P	**867**	**3168**	**414**	**1,311,552**
ERØFEO	**933**	**3128**	**418**	**1,307,504**
RN4LP	936	2995	420	1,257,900
RU6DZ	961	3089	403	1,244,867
RD4WA	982	2759	451	1,244,309
UA3PAB	939	2884	431	1,243,004
ABØRX	1141	2627	458	1,203,166
ZL2AMI	**772**	**2908**	**395**	**1,148,660**
KR7X	**1263**	**2638**	**431**	**1,136,978**
VA7ST	**959**	**2702**	**416**	**1,124,032**
YL2NN	804	2762	397	1,096,514
4Z5ML	**673**	**3043**	**356**	**1083308**
RW6CR	883	2584	416	1,074,944
VE2FK	842	2760	381	1,051,560
SD40JZ	**776**	**2578**	**402**	**1,036,356**
RZ3EC	823	2580	400	1,032,000
LZ17ØVL	821	2624	391	1,025,984
DHØGHU	756	2624	390	1,023,360
LY6A	759	2577	396	1,020,492
GM4FDM	**834**	**2313**	**437**	**1,010,781**
EA2AAZ	857	2331	428	997,668
LA6YEA	**733**	**2376**	**405**	**962,280**
KØFX	**892**	**2203**	**428**	**942,884**
KØTG	874	2322	387	898,614
NO2T	802	2053	427	876,631
ED7AJR	805	2290	379	867,910
VO1TTY	**706**	**2196**	**375**	**823,500**
W4MYA	732	2395	337	807,115
NG3U	641	2035	395	803,825
VO1TA	646	2207	359	792,313
AA3B	711	2067	383	791,661
F8BNN	**659**	**2242**	**353**	**791,426**
W2YE	815	2028	388	786,864
KA2D	736	1882	417	784,794
W4UK	1010	2112	350	739,200
DO1JN	639	2100	350	735,000
HA8IE	**605**	**1791**	**378**	**676,998**
ZL4BR	535	2300	291	669,300
UY2UQ	594	2041	327	667,407
JA7IC	621	1922	347	666,934
WO4O	821	1904	349	664,496
WN1GIV	788	1531	415	635,365
VY2LI	**612**	**2122**	**297**	**630,234**
SM7BHM	578	1870	335	626,450
K4CZ	625	1694	367	621,698
RAØACM	637	2054	296	607,984
TF3AM	**620**	**1630**	**368**	**599,840**
RL3WX	586	1859	308	572,572
VK4AN	**535**	**1850**	**309**	**571650**
JH4UTP	567	1912	296	565,952
VE3TES	661	2084	267	556,428
PG3N	**536**	**1924**	**289**	**556,036**
K7AGE	**742**	**1551**	**358**	**555,258**
F5CQ	516	1638	329	538,902
K3WI	597	1660	322	534,520
RM9RZ	488	1898	278	527,644
K3KO	481	1470	342	502,740
JR3NZC	483	1753	284	497,852
KJ6RA	741	1471	337	495,727
NA2M	591	1506	328	493,968
I1WBW	539	1614	305	492,270
RUØLL	658	1878	261	490,158
W4VD	775	1578	307	484,446
W6IHG	567	1475	326	480,850
EI4DW	**498**	**1572**	**305**	**479,460**
W1TO	505	1432	329	471,128
ED5YJ	547	1409	330	464,970
RV3WD	484	1570	282	442,740
RA3B8	516	1408	313	440,704
EA3OR	448	1560	282	439,920
8J3YAGI	489	1693	257	435,101
WA1PMA	704	1337	325	434,525
N1KWF	583	1386	313	433,818
PA9OD	444	1553	277	430,181
W4RK	700	1545	278	429,510
OK2SG	416	1466	289	423,674
N7MQ	689	1302	316	411,432
GØHDV	445	1548	265	410,220
F5UMP	451	1415	282	399,030
JM1XCW	444	1630	244	397,720
WBØHCH	554	1280	308	394,240
WX4G	540	1347	291	391,977
SP8NR	421	1468	266	390,488
VE7CF	**601**	**1429**	**273**	**390,117**
RAØQD	528	1399	272	380,528
W6AAN	451	1249	302	377,198
IN3BFW	434	1567	232	363,544
UXØFY	429	1324	267	353,508
N7BF	659	1176	298	350,448
JAØTR	472	1453	240	348,720

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IK1DFH	394	1362	250	340,500
RN6DR/6	398	1314	259	340,326
K5ZD	**417**	**1260**	**267**	**336,420**
K5NZ	495	1066	312	332,592
AJ3G	478	1243	264	328,152
WQ4CWA	487	1221	267	326,007
K6MM	618	1212	268	324,816
VE5CPU	**567**	**1309**	**248**	**324,632**
W6OTC	574	1371	236	323,556
N6AR	389	1315	246	323,490
ZS2EZ	**385**	**1276**	**253**	**322,828**
ON4BHQ	409	1194	269	321,186
SP2HYO	370	1368	230	314,640
NT6K	668	1192	263	313,496
KH6FI	448	1471	212	311,852
T94KC	**336**	**1374**	**225**	**309,150**
LU1BJW	382	1232	249	306,768
DL1DTC	377	1107	275	304,425
DL5YM	382	1213	250	303,250
N1OKL	456	1154	262	302,348
PA0LSK	369	1274	237	301,938
PT2BW	379	1160	260	301,600
N6FF	536	1220	247	301,340
UT7GX	375	1330	226	300,580
WN1OTV	439	1167	257	299,919
K1KO	402	1094	260	284,440
NJ4F	449	1086	259	281,274
K4WX	399	1127	246	277,242
SM2M	353	1075	256	275,200
K4HMB	411	1149	236	271,164
OK2PZ	333	1240	217	269,080
RZ6HN	391	1199	223	267,377
NS9I	490	1011	264	266,904
KØJJR	501	1082	240	259,680
K4GM	474	1161	221	256,581
K8UT	410	1022	251	256,522
W5YAA	488	929	275	255,475
W5JAY	539	1122	223	250,206
JL1OXH	398	1135	219	248,565
IW5EIJ	341	1096	226	247,696
WB9CIF	360	1026	241	247,266
W7YES	490	883	277	244,591
GW4BLE	**320**	**1132**	**201**	**227,532**
9A3ST	298	1087	209	227,183
G3LZQ	288	1070	212	226,840
PAØVHA	343	1057	214	226,198
UA9BS	324	1063	206	218,978
WA9IVH	451	983	222	218,226
K4HAL	434	1006	216	217,296
WVØT	561	935	232	216,920
KTØR	424	883	243	214,569
UA4LA	307	919	232	213,208
KM4M	323	1005	212	213,060
NL7V	**356**	**909**	**231**	**209,979**
N6CK	507	933	223	208,059
WB6JJJ	437	970	214	207,580
JA1AYO	352	1104	188	207,552
W7TTE	346	954	216	206,064
AK6DV	497	972	210	204,120
UAØQBR	352	924	218	201,432
DL4PY	286	980	203	198,940
RZ3FR	326	986	201	198,186
K6TD	384	777	249	193,473
W7DPW	391	788	245	193,060
DL4CF	297	935	204	190,740
UT5ECZ	295	922	205	189,010
W3DAD	325	877	210	184,170
OK2FB	268	913	201	183,513
MMØCBL	303	894	205	183,270
K7EG	389	781	232	181,192
RA3TT	299	849	211	179,139
DL5CF	305	818	213	174,234
IK2AHB	308	799	218	174,182
RA3MB	262	923	184	169,832
WB4MSG	344	889	188	167,132
UT5UGR	275	818	200	163,600
KA3EAJ	298	826	195	161,070
KDØX	268	729	214	156,006
AA5VU	351	732	213	155,916
HR2/LTØE	**330**	**837**	**183**	**153,171**
EA3AGZ	269	708	215	152,220
HBØAVK	**244**	**773**	**191**	**147,543**
W2WB	319	765	192	146,880
W6AEA	337	680	216	146,880
WB2JEP	295	796	180	143,280
KO6LU	389	681	209	142,329
K6RB	403	796	178	141,688
YV6BTF	245	868	159	138,012
YL6W	220	820	164	134,480
DL5MEV	238	773	170	131,410
UR4EI	248	748	175	130,900
NI5F	287	759	172	130,548
TF3AO	257	678	192	130,176
KG6DX	**296**	**963**	**128**	**123,264**
HSØEHF	**264**	**688**	**179**	**123,152**
HB9CVE	204	683	163	111,329
AD6KA	313	690	161	111,090
MX1SWL/P	198	744	145	107,880
YU1EA	**192**	**648**	**163**	**105,624**
RA3NZ	226	605	174	105,270
OH2GI	213	643	163	104,809
DB9EX	202	679	151	102,529
N6VH	278	607	167	101,369
W1KQ	243	575	175	100,625
LA5TFA	268	563	177	99,651
AI9L	222	604	160	96,640
PY4OG	**169**	**650**	**148**	**96,200**
XE2YWH	**234**	**671**	**143**	**95,953**
K5HDU	302	595	160	95,200
N6HC	225	614	155	95,170
OK2PCL	218	556	171	95,076
NW6P	286	585	162	94,770
W5KI	249	619	147	90,993
JR1NHD	221	648	140	90,720
EA4TX	191	608	148	89,984
JA7ZP	204	674	132	88,968
K6HGF	290	484	183	88,572
WØMU	265	519	166	86,154
KE3D	255	572	150	85,800
JN3SAC	191	689	124	85,436
N3ND	211	628	136	85,408
WA6BOB	219	656	128	83,968
AA4LR	253	500	160	80,000
W7HJ	235	579	138	79,902
W2TB	210	480	164	78,720
K4ZTL	176	549	140	76,860
RW9SW	139	671	103	69,113
RA9SD	156	592	115	68,080
W6OQI	235	473	140	66,220
N9AKR	178	497	133	66,101
I5JFG	173	482	136	65,552
W4BCG	226	445	147	65,415
WG7X	298	423	154	65,142
W5AP	265	416	156	64,896
KCØRET	248	457	142	64,894
W4OJC	169	470	133	62,510
YO7BGA	154	466	133	61,978
N6MZ	164	411	148	60,828
AA7FY	233	448	134	60,032
DL5XL	148	485	116	56,260
RZ1AWF	143	454	123	55,842
DL1NRC	159	413	133	54,929
N3NZ	209	390	137	53,430
WB1AEL	136	432	118	50,976
AH7C	132	602	84	50,568
DL7DZ	139	413	117	48,321
AF5AR	200	468	103	48,204
W7WHY	204	385	125	48,125
WA6BFW	200	363	125	45,375
OK1SI	121	448	101	45,248
KE1F	185	375	120	45,000
N8NOE	147	379	115	43,585
JF2SKV	169	432	98	42,336
4U1WB	154	343	115	39,445
4X6UO	137	401	98	39,298
K8FC	148	328	118	38,704
K7WM	105	387	98	37,926
JA8UON	130	416	90	37,440
UU2JG	115	378	98	37,044
DK4IO	118	338	106	35,828
W7SYJ	161	347	103	35,741
N6QEK	173	363	98	35,574
OZ6EI	136	341	104	35,464
JA7BME	123	386	91	35,126
KDØS	146	350	98	34,300
N9WKW	143	317	105	33,285
W4NZ	125	305	103	31,415
WØTY	144	327	95	31,065
UN5J	100	343	88	30,184
W2LE	118	274	108	29,592
AE6RR	151	279	103	28,737
IKØYUO	115	292	95	27,740
RZ3DX	123	265	103	27,295
IK1WEG	110	300	87	26,100
K8AJS	97	322	80	25,760
PAØLOU	103	285	88	25,080
NT4D	111	249	94	23,406
NF6A	106	299	77	23,023
N5DD	98	307	68	20,876
9M2CCO	88	313	64	20,032
JE1LFX	118	288	66	19,008
NG2P	99	203	88	17,864
DL6NCY	72	286	60	17,160
ABØYM	128	208	79	16,432
W4GHD	95	239	68	16,252
LY2CV	65	270	60	16,200
S54AA	75	274	59	16,166
KØCOP	80	202	75	15,150
F8DBF	71	243	60	14,580
JA9CWJ	79	258	56	14,448
MMØRKT	72	212	67	14,204
K6DGW	111	167	81	13,527
W8TK	90	166	77	12,782
W6ZZZ	106	210	60	12,600
JA2PAC	71	204	59	12,036
ES1A	57	240	48	11,520
TA1EE	81	186	61	11,346
W6SA	87	170	66	11,220
K5YAC	71	174	63	10,962
WB2TPS	65	178	59	10,502
SM5AJV	52	192	50	9,600
N4XMX	50	208	43	8,944
ABØOX	62	172	51	8,772
NØTCP	75	118	65	7,670
RN4HGJ	69	142	53	7,526
KB9Q	65	126	52	6,552
RW3QF	37	156	33	5,148
OE1TKW	38	144	35	5,040
DK6CQ	41	113	37	4,181
VK2NU	33	133	28	3,724
OH1MA	32	112	30	3,360
JA2FSM	37	98	32	3,136
VA3PC	24	102	24	2,448
EA4EJP	23	92	22	2,024
UA4RZ	26	65	24	1,560
JA1ALE	25	47	17	799
W6SX	19	36	17	612
OH5UX	13	44	12	528
UR7EY	8	46	6	276
CW7T	5	22	5	110

Single Operator All Band Low Power

ZX2B	**1760**	**6618**	**627**	**4,149,486**
5C5W	**1541**	**6222**	**591**	**3,677,202**
VE1OP	**1372**	**4099**	**585**	**2,397,915**
HI3TEJ	**1482**	**4418**	**525**	**2,319,450**

4Z5CP	**1095**	**4563**	**441**	**2,012,283**	DK3RA	420	1465	265	388,225	DGØDG	292	1042	192	200,064	VE5TLW	224	608	183	111,264
UO6P	**1129**	**4212**	**434**	**1,828,008**	EA3FLS	428	1371	279	382,509	PA3CWQ	304	961	207	198,927	UN7PV	201	686	162	111,132
RW9UU	**1176**	**4269**	**419**	**1,788,711**	RU3WR	436	1515	249	377,235	**ISØLFZ**	**279**	**989**	**201**	**198,789**	DK3PM	207	707	157	110,999
NP3D/WE1	**1192**	**3439**	**520**	**1,788,280**	KR4F	544	1318	286	376,948	K6EU	437	827	240	198,480	IW8PQ	235	652	170	110,840
ED1BXN	**1069**	**3547**	**495**	**1,755,765**	WA1LWS	570	1354	274	370,996	EA1DZL	299	1027	193	198,211	W4EE	275	637	174	110,838
OK3C	**1011**	**3581**	**480**	**1,718,880**	OK2SVL	420	1421	258	366,618	SP2IKP	287	1012	195	197,340	WA1ZYX	233	636	174	110,664
AA5AU	**1375**	**3289**	**511**	**1,680,679**	KA1C	556	1269	288	365,472	IK5FKF	297	938	209	196,042	DF6WE	202	616	179	110,264
UY8IF	**1073**	**3454**	**479**	**1,654,466**	YO3APJ	415	1276	284	362,384	DM3HZN	290	950	204	193,800	KO1H	232	616	179	110,264
VA2UP	**1086**	**3301**	**497**	**1,640,597**	GMØNBM	431	1393	259	360,787	RW3WX	306	978	198	193,644	RW4PK	200	719	152	109,288
UT2UZ	933	3545	458	1,623,610	**VE9NC**	**468**	**1201**	**300**	**360,300**	KE4KWE	361	929	208	193,232	HA1YI	204	705	155	109,275
LZ9R	**996**	**3474**	**452**	**1,570,248**	PT7AZ	433	1299	277	359,823	IZ5HQB	317	923	209	192,907	AG1RL	293	572	190	108,680
LA6FJA	**992**	**3189**	**492**	**1,568,988**	F5RD	422	1366	263	359,258	SP7QJB	295	975	197	192,075	YO7LGI	203	723	149	107,727
YU7AM	**997**	**3158**	**464**	**1,465,312**	URØCB	466	1337	267	356,979	RA1WZ	302	928	205	190,240	NV2G	269	629	171	107,559
OM5CD	**926**	**3217**	**445**	**1,431,565**	IW2FIV	428	1310	271	355,010	UR5FS	284	921	206	189,726	**ES4MM**	**217**	**628**	**171**	**107,388**
SP3GXH	**876**	**3088**	**445**	**1,374,160**	I1BAY	388	1424	249	354,576	PA3CDN	283	942	201	189,342	HZ1PS	180	761	141	107,301
W3LL	**963**	**2903**	**473**	**1,373,119**	VE3ESH	488	1525	231	352,275	KC4SAW	339	944	200	188,800	HA7MW	186	674	159	107,166
OZ4SK	**865**	**3160**	**425**	**1,343,000**	**OT4M**	**380**	**1370**	**257**	**352,090**	DL3SCN	296	953	198	188,694	UT4UQ	248	626	171	107,046
UA4LU	**1007**	**2889**	**453**	**1,308,717**	SP9AUV	407	1396	252	351,792	SN1A	280	919	205	188,395	**RK2FXG**	**210**	**722**	**148**	**106,856**
IZ2FOS	**885**	**2937**	**442**	**1,298,154**	DL2AL	418	1340	261	349,740	DL3DRN	274	974	193	187,982	**VK3KE**	**205**	**755**	**141**	**106,455**
OK2RU	**843**	**3127**	**405**	**1,266,435**	KD5LNO	565	1350	257	346,950	UA3RW	290	924	202	186,648	RA6XE	234	641	165	105,765
YT7TY	**847**	**2986**	**409**	**1,221,274**	**UK7F**	**458**	**1404**	**247**	**346,788**	VA6RAR	349	975	191	186,225	DK8EY	204	729	145	105,705
RK9AJZ	875	3060	388	1,187,280	MØVBY	409	1276	271	345,796	EA2APH	268	961	193	185,473	DL3G	206	711	148	105,228
UA6CE	924	2708	427	1,156,316	S57AM	409	1460	235	343,100	SQ9AOR	278	931	199	185,269	N9LF	273	641	164	105,124
CT1ILT	**869**	**2459**	**441**	**1,084,419**	UA9CR	398	1489	230	342,470	JP1QDH	322	1015	182	184,730	V31GW/P	260	731	143	104,533
ZX7A	**704**	**2805**	**379**	**1,063,095**	OK2BMC	413	1401	243	340,443	OK2BJ	276	981	188	184,428	WD9FTZ	278	654	157	102,678
UA4LCQ/9	943	2461	428	1,053,308	SP3DOF	393	1370	245	335,650	LZ1QV	252	904	204	184,416	IK3CST	214	674	152	102,448
IV3JCC	766	2626	399	1,047,774	RX9DJ	404	1427	232	331,064	JA1MVK	291	852	216	184,032	EA7HY	208	631	162	102,222
RA9AU	785	2808	355	996,840	SP3DSC	387	1256	262	329,072	N3CHX	346	895	202	180,790	RU3VD	197	631	160	100,960
DL6JZ	**739**	**2541**	**390**	**990,990**	SP3HC	387	1265	258	326,370	RA9CCO	266	1043	173	180,439	G7TWC	190	681	148	100,788
EA4BT	796	2191	440	964,040	UA3VJV	403	1326	246	326,196	DM5JBN	293	943	191	180,113	BD1FJP	279	812	124	100,688
HR2DMR	**929**	**2591**	**370**	**958,670**	SQ7B	397	1336	244	325,984	IKØRCV	264	915	195	178,425	EA1EWC	189	594	169	100,386
OH6XY	**760**	**2437**	**393**	**957,741**	DJ4EY	382	1311	248	325,128	DJ6JH	295	932	189	176,148	N9JRZ	313	644	155	99,820
UA9SP	682	2651	359	951,709	SQ9CND	374	1407	231	325,017	UT2QQ	291	907	190	172,330	UAØFHT	280	831	120	99,720
RA4HL	804	2338	407	951,566	**N9CK**	**511**	**1176**	**276**	**324,576**	EA5EN	287	774	219	169,506	RU3PU	206	690	144	99,360
UYØLL	736	2399	394	945,206	DL5KUD	375	1312	247	324,064	DL8UFD	256	854	198	169,092	VA3SWG	232	658	150	98,700
UA4HU	812	2530	372	941,160	RN4CA	438	1312	247	324,064	N6PC	438	822	204	167,688	SQ9FMU	191	650	151	98,150
OK1WCF	681	2484	365	906,660	**JT1C**	**533**	**1677**	**193**	**323,661**	KK9DX	370	794	209	165,946	CO2MHZ	186	732	134	98,088
VY2SS	**736**	**2366**	**374**	**884,884**	K8ZZ	625	1211	266	322,126	K6DEX	437	841	196	164,836	KF2O	180	592	165	97,680
RL9A	711	2638	327	862,626	JA1XRH	465	1358	237	321,846	EA5QB	276	839	196	164,444	DL1ASR	221	566	172	97,352
UT5EPP	738	2558	328	839,024	N2FF	439	1170	275	321,750	DL1ECG	290	814	199	161,986	VA6XDX	223	640	150	96,000
RV3QX	726	2379	352	837,408	VE9GJ	424	1200	268	321,600	RX3BP	280	819	197	161,343	IK5RUN	207	576	165	95,040
RX3ZX	716	2337	356	831,972	M3CVN	376	1281	249	318,969	ABØS	393	802	199	159,598	JA1BWA	264	744	127	94,488
YL2TB	702	2483	335	831,805	KØWA	548	1128	280	315,840	EX8AB	261	1016	157	159,512	SM6GKT	203	598	158	94,484
RA9CB	636	2736	304	831,744	WN6K	626	1206	258	311,148	KK8MM	348	766	207	158,562	G3RHH	190	600	156	93,600
N2KI	**853**	**2148**	**386**	**829,128**	RV4LC	405	1311	237	310,707	UX8ZA	285	876	181	158,556	LA1QDA	207	663	140	92,820
ABØLR	**1052**	**2110**	**389**	**820,790**	**TA1FA**	**434**	**1124**	**268**	**301,232**	RA3UAG	266	895	177	158,415	SQ9ANS	196	647	143	92,521
IZ5CCS	681	2216	368	815,488	**BD7JLR**	**454**	**1354**	**222**	**300,588**	RA3QH	282	831	190	157,890	RW4NN	202	611	151	92,261
EA8OM	**624**	**2369**	**342**	**810,198**	RU3XB	380	1247	236	294,292	IK8MYM	249	890	177	157,530	G3RSD	188	622	148	92,056
MWØCRI	**708**	**2030**	**398**	**807,940**	OH2LZI	378	1202	240	288,480	UA9WIK	196	1082	145	156,890	OK2KV	197	583	163	91,769
RVØAL	767	2271	355	806,205	**TI2JCY**	**484**	**1298**	**222**	**288,156**	**CO2IZ**	**317**	**808**	**194**	**156,752**	HB9HQX	184	665	136	90,440
UR7GO	711	2293	350	802,550	RW3XB	386	1175	245	287,875	OM3TLE	249	898	174	156,252	IZ8DBJ	236	514	175	89,950
ER5DX	**619**	**2306**	**346**	**797,876**	W1ECT	425	1082	266	287,812	MØZAK	258	827	187	154,649	WB8MKH	327	615	146	89,790
K7TE	**1005**	**1926**	**414**	**797,364**	G4OBX	389	1134	252	285,768	F4EUN	263	771	200	154,200	WØRAA	345	527	170	89,590
W1BYH	**815**	**2157**	**364**	**785,148**	US2IR	374	1133	251	284,383	W3BUI	315	765	200	153,000	SP2GJI	194	624	142	88,608
UA9OG	658	2251	348	783,348	N3XL	440	1101	257	282,957	UA9ADW	252	1033	148	152,884	ES7FU	186	634	139	88,126
IZ7CDB	666	2067	377	779,259	VE3KAO	421	1261	223	281,203	DD5RW	256	854	179	152,866	RA9OBG	201	639	137	87,543
LZ5XQ	703	2260	341	770,660	DL1DXF	352	1184	237	280,608	UA3PW	298	699	218	152,382	AA5CH	283	568	152	86,336
IK1SOW	648	2108	365	769,420	DL4JYT	371	1198	234	280,332	W3KB	276	794	191	151,654	SM7CIL	214	499	173	86,327
YV5AAX	**658**	**2309**	**331**	**764,279**	NY4N	501	1118	250	279,500	DK4LI	265	783	193	151,119	4L6QL	183	608	141	85,728
UA9AFS	652	2298	324	744,552	RZ6AK	382	1194	234	279,396	MØEDH	285	710	212	150,520	AD1C	204	500	171	85,500
UQ1D	**683**	**2479**	**296**	**733,784**	VE4EAR	414	1199	232	278,168	K4BX	349	783	192	150,336	UA9APA	173	636	134	85,224
NG1I	830	1981	366	725,046	RWØLT	430	1278	217	277,326	YU1RP	260	896	166	148,736	RV3LQ	191	575	147	84,525
IK2DKX	675	1996	369	721,764	RA9UN	426	1342	206	276,452	K5WW	419	768	193	148,224	UN7TW	163	723	116	83,868
ZM3R	**640**	**2248**	**320**	**719,360**	DL4R	357	1207	229	276,403	N3XLS	357	722	204	147,288	SP3VSE	179	634	132	83,688
6J3R8A	**785**	**2325**	**303**	**704475**	W1EQ	402	957	288	275,616	DJ2IA	242	808	182	147,056	VA3GGF	209	646	128	82,688
EB5GMH	742	1891	371	701,561	**EU6PW**	**361**	**1276**	**215**	**274,340**	S57SWR	227	855	171	146,205	RV6BO	192	595	138	82,110
OM6RK	611	2162	324	700,488	DL1BBO	359	1082	253	273,746	WA5ZUP	402	758	190	144,020	WA4PGM	261	569	144	81,936
PA3DBS	615	1991	343	682,913	RW6HP	403	1264	215	271,760	YO8RFS	233	889	160	142,240	2E1OKT	196	512	160	81,920
RA3QN	658	2002	340	680,680	RA9SAS	310	1387	195	270,465	OH6HOW	249	776	182	141,232	DL3ARK	197	597	137	81,789
AB4GG	771	1896	358	678,768	YO2MFA	341	1246	217	270,382	AL2F	353	898	157	140,986	HB9AWS	179	625	128	80,000
SP3GAX	583	2019	323	652,137	DL2RUG	314	1231	219	269,589	RX3AIS	260	765	184	140,760	KB9DVC	252	545	146	79,570
RD3DT	657	1797	362	650,514	DF5BX	341	1220	220	268,400	JA1BHK	317	823	171	140,733	IK1/DH2SAQ	190	610	130	79,300
OO5D	583	2069	312	645,528	VE1MC	363	1115	240	267,600	VE2LX	271	798	175	139,650	DK9ETM	176	535	148	79,180
RX6LD	678	1754	362	634,948	HA7PO	371	1127	237	267,099	CU2AF	276	760	183	139,080	UAØACG	211	609	130	79,170
UR4U	593	1814	348	631,272	SP9CTS	331	1218	219	266,742	KK1X	345	687	202	138,774	HA8BQ	164	666	118	78,588
NP2KW	**555**	**2116**	**298**	**630,568**	TI7/DH8WR	406	1277	208	265,616	UA4FX	239	819	169	138,411	K6GEP	268	540	145	78,300
KØRC	792	1821	344	626,424	UN8PIM	393	1097	242	265,474	WB2OQQ	262	723	190	137,370	LU4DX	189	558	140	78,120
GUØSUP	**525**	**1643**	**372**	**611,196**	DH3RB	371	1137	232	263,784	UR3AC	256	808	170	137,360	6H1ZVO	231	581	134	77,854
WA1EHK	646	1706	358	610,748	ON6UF	354	1097	237	259,989	OK2PAD	233	811	168	136,248	UA3QIX	199	543	143	77,649
UR7EQ	587	1899	318	603,882	W3DQN	405	1039	247	256,633	ON3DSG	254	747	182	135,954	RK3QS	191	552	140	77,280
E21YDP	**659**	**1916**	**315**	**603,540**	KG4IGC	531	1108	231	255,948	EC7AKV	258	724	186	134,664	DKØW	171	543	141	76,563
RNØSS	651	1863	321	598,023	W3MEL	424	1019	248	252,712	VE3JAQ	262	747	179	133,713	OM4TC	187	571	134	76,514
YI9GT	587	2245	265	594,925	WD4GBW	354	1025	243	249,075	W6FFH	382	664	200	132,800	N8XI	202	472	160	75,520
VE2AXO	590	1834	321	588,714	BD4SX	379	1281	192	245,952	7N2UQC	311	795	166	131,970	HF5ØIU	183	519	144	74,736
PX2T	572	1698	342	580,716	UU1DX	290	1193	206	245,758	VE3XAT	242	806	163	131,378	**YC6EXL**	**168**	**607**	**122**	**74,054**
4X6UU	507	2066	280	578,480	IZ2GIU	313	1152	212	244,224	DC8QT	225	800	164	131,200	W3OFD	205	518	139	72,002
GØMTN	**543**	**1816**	**318**	**577,488**	K3IXD/4	395	1085	225	244,125	DL3APM	262	737	177	130,449	KE5AQD	248	506	140	70,840
9A5ANB	524	1942	289	561,238	EC1AIJ	321	1018	239	243,302	SM5QU	245	695	187	129,965	W5JE	233	441	158	69,678
SP3EPX	533	1749	319	557,931	K2PAL	453	953	255	243,015	DG2BWG	230	763	170	129,710	HC1JQ	173	512	136	69,632
IK1TWC	537	1751	317	555,067	IK2YSJ	342	1109	219	242,871	OR6C	231	796	162	128,952	F1RHS	181	466	148	68,968
PV8DX	467	1882	290	545,780	YO9BXL	307	1063	223	237,049	NJ1H	320	689	187	128,843	XE1VY	184	567	121	68,607
HA5LZ	516	1782	305	543,510	OK1DKO	290	1160	202	234,320	IZ1DXS	224	771	167	128,757	SP3NYR	151	556	123	68,388
RV3FF	549	1745	307	535,715	DKØGER	327	1136	206	234,016	UN8P	255	772	166	128,152	YB1YCT	159	555	120	66,600
EA2BNU	545	1757	304	534,128	RZ3ATE	352	1053	222	233,766	K2YG	282	694	183	127,002	W5RZ	213	476	139	66,164
HA2ESM	488	1850	284	525,400	PH3BDJ	337	1032	225	232,200	WM5DX	271	788	161	126,868	KC5LK	208	442	148	65,416
RA3PLQ	513	1887	278	524,586	SP2IW	330	1020	227	231,540	VE3TMT	277	849	149	126,501	IWØGYC	162	521	124	64,604
VE3GSI	530	1668	309	515,412	OM7AG	319	1066	214	228,124	LW9ETQ	244	757	167	126,419	IK3WUB	167	469	137	64,253
NS5HH	800	1584	324	513,216	**TA1BM**	**300**	**1134**	**201**	**227,934**	VO1KVT	241	779	162	126,198	US5EEK	150	584	110	64,240
YO3FR	527	1725	296	510,600	PX8I	237	1253	181	226,793	YO4CVV	229	755	166	125,330	OM5MX	158	490	130	63,700
XW1LLR	**582**	**1629**	**308**	**501,732**	UY5TE	340	1064	213	226,632	VA3PL	238	709	176	124,784	JH3PTC	188	567	112	63,504
LY3UV	508	1648	303	499,344	IZ5CMG	300	1053	215	226,395	UA9OLO	248	817	152	124,184	US5ESP	169	515	123	63,345
UA4ALI	522	1635	298	487,230	F4EFL	331	895	251	224,545	YO7ARY	214	774	156	120,744	RU2FL	143	519	122	63,318
F6FTB	495	1593	303	482,679	F4EGZ/P	287	1053	213	224,289	PE2S	215	727	166	120,682	K7CS	190	498	127	63,246
RW6AH	531	1751	275	481,525	WA2MCR	391	995	225	223,875	KW7N	380	686	175	120,050	VE7KPB	220	483	129	62,307
RW3PF	489	1596	297	474,012	WB5KSD	456	1051	213	223,863	OK1VRF	225	723	166	120,018	EA3NO	180	431	144	62,064
DM5TX	443	1613	292	470,996	VE3DZ	320	959	233	223,447	K3RWN	295	709	169	119,821	N5KDV	236	443	139	61,577
LY2SA	463	1598	292	466,616	RW3TA	329	993	225	223,425	2EØZEO	216	653	183	119,499	IYØTC	150	490	125	61,250
JA7EMH	**544**	**1715**	**269**	**461,335**	EC2AFI	317	1034	216	223,344	OH5UFO	213	781	153	119,493	AC4PY	157	469	130	60,970
YO5OHY	460	1667	275	458,425	OM1AVK	305	1151	194	223,294	**OE5PEN**	**233**	**731**	**153**	**119,153**	KM4RK	160	472	128	60,416
EA1AST	496	1631	280	456,680	S57U	296	979	228	223,212	IK8SEU	230	673	177	119,121	DL2SBA	168	470	128	60,160
YO3JF	542	1367	334	456,578	UA3OGT	332	980	226	221,480	UA9FFV	224	768	154	118,272	ISØXDA	137	536	112	60,032
RW9WF	449	1819	251	456,569	RX3DFW	364	885	247	218,595	EC3CXS	227	678	174	117,972	EA4BGM	155	447	134	59,898
RW6BN	516	1636	279	456,444	IK1VEK	306	1032	211	217,752	JH1GUO/4	274	760	155	117,800	UR5EIT	160	489	122	59,658
SP8EEX	470	1623	277	449,571	EA5DYB	317	1007	215	216,505	RAØWJJ	237	811	145	117,595	WB5AAA	201	451	131	59,081
UTØSE	488	1609	279	448,911	ON4CT	314	953	227	216,331	F1IWH	223	687	171	117,477	AK9F	212	462	127	58,674
SP4CJA	488	1618	272	440,096	DC8SG	301	1059	204	216,036	WD4LYV	270	711	165	117,315	BD1CAL	151	575	101	58,075
DD1LI	491	1530	287	439,110	OQ4A	313	1091	198	216,018	W5MPC	299	738	158	116,604	IV3KSE	148	486	119	57,834
HA5VZ	491	1636	268	438,448	G3KNU	310	968	223	215,864	EA1DBC	211	757	154	116,578	DJ7UG	158	444	130	57,720
DL3R	423	1594	271	431,974	EW7EW	312	1103	195	215,085	VE7BSM	296	666	174	115,884	OE1MBB	131	483	117	56,511
N4IG	517	1404	306	429,624	OK1AZK	292	1049	203	212,947	YL2CV	213	719	161	115,759	DM5JL	161	438	129	56,502
JO1WKO	416	1661	258	428,538	SM7BJW	317	943	225	212,175	G7TMU	229	673	172	115,756	WØTUP	189	385	145	55,825
HK6PSG	**408**	**1702**	**251**	**427,202**	KW3W	363	984	214	210,576	RU2FM/QRP	255	615	188	115,620	NG7Z	222	413	135	55,755
VA2SG	542	1564	271	423,844	US7IB	318	1042	202	210,484	JA1XUY	261	750	152	114,000	N2KX	151	418	133	55,594
DM6DL	455	1522	278	423,116	GØCER	320	1019	206	209,914	JA8EIU	257	738	154	113,652	SP6TRX	141	505	110	55,550
VE1DHD	508	1427	296	422,392	EA8AG	266	1098	190	208,620	DL5JBW	226	709	160	113,440	KD5J	192	419	132	55,308
KØHW	720	1470	283	416,010	JA1BNW	373	1080	193	208,440	NM6XX	331	594	190	112,860	F4EEJ	144	455	121	55,055
HB9ODP	424	1509	272	410,448	NTØF	460	918	227	208,386	OH3LQK	240	549	205	112,545	KSØM	189	408	134	54,672
VE3FH	512	1634	248	405,232	G4DBW	297	929	221	205,309	IK3ASM	205	672	167	112,224	N7DB	187	429	126	54,054
DL8NBE	433	1506	266	400,596	IZØEHL	291	891	228	203,148	DG3RCE	208	741	151	111,891	SP3AOT	165	422	128	54,016
KE5K	554	1342	295	395,890	K9WX	443	974	207	201,618	JA8JCR	261	761	147	111,867	AA7FK	198	403	134	54,002
UT8EL	475	1470	265	389,550	SP6GNJ	295	1008	200	201,600	YO2LSK	208	718	155	111,290	DGØKS	151	442	122	53,924

UA3UBT	152	438	123	53,874
JH3CUL	150	517	104	53,768
LA9DK	152	448	119	53,312
IKØXBX	139	444	120	53,280
DJ6TK	156	422	126	53,172
KØGEO	221	425	125	53,125
AD4YQ	171	434	122	52,948
W6KY	236	442	119	52,598
DL1DWL	175	424	124	52,576
KE5DHY	241	422	124	52,328
DL1KUR	149	454	115	52,210
DG3FA	130	486	107	52,002
RZ6HF	154	436	119	51,884
OH8GZN	152	407	127	51,689
US5LAE	153	438	118	51,684
VE3SS	143	439	117	51,363
KTØP	163	391	130	50,830
IKØMIB	150	416	122	50,752
EA6AZ	124	463	109	50,467
IQ3ME	142	480	105	50,400
LZ2DF	130	475	106	50,350
DK1LRS	147	498	101	50,298
OT7N	125	492	102	50,184
RA9SN	135	483	103	49,749
KA5EYH	214	363	136	49,368
GØVDK	142	407	121	49,247
K1GU	142	439	112	49,168
K9HCK	163	386	127	49,022
DJ5UP	138	444	110	48,840
OK1DOZ	136	456	106	48,336
DF1MA	138	462	104	48,048
WA4OSD	179	423	113	47,799
DU7/G4DUM	**193**	**597**	**80**	**47,760**
DV1JM	125	643	74	47,582
KB3KOT	156	399	119	47,481
G6CSY	123	455	102	46,410
RV9MN	141	504	92	46,368
DL7UGO	133	410	113	46,330
EA1OJ	130	432	107	46,224
RU3AT	135	392	116	45,472
UA9YAD	153	430	105	45,150
IW3SOM	132	424	104	44,096
N3XZ	170	388	113	43,844
RA3TYL	127	415	105	43,575
TF3PPN	151	336	129	43,344
RKØSP	173	428	101	43,228
KØVM	183	355	121	42,955
DL6UAM	123	456	94	42,864
KØYQ	194	326	131	42,706
WQ9T	178	358	119	42,602
KN6OZ	208	390	109	42,510
K4RY	183	372	114	42,408
DH6AB	138	364	116	42,224
JA3ETD	150	428	98	41,944
SP2HXY	114	449	93	41,757
DH2HUH	138	375	111	41,625
KB3KXX	145	345	119	41,055
K5DKH	146	347	117	40,599
WA9AFM/5	200	416	97	40,352
AE6RF	201	391	103	40,273
W7VXS	200	335	120	40,200
W1HBR	165	377	106	39,962
N2OPW	143	416	96	39,936
OZ4EL	131	406	97	39,382
AF9J	190	360	108	38,880
VE7AXU	153	409	95	38,855
KE6QR	196	360	107	38,520
RW3AI	119	381	101	38,481
G6OKU	120	363	106	38,478
JH1ECF	138	359	107	38,413
SP7DQR	109	386	98	37,828
ON8VM	127	353	106	37,418
F1TIM	119	365	101	36,865
SV1BDO	142	308	119	36,652
N6TQS	153	334	109	36,406
N8IW	126	383	95	36,385
NØIBT	182	340	107	36,380
ON3WP	116	394	92	36,248
JA2KCY	141	381	93	35,433
VE7FCO	148	340	104	35,360
LZ2UZ	109	434	81	35,154
RW9WW	113	380	92	34,960
K9PY	135	326	107	34,882
EY7AB	113	410	85	34,850
W9THD	161	303	115	34,845
YO2DFA	115	366	94	34,404
G4WGE	112	362	95	34,390
WG7U	175	317	108	34,236
DL6RBH	111	374	91	34,034
DL5SWB	125	339	100	33,900
AE4EC	125	349	97	33,853
NCAJA	163	312	107	33,384
SP4DC	123	337	99	33,363
K4VU	174	311	107	33,277
RW4FX	120	330	100	33,000
UAØZEO	157	457	72	32,904
SQ8LEC	115	330	99	32,670
SQ1K	117	362	90	32,580
JA9LX	129	422	77	32,494
RZ9IB	139	334	97	32,398
UA4PAY	106	362	89	32,218
K7GS	142	275	117	32,175
VE2FFE	131	356	90	32,040
WN3C	131	304	105	31,920
AA1QD	105	325	97	31,525
SP6NVK	131	301	104	31,304
K9QH	130	319	98	31,262
N2WLS	142	300	104	31,200
JA1RRA	147	368	84	30,912
DP6M	112	343	90	30,870
WØPC	155	300	101	30,300
EA3FHP	121	280	108	30,240
KC6G	154	289	104	30,056
N3KHK	148	297	101	29,997
K3FH	133	321	93	29,853
JA1XPU	154	372	80	29,760
W3VR	130	368	80	29,440
JA1IZZ	116	363	81	29,403
EI9ES	122	295	99	29,205
JH4BTI	146	332	87	28,884
DG2TDM	96	359	80	28,720
IZ2GMT	100	337	85	28,645
W1DY	174	275	104	28,600
W5APS	138	306	93	28,458
W5ZH	124	316	90	28,440
G1DJI	107	328	86	28,208
KB8NNU	118	304	92	27,968
IWØUWE	101	302	92	27,784
K6RFM	142	251	109	27,359
KØXU	130	314	87	27,318
SM7CWI	105	313	87	27,231
RX9AOG	105	298	91	27,118
N5MOC	160	289	93	26,877
NØKK	162	244	109	26,596
OK2SWD	113	274	97	26,578
IN3RWY	91	347	76	26,372
KAØEIC	138	283	93	26,319
KA1HC	104	313	84	26,292
G3VQQ	100	298	84	25,032
PY2BRZ	100	298	84	25,032
K6BIR	138	272	91	24,752
DL1DWR	106	268	92	24,656
OK2SAR	111	270	91	24,570
IK7PTX	94	284	85	24,140
RD3AL	99	294	82	24,108
WB9WOZ	119	277	87	24,099
FM1HN	91	338	71	23,998
SP3XR	96	290	82	23,780
W7BCC	147	255	93	23,715
EC1DAV	102	274	86	23,564
DJ3EF	95	312	75	23,400
VA7MJR	114	271	86	23,306
F1TRE	84	308	75	23100
WIØWA	150	235	98	23,030
N8YYS	102	250	92	23,000
N8IE	126	267	85	22,695
BV4VR	122	333	68	22,644
WØPSS	132	241	93	22,413
RU9YT	85	301	74	22,274
RV3BZ	97	293	76	22,268
F4EMN	100	248	89	22,072
VE3MGY	97	266	82	21,812
K7VIT	125	247	87	21,489
IN3UFW	78	293	73	21,389
EA4CRP	78	297	72	21,384
DL1JB	88	280	76	21,280
CM2KY	95	299	70	20,930
RV4HL	73	305	68	20,740
US1IV	95	265	77	20,405
JL7IFR	102	252	79	19,908
NØLLH	119	221	90	19,890
UR5UDX	106	225	87	19,575
DF3IS	98	254	77	19,558
N4NX	80	257	75	19,275
YB1WAA	88	260	74	19,240
EA7EYQ	91	231	82	18,942
DL1ARJ/P	75	283	66	18,678
OZ1DGQ	87	247	75	18,525
GØVAX	79	271	68	18,428
KA6GDT	106	216	84	18,144
OK2PHI	76	248	73	18,104
SP5GMM	79	251	72	18,072
KA4OTB	103	231	78	18,018
GWØETF	84	230	78	17,940
EA8/IK1PMR	68	295	60	17,700
UR4CU	76	272	65	17,680
N1NQX	91	232	76	17,632
N5UWY	118	202	87	17,574
JF9KVT	97	243	72	17,496
DO1AN	75	269	65	17,485
JA4DWG	83	228	75	17,100
JA1IE	96	263	65	17,095
NC6P	132	190	89	16,910
WA7SHP	110	256	65	16,640
YL2KF	77	252	65	16,380
F4DXW	63	274	59	16,166
OH2JLN	79	221	73	16,133
S55O	69	239	67	16,013
YC8EL	76	291	55	16,005
ABØUK	127	194	82	15,908

KH6/NØCO	79	291	54	15,714
N4WYR	84	220	71	15,620
KD4HXT/6	129	177	87	15,399
EB2CYQ	81	210	72	15,120
K9NR	97	204	74	15,096
VE3NCO	77	235	64	15,040
N2SQW	104	242	62	15,004
KMØTO	94	211	71	14,981
UT2AB	64	260	57	14,820
K9JWI	107	196	75	14,700
EA5VQ	73	229	64	14,656
W6BXQ/4	78	235	62	14,570
KR1ST	93	224	65	14,560
UZ2HZ	67	250	58	14,500
IK8SCR	67	219	66	14,454
W6RK	101	210	68	14,280
SP9IHP	75	221	64	14,144
JA1IWP	87	235	60	14,100
AI4ME	73	231	61	14,091
NA7RF	102	194	71	13,774
NK6A	98	170	81	13,770
KG9JP	91	194	70	13,580
RN1AO	73	239	56	13,384
SP9FT	69	230	58	13,340
JA3MIB	89	226	59	13,334
JK2KNR	65	257	51	13,107
DL4NT	67	207	62	12,834
UA3XAC	65	227	55	12,485
IK2EBP	61	219	57	12,483
DL1EJD	77	185	67	12,395
JG3VEI/1	62	246	49	12,054
G4EMT	69	204	59	12,036
DU1IVT	58	236	50	11,800
IKSZTT	64	232	50	11,600
JK1NSR	78	195	59	11,505
EA7LS	59	211	54	11,394
KØEWS	97	161	70	11,270
ADØK	97	150	75	11,250
N2CK	73	188	59	11,092
KØUK	79	172	64	11,008
OH2BF	55	214	51	10,914
N3RDV	80	159	68	10,812
JA1RQT	72	168	64	10,752
UAØFGZ	75	255	42	10,710
IK7TOE	60	194	55	10,670
WAØBNX	114	144	74	10,656
SC3ØØVL	56	197	54	10,638
SP9RQH	56	219	48	10,512
UA3UHZ	55	206	51	10,506
9A5CW	52	207	49	10,143
JA5FNX	99	198	51	10,098
K4UUU	82	174	58	10,092
JA1IZ	67	184	54	9,936
EB1DMQ	82	151	65	9,815
MØGMB	60	176	55	9,680
RN6AH	69	167	57	9,519
JA1CPZ	60	171	50	8,550
PY3LUK	53	166	50	8,300
UA9OV	54	184	45	8,280
EA4NP	53	167	49	8,183
PA3HGF	53	159	51	8,109
WB5WAJ	57	165	49	8,085
IZØFVD	47	170	47	7,990
W9VQ	62	135	59	7,965
OK1LO	51	176	45	7,920
NØEOP	104	118	67	7,906
K2DB	58	158	49	7,742
SQ3LLW	50	161	47	7,567
JA6AVT	62	155	47	7,285
N9BT	60	148	49	7,252
WØZW	62	122	59	7,198
JA5ENO	53	167	43	7,181
IWØFMT	46	157	45	7,065
MUØFAL	49	165	42	6,930
JA9WA	48	177	38	6,726
WA5MAH	59	138	48	6,624
N4OK	58	139	47	6,533
K3SV	58	123	53	6,519
K4QPL	52	145	44	6,380
KI6ASK	74	109	58	6,322
PY2IQ	58	140	45	6,300
WB4MNK	49	156	39	6,084
LZ2JE	51	132	45	5,940
WA4FXX	43	151	39	5,889
KX1X	55	113	51	5,763
VE6DJT	52	133	43	5,719
AD6ZJ	64	109	52	5,668
KF4OTN	45	130	41	5,330
RA1QCT	38	139	38	5,282
JL8MBF	43	144	36	5,184
ON3AD	45	125	41	5,125
JA1BFN	45	130	39	5,070
RA4LK	43	127	39	4,953
DL8MRE	41	130	38	4,940
N6KW	68	95	52	4,940
RW4LQ	42	120	41	4,920
K9OSH	52	114	43	4,902
SQ9FCH	40	125	38	4,750
IW3IKX	37	130	34	4,420
SM7N	37	138	32	4,416
KA3JOI	52	97	42	4,074
W8RIT	40	125	32	4,000
YL2PJ	37	113	35	3,955
EA8ARG	38	109	36	3,924
RV3IC	41	93	41	3,813
PU8TFA	38	103	34	3,502
WD4FL	42	92	36	3,312
RAØAY	33	96	33	3,168
HB9ARK	35	99	31	3,069
PV8AZ	32	97	31	3,007
SM6AHU	35	91	30	2,730
EA2AVM	27	89	27	2,403
JR1UMO	28	90	25	2,250
VU2PTT	29	77	27	2,079
VK2KDP	25	75	23	1,725
RU4WD	22	86	20	1,720
9A2BW	25	68	25	1,700
VE3TAZ/P	27	72	23	1,656
HA5OMM	23	72	21	1,512
JH4GLG	21	70	21	1,470
SM5OSZ	20	79	18	1,422
USØYA	22	61	21	1,281
WB1EDI	23	56	22	1,232
RA6XB	18	66	18	1,188
RAØANO	19	64	18	1,152
AF9H	25	67	17	1,139
YO5TP	19	55	18	990
WA4GLH	21	45	20	900
N6BXO	19	44	19	836
PT8CWA	17	52	16	832
NA6G	24	37	19	703

SA1A	15	47	14	658
RK4CR	13	51	12	612
HQ2LAS	14	31	14	434
N7CKP	17	27	16	432
SM6BSK	5	25	5	125
9A5YY	5	10	5	50
Z31GX	3	14	3	42
NE1F	5	6	5	30
SP3RBT	1	3	1	3
F1OK	1	2	1	2

Single Operator 10m

LU8ADX	**28**	**70**	**28**	**1,960**
JE2SOY	12	23	11	253

Single Operator 15m

LW9EOC	**1087**	**3225**	**543**	**1,751,175**
LV5V	1069	3170	506	1,604,020
LR4E	388	1144	254	290,576
EA1ACP	**283**	**719**	**188**	**135,172**
RA6AFB	**270**	**641**	**172**	**110,252**
F1JKJ	**214**	**548**	**151**	**82,748**
HG1W	**198**	**553**	**148**	**77,420**
YBØJIV	**193**	**572**	**134**	**76,648**
EO1I	**203**	**518**	**145**	**75,110**
S51FB	**185**	**510**	**134**	**68,340**
PTØDX	**183**	**511**	**133**	**67,963**
BD4SI	**193**	**466**	**129**	**60,114**
RV6FT	187	450	128	57,600
F5BEG	163	435	123	53,505
UTØLWR	148	363	112	40,656
IW1QN	**140**	**359**	**109**	**40,221**
EA2BOV	137	315	108	34,020
YO9BXC	**130**	**347**	**98**	**34,006**
UABSR	**129**	**309**	**105**	**32,445**
DL3BQA	**119**	**324**	**96**	**31,104**
CX2AM	**113**	**326**	**95**	**30,970**
RA6YDX	122	278	94	26,132
SV1JG	**129**	**301**	**84**	**25,284**
8N3HK/3	**122**	**268**	**93**	**24,924**
JH7RTQ	108	260	93	24,180
SP8TJU	**98**	**269**	**75**	**20,175**
BD3APX	107	265	75	19,875
JK3GWT	103	224	79	17,696
OM7PY	**83**	**231**	**68**	**15,708**
SP6DMI	83	229	64	14,656
JA3EVZ	84	184	72	13,248
RZ3AV	**77**	**183**	**70**	**12,810**
HB9DHG	80	190	61	11,590
JL3SBE	67	173	61	10,553
UU4JO	71	183	54	9,882
EA4AFP	58	156	56	8,736
JH9BWC	60	152	51	7,752
UA9FGJ	54	149	52	7,748
JH2BTM	49	124	44	5,456
IZ8EDL	40	114	37	4,218
DK1AW	46	122	34	4,148
OK2PMS	**40**	**111**	**31**	**3,441**
EA3EYD	34	100	30	3,000
HB9ACA	19	48	18	864
CT1AOZ	**18**	**45**	**18**	**828**
OZ1FAO	**17**	**45**	**16**	**720**
RK4PA/QRP	18	39	18	702
UA3SBW	10	28	10	280
7K3OZQ	5	11	5	55
YO3JW	1	3	1	3

Single Operator 20m

9A5W	**1436**	**3657**	**659**	**2,409,963**
VE2RYY	**1279**	**3343**	**621**	**2,076,003**
ZC4LI	**1176**	**3430**	**545**	**1,869,350**
9A5D	1157	2824	541	1,527,784
OL6X	**1074**	**2799**	**543**	**1,519,857**
OH7MJU	**1045**	**2487**	**522**	**1,298,214**
S52X	**977**	**2456**	**511**	**1,255,016**
S5ØR	954	2492	480	1,196,160
RK3DZB	**985**	**2266**	**510**	**1,155,660**
OH8GLL	945	2227	515	1,146,905
UV8M	**941**	**2174**	**493**	**1,071,782**
WG8Y	**888**	**2061**	**498**	**1,026,378**
6V7E	**797**	**2377**	**426**	**1,012,602**
WØLSD	1002	1960	503	985,880
OHØZ	**851**	**2158**	**450**	**971,100**
AM7HBP	**952**	**2126**	**453**	**963,078**
8P2K	**862**	**2026**	**445**	**901,570**
SV1JCZ	**863**	**1900**	**411**	**780,900**
YO6BHN	**751**	**1795**	**415**	**744,925**
KY4KY	714	1658	433	717,914
KZ7X	884	1518	433	657,294
OH9MSW	728	1656	393	650,808
EB5KB	**716**	**1605**	**405**	**650,025**
HG4I	**674**	**1661**	**370**	**614,570**
T94CT	**666**	**1626**	**358**	**582,108**
WM9G	624	1319	383	505,177
W7ZR	766	1321	378	499,338
WN3R	571	1320	355	468,600
PY5ZHP	**469**	**1375**	**310**	**426,250**
ES4RD	521	1270	325	412,750
PY2NY	468	1394	279	388,926
UU9B	551	1239	311	385,329
KH6GMP	**480**	**1431**	**253**	**362,043**
DK1QH	**482**	**1253**	**285**	**357,105**
4N1N	**458**	**1054**	**306**	**322,524**
UXØIK	506	1085	276	299,460
UABCA	**456**	**1116**	**266**	**296,856**
TA3/LZ4SA	**388**	**1142**	**249**	**284,358**
W4LC	412	898	307	275,686
YL3DQ	**426**	**1007**	**267**	**268,869**
TG9ANF	**482**	**1059**	**248**	**262,632**
IK2DPP	**387**	**933**	**280**	**261,240**
IK7AFM	425	959	272	260,848
USØYW	438	992	260	257,920
EA4RH	348	805	274	220,570
UN4PG	**311**	**868**	**231**	**208,508**
EA1CUB	348	825	241	198,825
G3WW	**327**	**770**	**252**	**194,040**
KM6Z	446	706	269	189,914
S51U	331	812	224	181,888
WNØL	362	653	251	163,903
RX9FG	267	747	219	163,593
S58L	300	724	225	162,900
VE3UAE	312	730	218	159,140
IKØEJE	298	707	217	153,419
SV3EXU	305	684	218	149,112
W9ILY	295	635	228	144,780
EA2RY	285	649	222	144,078
UT2AU	293	680	205	139,400
CT1BNW	274	648	198	128,304
EA4ZK	257	630	203	127,890
UT9FJ	302	673	188	126,524
SP4DM	254	619	200	123,800

IZ2FWJ	251	604	203	122,612
TG9SM	331	696	170	118,320
WA3AAN	239	554	201	111,354
OE8CIQ	242	603	179	107,937
CX4AAJ	209	611	164	100,204
UX6F	283	598	167	99,866
SP6EIY	232	563	170	95,710
VR2XMT	243	588	162	95,256
JA9FAI	202	526	158	83,108
UR5ZMK	203	475	159	75,525
UA3EAY	194	447	167	74,649
DL1DTL	194	476	153	73,134
YB2ECG	198	582	124	72,168
RA9AFZ	175	468	154	72,072
SP2MKZ	192	451	157	70,807
UA1NFA	203	438	159	69,642
ON4KGL	179	445	149	66,305
EA3ALV	185	414	158	65,412
UN4PD	157	443	141	62,463
VE3FJ	185	426	141	60,066
DL9MBZ	183	420	142	59,640
DL5KUR	175	420	139	58,380
WR1H	174	392	147	57,624
DR7T	176	398	133	52,934
SP5ECC	163	408	126	51,408
IN3OWY/2	159	368	136	50,048
F6AUS	153	430	107	46,010
M5AAV	147	328	130	42,640
IZ3GYS	126	301	125	37,625
DL1THB	141	327	111	36,297
LY2CG	139	322	112	36,064
OQ5M	131	340	101	34,340
9M2MT	129	303	95	28,785
SQ1WO	120	268	102	27,336
RW9SZ	113	282	96	27,072
RV3YR	114	268	98	26,264
VE2XAA	111	265	96	25,440
RA9KM	93	267	87	23,229
EA1AHA	105	243	94	22,842
VE2HLS	97	245	88	21,560
UAØSAV	112	242	85	20,570
K2MK	100	201	95	19,095
GW3NJW	99	220	83	18,260
VE3RCN	96	211	86	18,146
IT9ESW	95	210	86	18,060
OK2ZIL	92	213	79	16,827
EA3AAO	80	192	72	13,824
NØUNL	120	153	87	13,311
9A1CMS	82	183	68	12,444
IWØERQ	68	178	64	11,392
I1NHR	75	167	68	11,356
UE3DRS	84	175	64	11,200
OL9R	64	172	58	9,976
NN7SS	95	139	71	9,869
EA5TS	66	171	55	9,405
VU3OJQ	59	143	55	7,865
SP6BBE	62	131	58	7,598
RL9FYL	55	144	48	6,912
VP8/LZ1UQ	49	135	44	5,940
VA3JFF	55	118	46	5,428
KG6ZHC	61	94	53	4,982
YB5AQB	47	135	36	4,860
OE1KTS	45	103	44	4,532
JG5DHX/5	50	102	40	4,080
HB9JAQ	42	97	41	3,977
JK1LUY	43	109	36	3,924
UA3YQL	40	101	38	3,838
UA1CEC	45	86	40	3,440
LZ1ZC	30	69	29	2,001
RA3YC	23	59	23	1357
EA8/IZ1GLO	14	40	14	560
PY2NA	14	39	14	546
OZ7AEI	13	32	13	416
K3OQ	11	14	11	154
UU2JQ	7	15	7	105
JP1ITN	3	6	3	18
OZ7AM	1	3	1	3
PR7AF	1	3	1	3

Single Operator 40m

I4IKW	**1195**	**5832**	**585**	**3,411,720**
7XØRY	**1064**	**6366**	**531**	**3,380,346**
DL3TD	**999**	**4706**	**521**	**2,451,826**
UXØFF	**1055**	**4610**	**519**	**2,392,590**
UW5Q	994	4450	523	2,327,350
IV3OWC	877	4258	484	2,060,872
IV3ZXQ	877	4030	469	1,890,070
F4JRC	**830**	**3750**	**458**	**1,717,500**
YU7AE	**812**	**3500**	**419**	**1,466,500**
AE5AA	**875**	**2990**	**456**	**1,363,440**
IW1PNJ	747	3210	414	1,328,940
UT2IV	686	2970	395	1,173,150
OK1DIB	**622**	**2854**	**393**	**1,121,622**
IK3SSJ	575	2516	345	868,020
ES5RY	**563**	**2428**	**324**	**786,672**
KØKT	**683**	**2264**	**342**	**774,288**
T99D	**497**	**2226**	**314**	**698,954**
CU2JT	**471**	**2418**	**282**	**681,876**
S57SU	475	2096	310	649,760
OH9RI	483	2056	304	625,024
IV3IZU	470	2008	279	560,232
UT5SA	464	1930	289	557,770
OK1MSP	424	1878	297	557,766
SP2EXE	**452**	**1908**	**292**	**557,136**
UW2F	471	1966	280	550,480
DD1LD	401	1754	283	496,382
W2RTY	554	1692	291	492,372
UA3SAQ	403	1696	276	468,096
DL8MBS	391	1680	271	455,280
SP5OXJ	394	1682	269	452,458
SP6AXW	419	1722	246	423,612
UR8QR	369	1598	247	394,706
YT1AA	**357**	**1554**	**252**	**391,608**
HA4WQ	389	1634	237	387,258
DK2AB	353	1502	251	377,002
JA1OVD	**335**	**1640**	**224**	**367,360**
IK3QAR	349	1424	242	344,608
USØHZ	331	1440	226	325,440
SV1CER	**325**	**1408**	**231**	**325,248**
HK3W	**259**	**1542**	**182**	**280,644**
N2WQ/VE3	406	1164	226	263,064
RN4HFJ	297	1196	209	249,964
WP4WW	**268**	**1256**	**186**	**233,616**
LY2FN	**265**	**1146**	**201**	**230,346**
VE3NZ	282	1158	180	208,440
G4ZOB	245	1072	192	205,824
OT4P	236	1028	189	194,292
TA3J	**192**	**1140**	**142**	**161,880**
WØBR	272	844	189	159,516
EA7ELY	213	906	166	150,396
MM5DWW	**213**	**890**	**149**	**132,618**

EC4AIU	194	838	149	124,862
RV3BQ	191	804	155	124,620
NA5Q	216	770	161	123,970
AB1FY	207	724	157	113,668
UAØWL	173	810	126	102,060
SN2M	143	614	121	74,294
LZ2ZG	**140**	**612**	**115**	**70,380**
WA2RSX	192	530	128	67,840
JH1RFM	118	604	104	62,816
UR6QS	127	578	104	60,112
TE2M	**113**	**524**	**90**	**47,160**
N9TF	144	408	109	44,472
BG4SGP	**94**	**498**	**88**	**43,824**
BA3CE	111	482	78	37,596
DL4ME	96	388	84	32,592
RU6YJ	96	380	84	31,920
YY6JAG	69	410	65	26,650
NRØL	101	268	73	19,564
G5YC	67	282	63	17,766
UW8SM	55	230	52	11,960
LZ1FH	57	230	51	11,730
SP6JQC	54	230	51	11,730
ZL3TE	48	266	44	11,704
ON4IVU	52	210	44	9,240
WW2J	49	188	43	8,084
VE2FU	43	196	38	7,448
JJ2PUG	38	192	36	6,912
EW8CY	37	164	34	5,576
K3NK	42	126	37	4,662
EA7CWA	31	152	30	4,560
LW5HBR	27	152	26	3,952
YZ1FA	31	126	30	3,780
RA1AR/3	28	106	26	2,756
OM7YC	25	114	22	2,508
EA4WC	22	90	21	1,890
WA7BME	26	66	26	1,716
EA7MT	16	66	16	1,056
TA3BQ	11	66	11	726
K3RMB	19	42	16	672
PR7AR	3	18	3	54
K2NNY	1	2	1	2

Single Operator 80m

SO4M	**924**	**4042**	**479**	**1,936,118**
S54E	**893**	**4082**	**463**	**1,889,966**
9A2DQ	**899**	**3948**	**458**	**1,888,184**
IV3SKB	**830**	**3612**	**430**	**1,553,160**
I4AVG	777	3468	427	1,480,836
YU7W	**740**	**3204**	**399**	**1,278,396**
DJ6BQ	**733**	**2854**	**381**	**1,087,374**
YZ1SM	**643**	**2760**	**364**	**1,004,640**
HA8BE	**640**	**2730**	**343**	**936,390**
4N1A	628	2626	345	905,970
DJ3IW	506	1992	321	639,432
UX1UX	455	1808	268	484,544
HA1AD	415	1700	267	453,900
KH7X	**334**	**1986**	**191**	**379,326**
YU7YZ	344	1402	239	335,078
UT5KD	337	1318	209	275,462
N2WK	**349**	**1028**	**206**	**211,768**
KE3WM	360	998	206	205,588
OHØI	**255**	**1090**	**168**	**183,120**
UA4WAU	**266**	**1024**	**177**	**181,248**
RW6FZ	247	948	170	161,160
UR5KCC	248	956	159	152,004
S57AJ	**221**	**866**	**171**	**148,086**
US6IOT	219	900	161	144,900
YO5CRQ	**210**	**850**	**162**	**137,700**
OK1HMP	205	822	160	131,520
IT9BOR	**199**	**834**	**157**	**130,938**
UT5ST	198	766	144	110,304
UT5ZA	195	752	143	107,536
YU1EFG	172	678	137	92,886
UT3N	174	664	131	86,984
KEØL	191	418	114	47,652
AC1O	144	392	96	37,632
EA8ANE	80	468	77	36,036
9A5MT	98	392	89	34,888
YL1ZJ	87	350	83	29,050
NQ4K	107	270	77	20,790
TA1AT	66	268	59	15,812
SQ3LLM	63	238	55	13,090
ON5KQ	47	190	44	8,360
WC4J	62	142	51	7,242
RA3GFG	40	160	34	5,440
UY5ZZ	24	90	24	2,160
HSØZEE	11	50	11	550

Rookie

IW7EFC	**1053**	**2888**	**511**	**1,475,768**
				SO-ALL-HI
K3MQ	1028	2838	495	1,404,810
				SO-ALL-HI
RK9AJZ	875	3060	388	1,187,280
				SO-ALL-LO
YZ1SM	643	2760	364	1,004,640
				SO-80M
6J3RBA	785	2325	303	704,475
				SO-ALL-LO
K4CZ	625	1694	367	621,698
				SO-ALL-HI
PX2T	572	1698	342	580,716
				SO-ALL-LO
VE3TES	661	2084	267	556,428
				SO-ALL-HI
LY3UV	508	1648	303	499,344
				SO-ALL-LO
DD1LD	401	1754	283	496,382
				SO-40M
EA3FLS	428	1371	279	382,509
				SO-ALL-LO
MØVBY	409	1276	271	345,796
				SO-ALL-LO
RW3XB	386	1175	245	287,875
				SO-ALL-LO
W5YAA	488	929	275	255,475
				SO-ALL-HI
RN4HFJ	297	1196	209	249,964
				SO-40M
RZ3ATE	352	1053	222	233,766
				SO-ALL-LO
WP4WW	268	1256	186	233,616
				SO-40M
IZ5HQB	317	923	209	192,907
				SO-ALL-LO
F4EUN	263	771	200	154,200
				SO-ALL-LO
VO1KVT	241	779	162	126,198
				SO-ALL-LO
RK2FXG	210	722	148	106,856
				SO-ALL-LO

BD1FJP	279	812	124	100,688
				SO-ALL-LO
EA1EWC	189	594	169	100,386
				SO-ALL-LO
DK9ETM	176	535	148	79,180
				SO-ALL-LO
JH1RFM	118	604	104	62,816
				SO-40M
WB5AAA	201	451	131	59,081
				SO-ALL-LO
OE1MBB	131	483	117	56,511
				SO-ALL-LO
KE5DHY	241	422	124	52,328
				SO-ALL-LO
OH8GZN	152	407	127	51,689
				SO-ALL-LO
N3XZ	170	388	113	43,844
				SO-ALL-LO
EA2BOV	137	315	108	34,020
				SO-15M
AE6RR	151	279	103	28,737
				SO-ALL-HI
IZ2GMT	100	337	85	28,645
				SO-ALL-LO
EA1AHA	105	243	94	22,842
				SO-20M
IN3UFW	78	293	73	21,389
				SO-ALL-LO
BD3APX	107	265	75	19,875
				SO-15M
AI4ME	73	231	61	14,091
				SO-ALL-LO
SQ3LLM	63	238	55	13,090
				SO-80M
ES1A	57	240	48	11,520
				SO-ALL-HI
EB1DMQ	82	151	65	9,815
				SO-ALL-LO
SQ3LLW	50	161	47	7,567
				SO-ALL-LO
JL8MBF	43	144	36	5,184
				SO-ALL-LO
PU8TFA	38	103	34	3,502
				SO-ALL-LO
K3RMB	19	42	16	672
				SO-40M
K3OQ	11	14	11	154
				SO-20M

Multi-Operator Single Transmitter

CT9M	**2630**	**10937**	**738**	**8,071,506**
EF8A	**2297**	**9405**	**692**	**6,508,260**
HG1S	**2287**	**8465**	**749**	**6,340,285**
4L8A	**2110**	**8182**	**634**	**5,187,388**
TM4P	**2055**	**7517**	**657**	**4,938,669**
OE9R	**1705**	**6579**	**609**	**4,006,611**
RK3DXW	**1720**	**5765**	**621**	**3,580,065**
YTØA	**1717**	**5807**	**599**	**3,478,393**
R7C/3	**1380**	**5210**	**570**	**2,969,700**
TK5KP	**1518**	**4833**	**605**	**2,923,965**
AF4Z	**1820**	**4749**	**588**	**2,792,412**
UA9UZZ	1442	5472	500	2,736,000
UR4EWT	**1473**	**4853**	**545**	**2,644,885**
YZ9A	**1443**	**4672**	**559**	**2,611,648**
OK1KSL	**1322**	**4678**	**548**	**2,563,544**
J43BSF	**1534**	**4818**	**525**	**2,529,450**
RK4LWZ	1436	4567	530	2,420,510
RK9JWR	1373	5014	473	2,371,622
S56A	**1190**	**4240**	**546**	**2,315,040**
YWØDX	**1292**	**4254**	**487**	**2,071,698**
NØNI	**1373**	**3491**	**523**	**1,825,793**
9A7T	**1004**	**3564**	**486**	**1,732,104**
YE1ZAT	**933**	**3893**	**406**	**1,580,558**
SP9KDA	**974**	**3481**	**436**	**1,517,716**
KE7AJ	1451	2965	503	1,491,395
BY1RX	**1060**	**3689**	**388**	**1,431,332**
RK9AWN	840	3280	404	1,325,120
OM3KWZ	887	3318	392	1,300,656
VA7RN	**1074**	**3227**	**345**	**1,113,315**
VE5RI	**1014**	**2785**	**383**	**1,066,555**
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YR4R	755	2471	373	921,683
JM1LPN	**741**	**2405**	**332**	**798,460**
ON6ØNLB/P	**637**	**2318**	**331**	**767,258**
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W3DSX	142	356	118	42,008
UU5A	15	39	14	546

Multi-Operator Two Transmitter

EA8AH	**4558**	**18996**	**895**	**17,001,420**
LX8M	**2885**	**10814**	**751**	**8,121,314**
KI1G	**2880**	**9067**	**778**	**7,054,126**
DG7RO	**2289**	**8455**	**716**	**6,053,780**
TI5N	**2525**	**8436**	**670**	**5,652,120**
WI6NE	**2569**	**6463**	**663**	**4,284,969**
DA3X	1821	6294	606	3,814,164
WX5S	**1647**	**3957**	**517**	**2,045,769**
NC7J	**1657**	**3673**	**475**	**1,744,675**

Multi-Operator Multi-Transmitter

OM8A	**3092**	**11861**	**877**	**10,402,097**
UU7J	**3205**	**11453**	**840**	**9,620,520**
Z37M	**3254**	**11659**	**794**	**9,257,246**
RWØA	**2948**	**11718**	**734**	**8,601,012**
SPØDXC	**2621**	**10405**	**782**	**8,136,710**
WW4LL	**2472**	**6675**	**704**	**4,699,200**
KA4RRU	2127	5607	680	3,812,760
OH6R	**1753**	**5957**	**583**	**3,472,931**
RK4SWA	**1189**	**4120**	**463**	**1,907,560**
JA6ZPR	**1077**	**3711**	**443**	**1,643,973**
KC2NMZ	**994**	**2530**	**483**	**1,221,990**
SF6O	**776**	**2604**	**404**	**1,052,016**

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ZL2-001	290	1033	192	198,336
ONL-383	247	924	181	167,244
DEØWAF	250	817	173	141,341
DE1RNH	108	408	97	39,576

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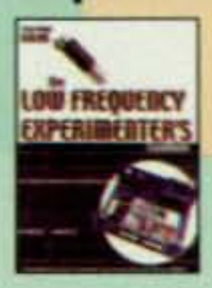

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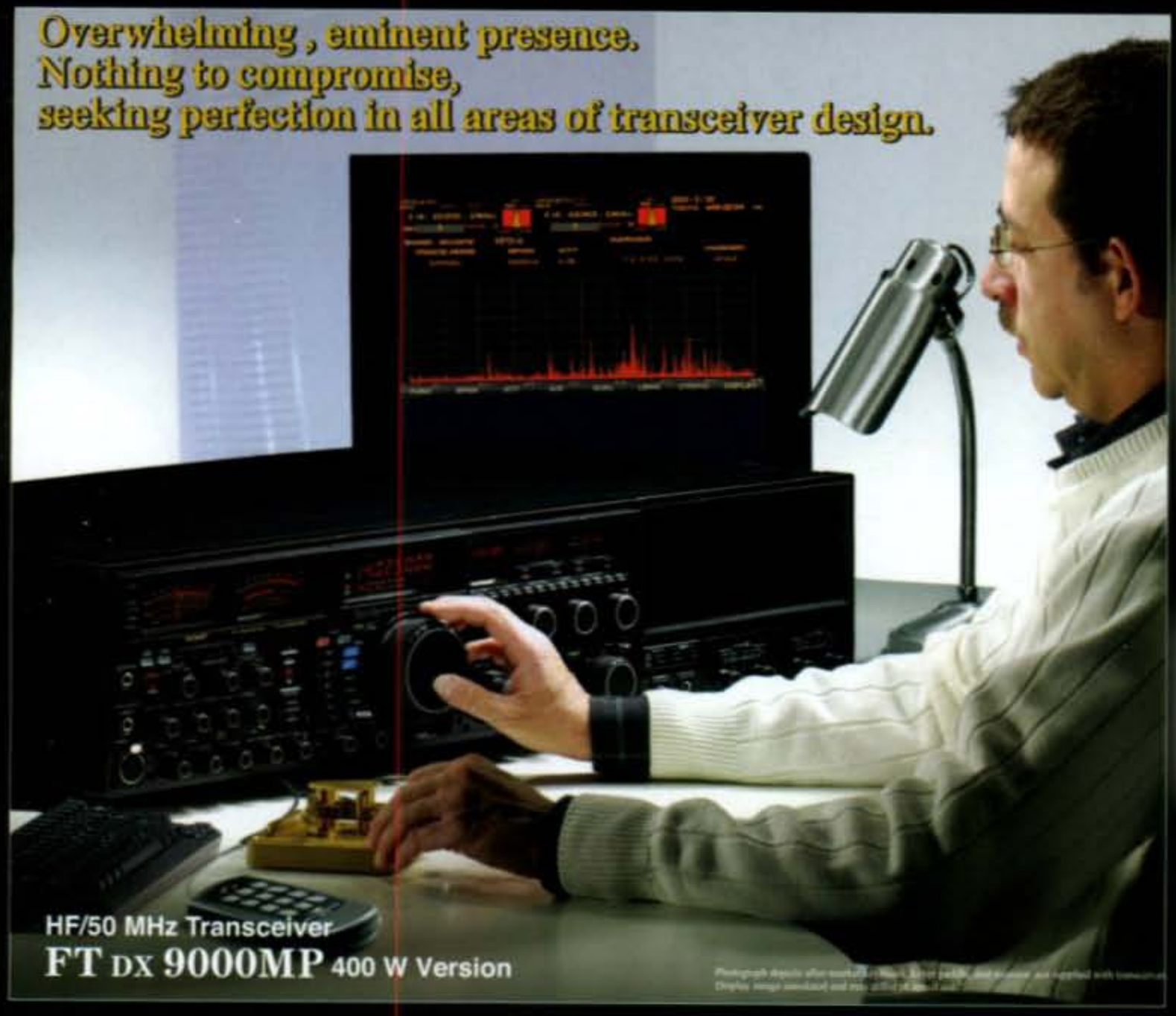

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