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Amateur Radio

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COMMUNICATIONS & TECHNOLOGY

JULY 2008

CQ

On the Cover: Noted DXers Bernie McClenny, W3UR, and Wayne Mills, N7NG, on the roof of a hotel in Pristina, Kosova, where they put YU8/OH2R on the air to mark Kosova's newly-declared independence. Story on page 13, details on page 22.

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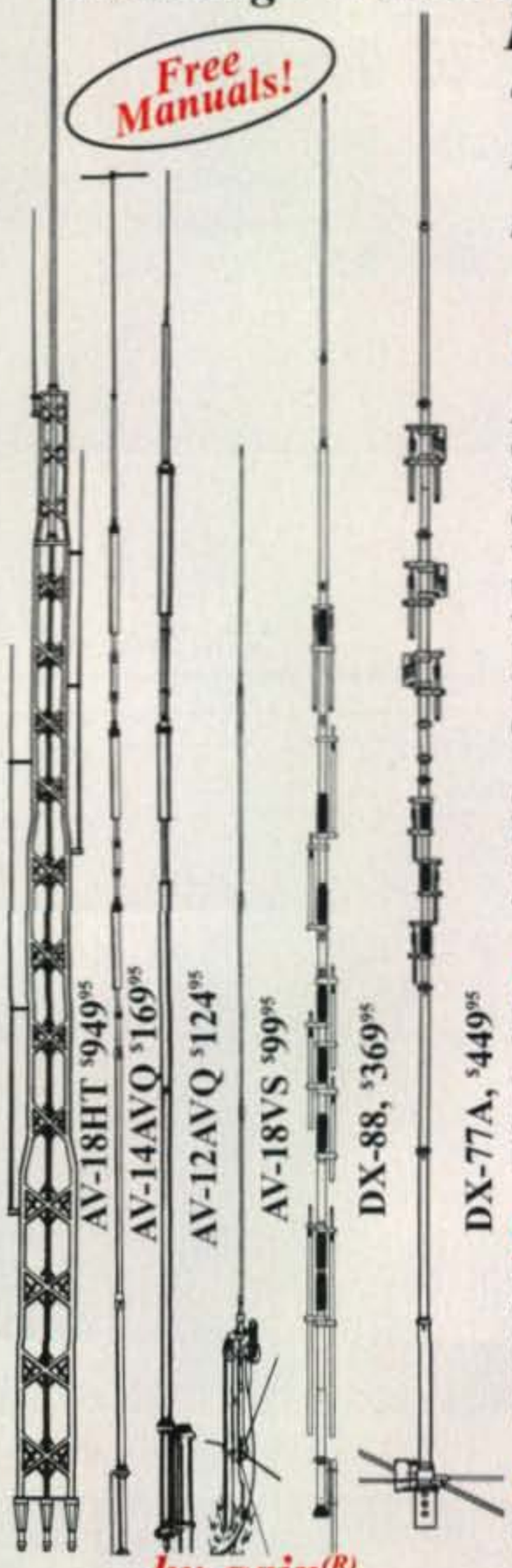

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Classics

***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 band-switching (except AV-18VS) and include a 12-inch heavy duty mast support bracket (except AV-18HT).

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

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

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

AV-14AVQ, $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.

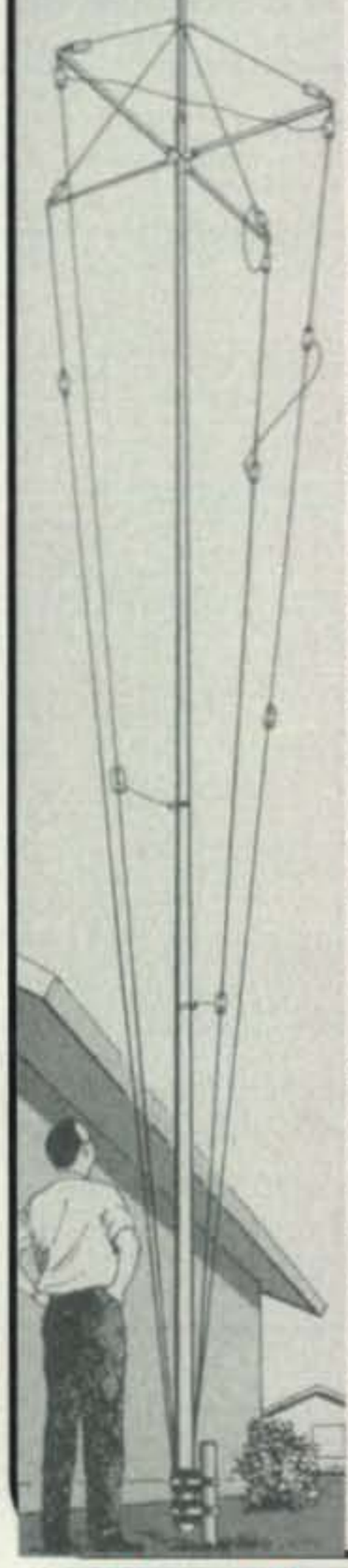
Model #	Price	Bands	Max Power	Height	Weight	Wind Surv.	Rec. Mast
AV-18HT	$949.95	10,15,20,40,80	1500 W PEP	53 feet	114 pounds	75 MPH	------
AV-14AVQ	**$169.95**	**10,15,20,40**	**1500 W PEP**	**18 feet**	**9 pounds**	**80 MPH**	**1.5-1.625"**
AV-12AVQ	$124.95	10,15,20 M	1500 W PEP	13 feet	9 pounds	80 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 — no guy	1.5-1.625"
DX-77A	**$449.95**	**10 - 80 M**	**1500 W PEP**	**29 feet**	**25 pounds**	**60 mph — no guy**	**1.5-1.625"**

Hy-Gain HyTower-Jr™

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

New!

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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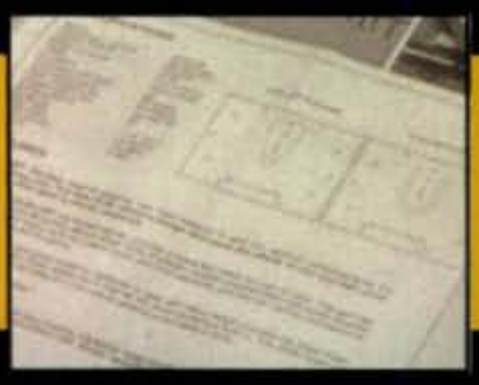
Attention New and Seasoned Ham Operators...

Introducing...the ME-2 Starter Series Yagi's...

The **ME-2 Starters Series Yagi's** have been designed for New and Seasoned Hams operators alike.

New licensed Hams will find these low cost, medium performance antennas, to be a great choice for a starter antenna without compromising quality. And when it's time to move up to a more tailored antenna, M2 will be there to help them make the best choice from our High Performance models.

The Seasoned Ham operator, will find these antennas to be a fun experimental antenna or a great mobile antenna for getting out on the road.

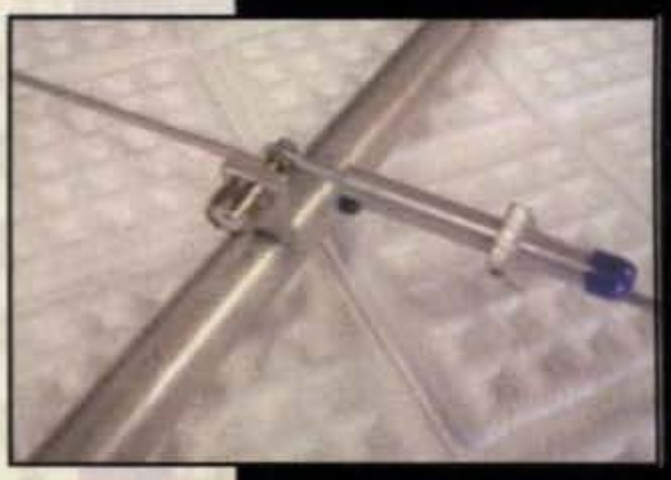
Each antenna has been specifically tailored for:

Compact Size and Portability: Great for Field Days, Mountain Topping, Fox Hunts, DXpeditions and ATV use. Each antenna breaks down to no more than 40" long, making it a natural for trips. Not to mention, it's a perfect fit for deed restricted antenna areas where wind load and overall appearance must be kept to a minimum.

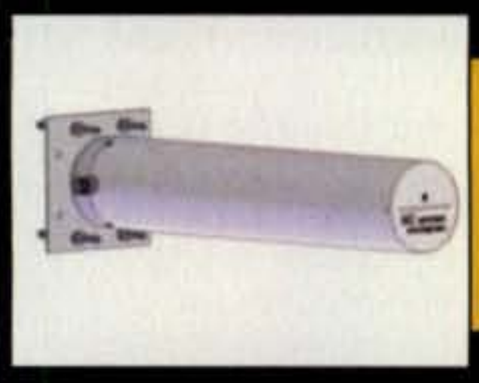
Quality Construction: A medium performance Gamma Match feed with no balun. Giving you the capability of adjustments for best match. A single heavy duty mounting cradle and stainless steel hardware, give you the confidence of quality construction you have come to expect from M2.

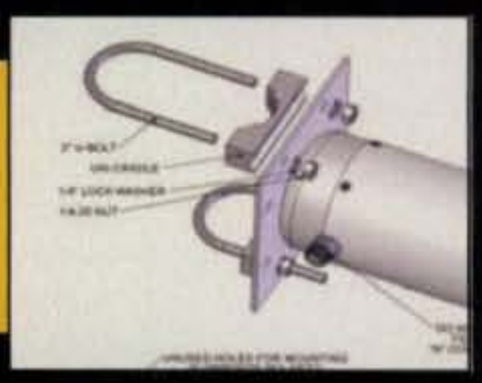
Four Models to choose from

* 6 Meter 3 Element
* 2 Meter 3 Element
* 1.25 Meter 4 Element
* 70 Centimeter 6 Element



Attention 2.4 GHz antenna users...



Introducing...Our New 2.4 GHz Series Wave Guide Fed Yagi antennas...

The **2.4 GHz** series of Wave Guide Fed Yagi's, have been computer optimized for use in the 2390 to 2450 MHz band. Mechanically optimum computer calculations are held by CNC stamping out the director element structure. The loss-less Polyethylene Radome covers and adds to the strength of the antenna. The short boom version is the best performer for it's size on the market. If more gain is required, stacking two at 8" apart nets another 3.0 dB gain. Or you can simply step up it's big brother with the 34" boom model for a jump of 2.7 dB more gain. Both antennas come complete with stainless steel hardware for long life.

Two Models to choose from

* 2.4 GHz 25" Boom
* 2.4 GHz 34" Boom

Don't forget about our Quality Phase matched cables..

And
2 & 4 Port
Power Dividers

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ham radio news

Red Cross Relents on Background Checks

A lengthy impasse between the ARRL and the American Red Cross seems to be over. The ARRL had objected to Red Cross plans, announced in 2006, to require background checks—possibly including credit checks and "mode of living" checks—of all staff and volunteers, including hams providing communications to the Red Cross through the ARRL's Amateur Radio Emergency Service (ARES). In a May 8, 2008 letter to ARRL President Joel Harrison, W5ZN, Red Cross Vice President for Disaster Response Services said that "(a) new background consent form now [is] to be used by all Red Cross chapters for ARRL members and other partner organizations ... limited to the name and social security number verification ... and a criminal background check." According to the ARRL, the letter added that references "to other related investigative possibilities have been stricken." With this issue now resolved, the ARRL says it has begun working on renewing the long-standing Memorandum of Understanding between the two groups that had been allowed to expire last year because of the impasse.

Appeals Court Sends BPL Rules Back to FCC

A federal appeals court has told the Federal Communications Commission it must reopen its rulemaking proceeding establishing rules for Broadband over Power Lines (BPL), and specifically that it must make the full content of five internal studies available for public review and comment and that it must explain why it chose to use a more liberal measurement technique for determining interference potential from BPL.

In a case brought by the ARRL, the U.S. Court of Appeals for the District of Columbia ruled April 25 that the FCC had relied heavily in its decision on five internal studies but then impermissibly refused to release those studies in full for review and comment. The ruling said, "It would appear to be a fairly obvious proposition that studies upon which an agency relies in promulgating a rule must be made available during the rulemaking in order to afford interested persons meaningful notice and an opportunity for comment." There is no indication at this time as to when the FCC might reopen the proceedings and/or whether it will appeal the ruling to the United States Supreme Court.

Riley May Retire (Again)

Riley says it's for real this time. FCC Special Counsel for Amateur Radio Riley Hollingsworth, K4ZDH, says he hopes to retire in early July. Hollingsworth had announced plans to retire at the beginning of this year, but then did a turnaround. He explained recently that his decision then was due to the emergence of the Air Force PAVE PAWS radar interference issue regarding 70-centimeter amateur repeaters in New England and California. "We had to send out 140 letters to repeater owners," he told *CQ*, "and I didn't want to dump that in the lap of someone new." Riley says the PAVE PAWS issue appears headed for resolution, and as long as no new problems crop up, he will feel comfortable retiring in July. He did note that he plans to stay as active as possible in amateur radio, adding, "in a fun way this time."

Chinese Hams Answer the Call

Hams in China responded quickly after the massive earthquake that hit the country in early May. Reports posted on qrz.com and elsewhere indicated that hams were passing emergency traffic on 7.050, 7.060, and 14.270 MHz. No specifics are available at press time. Public Service Editor Bob Josuweit, WA3PSZO, will pass along whatever he learns in upcoming columns.

First US-JA D-Star Contact Reported

The first D-Star contacts between the United States and Japan were made during, and from, the Dayton Hamvention®. According to a posting on the D-Star users website, ICOM America's KD7QDZ initiated the first contact, in line with a request by the JARL (Japan Amateur Radio League), which developed the digital voice system, that the first contact be made by a U.S. ham who also spoke Japanese. Several contacts followed on three Japanese D-Star repeaters, in Tokyo, Nagoya and Osaka.

Astronaut Ron Parise, WA4SIR, SK

Astronaut and long-time ham Ron Parise, WA4SIR, died May 9 after a long battle with cancer. He was 56. According to an obituary in the *Washington Post*, Parise spent more than 615 hours in space and received the NASA Space Flight Medal twice. The obituary added, "An amateur radio operator, he talked to hundreds of ham operators and school children during his space flights, as part of his larger interest in encouraging careers in science." His hometown newspaper, the Warren, Ohio, *Tribune Chronicle*, reported that the family has asked that any "material tributes" should "take the form of contributions to the Youngstown State University Foundation's Dr. Ronald A. Parise Scholarship Fund, One University Plaza, Youngstown (OH) 44555."

BPL Hits Dead End in Dallas

Another one bites the dust ... Current Communications has dropped out of the Broadband over Power Lines (BPL) business in Dallas, Texas, according to a report in the *Dallas Morning News*. The newspaper reported that the company said "it will sell its so-called smart grid of networking equipment" to the local electric utility, Oncor, for $90 million. Oncor said it is not in the telecommunications business and will use the network only to read information from meters, transformers, and other devices on the electric delivery network. Current's Dallas system had already been notched to exclude transmissions on amateur radio frequencies, and there had been no opposition to the system from hams.

In a somewhat related story, EarthLink has ended its free WiFi internet service in Philadelphia after failing to reach agreement with the city or a non-profit organization to transfer ownership of its $17 million wireless network at no charge, according to *Government Technology* magazine. The company told the magazine it now has no choice but to dismantle the setup and help its customers find new ways to access the internet.

ARRL to Focus on Technology

The ARRL announced plans at the Dayton Hamvention ® to add a "fifth pillar" to the organization's underpinnings, adding technology to its existing four "pillars" of public service, advocacy, education, and membership. (The announcement mystified many who heard about it [including this writer], being under the impression that technology had always been one of the ARRL's primary underpinnings.) The League also announced that technology would be the focus of its public relations campaign for 2008, adopting a slogan of "We do that..." in regard to a variety of high-tech activities.

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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Two of the LIGHTEST and MOST COMPACT Amplifiers in the Industry!

HL-1.5KFX

HF/50MHz Linear Power

Features

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

Specifications

Frequency:
1.8 ~ 28MHz all amateur bands including WARC bands and 50MHz
Mode:
SSB, CW, RTTY
RF Drive:
85W typ. (100W max.)
Output Power:
HF 1kW PEP max.
50MHz 650W PEP max.
Circuit:
Class AB parallel push-pull
Cooling Method:
Forced Air Cooling
AC Power:
AC 240V default (200/220/235) – 10 A max.
AC 120V (100/110/115) – 20 A max.
Dimensions:
10.7 x 5.6 x 14.3 inches (WxHxD)/272 x 142 x 363 mm
Weight:
Approx. 20kgs. or 45.5lbs.
Optional Items:
Auto Antenna Tuner (HC-1.5KAT)
External Cooling Fan (HXT-1.5KF for high duty cycle RTTY)
Accessories Included:
Band Decoder Cables included for Kenwood, ICOM and some Yaesu

HL-1.2KFX

750W PEP Desktop Linear

Features

- Solid State.
- This world-class compact 750W HF amplifier is the easiest to handle and operate.
- The amplifier's broadband characteristics require no further tuning once the operating band is selected.
- The amplifier allows operation in full break-in CW mode due to the use of the amplifier's high speed antenna relays
- Quiet operation allows for even the weakest DX signals
- The amp utilizes a sophisticated circuit to run the various high speed protection circuits.

Specifications

Frequency:
1.8 - 28MHz all amateur bands including WARC bands
Mode:
SSB, CW, RTTY
RF Drive:
75 - 90W
Output Power:
SSB 750W PEP max.,
CW 650W, RTTY 400W
Circuit:
Class AB parallel push-pull
Cooling Method:
Forced Air Cooling
AC Power:
1.4kVA max. when TX
AC 100/110/115/120V,
AC 200/220/230/240V
Dimensions:
9.1 x 5.6 x 14.3 inches (WxHxD)
Weight:
Approx. 33lbs.

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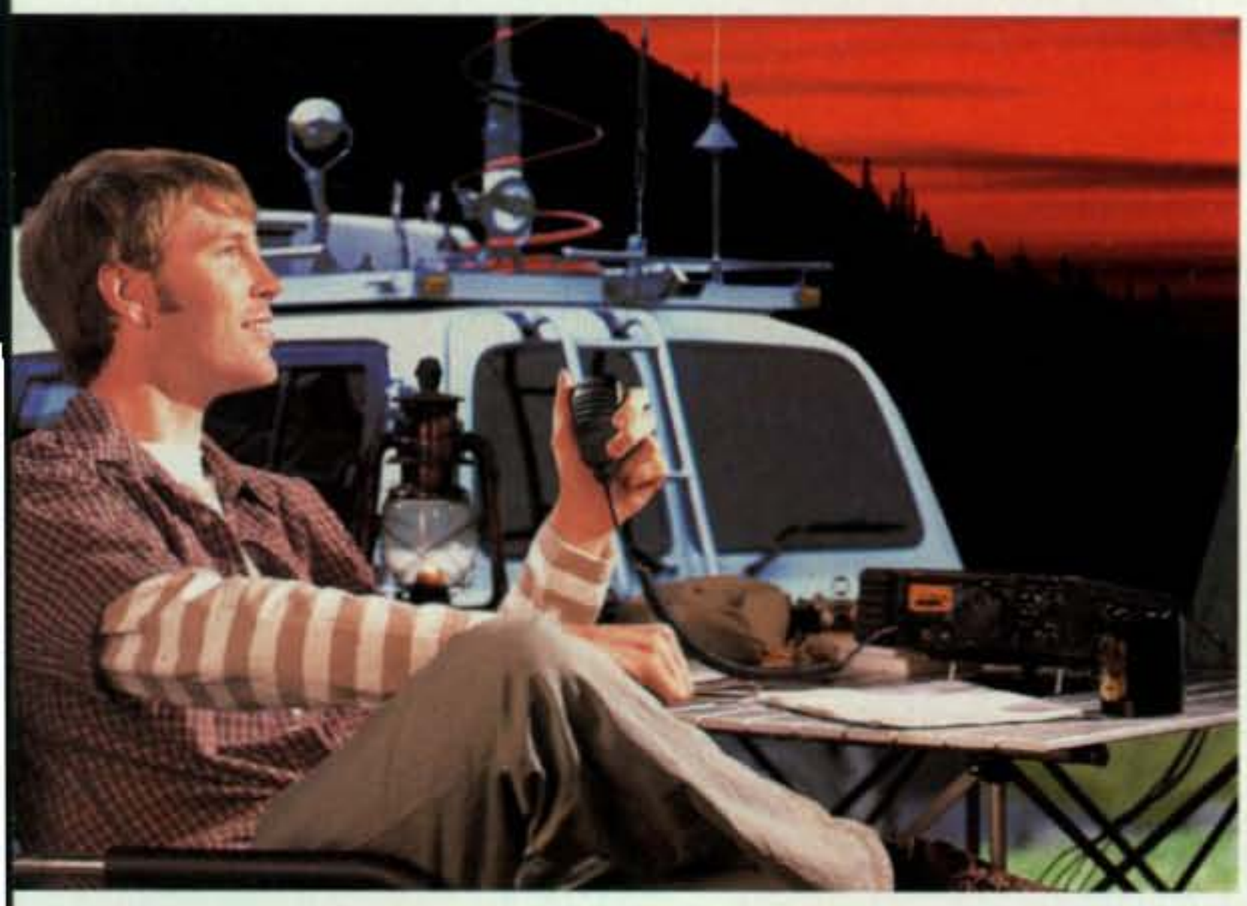

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FT-897D TCXO DSP 60 m Band

HF/50/144/430 MHz
100 W All Mode Transceiver
(144 MHz 50 W/430 MHz 20 W)

HF/VHF/UHF Multimode Mobile Transceiver, now Including Built-in DSP

FT-857D DSP 60 m Band

HF/50/144/430 MHz
100 W All Mode Transceiver
(144 MHz 50 W/430 MHz 20 W)

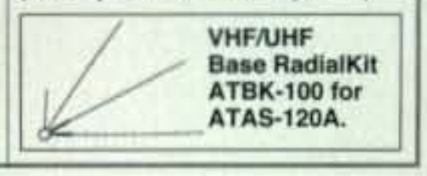
Automatic Matching for FT-897/857 Series Transceivers

FC-40
Automatic-Matching 200-Memory Antenna Tuner (160 m ~ 6 m Band)

WATERPROOF

Mobile Auto-Resonating 7~430 MHz for FT-897/857 Series Transceivers

ATAS-120A
Active Tuning Antenna System (no separate tuner required)



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REAL PERFORMANCE, REALLY PORTABLE

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HF/50/144/430 MHz
5 W All Mode Transceiver
(AM 1.5 W)

60 m Band

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

HF/50 MHz 100 W Transceiver

FT-950

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

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

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COMPACT HF/50 MHz TRANSCEIVER WITH IF DSP

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

HF/50 MHz 100 W All Mode Transceiver

FT-450 Automatic Antenna Tuner ATU-450 optional

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

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

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

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– a CQ editorial

zero bias

BY RICH MOSESON,* W2VU

From Dayton . . . to Mars

"I'm going back home now, to the Holy Land," said the Israeli ham as he left our booth at the Dayton Hamvention®. I couldn't help thinking, perhaps a bit sacrilegiously, that for most of us in Hara Arena at that moment we were already *in* the Holy Land ... the Ham Radio Holy Land, that is. Another Dayton is in the history books as I write this, another gathering of thousands and thousands of people with a single shared interest—amateur radio. The crowd seemed a bit smaller this year, perhaps due to sky-high gas prices, but many vendors reported better-than-ever sales, perhaps due to the arrival of those economic incentive checks just before the show got started. But even with a slightly smaller crowd, the Hamvention is still the most amazing gathering of ham radio operators on the planet.

Well, almost. The *really* most amazing gathering of ham radio operators is the one that takes place every day on the air. I was reminded of this vividly a week before Dayton, when I managed to get on the air for a little while on Sunday afternoon. I heard a station in North Carolina calling CQ on 20 meters. I answered but a station in Maine got through first. I listened to their QSO, then called and worked the North Carolina station. He explained that he had recently upgraded to General and was trying to work all states—a good goal with our seemingly endless bottom of the sunspot cycle. The DX will come back, but meanwhile, working on a domestic award such as Worked All States or *CQ*'s USA Counties Award is a good idea. It provides you with a challenge and keeps the bands busy. We talked until he was called away by a phone call from work. As soon as we signed clear, the station in Maine called and I also had a very pleasant QSO with him. He lives and works, as the "fix-it" man, on an organic farm right along the Bay of Fundy. It turns out that his farm is only about 50 miles from where we're planning to go on vacation this summer, and he invited us to stop by and visit—something we may well do. After I got off the air, I looked up the address of the North Carolina station so I could send him a QSL card, and discovered from his online bio that he is an Associate Justice of the North Carolina Supreme Court!

To me, the magic of ham radio was wrapped up in those two contacts. Over a period of ten minutes, I had talked to a fix-it man on a dairy farm in Maine and a state Supreme Court Justice in North Carolina. And everyone was on a first-name basis. In my everyday life in the suburbs of New York City, it's unlikely I would have met either of them if not for ham radio. This is what it's all about. Not only don't you know *where* your next contact is going to be, you also never know *who* your next contact is going to be. The great breadth of knowledge and experience that results from this diversity not only makes for more interesting conversations on the air, but creates a near-unique ability for hams to pull together people with the right skills to do just about anything that is needed, on or off the air. It also creates a community—on-air, online, and in person—in which people who might otherwise never come in contact with each other are able to work together on innovations that may extend far beyond the "borders" of amateur radio.

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

Back To Dayton ... and on to Mars

Back to Dayton, it was its usual amazing self, an opportunity not only to buy and sell (see this month's survey for questions on how you deal with used gear), but also to see the latest and greatest new stuff—our annual Sunday morning new-product tour (writeup will be next month) took us 3 1/2 hours!—to talk in person with industry sales reps, engineers, and top brass; to meet up with old friends; and to attend a wide variety of forums on topics ranging from the latest in ham radio digital technology to restoring old equipment, every operating activity you can think of (and maybe a few you can't!), and a host of other subjects.

One forum I wish I'd been able to attend (I was off on the new-product tour) was on one of those "other subjects." It was titled "MDRS—The Mars Desert Research Station," and was led by Andrea Hartlage, KG4IUM. I've had the pleasure of knowing Andrea and her family for about four years now; we met at the Huntsville Hamfest when Andrea was named the Newsline Young Ham of the Year for 2004 (*CQ* is a co-sponsor of the award). She has just finished her freshman year at Georgia Tech, where she is majoring in aerospace engineering and hopes to become an astronaut. On her spring break this year, Andrea joined five other Georgia Tech students in the Utah desert where they spent two weeks in a simulated Martian environment, conducting experiments and other projects (see <http://marssociety.org/mdrs/fs07/crew69/>).

All of the other teams have used Family Radio Service (FRS) handhelds for communications; Andrea's team is the only one so far to use ham radio, but it probably won't be the last, since (no surprise here) the ham rigs were far more effective at meeting their communications needs. And, of course, she got five new hams licensed in the process!

What really caught my eye, though, as I read Andrea's bio on the MDRS crew home page was the following: "She has been fascinated with airplanes since her first commercial jet trip as an infant, but her interest was again piqued when she received a scholarship to Space Camp the summer before her junior year of high school. It was then that she began considering aviation as a career. ... After going back to space camp for a second time, she decided that she wanted to be an astronaut."

It was *CQ* that provided that scholarship to Space Camp as part of its co-sponsorship of Newsline's Young Ham of the Year Award program. Reading how much it influenced Andrea in her career path, and knowing her level of dedication to whatever she sets her mind to, reinforces the value of our participation in the Young Ham of the Year program, and the value of the program itself. By the time you read this, nominations for the 2008 award will be closed, but if you know a young ham who is doing remarkable things, please keep the YHOTY program in mind and consider making a nomination for future awards. We need to encourage and recognize those young people whose contributions suggest that they will be not only the next generation of leaders for our hobby, but for our planet as well. It's amazing where just a little bit of encouragement can go ... just ask Andrea.

73, W2VU

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Brake Power	**5000 in.-lbs.**
Brake Construction	Electric Wedge
Bearing Assembly	**dual race/96 ball bearings**
Mounting Hardware	Clamp plate/steel U-bolts
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Shipping Weight	26 lbs.
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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.
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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.**

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

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announcements

The following special event stations are scheduled for late June and July:

W2B, from 50th anniversary of the North Jersey DX Association, Northern New Jersey; 0000–2359Z, July 4–18 on 14.050, 14.250, 7.050, 7.250, 3.550, 3.750 MHz. QSL to W2 QSL Bureau or direct to W2IRT, P.O. Box 1623, West Caldwell, NJ 07007-1623. <http://www.njdxa.org>

W2G, from Geneseo, New York Airshow and Flying Tigers Reunion; 1200–2200Z July 12–13 on 7.265 and 14.265 MHz. For QSL send QSL and SASE (U.S.) or SAE and 1 IRC or US$1 (DX) to Norm Schrader, WB2GGM, 6009 Pine Haven Lane, Honeoye, NY 14471.

K4F, from 37th Annual Smithville Fiddlers' Jamboree & Crafts Festival, Smithville, Tennessee; DeKalb County ARC; 1400–2200Z July 5 on 28.425, 21.335, 14.280, 7.275 MHz. For QSL send QSL and SASE to Wm. Freddy Curtis, KC4GUG, 288 Dogwood Circle, Smithville, TN 37166-2712. <http://www.dcarc.drivehq.com/>

W8C, from Zane's Trace Commemoration, Cambridge, Ohio; Cambridge ARA; 1300–2200Z July 19 & 20 on 7.235 and 14.260 MHz. QSL to George Alfman, 1975 N. Moose Eye Rd., Norwich, OH 43767.

W8Z, from Zane's Trace Commemoration, Zanesville, Ohio; Muskingum Valley Amateur Radio Group; 1300–2200Z July 19 & 20 on 7.235 and 14.260 MHz. QSL to George Alfman, 1975 N. Moose Eye Rd., Norwich, OH 43767.

KØS, from Field Day at Mount Sunflower, the highest point in Kansas; June 28 & 29, CW and SSB operation on all bands. Ops: WØSO and KDØDSU. QSL to WØSO.

VF2ANNE, from commemoration of the 100th anniversary of the publishing of L. M. Montgommery's Anne of Green Gables, Prince Edward Island; Charlottetown ARC and Summerside ARC; June 28 to July 28.

CI2, from Prince Edward Island; Charlottetown ARC and Summerside ARC; June 1 to July 30.

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

July 6, **Milwaukee ARC Hamfest,** American Legion Post #434, Oak Creek, Wisconsin. For information call 414-762-3235, e-mail <ryatex@aol.com; <www.qsl.net/wa9txe>. (Talk-in 146.52)

July 11–13, **International Hamfest,** International Peace Garden, CCC Lodge, U.S. side. Contact Richard L. Holder, VE4QK, P.O. Box 1011, Beausejour, MB RØE ØCØ, Canada; phone 204-268-1702; e-mail <ve4qk@mts.net>. (Talk-in 146.52; exams)

July 11–13, **Lobstercon 2008 QRP Gathering,** Thomas Point Beach & Campground, Brunswick, Maine. Contact Rex Harper, W1REX, e-mail <w1rex@arrl.net>.

July 12, **NOARSFEST 2008,** Lorain County Fairgrounds, Wellington, Ohio. Contact John Schaaf, K8JWS, phone 216-696-5709, e-mail <jschaaf@wyseadv.com>. <http://www.noars.net/>

July 13, **Valley Forge Hamfest & Computer Fair,** Kimberton, Pennsylvania Fire Co. Fairgrounds. Contact Mike Pilotti, KF3CD at <reservations@marc-radio.org>; <www.marc-radio.org>. (Talk-in 145.130– PL, 147.060+ PL 131.8)

July 18–19, **Ham Holiday 2008,** Oklahoma State Fair Park (NE of I-40 & I-44 intersection), Oklahoma Expo Hall. Information on the Central Oklahoma Radio Amateurs website: <www.HamHoliday.org>. (Talk-in 146.82 [–, 151.4]; exams)

July 19, **Ozone ARC Hamfest,** Slidell, Louisiana Auditorium. Contact Mike King, W5PY, e-mail <w5py@arrl.net>. (Talk-in 147.27/87, PL 114.8; exams)

July 20, **BRATS Maryland Hamfest & Computer Fest,** West Friendship, Maryland. Information call 410-461-1212; <http://www.bratsatv. org>. (Talk-in 147.030, 448.325; exams 9 AM)

July 26, **Deuel County ARC Hamfest,** Clear Lake City Park, Clear lake, South Dakota. Contact Robert Schmidt, NØTAW, phone 605-695-0219. (Talk-in 147.315+ [PL 136.5], 444.300+ [PL 136.5, 145.390–; exams)

A publication of
CQ Communications, Inc.
25 Newbridge Road
Hicksville, NY 11801 USA.

CQ Amateur Radio (ISSN 0007-893X) is published monthly by CQ Communications, Inc., 25 Newbridge Rd., Hicksville, NY 11801, Telephone 516-681-2922; Fax 516-681-2926. E-mail: cq@cq-amateur-radio.com. Web site: www.cq-amateur-radio.com. Periodicals Postage Paid at Hicksville, NY 11801 and at additional mailing offices. Subscription prices (all in U.S. dollars): Domestic-one year $36.95, two years $66.95, three years $96.95; Canada/Mexico-one year $49.95, two years $92.95, three years $135.95; Foreign Air Post-one year $61.95, two years $116.95, three years $171.95. U.S. Government Agencies: Subscriptions to CQ are available to agencies of the United States government including military services, only on a cash with order basis. Requests for quotations, bids, contracts, etc., will be refused and will not be returned or processed. Entire contents copyrighted by CQ Communications, Inc. 2008. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address.

Printed in the U.S.A.
POSTMASTER: Send address changes to:
CQ Amateur Radio, 25 Newbridge Rd., Hicksville, NY 11801

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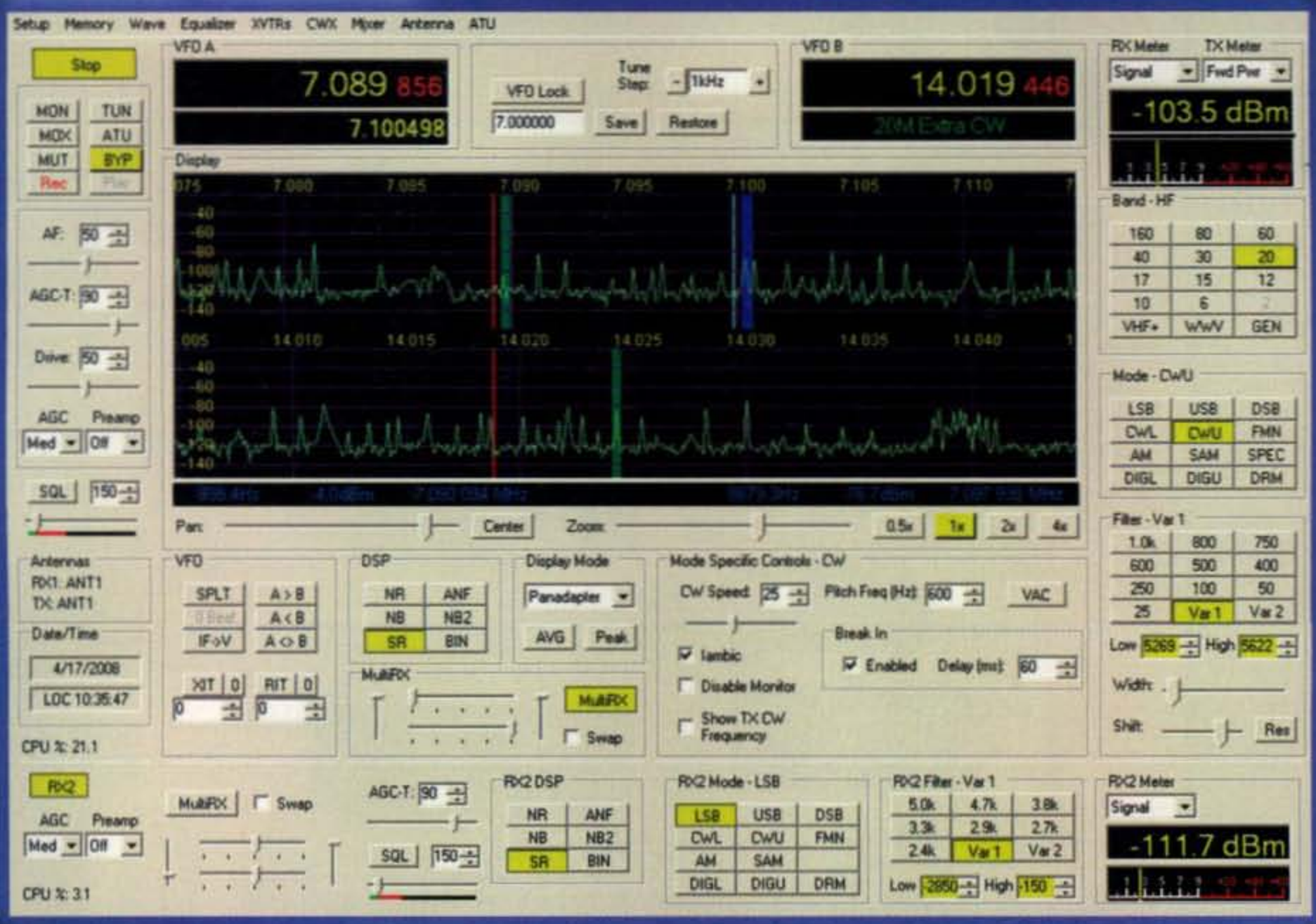

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YU8/OH2R
Project Goodwill Kosova

BY MARTTI LAINE,* OH2BH/4O3B

The Balkan region has produced many newly-independent countries in recent years as a result of a sequence of historic events playing out, some peacefully and some not. Slovenia (S5), Croatia (9A), Bosnia-Herzegovina (E7), Macedonia (Z3), Montenegro (4O), and the new Republic of Kosova all were once joined with Serbia in the former Yugoslavia. Now each of them is independent, creating a new regional order and hopefully bringing greater stability within reach in that turbulent corner of Europe.

Kosova, the last of these countries to break away from Serbian-dominated Yugoslavia, declared its independence on February 17, 2008 with the support and immediate recognition of the United States and many leading European nations. As this is written in early May, Kosova is recognized by nearly 40 countries from all continents, including Australia, Canada, and Japan. On Kosova's independence day, the multinational ham radio group of G3TXF, N7NG, W3UR, OH2BH, OH2PM, and OH8NC was there to put the new nation on the air. Here is their story, shared with us by Martti Laine, OH2BH. — *W2VU*

It all started in 1991 when we were in the process of carrying out the original Albania project (ZA1A). Not only were we activating for the first time the country that was then at the top of every DXer's needed list, but we were also helping that country's telecommunications administrators in regulatory matters as well as training locals for this wonderful hobby of ours.

I had visited Albania regularly from 1970 through 1990 trying to convince them to allow amateur radio. I repeatedly met with Mr. Dajlan Omeri, representing Albania's radio frequency management agency, who appeared to be nodding his head approvingly when I talked of amateur radio. However, I discovered that the meaning of horizontal and vertical nodding are reversed in Albania when compared to the rest of the Western world, and what I thought was a positive sign was instead a negative one!

There was a victory looming on the horizon, though, and it was to become a definite highlight of my ham radio career when Mr. Omeri joined our amateur radio course and issued himself the first individual Albanian ham license ZA1KAA, now ZA1Z. Mr. Omeri is one of the most active CW operators in Albania and chairman of its amateur radio association.

Assisting Mr. Omeri in those days was Mr. Frederik Kote, a knowledgeable young engineer with whom we wrote the first set of amateur radio regulations in Albania. Since my experience in Albania, amateur radio and DX have not been the same to me. Even though we enjoy the radio spectrum, especially DX-wise, I have learned to conduct these activities under a DX Missionary charter with the aim that the future of amateur radio in evolving societies should always be secured. Ultimately, Frederik Kote became head of

*c/o CQ magazine
e-mail: <oh2bh@oh2bh.fi>

the Albanian radio frequency management agency, and we both went our separate ways.

Happy Reunion in 2003

When entering Albania for the second phase of the ZA1A project in 2003, integrating amateur radio into the programs of the Technical University of Tirana, I had the pleasure of meeting Frederik once again, now having a cup of coffee with him just when he had taken up an assignment with the United Nations Mission in Kosovo (UNMIK), as head of the UNMIK Frequency Management Office (FMO). We had hoped to meet again one day in Kosovo, but little did we know that this day was indeed to come with a similar project in the newly born Republic of Kosova, as Kosovo is spelled in the Albanian language, which is also the official language of Kosova. *(With certain exceptions, we will be using Kosova in this article.—ed.)*

Recap of Kosova's History

Kosova, previously a part of Yugoslavia, is populated by nearly 2-million ethnic Albanians (90 percent) with a minority Serb population. The area is just the size of the state of Connecticut and it is a mountainous land with the capital, Pristina, some 1000 feet above sea level. It has a cold winter season with snow and ice. The area is well developed with good agricultural land, and the country possesses rich mineral resources.

In the 1990s, Kosova was engaged in a bloody conflict with Yugoslavia, seeking its independence. In 1999 NATO forces moved into Kosova to put an end to the brutal violence that had cost thousands of lives there.

The original Kosovo callsign indicator was YU8, with many stations on the air in the early 1990s. However, with unrest growing prior to the 1999 outbreak of hostilities, all radio equipment had been confiscated from the province's 1991 amateur radio population of some 200 hams. Also, while a 2001 Kosovo Radio Association (SHRAK) assembly was attended by 120 participants pursuing our hobby, none was on the air. Under temporary UNMIK administration, the United Nations issued foreign personnel the portable YU8 indicator. Kosova's status was still not resolved, however, and as amateur radio activity was considered to have security implications, no new licenses were granted to local operators and no new callsign indicator was available.

2007 Kicks Off Everything

Seven long years after the NATO intervention, the U.N. finally launched the Kosovo peace process in March 2007 and invited Mr. Martti Ahtisaari, a former President of Finland, to lead the process as the Special U.N. Envoy for Kosovo. An overall plan was drawn up and amateur radio prospects were found to be in harmony with it as another meaningful activity in that evolving society. We are grateful to Mr. Ahtisaari for his support.

Following in the footsteps of the successful Project Goodwill Albania, a similar project was set in motion and detailed plans were drafted. This project took me twice to United Nations headquarters in New York, where I was delighted to learn how positively the prospects for amateur radio were viewed by the U.N. as a complement to its efforts in Kosova. Additionally, the preparatory phase took me to Kosova three times in 2007, where I was further introduced to the United Nations Development Program (UNDP) personnel. With the support of the U.N. staff in New York as well as the local U.N. officials in Kosova, we had a firm start in developing the basis for amateur radio in what would one day become a free and independent Kosova. As a result of this, Project Goodwill Kosova was initiated.

We had invited several individuals offering valuable resources for the pro-

The "Newborn" theme was staring at us through our hotel window, and everywhere in the city. During the course of the festival, people came to sign their names on these tall, illuminated structures. (G3TXF photo)

OMNI-VII

"I was struck by how clean, natural and quiet the receiver sounded in comparison to some DSP based radios. I found the Omni-VII a real pleasure to listen to – in any mode." – W1ZR, in the ARRL Product Review, QST July 2007

"What a neat little package! I'm having more fun with this thing!" – K1SA

"In 40+ years and many receivers, the Omni-VII is the most sensitive, most QRM proof and most pleasant to operate I have enjoyed. The noise blanker and noise reduction systems really help me in dealing my sometimes noisy location." – K6LE

"High quality manufacturing...overall a very impressive transceiver" – W9AC

"As an avid CW operator, it is like listening to your favorite music while operating." – N1SW

"Close-in dynamic range unsurpassed by any other general coverage radio." – Radio Society of Great Britain RadCom review, September 2007

"Once again, Ten-Tec has produced a superb transceiver, with great SSB audio and their famous QSK." – K4SQR

"I can say that in my 30+ years of operating I've never enjoyed a rig more than the Omni-VII. The audio is superb as is the QSK, ergonomics, receiver characteristics and on and on." – W7TEA

"My Dad, KB2LAU, in Florida has become active again using my Omni-VII in Vermont. He is enjoying daily contacts [via Internet remote control]. Being a ham with limited to no antenna options, this has been a great opportunity." – W1ZN

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Kosova's capital city of Pristina was very colorful in the days leading up to independence. Red Albanian flags dominated, as Kosova's new blue flag was only introduced as part of the independence ceremonies. (G3TXF photo)

ject in areas that were initially needed. Hans Timmerman, PB2T, was invited in his personal capacity and with his International Amateur Radio Union (IARU) profile[1] to oversee development of the regulatory part, as well as Nigel Cawthorne, G3TXF, who was to be in charge of the educational activity using selected RSGB training material just as we had used in Albania in 2003.

"Daily DX" editor (and *QST* DX columnist) Bernie McClenny, W3UR, was charged to be spokesman to the media, especially as the U.N. was indicating an interest in promoting efforts for amateur radio within its organization in New York. In all, the project has nine international volunteers involved as of today, working at their own expense, wanting to experience something extraordinary. Without exception, they were and are very pleased with this project.

However, clouds were gathering on the horizon, and the United Nations process for a resolution was slow and painful. Even though we had a tentative plan for a 4U (United Nations) callsign block to be released for locals and for-

There were parties everywhere after independence was declared, even in the lobby of the Grand Hotel, with plenty of TV crews on hand to capture the moment. (OH2BH photo)

It was during the term of President Clinton when Kosova's future was secured by the deployment of NATO troops. This large billboard welcomes you to Bill Clinton Boulevard, dedicated as a "thank you" to America for saving their country. (OH2BH photo)

eign visitors, the U.N. was not able to proceed in any new Kosova matters or its overall plans due to internal resistance from some of its member states. Ultimately the Kosova issue turned out to be a unique case in which no U.N. process would work, given the specter of veto options being exercised in the Security Council. An immediate breakthrough proved impossible. Alternative avenues had to be considered.

New Hope Arises in 2008

With the presence of some 15,000 NATO troops on the ground, as well as 1000 U.N. civilian development personnel present, the process and a settlement were to come to fruition anyway. The United States, with its leading European and Asian allies, expressed support for Kosovo to declare its independence and finally a long march of nearly nine years was to come to an end.

A visit to the UNMIK Frequency Management Office. On the left is Mr. Fazli Shala, head of the office; in uniform is SHRAK Secretary Feti Fazliu, ex-YU8FF; next is the office's "licensing lady," Mrs. Hasije Habibi, who prepares each and every radio/TV license issued for Kosova; and finally, author Martti Laine, OH2BH. (OH2BH photo)

Inspired by the original U.N. plan, the world press was reporting a speculative date for the declaration of independence but we knew better, thanks to our position. The date was to be the 17th of February 2008, and a delegation representing Project Goodwill Kosova was invited to be there on that historic day. Nigel, G3TXF; former ARRL Membership Services Manager Wayne Mills, N7NG; Bernie, W3UR; your author, OH2BH; Pertti Simovaara, OH2PM; and Juha Hulkko, OH8NC, all were able to represent amateur radio on that emotional day when the people of Kosova celebrated their new independence.

Cold But Warm February Weekend in Pristina

The Project Goodwill Kosova members were housed in the heart of Pristina in two hotels. Part of the group stayed at the Grand Hotel, the site of the Press and Media Center where the President and the Prime Minister were to appear before foreign media delegations. The other half of our group was located at Victory Hotel, which stands as a symbol of free Kosova and is dedicated to those countries that have supported Kosova from 1999 to these days of independence.

It was a cold winter weekend in Pristina with some snow on the ground as we hoisted the new flag of Kosova together with our antennas at both locations; amateur radio was to be aired on that historic moment with all world media present. We were very nervous—indeed, truly scared—when erecting our antennas on the roofs of the highest and most visible buildings in Pristina. Those in charge of security measures at their rooftop posts were just smiling. No one knew whether the independence declaration would result in unrest, but thankfully there were no problems. Strict security measures were well in place, and amateur radio was looked upon positively on that bright day in Kosova.

We also paid courtesy calls on those officials who were involved in our project, and their smiles were broad and bright as the sun on this truly memorable day. We had hoped to sign "OH2R/Kosovo" on the air after the independence declaration. Although we had the complete informal support of the U.N. authorities for our operation, on a formal basis the U.N. did not want to promote the occasion or emphasize its role in changing the status of Kosovo since its role in the peace process had not been successful.

Local U.N. dealings with the International Telecommunications Union (ITU) have also had a complex history. An assignment of a country code for telephone dialing and routing was required, but it did not happen. Thus, if you ever call Kosova on the phone, you must use a country code for either Monaco or Slovenia. These countries, friendly to Kosova, have consented to

A statue of Skenderbeu, the national hero of all Albanians, is located next to the parliament building in the immediate center of Pristina. Martti, OH2BH, is pictured here with the project assistant, Mr Besim Ismaili. (OH2BH photo)

allow Kosovan traffic to utilize their telecommunications networks.

Obtaining a new prefix from the U.N. administration that would be consistent with the new status of Kosova for that historic day simply was not possible. The only callsign that the U.N. authorities would allow was YU8/OH2R. While we understood their reasons—the constraints of the U.N. position—we very much would have preferred a callsign with no reference to the Serbian ITU allocation. It was not to be. In the end, we were licensed by the United Nations Frequency Management Office, as advised by the U.N. legal office, as

The Grand Hotel was the main base for visiting delegates and the media, and the location of one of two stations set up for the YU8/OH2R operation. Note the pair of SteppIR verticals at the far left and center of the photo. (OH2BH photo)

YU8/OH2R. We participated in the official independence ceremonies, but immediately after YU8/OH2R was on the air from two locations sharing the moment with folks all over the world. Many "happy messages" rolled out and called people for a dance on the radiowaves; some 11,000 radio contacts were handed out in three days. You can look for yours online at <http://df3cb.com/logsearch/yu8/>. A new country had been born, with a slogan featured everywhere in the city: NEWBORN!

Is This a New Country or Not?

After our initial operation, a great deal of confusion was created by the ARRL's DXCC Desk. We certainly appreciated that Kosova was not approved as another DXCC country without proper procedures ,even though the U.S. State Department had promptly announced U.S. diplomatic recognition of the new country. Nonetheless, it came as a complete shock to us, the people we worked with, and the Kosovan amateur radio community, when the ARRL announced within the timeframe of the celebrations that contacts from independent Kosova would count for Serbia[2], the country from which Kosova had seceded! Still today, in May 2008, we remain astonished. Is this to remain the ARRL's official position?

Why did the ARRL throw cold water on the happy occasion with that bit of unfair news? It seemed as if the League was just firing at us, with an immediate release, without even studying our case. If it wanted to convey to ARRL members its position that the status of Kosova remained in an interim phase, that we would have understood. But it was totally unwarranted to extend that statement to a declaration that contacts from Kosova would continue to count as Serbia. The DXCC response looked like a rigid political position, one certainly not in harmony with U.S. foreign policy.

However, from many messages received, we believe that this will soon be corrected. We are mindful of the fact that the DXCC Desk got confused with the YU8 indicator, which pointed them to Serbia. This surely must be corrected when our license is reviewed and accredited as the U.N.-issued license for radio operations from Kosova—a license authorizing such activity beyond the date of independence.

The YU8 prefix we used is obviously not a determining factor, but the authority and legality of the license and the issuing office is. Our use of an earlier prefix as such is firmly supported with a recent DXCC precedent—the previous new Balkan country, Montenegro,

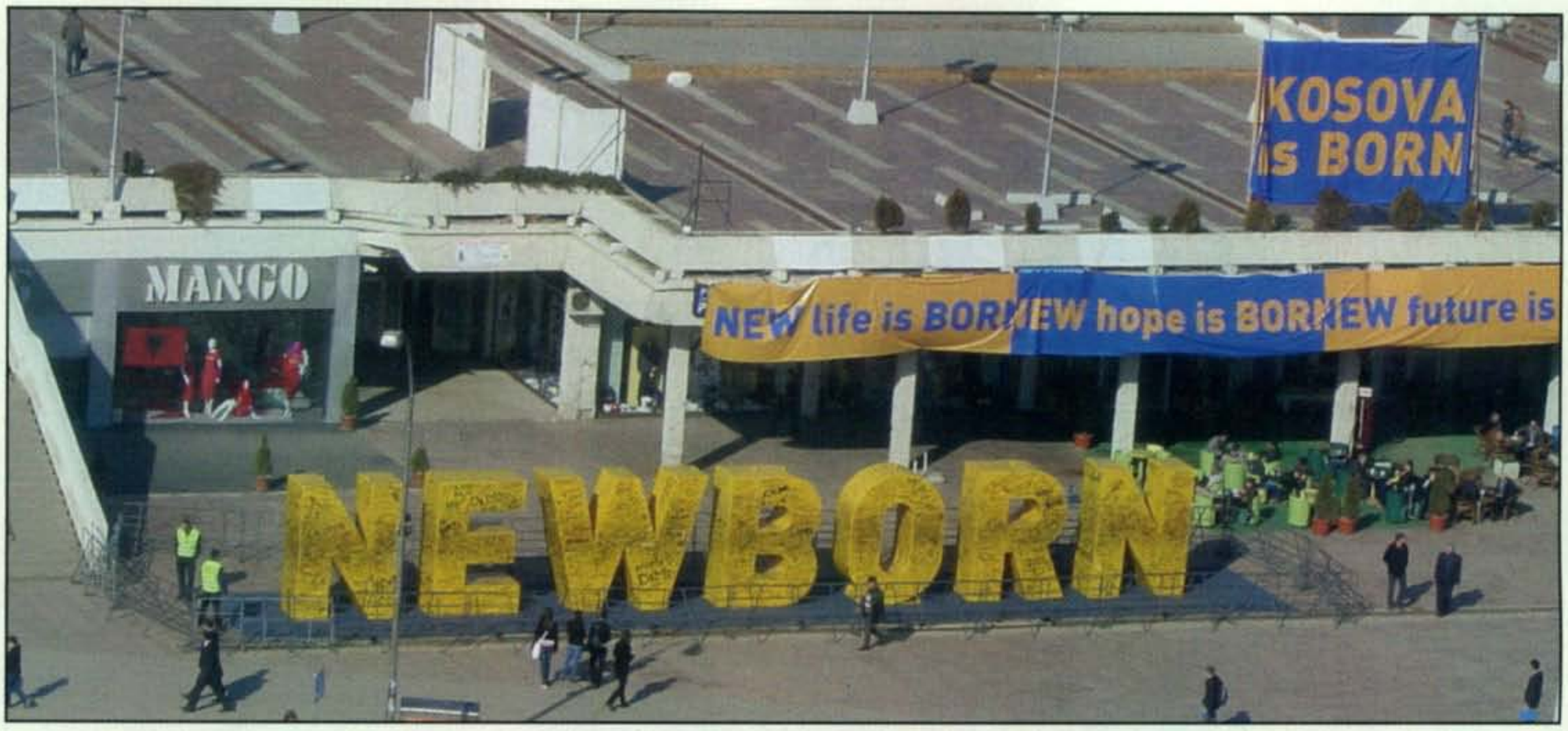
The ham volunteers who offered their time and money to help develop a modern framework for amateur radio in Kosova. All these people have a dual role as the Project Goodwill Kosova draws resources from the ranks of the DX community. From left; Pertti, OH2PM; Nigel, G3TXF; Martti, OH2BH; Juha, OH8NC; Wayne, N7NG; and Bernie, W3UR. (G3TXF photo)

where the YU6 prefix was still used months after the independence declaration, and in which case it took several months for the International Telecommunications Union (ITU) to officially release the dedicated 4O prefix for Montenegro.

Also, this situation has exposed an underlying weakness in the DXCC criteria for validating a political entity, since Kosova is not targeted to become a U.N. member country any time soon, following the steps outlined in the Ahtisaari road map. For essentially the same reasons, dealings with the ITU do not suggest that a distinctive new pre-

Hotel Victory in Pristina was selected as the base for the U.K. and American delegations. It is located at the end of Bill Clinton Boulevard and symbolizes not only Kosova's victory, but through a mini Statue of Liberty, their appreciation to the U.S. for its help. The SteppIR vertical adds to the occasion. (G3TXF photo)

Mr. Fazli Shala (center, wearing tie) is the successor to Frederik Kote as head of the UNMIK Frequency Management Office (FMO). With new regulatory work under way, his office acts as host for the project. It is Mr Shala who, together with U.N. legal office, signed the license for our radio presence in Kosova. (G3TXF photo)



The wording on the sign across from our hotel reads: "KOSOVA IS BORN — New Life is Born, New Hope is Born, New Future is Born, a New Country is Born." You cannot phrase it any better, DX-wise either! (OH2BH photo)

fix for Kosova will be released in the near future.

Life Continues in Kosova

The United Nations was scheduled to discontinue its presence in Kosova by June 2008, when the European Union (EU) would assume an advisory role in those areas that need to be transferred from the U.N. to local institutions—i.e. the government of the Republic of Kosova. We will have some sad moments when saying goodbye to those who leave Kosova, but at the same time we are delighted to see those who will stay, continuing to work either under EU or local institutions. Our project will stand until such time as the local people appear on the air and provide us with those true native voices from Kosova.

The first draft of amateur radio regulations is under review, along with training material. I know that SHRAK President Sabit Zymberi, ex-YU8KT, is there in his remote village getting up every morning, waiting for this nine-year hiatus to come to an end and to turn on his radio. I would like to be present when that happens.

When I attended a SHRAK assembly session with Hysen, ex-YU8PR; Feti, ex-YU8FF; and Smani, ex-YU8DD, with the frequency management people, I realized that these nine years had united them even more strongly. We should welcome most heartily their return to the worldwide brotherhood of amateur radio. We know that they have been holding back those YU8 callsigns for nine years and we know that the Euro-

Keeping Up with Kosova

You can follow the case of this fledgling Republic of Kosova by checking out the following websites:

<http://www.state.gov/r/pa/scp/2008/99611.htm> gives you an immediate historical account of developments that resulted in the birth of the Republic of Kosova.

<http://www.n4gn.com/yu8/> takes you to a presentation of the amateur radio activation where the case of YU8/OH2R is spelled out.

<http://www.kosovothanksyou.com> gives you an overview of how the new republic makes progress in the international arena.

On the Cover

Bernie McClenny, W3UR (left), and Wayne Mills, N7NG (right), stand in front of a miniature Statue of Liberty on the roof of Hotel Victory, the leading hotel in Pristina, the capital city of Kosova. They were there in February as part of a multinational ham team that put the newly-independent country on the air on the day that it declared its independence from Serbia. Both Bernie and Wayne are very well-known DXers. Bernie is founder, Publisher, and Editor of the "Daily DX" and DX Editor of *QST* magazine. From 1999 to 2006, Wayne was the ARRL's Membership Services Manager, a position that—among many other things—put him in charge of the DXCC program while he served on the League staff.

The hotel, located on the main street of Pristina, at the end of Bill Clinton Boulevard, is dedicated to the people who helped this newborn country to keep its faith during nine years of terrible suffering. It was chosen as one of the two radio locations for the YU8/OH2R special operation on Kosova's independence day, and was the base for the U.K and U.S members of the ham radio team. Six operators from three countries made more than 11,000 contacts in three days. See the accompanying article, "Project Goodwill Kosova," for complete details. *(Cover photo by Martti Laine, OH2BH)*

pean Union, in turn, will soon get the prefix matter sorted out for Kosova. We regret that the DXCC Desk did not know better and that it issued its statement that it intends to accredit radio contacts from Kosovar soil as Serbia.

Summary

Walking along the main street of Pristina, Bill Clinton Boulevard, I see people working hard and being grateful to those who have helped them into a new beginning with newborn hope for a better tomorrow. Although they suffer from high unemployment and a shortage of energy, and their educational system needs to be supported, they feel cold but their hearts are warm. I have learned to love these people and help them within the terms of amateur radio.

I have lived now for 20 years among the ethnic Albanians and have become one of them in my heart. My best moments are those in which amateur radio has helped them find a path to the wider world, whether in Tirana or in Pristina. You people are worth our warmest thoughts, not just on our QSL cards.

Recently, I was sitting under an oak tree in the Northern Village[3] with Jarmo, OH2BN, and the topic of the unfairness of this world was discussed. Jarmo pulled out an original text of Clinton DeSoto, W1CBD, from 1937, defining what would constitute a country for the then-new DXCC award.

In DeSoto's words, the basic rule is simple and direct. Each discrete geographical or political entity is considered to be a country. One cannot say it any better. We regained our faith, turned on our radios, and started to look for what might be on 20 meters that day.

Notes

1. Hans Timmerman, PB2T, is a member of the IARU Region 1 Executive Committee and Chairman of its External Relations Committee.

2 .The ARRL's decision does not apply to CQ awards or contests. In mid-March, CQ announced that, based on U.S. government recognition, Kosova would count as a separate entity for its DX awards as of its independence day on February 17, 2008. Subsequently, the Deutsche Amateur Radio Club's (DARC's) Worked All Europe award committee voted to add Kosova to the WAE list, meaning that it also counts as a separate multiplier in the CQ World-Wide DX Contest and CQ DX Marathon.

3. For those who read everything literally, no, it was not a real oak tree or a real village. "Sitting under the oak tree" is a Finnish expression for having a serious discussion, and "the Northern Village" is a local reference to Finland itself, which has the world's second most-northerly capital.

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AT-100Pro

This desktop tuner covers all frequencies from 1.8 – 54 MHz (including 6 meters), and will automatically match your antenna in no time. It features a two-position antenna switch, allowing you to switch instantly between two antennas. The AT-100Pro requires just 1 watt for operation, but will handle up to 125 watts. All cables included. ***Suggested Price $219***

radio not included

AT-7000

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. Requires just 0.1W for operation, but will handle up to 125W (100 W on 6 m), making it suitable for everything from QRP (IC- 703 Plus) to a typical 100 W Icom transceiver. All cables included. ***Suggested Price $169***

Z-100

Designed from the ground up to provide 100 watt power handling in a small, lightweight package. Perfect for portable as well as sitting on your desk in your shack! The Z-100 will tune with 0.1 to 125 watts (50 watts on 6 meters), making it an excellent choice for almost any radio or operating style. Backpackers and QRP operators will appreciate the latching relays. Power can be removed from the tuner once you have tuned. Additionally, when it's not tuning, it draws nearly zero amps. ***Suggested Price $149***

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RCA-14 is a breakout box for the accessory jacks on most popular transceivers. It comes with cables with the right DIN plugs, and all the outputs are RCA jacks. You simply plug the RCA-14 into your radio's accessory jacks, and all your ports are right there at your fingertips; just plug and play, one function or all of them. The RCA-14 is compatible with: Icom 703, 706, 718, 746, 756, 7000 and 7800, Yaesu 817, 857, 897 and 840, Kenwood 480, 570, 2000, Ten Tec Orion and many more. ***Suggested Price $59***

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Results of the 2008 CQ WPX RTTY Contest

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

The 14th annual CQ WPX RTTY Contest was held February 9–10, 2008, with yet another record number of entrants—1,846 logs from 104 countries (including A5, 3V8, XW, D2, D3, SV5, T7)—by far the largest number of entries for any RTTY contest ever. One can only wonder what the results will be when 15 and 10 meters open again in the next few years.

Again, many new world records were set, including World Single Op All Band High Power, Single Op 21 MHz, SO 7 MHz, and Single Op 3.5 MHz, as were many important regional records. In addition, U.S. multi-op stations moved closer to parity with their European competitors. Total QSOs increased to 764,485 this year (vs. 681,000 in 2007) with 15,069 different callsigns (vs. 14,231 in 2007) in the database. Let's watch these numbers go up over the next few years as the solar flux improves dramatically over this year's number of 70, approximately the same as it was in 2007.

For log-checking, Paolo, I2UIY, was aided this year by the veteran and expert team of I2EOW, RW3FO, and N5KO. The most used software was N1MM Logger, followed by MixW, and then by WriteLog, collectively accounting for two-thirds of all logs submitted. Far behind the top three, but growing in popularity, is Win-Test, while a few of us hardheads continue to use the old reliable RTTY by WF1B.

World second-place Single Op All Band Low Power Roger, P40R (N4RR).

Single Operator

Single Operator, Low Power (SOL). Winning SOL this year, Mohamed, 5C5W (op: CN8KD), moved up from second place last year, and just missed setting a new world record with a score of 4,169,452 points (1,610 Q's, 6,926 pts, 602 mults). As it was, Mohamed increased the Africa SOL record for the second year in a row. In world second was Roger, P40R (aka: N4RR), who scored 3,660,636 points, making a significant contribution to the club score of the Society of Midwest Contesters. A bit farther north, from the Caribbean, Ted, HI3T (op: HI3TEJ), was world third, setting a new NA SOL record for the second year in a row with a score of 3,444,939 points. Setting a new Europe SOL record was world fourth, Sam, UT9FJ, who scored 3,314,126 points, significantly exceeding TM6A's (op: F6IRF) 2006 Europe record of 2,747,824 points. Of at least equal significance, KS1Y (op: N1BAA), in world fifth place, trounced the USA SOL record (1,887,187 points) formerly held by Don, AA5AU, with a score of 2,978,766 points (1,625 Q's, 4,527 pts, 658 mults). Don was not idling. He also broke his old USA record with a score of 2,032,008 (1,634 Q's, 3,784 pts, 537 mults), but despite Don's QSO rate, he could not match KS1Y's points and mults. World sixth, and setting a new Asia SOL record, RT9S scored 2,906,568 points (1,391 Q's, 5,688 pts, 511 mults).

Single Operator, High Power (SOH). But wait. New SOH records were at least as significant as those in SOL. As in 2007, Ed, WØYK, operating as P49X, set anoth-

North America winner (outside U.S.) Andrei, EW1AR, at YN2S.

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

er new World SOH record, this year scoring 10,055,636 points (2,997 Q's, 13,756 pts, 731 mults), the difference being in this year's mults, 731 versus last year's 723. World second was AO8A (op: RD3AF), who set a new Africa SOH record of 8,047,575 points (2,520 Q's, 11,415 pts, 705 mults), beating by almost 90% the Africa SOH record set in 2006 by 7XØRY. Next Tyler, K3MM, continued his dominance of USA/NA by setting another NA record, his fifth title, with 6,859,587 points (2,597 Q's, 8,897 pts, 771 mults). In world fourth, D4C also exceeded the previous Africa record with a score of 6,523,509 points, a great result, but not close to AO8A. However, world fifth, UA9CLB, exceeded his own Asia SOL record with a score this year of 6,007,579 points, an increase of about 40% over his 2007 record score. Mike, K4GMH, was world sixth, and USA winner with a score of 5,146,737 points. Europe was won by world seventh finisher DL3TD, who scored 4,359,264 points.

Single Operator, Single Band 28 MHz (28). Ten meters continued to have relatively little single-band activity, with the winner, LU1HF, scoring 46,041 points, a substantial increase over 2007. But just wait until next year!

Single Operator, Single Band 21 MHz (21). Fifteen meters shows how much propagation has, in fact, improved already, despite the relatively low solar flux. Here LS1D (op: LW9EOC) won for the second year in a row, but this time set a new SO 21 World record, with a score of

2008 CQ 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: **AO8A (Op: Valery Komarov, RD3AF)**
Asia: Sponsored by Tyler Stewart, K3MM. Winner: **Vadim Ovsyannikov, UA9CLB**
Europe: Sponsored by DL-DX RTTY Contest Group. Winner: **Lothar Wilke, DL9TD**
N.A.: Sponsored by Ed Muns, WØYK. Winner: **Tyler Stewart, K3MM**
N.A. Outside K/VE: Sponsored by Alex Priluk, K2PAL. Winner: **YN2S (Op: Andrei Stchislenok, EW1AR-NP3D)**
USA: Sponsored by Glenn Vinson, W6OTC. Winner: **Mike Sims, K4GMH**

Single Operator Low Power

World: Sponsored by Mike Sims, K4GMH. Winner: **5C5W (Op: Mohamed Kharbouche, CN8KD)**
Asia: Sponsored by Trey Garlough, N5KO. Winner: **Yuri Kotelnikov, RT9S**
Europe: Sponsored by Paolo Cortese, I2UIY. Winner: **Sam Sorokin, UT9FJ**
N.A.: Sponsored by Wayne King, N2WK. Winner: **HI3T (Op: Ted Jimeniz, HI3TEJ)**
Oceania: Sponsored by Steve (Sid) Ceasar, NH7C. Winner: **Felimon Morano, Jr., 4D75J**
USA: Sponsored by Jim Reisert, AD1C. Winner: **KS1Y (Op: Jose Castillo, N1BAA)**

Single Operator Single Band

3.5 MHz World: Sponsored by Doug Faunt, N6TQS. Winner: **Tone Crv, S53E**
7 MHz World: Sponsored by Don Reed, K2OGD. Winner: **Jose Duarte Sousa Goncalves, CT3KY**
14 MHz World: Sponsored by Fabi Bertolotto, VA2UP, Winner: **Zelimir Klasan, 9A2DQ**
21 MHz World: Sponsored by Jim Steel, MØZAK. Winner: **LS1D (Op: Silvio Martin, LW9EOC)**
28 MHz World: Sponsored by Steve Hodgson, ZC4LI. Winner: **John Morandi, LU1HF**

Multi-Op Single Transmitter

World: Sponsored by Steve Merchant, K6AW. Winner: **T93M (Ops: T93M, T93Y, T94KC, T97M)**
Asia: Sponsored by CT3 Madeira Contest Team/CQ9K/CT9M. Winner: **RK9CWA (Ops: RW9CF, RV9COX)**

Multi-Op Two Transmitter

World: Sponsored by HC8N RTTY Team. Winner: **NP3U (Ops: KI1G, NG1G, N1HRA, WE1H, KP4VP, WP4U)**
N.A.: Sponsored by Ed Muns, WØYK. Winner: **N2WK (Ops: N2WK, WA2TMC)**

Multi-Op Multi-Transmitter

World: Sponsored by Neal Campbell, K3NC. Winner: **Z37M (Ops: Z31MM, Z32ID, Z35T, Z35X, Z36N, Z36W, Roberto)**
N.A.: Sponsored by KA4RRU RTTY Team. Winner: **WW4LL (Ops: WW4LL, KI5XP, K1ZZI, K9JS, K9MUG)**
USA: Sponsored by Fred Dennin, WW4LL. Winner: **KA4RRU (Ops: KA4RRU, N4DXS, K3UI, KI4ZKJ, K5OF, KI4VUQ, KI4ZKI, N3WSO, W4MLD, KG4URW, N3XJN, WA4TK, KD6AKC)**

Club Competition

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

2,165,968 points. The veteran contester Wanderley, ZX2B (op: PY2MNL), also exceeded the old (2002) world record of 5U8B (op: I2UIY) with a score of 1,945,581 points. CT3FQ was world third, scoring 1,448,172 points.

Single Operator, Single Band 14 MHz (14). The results this year on 20 meters were good, but no new world record was set. The winner was 9A2DQ, scoring 2,124,825 points. Very close behind, in second place, LZ9W scored 2,012,023 points. In world third place, LZ8A scored 1,943,928 points.

Single Operator, Single Band 7 MHz (7). The conquest of new SO7 records continued this year with another new SO7 world (and Africa) record, this year set by CT3KY with a score of 3,686,144 points (1,132 Q's, 6,776 pts, 544 mults). In world second, YT5C scored 2,435,520 points, while world third was GW4SKA with a score of 2,124,752 points. Other notable scores were a new SO7 Oceania record set by AH6OZ, with a score of 1,817,924 points, and another new SO7 USA record set by AE5AA (op: N5ZM), who scored 1,715,778 points.

Single Operator, Single Band 3.5 MHz (3.5). On 80 meters, the quest for new records has been intense for several years, and yet again this year that quest was rewarded. Returning for his fifth 80-meter win, and reclaiming the SO3.5 world record, Tone, S54E, set the new world record of 2,225,056 points (985 Q's, 4,486 pts, 496 mults). Very close behind was OK3R (op: OK1DVM), who also broke last year's world record of 1,936,118 points, with his own score this year of 2,151,016 points. In world third, CT3EE almost equaled the old record with his score of 1,902,712 points.

Multi-Operator

Multi-Operator Multi-Transmitter (MOM). The three top finishers in MOM had remarkably close numbers of QSOs, each higher than the highest number (3,254) made in 2007. However, the multiplier totals this year were not as high as OM8A's winning number in 2007 (877). Last year's third-place winner, Z37M (ops: Z31MM, Z32ID, Z35T, Z35X, Z36N, Z36W, Roberto), moved to world first this year with a score of 9,792,090 points (3,262 Q's, 12,089 pts, 810 mults), more than 500,000 points above their 2007 score. RWØA (ops: RAØAM, RAØAHC, RAØALM, RUØAB, RUØAM, RUØAT, RUØAIG, RVØAR, RVØAX, RWØAR, RXØAE, RZØAF, RZØAT) was world second, scoring 9,238,341 points (3,257 Q's, 12,957 pts, 713 mults). WW4LL (ops: WW4LL, K4ZJ, KI5XP, K1ZZI, K9JS, K9MUG), in world third, smashed their own 2007 U.S./N.A. MOM record of 4,699,200 points with a very impressive leap to the world-class level of 8,084,176 points (3,293 Q's, 10,156 pts, 796 mults).

World Multi-Two champion team NP3U (left to right): N1HRA, WE1H, KI1G, NG1G, WP4U.

Multi-Operator Single Transmitter (MOS). After 2007's record-breaking scores in MOS, no new world record was set this year, but big scores were logged by a number of stations. In world first and setting a new Europe MOS record, T93M (ops: T93M, T93Y, T94KC, T97M) scored 7,185,772 points (2,520 Q's, 9,119 pts, 788 mults). World second was UF3CWR (ops: RZ3AZ, RX3DU), scoring 6,627,418 points (2,631 Q's, 8,686 pts, 763 mults). Very close behind, in world third, OM8A (ops: 9A7R, OM3NA, OM3RM, OM7JG) scored 6,468,024 points (2,212 Q's, 8,466 pts, 764 mults). RL3A was world fourth with 6,261,164 points. In world fifth, and setting a new USA MOS record, K1LZ (ops: KG6KZK, KE5KHS) smashed NN6NN's 2005 record of 2,973,030 points with a score of 5,581,185 points (2,247 Q's, 7,635 pts, 731 mults). Like WW4LL's score in MOM, this result moves the top U.S. entry closer to parity with the big guns in Europe and Africa.

Logging Note for RTTY WPX MOS: Remember, in WPX RTTY (unlike CQWW RTTY), only a single transmitter is used to make all contacts. Accordingly, MOS stations must use a *single sequence of serial numbers,* not separate numbers for each band or for any other purpose.

Multi-Operator Two Transmitter (M2). M2 continue what seems to have become a tradition by achieving the highest score in any category, with NP3U (ops: KI1G, NG1G, N1HRA, WE1H, KP4VP, WP4U) scoring 14,053,680 points (4,387 Q's, 15,720 pts, 894 mults), and establishing a new NA M2 record. Not surprisingly, this group was led by Rick Davenport, KI1G, who was already the USA/NA M2 champion and record-holder in CQWW RTTY as well as in WPX RTTY from his home station. In world second, OG8X (ops: OH8JT, OH8MWD, OH6KXL, OH8KVY, OH8GZN, OH6CT, OH8GZQ, OH8BQT) scored 7,465,920 points (2,746 Q's, 9,240 pts, 808 mults). World third was TM7Z (ops: F5MOO, F4EGD, F5CWU, F6FYA) with a score of 7,265,205 pts (2,602 Q's, 9,497 pts, 765 mults).

Rookie of the Year

Forty-one operators entered as Rookies this year, and IZ1LBG set a new World Rookie record, entering in SOH and scoring 2,437,044 points. Moving up from world third to world second place was RK9AJZ, entered in SOL, who scored 1,607,022 points, an improvement of 500,000 points for him. World third was XE3RBA, who scored 847,584 points. *Please remember that those entering the Rookie class must have been licensed for no moe than three years as of the time of the WPX RTTY contest.*

SWL

The SWL winner this year was I1-12387, who logged 680 Q's for 930,204 points.

Important On-Line Resources

To prepare for the 2009 contest, please refer to the following on-line resources:
Contest rules: <www.cq-amateur-radio.com>
Contest records: <www.rttycontesting.com/records/cqwpxrtty.html>
Operating, logging, and log submission tips: <www.i2uiy.it/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>
List of logs received: <www.cqwpxrtty.com>

Clubs

As one might expect in a year of a record number of log entries, club entries also increased from 55 to 62. Repeating as the decisive winner was the Bavarian Contest Club, increasing its score substantially from 32-million points to 46-million points, and winning the World Club plaque sponsored by the Potomac Valley Radio Club. PVRC was again world second, with 30-million points, winning the new North America plaque sponsored by the Northern California Contest Club. Contest Club Finland repeated in world third with 21.6-million points, while the Yankee Clipper Contest Club was fourth with 19.5-million points. *Please remember to write the full name of your club in the Cabrillo header. Otherwise, we may not recognize the abbreviation of your club's name.*

Summary

CQ WPX RTTY Contest participation and scores were exceptional this year, and suggest that future growth in RTTY contesting will be very impressive as the solar flux has now begun 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 RTTY WW and WPX 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.

No self-spotting is allowed: Remember that while spotting networks are permitted for all classes, self-spotting is not permitted for any class.

Summary sheets: *No summary sheet* is required for any log submitted in Cabrillo format.

All-time CQ WPX RTTY Records: To check these records, go to <www.rttycontesting.com/records/cqwpxrtty.

USA Multi-Two champion team N2WK: WA2TMC (front) and N2WK.

html> hosted and maintained by Don, AA5AU, a great friend to all RTTY contesters.

Expanded Results: For comments by participants, see the QRM sections that follow here, and also go to <www.cq-amateur-radio.com> for expanded QRM and a list of the ops of the multi stations.

The 2009 CQ WPX RTTY Contest

The 15th Annual CQ WPX RTTY Contest will be run on February 7–8, 2009 (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 50 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 6, 2009**. The full text of the 2009 rules will be published in the January 2009 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.

73, Glenn, W6OTC, and Paolo, I2UIY

DX QRM

5C5W: Nice conditions on the first day on low bands helped the score. I worked 30 hours. Thanks to all particpants. **9A2EU:** Limited time this year. I did just for fun couple of hours. Good propagation on 80 and 40 meters. **CT1AOZ:** Many thanks for all QSOs I made. Once again Mr. Murphy was here. I was prepared for the contest but linear fry, QRP fry, then take my old IC-720 from junkbox. When try to drive it, FSK switch was "kaput." Really was not my good day and went and had a walk around for one hour of time before repairing the FSK switch. **DJ3WE:** First time participation in a RTTY contest. Well, I just got my feet wet and had to stop just when I started to understand how it works. Seems to be a fairly relaxed way to participate in a contest. **DL4EAX:** Nice conds on 15m and 20m. Nothing on 10m. Equipment: FT-847 and 80m horizontal loop. See you next year! **DU1UGZ:** The propagation was very unpredictable. The band would open to Europe for 5 minutes and suddenly everybody was gone, even regional stations such as JA, YB, VK, and others. **EF5J:** This call wil be used for all CQ WW contests this year. I hope you can enjoy with this prefix, not usual in Spain. In next contest I try to activate the prefix more times.

TOP SCORES

Single Op High Power

P49X (op: WØYK)	10,055,636	D4C	6,523,509
AO8A (op: RD3AF)	8,047,575	UA9CLB	6,007,579
K3MM	6,859,587		

Single Op Low Power

5C5W (op: CN8KD)	4,169,452	UT9FJ	3,314,126
P4ØR (op: N4RR)	3,660,635	KS1Y	2,978,766
HI3T (op: HI3TEJ)	3,444,939		

Multi-Op Single Transmitter

T93M	7,185,772	RL3A	6,261,164
UF3CWR	6,627,418	K1LZ	5,581,185
OM8A	6,468,024		

Multi-Op Two Transmitter

NP3U	14,053,680	DAØBCC	7,137,858
OG8X	7,465,920	J4ØWPX	5,306,224
TM7Z	7,265,205		

Multi-Op Multi-Transmitter

Z37M	9,792,090	OH6R	7,731,220
RWØA	9,238,341	KA4RRU	4,591,668
WW4LL	8,084,176		

Single Op
3.5 MHz

S54E	2,225,056	IV3SKB	1,718,528
OK3R (op: OK1DVM)	2,151,016	I4AVG	1,717,100
CT3EE	1,902,712		

7.0 MHz

CT3KY	3,686,144	UT7U (op: UT7UV)	2,091,376
YT5C (op: YT7AW)	2,435,520	UW5Q	1,945,084
GW4SKA	2,124,752		

14 MHz

9A2DQ	2,124,825	I4IKW	1,863,225
LZ9W (op: LZ2HM)	2,012,023	VE2RYY	1,810,074
LZ8A (op: LZ2BE)	1,943,928		

21 MHz

LS1D (op: LW9EOC)	2,165,968	UR6F (op: UXØFF)	714,688
ZX2B (op: PY2MNL)	1,945,581	ZS6DXB	555,489
CT3FQ	1,448,172		

28 MHz

LU1HF	46,041

GØHVQ: My first WPX RTTY. Great fun. Didn't expect to work the Caribbean on 10m at the bottom of the cycle. Will be back next year with better antennas and more planning. Was too conscious of the 30 hr rule for single-ops and only ended up operating 24 hrs in the end. **GW4SKA:** Fantastic contest wth huge activity. Came so close to the magic 1000 contacts on a single band. **HZ1PS:** Many thanks to all for the QSOs. New antenna made a lot of difference but need to get the 40m antenna up and running. Thanks to CQ for the contest. **JH8KYU/1:** I had a fun time with a barefoot radio and 1 meter short whip antenna. **KL8DX:** What a blast! Saturday was standing room only on 20 meters, if that! Stations were lined up from 14065 thru 14130, and then came Sunday! A high solar wind nearly rendered the bands useless. Stations were workable over the pole but lots of polar flutter made many hard to copy. Saturday was easy but Sunday, that was a challenge. That's contesting! **LV5V:** Nice contest as usual. Had problem with my 15 meter Yagi so lost much time repearing it. Only 12 hours operation. Mny tnx to all and hope we see you agn in 2009. 73 Jorge, LU5VV.

MØGBP: Rookie operator, licenced Feb. 2007. Wall to wall stations all the time. I'm afraid I cherry picked the juicy DX in the time I had. Thanks everyone for taking part and CQ for organising. **NL7V:** Condx better than last year. **OM8A:** We worked NP3U on all 5 bands. Thanks to whoever was manning the contest station there! That is the first DX 5 band contact I have had in a contest for a couple of years. Maybe a sign of propagation improving finally! Equipment/software worked flawlessly. **P40R:** My most favorite contest. Need to increase operating time for single operators to 36 hours because of the increasingly higher activity. **PAØ-**

FAW: Condx Saturday not okay, on Sunday better. Worked on 15m LU and PY with 5 watts and an indoor longwire. **RM9RZ:** Many peoples worked in this year. Very fine weekend. Cu next year. **RZ4HZW:** Murphy was present all weekend. Lost 80/40 dipole balun on Saturday night. Remote antenna switch burned out on Sunday morning. Hooked SteppIR straight into rig; resurrected the 80/40 antenna during the day. All in all I enjoyed the contest. It was my second contest in doing RTTY.

S56G: Just couple of hours for setup and software testing. Thanks to all good ops who managed to decode me! **SPØDXC:** A lot of fun, a small WWYC gathering. We were using SP DX club callsign (big thanks to SP5UAF). **T77NM:** We tested homemade 4-square verticals. Had good experience and a lot of fun. Now we start to build 80m system. We operated only on 40m and only 24 hr. **VE3AP:** Thanks again to VE3RM for being host. Thanks again to LW8EXF for her support. SO2R with WF1B is a real challenge. **VE3FZ:** Fun contest this year and was great to see 15m open. **VE7FCO:** Still in the learning curve of this method. Thanks for everyone's support. **VK4EJ:** Terrific conditions for this great contest. Worked 4 continents at the same time on 40 meters, all this with no sunspots. Roll on Cycle 24 for next year. **VU2LBW:** The best thrills were to hear ZM2A call me and working OY3JE for an all time new one! **XE2RV:** This was my first RTTY WPX contest. It was really fun getting new DXCC and U.S. states for my list. I really enjoyed it. I am looking forward to next RTTY contest. **ZS2EZ:** Very enjoyable contest! 20m was a big disappointment on Sunday night, but 15 was in good shape for the first time in quite a while. Improved my score from last year but could have been much better!

CLUB COMPETITION

BAVARIAN CONTEST CLUB (DL)	**46,192,426**
POTOMAC VALLEY RADIO CLUB	**30,151,456**
CONTEST CLUB FINLAND (OH)	21,570,313
YANKEE CLIPPER CONTEST CLUB	19,517,374
RHEIN RUHR DX ASSOCIATION (DL)	17,046,233
NORTHERN CALIFORNIA CONTEST CLUB	16,087,370
CTRI CONTEST GROUP	14,892,345
URAL CONTEST GROUP (UA9)	14,663,570
RUSSIAN CONTEST CLUB (UA)	14,296,832
UKRAINIAN CONTEST CLUB (UR)	13,218,803
ALABAMA CONTEST GROUP	13,112,013
CENTRAL SIBERIA DX CLUB (UAØ)	10,940,337
SOUTH URAL CONTEST CLUB (UA9)	10,861,927
CONTEST CLUB ONTARIO (VE3)	10,849,097
HA DX CLUB (HA)	9,568,914
SOCIETY OF MIDWEST CONTESTERS	8,260,851
MADEIRA CONTEST TEAM (CT3)	7,242,394
CONTEST GROUP DU QUEBEC VE2)	7,014,454
LATVIAN CONTEST CLUB (YL)	6,625,128
BLACK SEA CONTEST CLUB (UR)	6,409,775
FLORIDA CONTEST GROUP	6,071,339
SP DX CLUB (SP)	6,040,718
YU CONTEST CLUB (YU)	5,968,009
LU-CG CONTESTER GROUP (LU)	5,944,587
FRANKFORD RADIO CLUB	5,536,935
DRCG (DL)	5,225,677
ROCHESTER (NY) DX ASSN	4,988,796
WORLDWIDE YOUNG CONTESTERS (*)	4,598,181
KIEV CONTEST GROUP (UR)	4,480,343
TENNESSEE CONTEST GROUP	3,789,862
TEMIRTAU CONTEST CLUB (UN)	3,293,202
MINNESOTA WIRELESS ASSN	3,229,400
GRAND MESA CONTESTERS OF COLORADO	3,162,282
MARITIME CONTEST CLUB (VE)	2,976,739
SKY CONTEST CLUB (YU)	2,776,828
BRITISH COLUMBIA DX CLUB (VE7)	2,480,113
TULA REGION CLUB (UA3)	2,444,573
ORDER OF BOILED OWLS OF NEW YORK	2,263,252
KRIVBASS (UR)	2,077,844
TIKKIRIKI CONTEST CLUB (I)	2,006,116
SLOVENIA CONTEST CLUB (S5)	1,983,283
DXXE DX GROUP (XE)	1,963,501
EPC (UA9)	1,934,211
SOUTHERN CALIFORNIA CONTEST CLUB	1,785,837
KKKK (UA6)	1,770,114
SIAM DX GROUP (HS)	1,467,922
GMDX GROUP (GM)	1,437,514
ORENBURG CONTEST CLUB (UA9)	1,367,292
BARTG (G)	1,213,633
WILLAMETTE VALLEY DX CLUB	1,142,176
MAIKOP RADIO CLUB (UA6)	1,140,250
CAROLINA SHINE	1,070,173
WESTERN WASHINGTON DX CLUB	833,961
LOW COUNTRY CONTEST CLUB	663,910
RTTY CONTESTERS OF JAPAN (JA)	540,870
CENTRAL TEXAS DX AND CONTEST CLUB	386,672
DAUBERVILLE DX ASSOCIATION	381,872
SPOKANE DX ASSOCIATION	328,330
VLADIMIRSKIJ RADIO CLUB (UA3)	326,703
SOUTH EAST CONTEST CLUB	310,854
KENTUCKY CONTEST GROUP	277,890
NANAIMO AMATEUR RADIO ASSOCIATION (VE7)	192,083
RIO DX GROUP (PY)	43,173

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

USA QRM

AA5AU: My best WPX RTTY ever! What a great contest! **AA7FK:** Had a blast! 40 and 20 were the best bands at this QTH. Only a handful of stations seen on 15. Looking forward to the next one and improvement in the cycle! **KØBX:** The WPX RTTY gets bigger and bigger each year. Sure is a lot of fun. **K4XD:** First SO2R experience. Poor man's version. Just used WriteLog to run two RTTY windows and hooked up the second radio to one of my Cobra ultralight multiband antennas. About 10.5% of the Q's were on the second radio. Did help to keep me awake! Thanks all for the fun and Q's. **K7RE:** Conditions to Europe up this far north were very spotty, and poor especially on Sunday morning. The QSB was horrendous and at times surrealistic. At times there were no signals at all showing on the display! I got that sinking feeling more than once that something on my end had failed, especially with the band noise being so incredibly loud. **K7XC:** A fun contest! Even 10m opened for a few hours Sunday afternoon! **KG4OLG:** Each contest is a learning opportunity. I hope I improve with each contact. Thanks to the ops who take the time to help a new RTTY contester.

KI4NSP: This was my first contest and also my first RTTY contact! I had a great time! Thanks very much for conducting the contest! **KY5G:** Had a great time this year after a log malfuntion right at the first. Needed my 400 ft 120 ft high double zepp, but wasn't able to get it fixed during the contest. Even though I couldn't spend a lot of time in the chair it was fun. Thanks to everyone for the Q's. **N9TF:** Just played a bit Sunday. Was looking to fill in some RTTY DXCC and hand out some points. Good sigs from EU Sunday morning on 20 but had hard time getting my 100 watts into mini beam to be heard. **NN6NN:** Part-time effort. However, my pile-up fix was satisfied for now. **WØRAA:** Things started out slow but picked up. I was beginning to wonder if my FT-950 was getting out. I did better than I thought but not as good as I wanted to do. Thanks to all who gave me a contact. **W4ZE:** This contest was really fun. I hit my 30 hour mark at 1817Z and had a really good run going on 15m. Speaking of 15m, what a pleasure to see Cycle 24 starting up and to have such good conditions on 20/15 for a change. I tried my hand at SO2R. **WG8Y:** Lost Friday night fixing balky blower on amp. Computer locked up Saturday AM. Keyboard trouble. WriteLog saved file. Had S9+ snow static part of Sunday AM. Lost power for 42 min. at end of test. Guess what? Still had a great time.

(Continued on page 107)

Announcing:

The 2008 CQ WW RTTY DX Contest

September 27–28, 2008

Starts: 0000 GMT Saturday • Ends: 2400 GMT Sunday

Logs are due no later than October 26, 2008

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, *using the full name of the club,* 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, 2008.**

2. Electronic Submissions.

(a) In the **"Subject:"** line of your e-mail message please include **only your callsign** and nothing else. 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 DX 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 DX 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, 2008.** Logs received after the deadline may be listed in the results but will be ineligible for any award.

Prefix Frolics – A WPX Crossword Puzzle

BY ANTHONY A. LUSCRE * K8ZT

Whether it is DXing or contesting, if you want to hunt for "new ones," you need to know how to recognize your prey. Most seasoned hams know the common callsign prefixes of most DXCC entities. But what about a newer ham or even a veteran encountering strange prefixes that seem to pop up during contests, especially those that appear only in the WPX contests? To be successful you need to know more prefixes, especially those special ones. Learning new information can often be aided by a game or competition. The following crossword puzzle - in honor of this month's CQ WPX Contest results - might help you learn a few new prefixes or reinforce your knowledge of others. —K8ZT

Have you ever noticed those callsigns that, when written out, almost appear to be words instead of just a series of letters and numbers? I call these "cute" or "attractive" callsigns because they are pleasing to the eye and/or mind. I think of them as callsign puns on real words. The two most obvious digits that have appearances similar to letters are the zero, which mimics the letter "O," and one, which mimics the letter "I." So in order to make a crossword puzzle of callsigns, we will make all zeros represent "O" and all ones represent "I." To add a little more spice to the recipe, we will use the digit 9 (which is often sent as the "cut number" N in CW) as the letter "N" in our crossword answers. In the clues you will often find a hint to the prefix in the form of a country, city or region name that corresponds to the word. A quick example would be a five-letter word for "a Dutch wall covering" would be PA1NT (for the uninitiated, PA is the callsign prefix for The Netherlands).

Before you get started, I have two disclaimers: 1. No clues or callsigns, whether actually issued or not, are meant to infer anything about the holders or potential holders of said callsigns. 2. I love puns, so some answers maybe really corny.

You will find the puzzle answers later in the magazine, on page XX. No fair cheating. If you sneak a peak, you may have the bad luck of receiving the dreaded "not in the log" when you send for a QSL card for that "new one."

ACROSS

3. Polynesian letter styles
5. University of Granada course that studies the production & consumption of goods & services (abbrev)
6. Originally a shipping company, now known for its cruises, possibly sailing to the Azores
9. Periods of history in Tehran
13. Made coins in Belfast
15. Group of rooms in a fancy Cairo hotel
16. Istanbul horse fly swatter
19. Beating egg whites between Hawaii and Australia
20. Slang abbrev for baseball call of third strike in Kiev
21. A line of pressure on a weather map, south of Corsica
26. Selected totally by chance in Omsk
28. Licorice-flavored seeds in Madrid
31. Child care giver in Zagreb
33. Not later, Okie in in Warsaw
34. Kills cockroaches in Russia
36. American visitor in Kabul or Kandahar
37. Forced to leave Kyrgyzstan
38. Faces of happy Stockholm children
40. Garment of Scottish immigrant in Maine
41. Rare, colorless, non-reactive gas in Mexico
43. Court case in Gabon
48. Familiar in Topeka
49. Used to collect water in Amsterdam
50. Havana pastry
53. At the top of the heap in Monrovia
55. Of the Moon in Northern Argentina
58. Greek epic poem found in Torino
59. Bad sounding audio on Cocos Island
61. Used to hold a frying pan in Budapest
62. Emission in Northern Europe that affects the atmosphere
63. Lyrics abbreviated "If you can make it here, you'll make it anywhere, ____ ____"

DOWN

1. Dwarf-like creature lives underground and guards treasures or a garden ornament in County Down
2. One who willfully or maliciously destroys property in New Brunswick
3. Paris Poisson
4. Costa Rican island, character in "The Wizard of Oz"
7. Fairy tale "Once _____ a time..." in Kazakhstan
8. Once a day in Berlin
10. Exercise using a bar, in Nova Scotia
11. Even an Italian can be _____ on St. Patrick's Day
12. Convent residents in Green Bay
14. Ivory Coast antenna system adjuster
17. A Buckeye state resident transferred to Scandinavia
18. Hunting or tour directors off the west coast of Normandy
22. Krakow C-Section anesthesia
23. One part of a whole in Karachi

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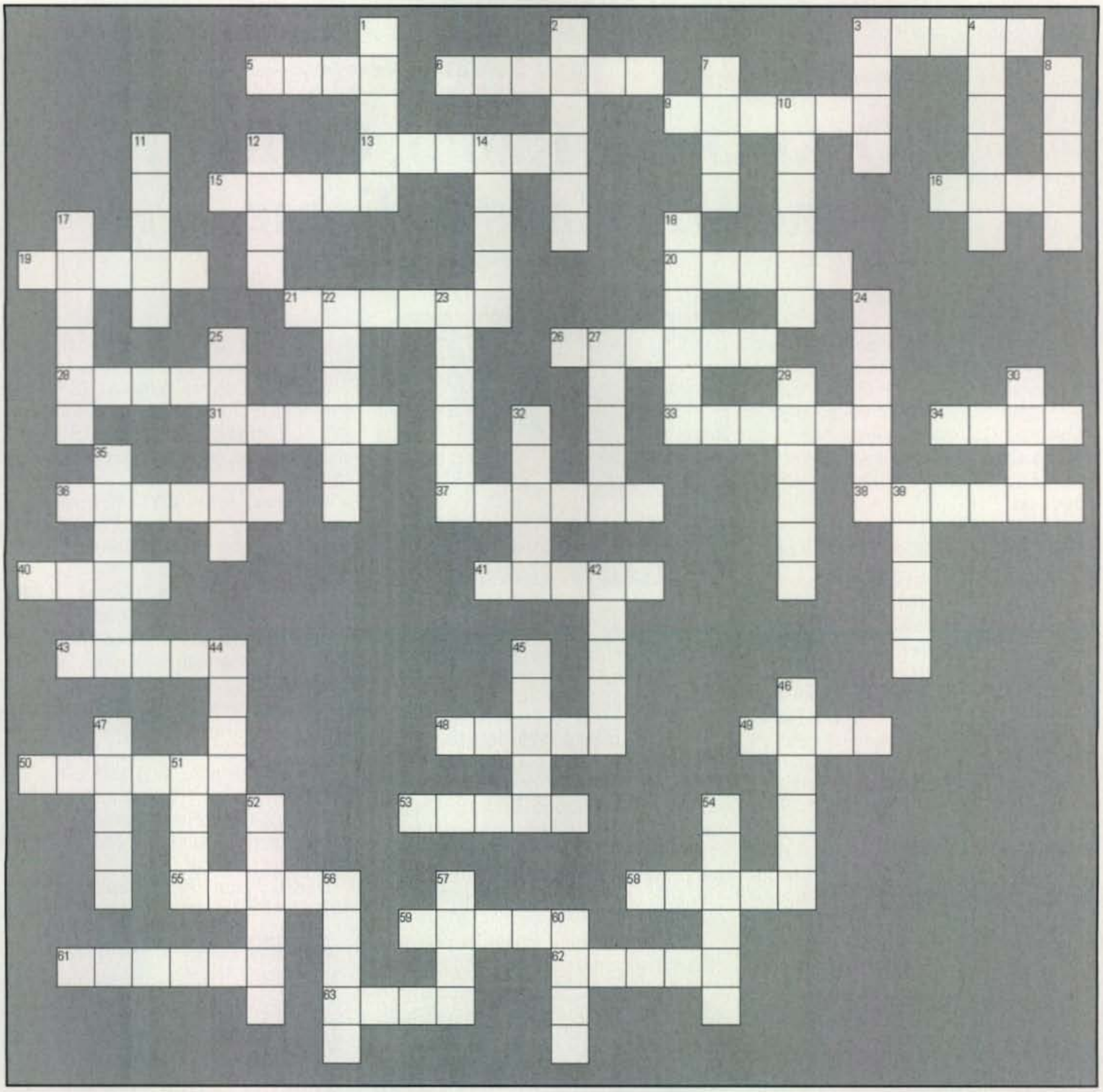
e-mail: <k8zt@cq-amateur-radio.com>



24. Avian bringers of babies to the African city of Juba
25. Where the South Pole is located in Antarctica
27. All the children in Lake Wobegon are _____ average
29. A character in "A Connecticut Yankee in King Arthur's Court"
30. Age of young New Hampshire ham?
32. Not dead in Nome
35. For gathering hay together in Hunan
39. Chew snacks in Guernsey
42. Belgian root vegetable
44. A small street in Oslo
45. Rainbow _____. It is a member of the Poisson family, in Africa
46. Detained in Tokyo
47. Sound from English bovine
51. One who is adored in Rome
52. Obstruct movement in Santo Domingo
54. Combined into a single entity in Kazakhstan
56. Day with precipitation, northwest of St. Petersburg
57. Very small Costa Rican island ham
60. Bronx expression for "hey" in Budapest

(Solution on page 84)

Announcing:

2008 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 eighth annual "class" of inductees to the CQ Amateur Radio Hall of Fame includes 14 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.

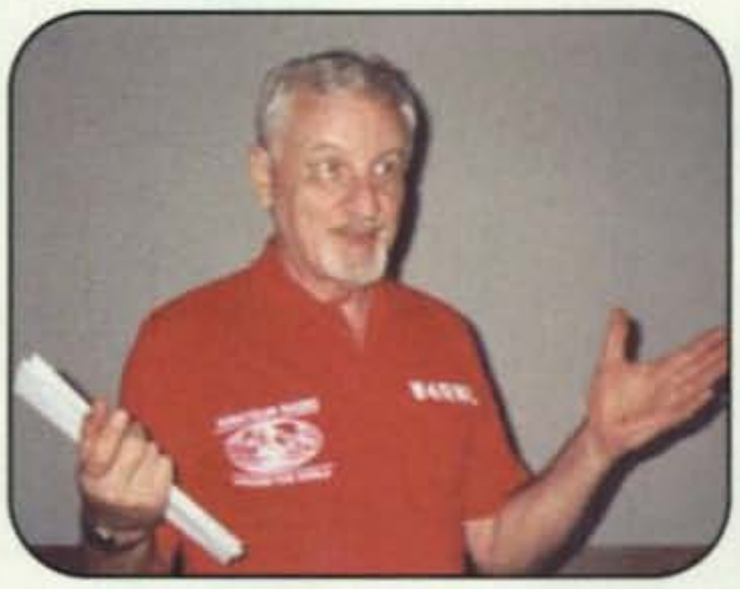
We welcome the following members (listed alphabetically) of the 2008 "class" of the CQ Amateur Radio Hall of Fame:

Bertels, Gaston, ON4WF. Honorary President, former President & CEO, UBA (Belgian IARU society); founder & President, AMSAT Belgium; Chairman, ARISS Europe; Vice-Chairman, ARISS International; Chairman, EUROCOMM, IARU Region 1 working group in European Union; "father" of ham antennas on Columbus ISS module.

Cebik, L.B., W4RNL (SK). Noted antenna authority, prolific author on topics relating to antennas and antenna modeling.

England, Gordon, ex-W3AWO. Deputy Secretary of Defense; former Secretary of the Navy; former defense industry executive.

Giambastiani, Adm. Edmund, N4OC. Retired Vice Chairman, Joint Chiefs of Staff.



L.B. Cebik, W4RNL (SK), noted antenna authority and author, and an inductee of this year's CQ Amateur Radio Hall of Fame.

Griffin, Gerald, MD, K6MD. Brigadier General, Medical Corps, US Army (Ret.), led medical brigades and humanitarian missions in Iraq (Desert Storm), Bosnia, Kosovo, Iraq (again); National Surgeon, Reserve Officers' Association; Delegate to NATO medical advisory committee; active DXer & MARS member.

Harris, Larnelle, WD4LZC. Gospel singer/songwriter; inducted Gospel Music Hall of Fame, 2007; winner of multiple music awards, including five Grammy awards and 11 Dove awards.

Jensen, Lenore, W6NAZ (SK). Co-Founder, Young Ladies' Radio League (YLRL); made 67,000 MARS phone patches for service personnel in Vietnam.

Kanzius, John, K3TUP. Inventor of possible cure for cancer using RF energy; process for possible use of seawater as fuel.

Margelli, Charles (Chip), K7JA. During many years with Yaesu, helped provide equipment for countless DXpeditions; member of many DXpeditions; successfully represented hams in Morse code vs. text-messaging competition on "The Tonight Show with Jay Leno" in 2005.

Rand, Philip S., W1DBM (SK). TVI pioneer; author, *Television Interference*; engineer, Remington-Rand (son of one of the founders); author, many articles in *CQ* and *QST*.

Redd, Vice Adm. Scott (Ret.), KØDQ/A92Q. Former Director, Nation-

CQ Amateur Radio Hall of Fame 2008 inductee Chip Margelli, K7JA, has been a member of many DXpeditions and helped provide equipment to countless DXpeditions during his years with Yaesu.

Vice Admiral Scott Redd (Ret.), KØDQ/A92Q, in addition to the government/military positions he has held, is an active contester and DXer. We welcome him to the CQ Amateur Radio Hall of Fame, 2008.

al Counterterrorism Center; Former Executive Director, U.S. commission on weapons of mass destruction in Iraq; Former Deputy Administrator, Coalition Provisional Authority in Iraq; Retired Commander, US Fifth Fleet; active contester and DXer.

Tether, Dr. Tony, K2TGE.- Director, Defense Advanced Research Projects Agency (DARPA).

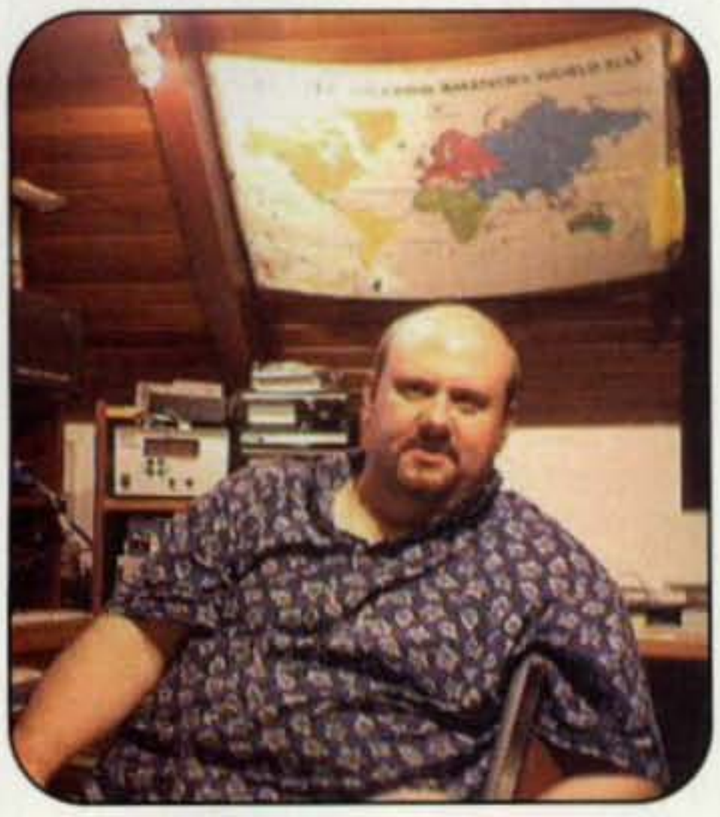
Touré, Dr. Hamadoun I., HB9EHT. Secretary-General, International Telecommunication Union (ITU).

Townsend, Dr. John, W3PRB. Space program pioneer; former Director, Goddard Space Flight Center; former Associate Deputy Administrator, NASA; former Associate Administrator, NOAA; former President, Fairchild Space Co..

CQ Contest Hall of Fame

For 2008, we are inducting two new members into the CQ Contest Hall of Fame and three new members of the CQ DX Hall of Fame. Our inductees into the Contest Hall of Fame are:

Paolo Cortese, I2UIY. Nominated by the Slovenia Contest Club, Paolo has been involved with contesting since *before* he became a ham in 1981, winning the SWL category of several European VHF contests. As an operator, he has too many top-10 finishes to list. Off the air, Paolo served for more than a decade as the HF Contest Manager for the Associazione Radioamatori Italiani (A.R.I.), Italy's national amateur radio association; he started the European Sprint Contest, wrote a book on contesting, has been a contestant, judge and log-checker at three World Radio Teamsport Championship (WRTC) competitions, has been a member of the CQWW Contest Committee since 1990 and co-director of the CQ WW RTTY DX Contest and CQ WPX RTTY Contest since 2005.



CQ Contest Hall of Fame inductee Paolo Cortese, I2UIY, has been heavily involved in contesting since before he became a ham in 1981.

Randy Thompson, K5ZD, is an accomplished contester, co-founder of eHam.net, and has been inducted into the CQ Contest Hall of Fame, 2008.

Randy Thompson, K5ZD, has been contesting for more than three decades and has multiple wins in the CQ World-Wide DX Contest, ARRL Sweepstakes, CQ WPX (CW and SSB), CQ 160, and the IARU HF Championship. His station has also hosted many #1 performances by guest operators. Randy is a four-time competitor in the WRTC; three-time editor of the *National Contest Journal*; co-founder of the eHam.net website; and a member of the First Class Operators' Club (FOC). In addition, Randy has just been named Director of the CQ WPX Contests. He was nominated by the Yankee Clipper Contest Club.

CQ DX Hall of Fame

Our newest DX Hall of Fame members are:

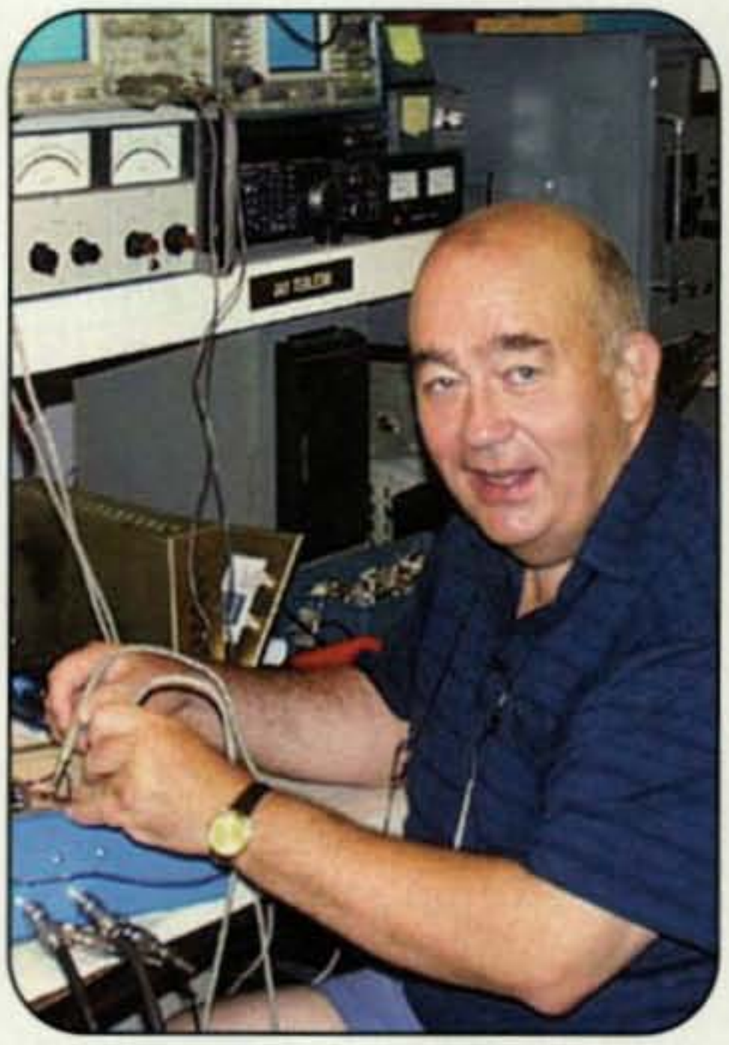
John Devoldere, ON4UN, who more or less single-handedly popularized DXing on 80 meters. Long thought to be useful only for local or regional contacts, John personally discovered the DX potential of the band in the 1960s and has been writing about it (as well as 160 meters) ever since. His book, *Low Band DXing*, is considered the "bible" for DXing on these bands, with more than 50,000 copies sold in the 20+ years in which it's been in print. John was the first ham to earn CQ's 5-Band Worked

All Zones (5BWAZ) award, in 1979; he holds 80m DXCC certificate #1 and currently has 357 countries confirmed on the band, as well as 303 countries on 160 meters. He was nominated by the UBA, Belgium's national amateur radio association.

Nellie Saltiel de Lazard, XE1CI, was nominated by the Magnolia DX Association. A pediatrician and active DXer/DXpeditioner, Nellie has earned just about every major DXing award and has operated from more than a dozen different countries. Among her certificates is a 5-Band Worked All States award with YLs only! (She has another 5BWAS certificate for working only OMs). She was also the first YL to operate from Palestine (E4), in 2000.

Bob Schenck, N2OO, is an active DXer and DXpeditioner, but his greatest contribution to DXing has been behind the scenes as QSL manager for over 100 DX stations and more than 130 DXpeditions—including, most recently, the massive 3Y0X operation from Peter I island—and as founder of the QSL Manager's Society. The society's main goal is to assure that DXpedition logs are not "closed" or lost upon the retirement or death of a QSL manager. Members agree to make provisions for the transfer of logs and cards to other member managers in the event that they can no longer handle the responsibility. Bob was nominated by the South Jersey DX Association.

Congratulations to our new inductees on their outstanding accomplishments!



John Devoldere, ON4UN, is an expert on DXing on the 80- and 160-meter bands. CQ welcomes John to the DX Hall of Fame.

Inducted this year into the CQ DX Hall of Fame, Nellie de Lazard, XE1CI, has earned just about every major DXing award and has operated from more than a dozen countries.

CQ DX Hall of Fame inductee Bob Schenck, N2OO's greatest contribution to DXing has been behind the scenes as a QSL manager for over 100 DX stations and more than 130 DXpeditions.

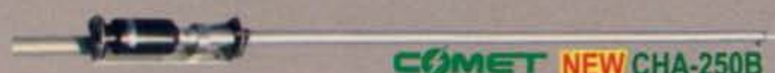
SUCH A HAM SH-002

I don't know about sending morse code, Stan but I can copy smoke signals.

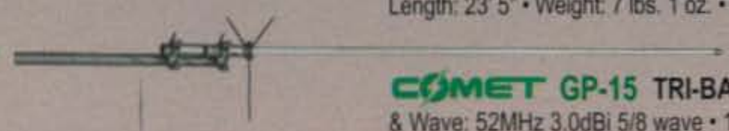
Life is a JOURNEY. Enjoy the Ride!

COMET and Maldol Antennas

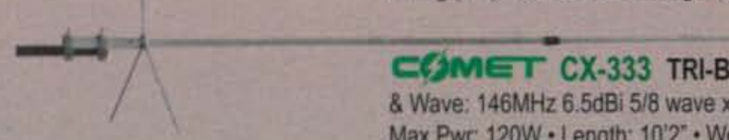
Base Antennas



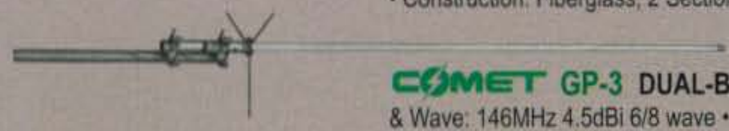
COMET NEW CHA-250B BROADBAND HF/6M GROUND-PLANE ANTENNA
A newly designed broadband vertical with NO GROUND RADIALS. EXTREMELY easy to assemble, requires no tuning or adjustments and VSWRis under 1.5:1 from 3.5-57MHz! • TX: 3.5MHz – 57MHz • RX: 2.0 – 90MHz • VSWR is 1.5:1 or less, continuous • Max Power: 250W SSB/125W FM• Impedance: 50 Ohm • Length: 23' 5" • Weight: 7 lbs. 1 oz. • Conn: SO-239 • Mast Req'd: 1" – 2" dia. • Max wind speed: 67MPH



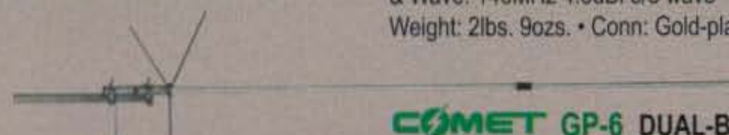
COMET GP-15 TRI-BAND 52/146/446MHZ BASE REPEATER ANTENNA Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi 5/8 wave x 4 • Max Pwr: 150W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated SO-239• 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass



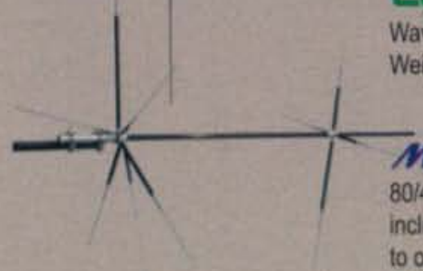
COMET CX-333 TRI-BAND 146/220/446MHZ BASE REPEATER ANTENNA Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 220MHz 7.8dBi 5/8 wave x 3• 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz.• Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections



COMET GP-3 DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 • Max Pwr: 200W • Length: 5'11"• Weight: 2lbs. 9ozs. • Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

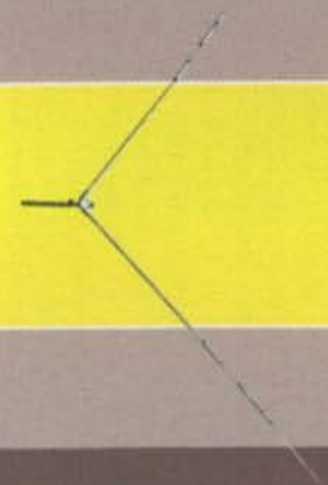


COMET GP-6 DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 200W • Length: 10'2"• Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

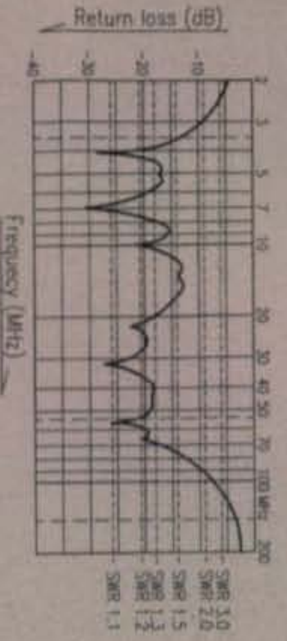


Maldol HVU-8 ULTRA-COMPACT 8 BAND HF/VHF/UHF VERTICAL ANTENNA
80/40/20/15/10/6/2M/70cm Only 1/2 the traditional size and weight of vertical HF antennas, and it includes 2M/70cm! Unique radial system rotates for balcony installations, the radials can all be rotated to one side. • HF and 6M: 1/4 wave-length • Gain 2M: 1/2 wave-length, 2.15dBi • Gain 70cm: Two 5/8waves in phase, 5.5dBi • Impedance: 50 Ohm • Max Power: HF 200W SSB • 6M–70cm: 150W FM• Conn: SO-239 • Height: Only 8'6" • Weight: 5lbs. 7ozs.

COMET GP-9 / GP-9N DUAL-BAND 146/446MHZ BASE REPEATER ANTENNA
BEST SELLER!• Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 • 446MHz 11.9dBi 5/8 wave x 8 • Max Pwr: 200W• Length: 16' 9"" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections



COMET NEW H-422 QUAD-BAND HF DIPOLE Compact 40/20/15/10M "V" or Horizontal Dipole • Max power: 1kW SSB • Length "V" Dipole: 24' 3" • Horizontal Dipole: 33' 10" • Shipping length: 79" • Weight: 11 lbs 14 ozs • Wind Load: 3.02 sq feet • Required mast size: 1.5" - 2.5" diameter • CBL-2000 2kW Balun included • Simple installation, band tuning and profile change



CHA-250B VSWR graph

"One person can effortlessly raise the antenna at night when no one can spot it, and take it down before daybreak. This antenna is also a great choice for portable operations, such as quick and easy mini-DXpedition to a campground or a nice tropical island! In short, the Comet CHA-250B is simple to assemble, painless to elevate and is easy on the eyes, while at the same time getting you on 6 meters thru 80 meters without the requirement of an antenna tuner and ground radials. You'll even be able to work some DX while you're at it!" – Dan Dankert N6PEQ

For a complete catalog, call or visit your local dealer.
Or contact NCG Company. 15036 Sierra Bonita Lane, Chino, CA 91710
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What You've Told Us...

Our April survey asked about trying new things in ham radio, sharing your knowledge with others and learning from your fellow hams. *CQ* readers tend to be more active than hams at large, but the response was pretty impressive nonetheless.

We asked how recently you've tried operating on a new ham band, and 46% reported doing so within the past year, followed by 29% 1–5 years ago (that's 75% within the past five years!), 11% 5–10 years ago and 14% haven't tried a new band in more than 10 years. New operating modes (such as PSK-31 or digital voice) weren't quite as popular... 23% reported trying a new mode within the past year, 33% within 1–5 years (but that's still 56% in the past five years), 13% 5–10 years ago and 23% more than a decade ago. We had similar responses about new on-air activities, such as QRP, DXing or Echolink, with 32% reporting trying something new within the past year, 29% within 1–5 years (61% total), 9% 5–10 years ago and 24% more than 10 years ago.

Responses to the two questions about sharing knowledge and experience with other hams were virtually identical—77% each have shared their knowledge and benefited from someone else's within the past year; 11% within the past 1–5 years (88% within five years), 3% 5–10 years ago, and 7% more than 10 years.

The numbers are similarly impressive regarding building—61% have built a piece of gear or a station accessory within the past year, 21% 1–5 years ago (82% within 5 years), 6% 5–10 years ago, 7% more than 10 years ago, and 6% have never built anything.

Finally, we asked how you rate the pace of technological change in amateur radio overall. Nearly half of you (49%) answered "not too slow, not too fast," followed by 30% responding "somewhat fast," 11% "somewhat slow," 7% "too fast" and 3% "too slow."

This month's free subscription winner is Paul Gates, KD3JF, of Glen Burnie, MD.

Reader Survey July 2008

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 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 find out how you deal with gear that becomes "surplus."

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

1. When you replace/upgrade a piece of station equipment, what are you most likely do with the old piece of gear?

Sell it....31
Keep it as backup....32
Put it away someplace to deal with it "later"....33
Keep it as a loaner for a ham in need....34
Cannibalize it for parts....35
Give it away to a club or another ham....36
Throw it away (because I never replace anything that still works)....37

2. When you *do* sell used gear, how are you most likely to try to sell it?

Trade or sell to a dealer who buys used gear....38
At own table at a hamfest....39
At club table at a hamfest....40
On the internet....41
With a magazine classified ad....42
Direct to a club member or other local ham....43
Don't sell used gear....44

3. When you sell used gear, do you clean it up and make sure it is working properly first?

Yes....45
No....46
Sometimes....47
Only sell "as is"....48
Don't sell used gear....49

4. Do you offer any sort of "service after the sale" to buyers?

Yes, will repair for limited time period....50
Yes, provide e-mail/phone number in case of questions and will help if possible....51
No, but always provide all manuals whenever possible....52
Nope, once you own it, it's no longer my problem....53
Don't sell used gear....54

5. Do you ever buy used gear? If so, from what source(s)? (Circle all that apply)

Yes, from a dealer....55
Yes, at a hamfest....56
Yes, over the internet....57
Yes, from magazine classified ads....58
Yes, from club members or other local hams....59
No....60

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

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

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

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Are your fingers too big for the tiny controls on Yaesu's popular portable FT-817? Are some commands on the FT-897 too hard to access? WA5VJB reports that the folks at bhi may have a solution for you.

CQ Reviews:

bhi Radio Mate Compact Keypad for the FT-817, 857, and 897

BY KENT BRITAIN,* WA5VJB

The Radio Mate from bhi is a great little accessory available for your Yaesu FT-817, FT 857, or FT-897 transceiver. Since I happened to use both the 817 and the 897, I was chosen for this pleasant testing.

Those of us who have a Yaesu FT-817 quickly learned that its biggest advantage is also one of its biggest negatives. That small size! My, those switches are small and the feature menus run deep. Here is where the bhi Radio Mate comes in.

As you can see in photo 1, the Radio Mate makes the FT-817's control panel something that those of us with big hands can easily control, not to mention the fact that those big numbers are very handy and easy to read if you forgot to pack your bifocals. When the Radio Mate is used with the Yaesu FT-897 (photo 2), size is not as much of an issue, but it is very handy for changing bands, saving and recalling memories, or changing modulation. Here's how that works:

Keypad Control

The Radio Mate lets you control a variety of features from its keypad. First, you pick from three basic operating modes—modulation, direct frequency entry, and memory. There's a button for each option on the right side (see photo 1). Pressing the "MOD" button lets you select your operating mode, be it CW, USB, LSB, digital, or any other mode that the radio supports. The "DIR" button puts you into "Direct Frequency Input" mode, a feature I especially like when using the Radio Mate with the FT-897. Instead of going in and out of the 897's fast/slow tuning speeds for the main knob, you just enter

*Contributing Editor, CQ
e-mail: <wa5vjb@cq-amateur-radio.com>

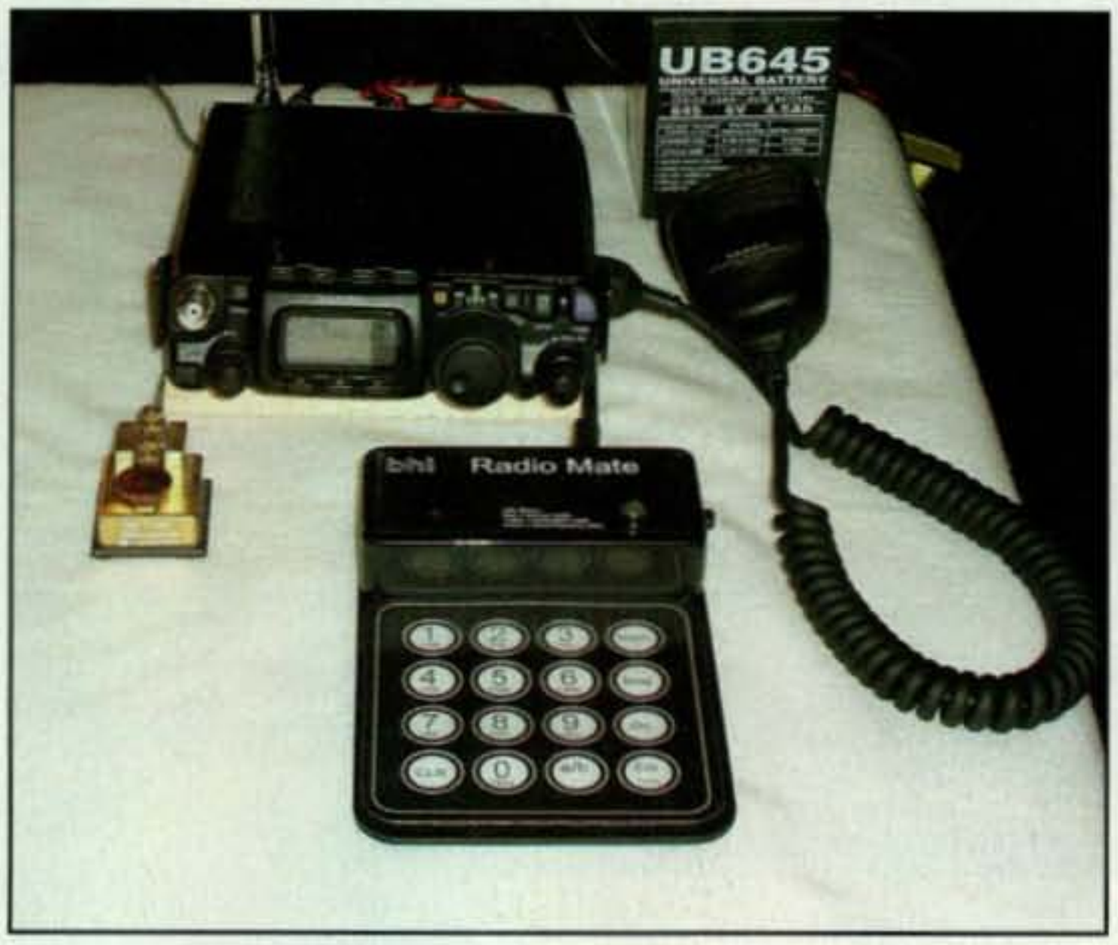

Photo 1– The Radio Mate makes the small buttons on the Yaesu FT-817 easier to deal with.

Photo 2– Button size isn't as big a problem on the FT-897 as on the 817, but the Radio Mate is able to make some of the more commonly-used functions much more accessible.

14.235 MHz, or 3.818 MHz, etc., and the radio just goes there. The "MEM" button lets you recall up to 20 stored frequency and mode combinations.

The Radio Mate also has a "Tune" function which puts the radio into FM mode and transmits for 10 seconds, giving you time to do any necessary antenna tuning. In addition, the unit gives you a lot of flexibility in terms of switching between VFOs, tuning the two VFOs to same frequency, or operating "split" (transmitting on one VFO and receiving on the other).

The Radio Mate conveniently plugs into the accessory jack on the back of the Yaesu FT-817, FT-857, or FT-897, and makes many of the handy functions buried in these radios' menus just a push of a button on its big keypad.

bhi is based in the United Kingdom. The company also has a complete line of DSP noise-cancellation products for the FT-817, 857, and 897 line and accessory DSP products that will work with almost any radio. Visit <http://radio.bhinstrumentation.co.uk/> for more information.

The Radio Mate retails in the U.K. for £89.95. It is sold in the United States by W4RT Electronics <http://www.w4wb.com/index.htm>. Current U.S. retail price is $159.

Looking Ahead in CQ

Here are some of the articles we're working on for upcoming issues of *CQ*:

- SSB Results - 2007 CQ World Wide DX Contest
- The Magical Mystery Dayton New Products Tour
- *CQ* Interviews: Mark Stenning, AA1AC, Chief Executive, International Tennis Hall of Fame

Do you have a ham radio story to tell? See our writers' guidelines on the *CQ* website at <http://www.cq-amateur-radio.com/guide.html>

math's notes

BY IRWIN MATH,* WA2NDM

The Voltage-to-Frequency Converter

At this point in time I am sure you will agree that we are well immersed in the digital revolution. Not all of us are well-versed in digital technology, however, so to get a feel for what is happening I would like to introduce you to a way to use digital techniques that you might be more comfortable with.

In the days before analog/digital (A/D) and digital/analog (D/A) converters were common, there was a series of integrated circuits that enabled users to convert an analog signal into a digital one without a host of extra logic. These ICs were known as voltage-to-frequency converters, or VFCs. The VFC accepted an analog input and provided a specific number of pulses (per second) that corresponded to the analog value. The most common range was DC to 10 volts, which was linearly converted to 0 to 10 kHz. If you connected a frequency counter to the output of such a circuit and applied 2.000 volts, for example, the output read on the counter (set to Hz) would be 2000. Change the input to 5.345 volts, and the counter would then read 5345. Linearity was quite good, easily reaching 0.1% even for low-cost units. Fortunately, some of the more popular devices still exist today, are low in cost to boot, and are interesting devices to "play with," particularly if A/D and D/A converters are a bit too much for you.

Operation of the basic VFC is shown in fig. 1. For this example we used the LM-331 from National Semiconductor (or the KA-331 from Fairchild Semiconductor, which is essentially the same device). This IC is available from DigiKey Corporation (and others) and should cost less than $3.00. As you can see, the chip contains a comparator, a one-shot (or monostable) multi-vibrator, a current source, a voltage-controlled switch, and an NPN transistor. In operation, when the voltage at pin 7

*c/o CQ magazine

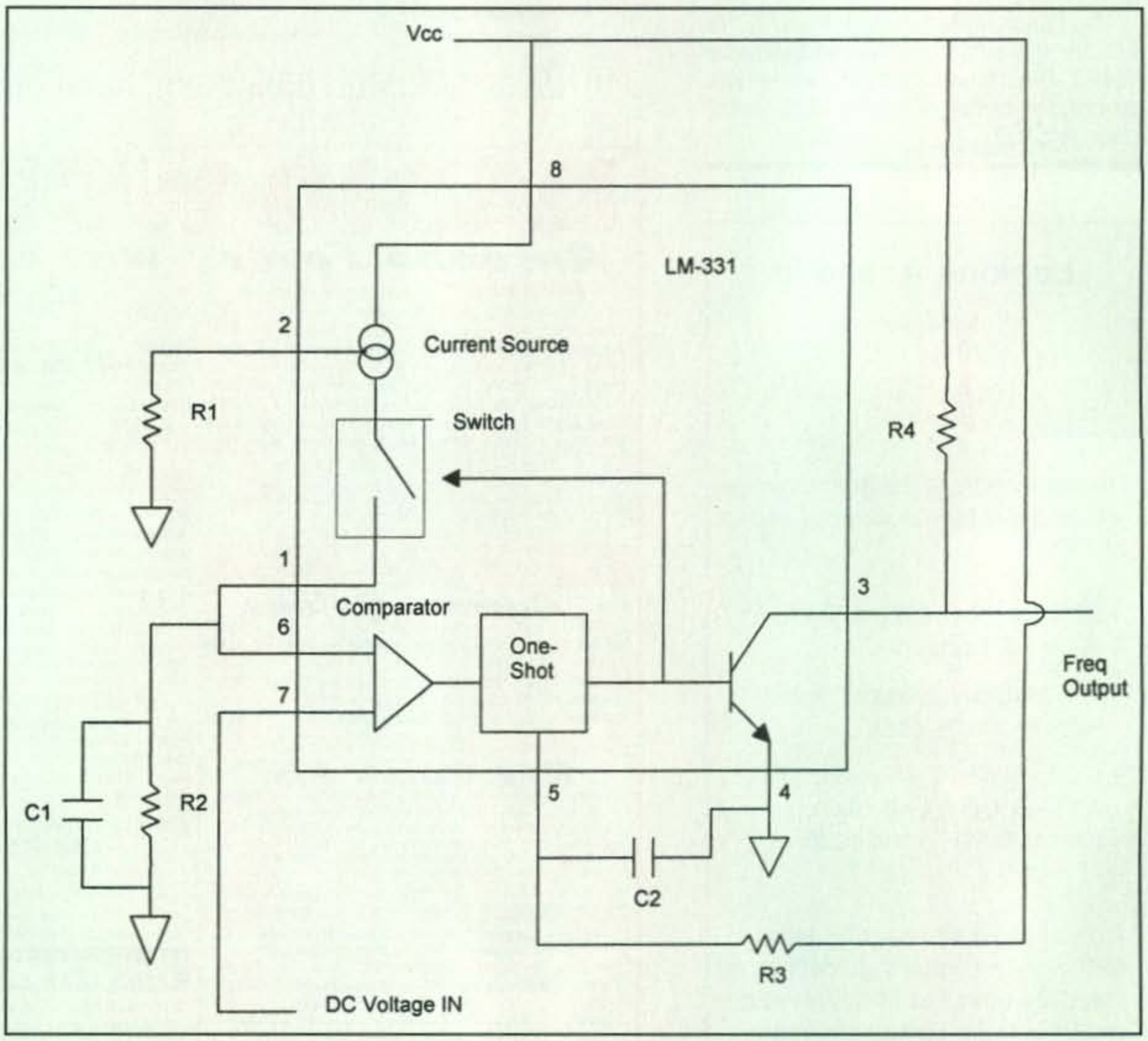

Fig. 1– Basic operation of the voltage-to-frequency converter.

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Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, low SWR. Handles 1500 Watts PEP SSB.

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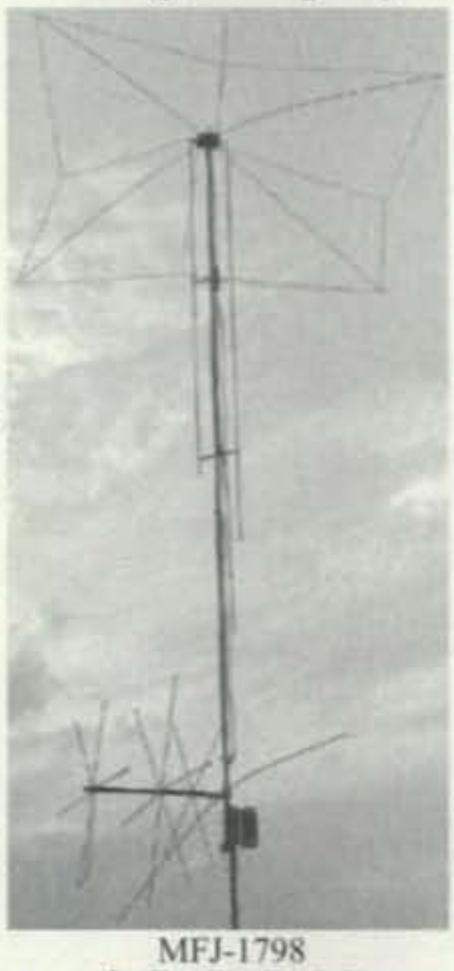
It's easy to tune because adjusting one band has minimum effect on the resonant frequencies of other bands.



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The active radiator works as a stub to decouple everything beyond it. *In phase* antenna current flows in all parallel radiators.

This forms a very large equivalent radiator and gives you incredible bandwidths.

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On 30, 40, 75/80 Meters, end loading -- the most efficient form of loading -- gives you highly efficient performance, excellent bandwidth, low angle radiation and automatic bandswitching.

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Tuning to your favorite part of these bands is simple and is done at the *bottom* of the antenna.

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You don't need a ground or radials because an effective counterpoise that's 12 feet across gives you *excellent* ground isolation.

You can mount it from ground level to roof top and get awesome performance.

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The feedline is decoupled and isolated from the antenna with MFJ's exclusive *AirCore*™ high power current balun. It's wound with *Teflon*® coax and can't saturate, no matter how high your power.

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Incredibly strong solid fiberglass rod and large diameter 6061 T-6 aircraft strength aluminum tubing is in the main structure.

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MFJ's Super High-Q Loop™ Antennas

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MFJ's *tiny* 36 inch diameter loop antenna lets you operate 10 through 30 MHz *continuously* -- including the WARC bands!

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

Enjoy both DX and local contacts mounted vertically. Get both low angle radiation for excellent DX and high angle radiation for local, close-in contacts. Handles 150 watts.

Super easy-to-use! Only MFJ's super remote control has *Auto Band Selection*™. It auto-tunes to desired band, then beeps to let you know. No control cable is needed.

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

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Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

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MFJ-1782, $379.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $299.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

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MFJ-1622 **$99.95**

Covers 40 thru 2 Meters. Mounts outdoor to windows, balconies, railings. Works great indoors mounted to desks, tables, bookshelves. Highly efficient air wound *bug catcher* loading coil and telescoping 5½ foot radiator lets you really get out! Radiator collapses to 2½ feet for easy storage/carrying. Includes coax RF choke balun, coax feed line, counterpoise wire, safety rope. 200 Watts PEP.

MFJ's G5RV Antenna

MFJ-1778
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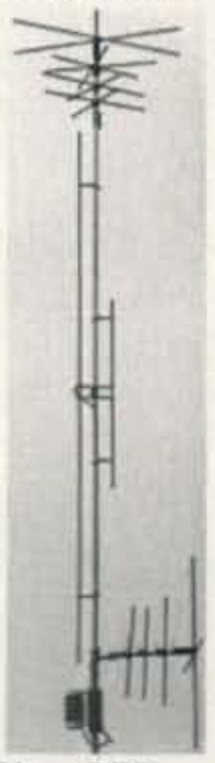
MFJ halfwave vertical

6 bands: 40, 20, 15, 10, 6, 2 Meters . . . No radials or ground needed



MFJ-1796
$229.95

Only 12 feet high and has a tiny 24 inch footprint! Mount anywhere -- ground level to tower top -- apartments,small lots, trailers. Perfect for vacations, field day, DXpedition, camping.

Efficient end-loading, no lossy traps. Entire length is always radiating. Full size halfwave on 2/6 Meters. High power *air-wound* choke balun eliminates feedline radiation. Adjusting 1 band has minimum effect on others.

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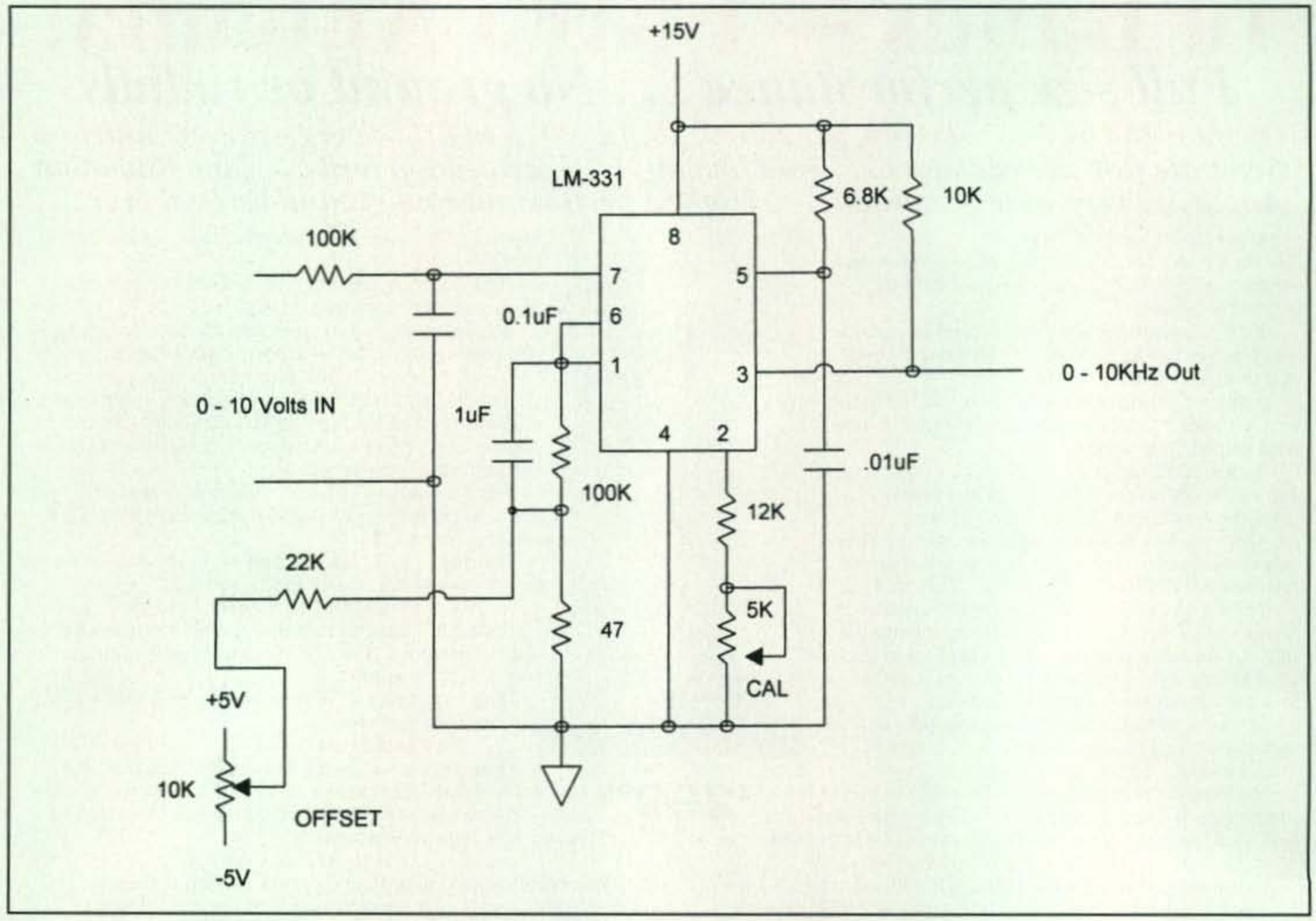

Fig. 2– A basic voltage-to-frequency converter circuit.

of the comparator is greater than the voltage at pin 6, the comparator switches and triggers the one-shot. The output of the one-shot then turns on the switch and starts current flowing to the R2/C1 combination. The NPN transistor is also turned on by the output of the one-shot pulling its collector to ground and resulting in a low output at pin 3. At the end of the timing period (determined by the R3/C2 combination) the one-shot turns off.

Now the voltage across R2/C1 starts to decay. When it drops to the point just below the voltage at pin 7, the comparator turns off, which also turns off the NPN transistor. The output at pin 3 now goes high. This cycle repeats as long as the voltage at pin 7 is higher than the reference at pin 6. The greater the voltage at pin 7, the shorter the turn-off time and the more on/off operations per second (the higher the frequency).

The operation of this circuit is linear, so an input of 0 to 10 volts will produce an output of 0 to 10 kHz, or 0 to 100 kHz, depending on the value of the external components. Note that R1 in the circuit is used to set the actual value of the current source in the chip and acts as a trimming adjustment, as we soon will see. R4 is simply the collector pull-up resistor.

An actual working circuit of the LM-331 that you can (and should) build if this interests you is shown in fig. 2. The values shown result in an input range of 0 to 10 volts and an output range of 10 Hz to 11 kHz. The reason for this somewhat offset range is to assure that 0 volts produces a frequency (10 Hz) that can be "worked with." If you do not need to sense 0 volts, you can easily adjust the circuit for 10 kHz at 10 volts input.

You will notice that the resistor connected to pin 2 has been replaced with a 5K pot and series 12K resistor. This pot now acts as a calibration control and is used to trim the range so that 10 volts exactly equals 10 or 11 kHz as you require. If possible, use a 10- to 15-turn trim-pot; it will make adjustments much easier. An optional offset pot (10K) is also provided if you wish to fine-tune the input. For best results the other values should be as accurate as possible and may be chosen with the help of a good digital multimeter. It should be noted that with the proper choice of components, it is possible to achieve an accuracy of ±.05% with this circuit.

Once you build the circuit, power it on and connect a scope to pin 3. Next set the offset pot (if used) to the middle of its range. Now apply 10.00 volts to the input and you should see a series of pulses on the scope. Connect a frequency counter to pin 3. You should read somewhere near 11 kHz (or 10 kHz). Adjust the 5K pot until the reading is as close to 11 kHz as possible. Reduce the voltage to 5.00 volts and note that the frequency changes to 5.50 kHz. Other voltages will be similarly scaled. However, if you choose to set the 10.00 volt input to 10 kHz, the 5-volt input will be at 5.00 kHz, but 0 volts will be unstable. You may wish to "touch up" the offset and calibration pots until the frequency range matches your needs, or you can just completely eliminate the offset pot (and 22K resistor). If you ignore the counter's decimal point, you will have produced a simple digital voltmeter.

Once you have the circuit working properly, you can configure a digital version of almost any DC voltage you can come up with. Fig. 3 shows the use of

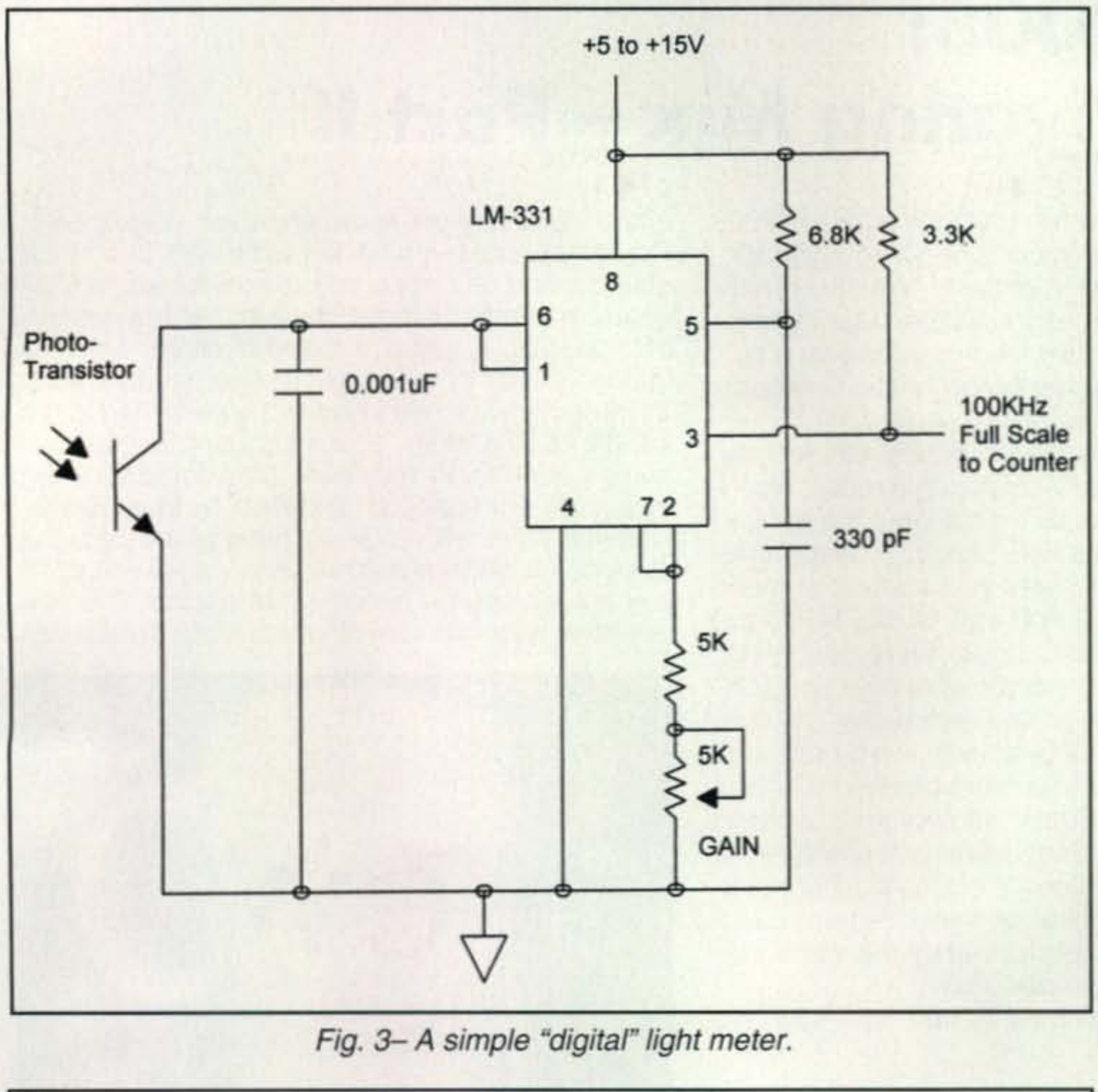

Fig. 3– A simple "digital" light meter.

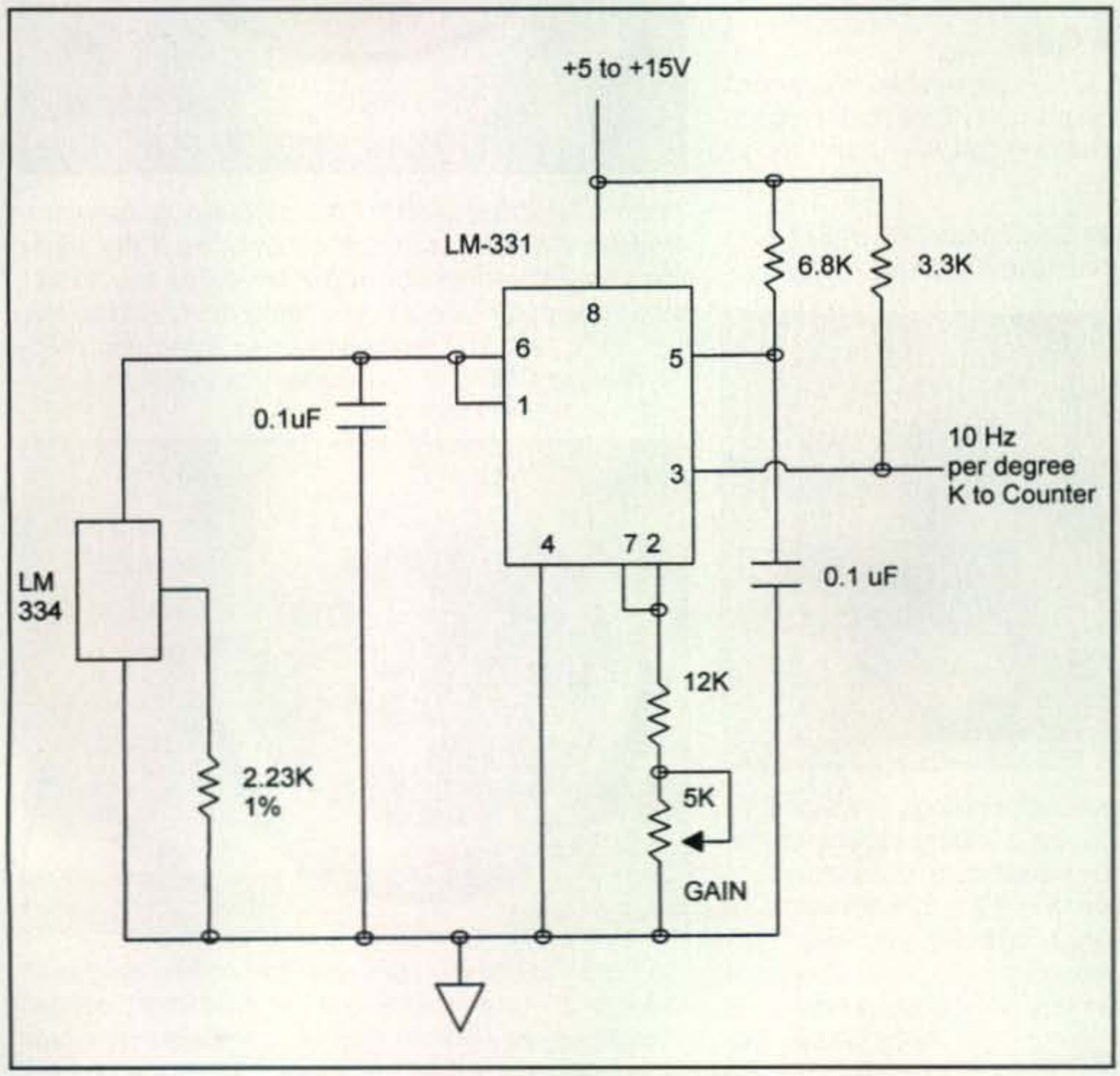

Fig. 4– A simple "digital" temperature meter.

a phototransistor for light measurements, while fig. 4 show a digital thermometer. Many similar applications can be configured. The LM-331 data sheet from National Semiconductor will give more technical details for those who are interested. Other VFC chips are available from Analog Devices, and you might wish to take a look at its website for details. These tend to be more expensive, however.

Next month we will look at the companion frequency-to-voltage converter and see how the two can be configured to work together.

As a footnote to this month's column, I would like to acquaint you with Ken, K4EAA, who is in the business of repairing older Kenwood-type hybrid transceivers as well as giving you advice to help you do the job yourself. If you have a TS-520, 530, 820 or 830 that is in need of repair or alignment, make sure you pay Ken a visit at <www.K4EAA.com>. On his website you will find a wealth of information, hard-to-find spare parts, advice, and, if you do not wish to tackle the job yourself, Ken can also do it for you at a reasonable cost.

73, Irwin, WA2NDM

BY DAVE INGRAM,* K4TWJ

Keys 2008: A Captivating Mix – Part II

This month's column continues our Keys 2008 celebration with more tantalizing telegraphic treats to tickle your fancy. We also realize our views may kindle an irresistible urge to add a few personally attractive keys to your own shack or collection, so we again include some new gems you can purchase right now.

In looking at the overall CW scene, incidentally, we noted on-the-air activity during a recent worldwide DX contest was so high it filled the full CW allocations on several HF bands. Indeed, amateurs on various continents continuously pumped away on CW above 7.100 and 14.100 MHz, and the phone bands were almost silent during that time. Apparently, most people were operating CW! I also notice, as I have stated before, that CW consistently outworks SSB by at least two S units, and full break-in CW outworks semi-break-in CW by a similar two S units. Stated another way, working CW with full QSK and a vertical antenna exhibits the same communications "clout" as working semi-break-in CW with a two- or three-element beam antenna (assuming approximately the same output power level of said stations).

That's enough CW notes for this time. Now let's focus on the keys!

New Chevron is a Gas!

First in the spotlight is the incredible "Chevron" Morse paddle shown in photo 1. This masterpiece is made by Kevin Gunstone, MØAGA, and much of its exquisite work is not apparent in the photo. Actually, photographing a paddle with this much glamour and reflectivity is a major challenge. The paddle measures 4 inches by 3 inches and weighs 4 1/2 pounds. It has a number of clever features that set it apart from less expensive paddles, such as perfectly balanced arms, etc. In referring to the paddle, Kevin says, "I am just a little guy who makes paddles in my spare time for discerning amateurs appreciating attention to fine details. Chevron keys will never be mass-produced, but everyone is guaranteed my personal attention." If you are looking for a really elite paddle, this one definitely warrants investigation! More details can

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

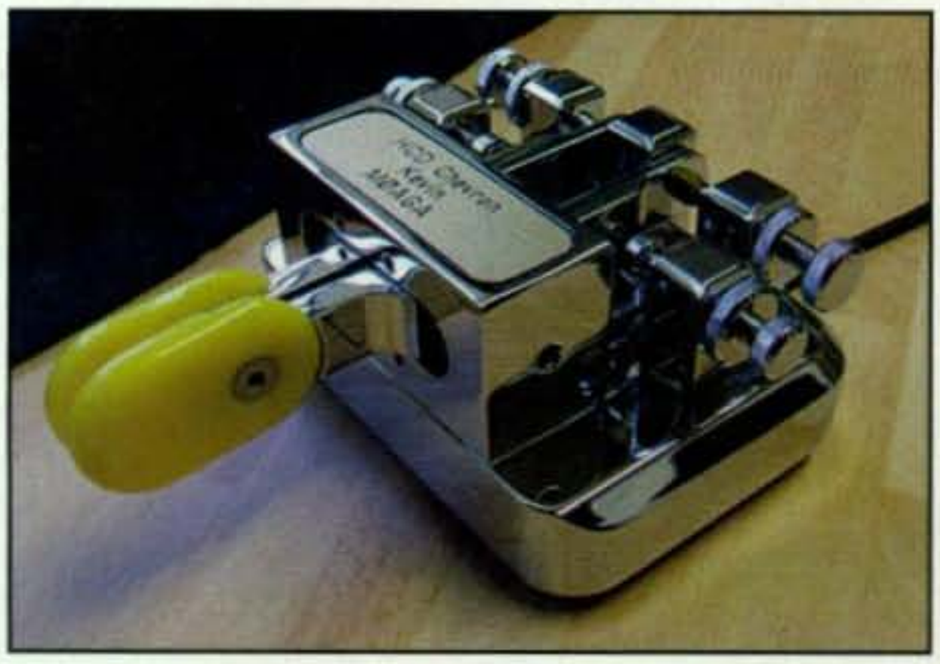

Photo 1– One of the most dazzling works of telegraphic art we have seen in many moons is this Chevron Morse paddle handmade in limited quantity by Kevin Gunstone, MØAGA, in England. The arms are magnetically tensioned, perfectly balanced, and ride on precision ball races. The paddle is even fitted with tiny shock absorbers and height adjustments for a "just right" feel. The chrome plating is beyond comparison. (Photo courtesy of MØAGA)

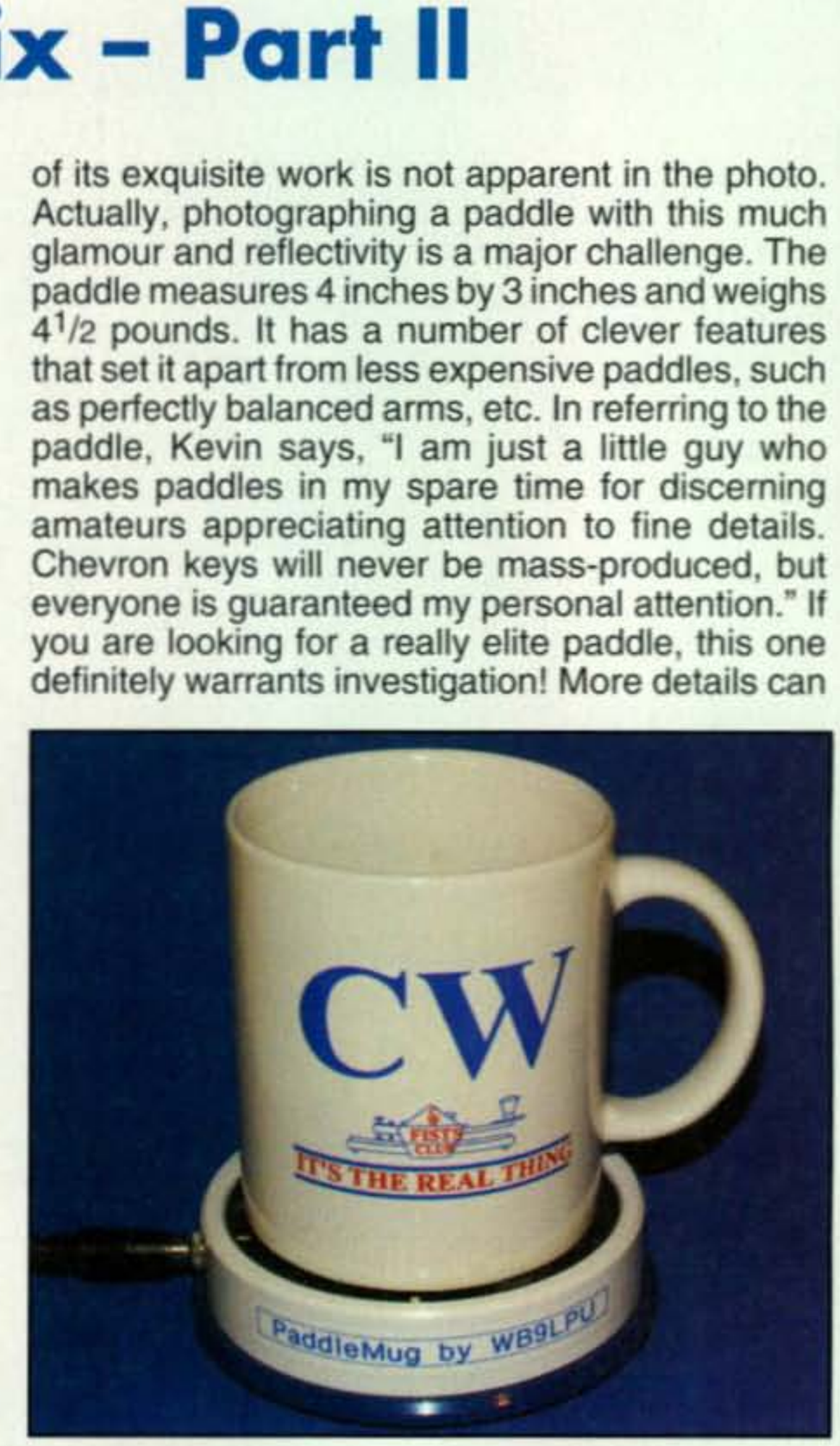

Photo 2– What is it? The coffee-cup Coaster Paddle! Richard Meiss, WB9LPU, built the paddle's entire mechanism into a moveable-top coaster so you just place a cup or mug on it and tap the handle's left and right sides to send smooth-flowing CW. (Photo courtesy of WB9LPU)

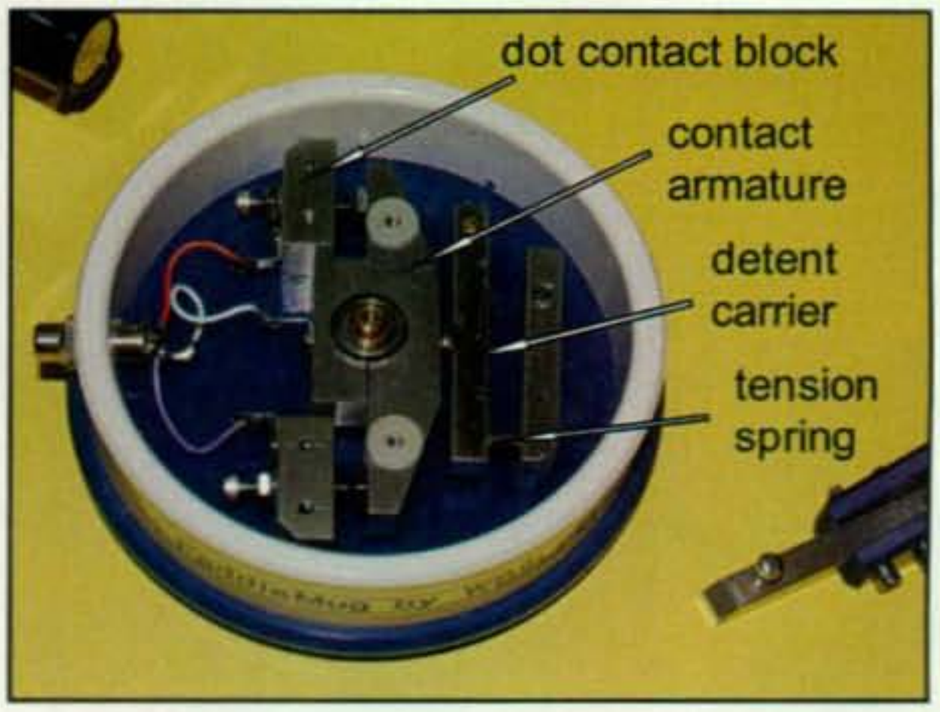

Photo 3– WB9LPU removed the coffee mug and labeled the parts to show us how his Coaster Paddle works. The arm with fingerpieces also can fit to center armature for stand-alone/no-cup operation. (Discussion in text.)

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Photo 4– Richard, WB9LPU, also designed and made this beautifully crafted "PaddleKey," and it is totally unique. The paddle's arm pivots on a double stack of three ball bearings and moves left and right to function as a single-lever paddle or moves up and down to function as a hand key. It uses two cables to connect to a rig's key and paddle sockets. (Photo via WB9LPU)

Photo 6– Palm Radio, well-known manufacturer of the Retractable Palm Mini Paddle, now makes this 1" × 1" × 3" equivalent pump key which I understand has a very good feel—similar to the famed "Junker" key. It retracts fully into its shell for carrying, it has an optional infrared link for wireless operation, and it is available right now from <www.MorseX.com>.

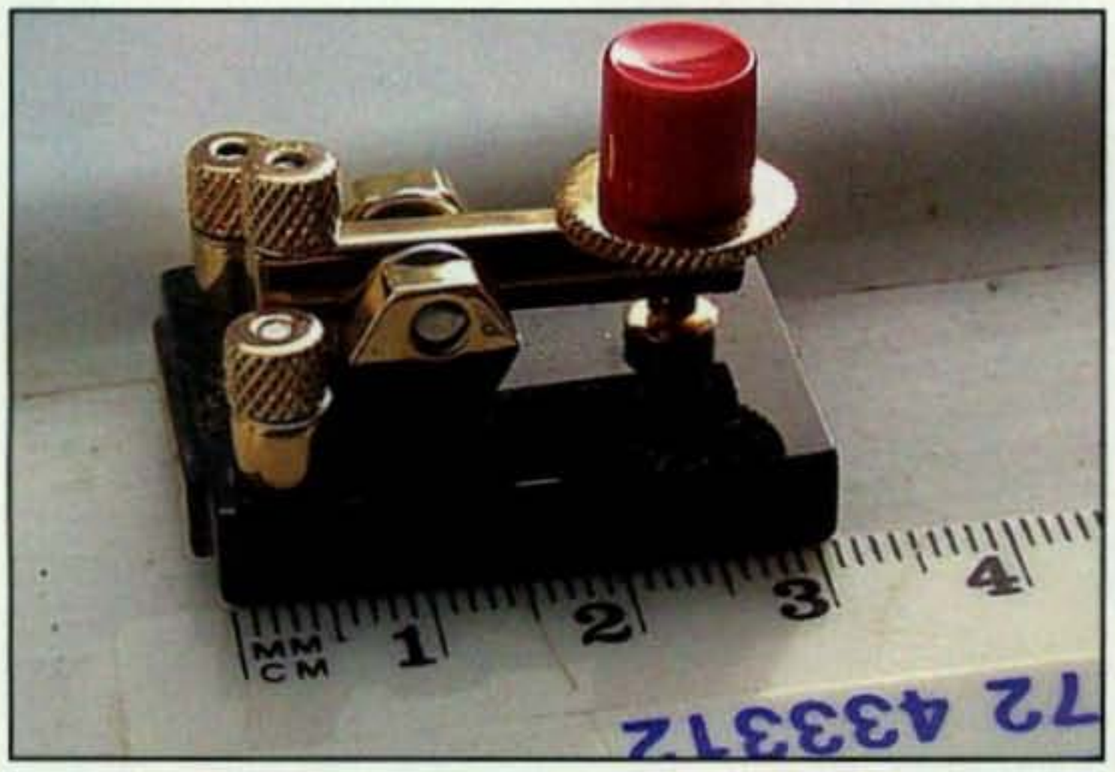

Photo 5– This one-inch-square treat is made by Gordon Crowhurst, G4ZPY, in England. It looks like a piece of fine jewelry, but it is fully functional and works quite well. We think this is the smallest key in production today. More details at <www.g4zpy.go-plus-net>.

Photo 7– Like the new Palm Radio Pump Key in photo 6, the Palm Mini Paddle sports a precise and fully adjustable mechanism and its fingerpieces retract into the case for safe carrying.

be found at <www.chevronmorsekeys.com>. Questions? E-mail Kevin at <Kevin.gunstone@ntlworld.com>.

Designers' Delights

If you think you have seen it all in unique and novel CW paddles, take a peek at the "Coaster Paddle" devised by Richard Meiss, WB9LPU, and shown in photos 2 and 3. Richard is a mechanical design and prototyping wizard with a number of captivating keys to his credit (check out: <http://wb9lpu.googlepages.com>). As he explains here, "The basic design is a modified coaster for a coffee cup. There is a center pivot point for the upper plate to swivel so that moving the cup's handle back and forth actuates base-mounted contacts to produce hot, flowing CW. The concept may be wild, but it is so solid and stable that a cup placed on it does not wobble at speeds of 20 to 25 wpm."

The coaster's base section is made of blue and semi-clear plastic, and the surrounding support ring is cut from PVC pipe. Looking down into the coaster, you can see the contact armature mounted to a central shaft fixed to the base plate. Left and right dot and dash contact blocks are fitted with gap adjustments. A detent block with a single steel ball maintains the paddle's center resting position. Tension is set by changing the position of a spring support at the rear.

Taking the Coaster Paddle a step further, Richard also fabricated a snap-in single-lever arm to substitute for the coffee cup. Richard says, "The 'lever version' is smooth with crisp action that is enjoyable to use on the air, but I personally think the cup version draws more attention."

Another WB9LPU brainchild we are sure you will enjoy looking at is the unique "PaddleKey" shown in photo 4. This item is specially designed for instantly shifting between a paddle and a hand/pump key for those times when band con-

Photo 8– This one-inch cube is a plug-in electronic keyer for the Palm Mini Paddle, and it includes a wireless infrared link to its connected/unconnected transceiver. The keyer has a built-in battery (at rear), and "toothy" speed control (near front). A similar infrared LED-type transmitter is available for the Palm Radio Pump Key. (Photo courtesy Morse Express)

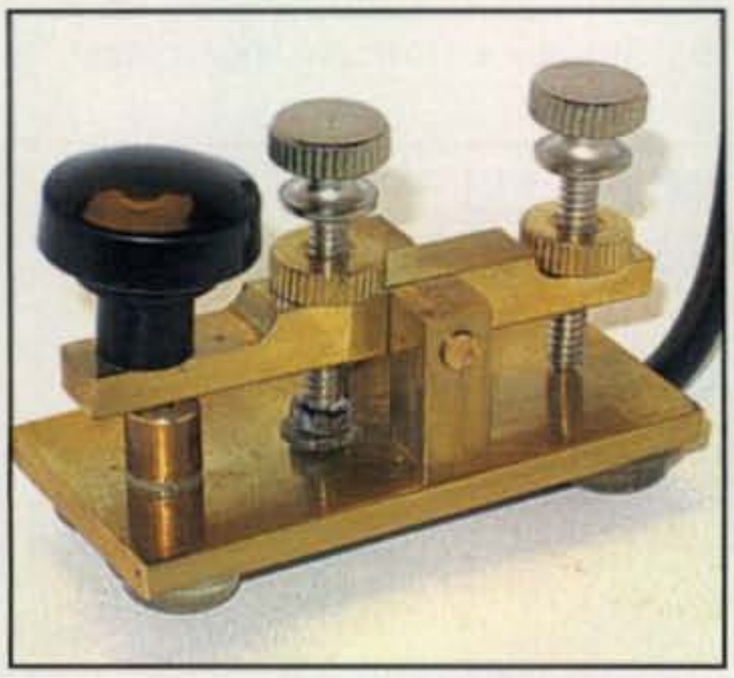

Photo 9– This good-looking mini-pumper is made by Tim Soxman, W3ZVT, and also sold by Morse Express. It has a nice brass finish, is magnetically tensioned, and is a 1" × 2" gem you can use or wear as the mood strikes you.

ditions are rough and a station you contact asks for clarification of your call letters. It is a combination single-lever paddle and straight key on a single base—each connecting to respective sockets on a transceiver (two cables from a paddle to rig).

Describing how the PaddleKey works in less than two full pages requires a lot of condensing, so bear with me. Notice the aluminum block on the paddle's left side peeking out from under the top cover. It is a "T"-shaped rocker plate with the paddle's three fingerpieces (two vertical for paddling, one skirting horizontally for pumping) attached at the bottom of the "T." Next notice the black-tipped gap-adjusting screw for dots on the left side (the right dash screw is not visible) and the hand key's gap-setting screw atop the arm. Also note tensioning magnets are enclosed in round brass cylinders with (brass) rear adjustment screws.

Now we return to the previously mentioned rocker plate. It is slightly beveled on its rear-facing edges (the left and right sides of the "T") and is spaced slightly away from a mating rear (brass) plate by two vertical stacks of three ball bearings each. The rocker plate is also slightly beveled on its bottom edge so it can tilt forward when the arm/fingerpiece is pressed down to function as a hand key. In addition, when the fingerpiece is pressed down, the two bottom ball bearings (one in each stack of three) allow the rocker plate to tilt down.

When not tilted down (that is when the hand-key function is not in use), the two bottom bearings plus the top and base plates of the paddle's mechanism assure proper alignment so the main arm can move horizontally or vertically without movement in the unwanted direction. Our compliments to WB9LPU on this paddle's innovative design. It is definitely the result of thinking outside the box. Questions? You can e-mail Richard at <wb9lpu@earthlink.net>.

More Tiny Treats

Now shifting focus, Gordon Crowhurst, G4ZPY, introduces us to the "li'l guys" with his ultra miniature and fully functional pump key (photo 5). It is strikingly similar to Gordon's full-size keys, which are available in brass and with gold plating, and classic British influence is obvious in both the pump key's arm and center assembly. For more information, e-mail Gordon at <g4zpy@g4zpy.co.uk>.

Continuing along the mini-key path, Marshall Emm, N1FN, of Morse Express, shows us Palm Radio's new hand/pump key which is designed along the same "slide-in/snap-out of its protective cover" lines as the popular Palm Paddle (photos 6 and 7). The hand key's internal mechanism is quite impressive, but its main attraction is a tiny, optional infrared transmitter that fits on the key and a mating IR receiver that connects to a transceiver for wireless key operation (photo 8). Need to get up from the rig or move from the passenger's seat to the rear seat while mobiling? No problem. Just take your key with you.The infrared link concept also works with the Palm Paddle. For details, go to: <www.MorseX.com>.

Phenomenal Fingerpieces

Would you like to add a personalized touch of class to your favorite CW paddle? Check out the custom-made fingerpieces made by Gregg Mulder, WB8LZG, and shown in photos 10, 11 and 12. Gregg says he started the pursuit after purchasing a used paddle with broken fingerpieces at a hamfest. The fingerpieces he made came out so good that he decided to make fingerpieces for

World-Touring Morse/CW/Keys Display

K4TWJ, N3ZN, and friends have put together a very special display of telegraphic treats and artifacts plus world-class keys guaranteed to bring tears of joy to every radio amateur's eyes. The display will soon begin traveling nationwide (and then the world), and it will be available for a guest appearance at your area's amateur radio convention. Tell your convention/hamfest chairman about it!

This history-making display contains views and details of Samuel F. B. Morse's first pen and canvas-type telegraph, H. G. Martin's first battery-powered semi-automatic key, a recording (possibly authentic, possibly simulated) of the *Titanic*'s 1912 S.O.S., books and CDs on CW and keys, plus invitations to join several CW clubs. It also features an elite mini collection of noteworthy keys such as a replica of Samuel Morse's famed "Correspondent," a *Titanic* replica key, an 1880-style Chubbock key, a Vibroplex 1905-style bug, WB9LPU's new RotoBug, N3ZN's glamorous round-based magnetically-operated paddle, exotic fingerpieces from WB8LZG, and much more.

This world-touring display began as a vision by me, Dave Ingram, K4TWJ, with the purpose of passing some of our proud history and legacies from generation to generation so they live on throughout the annals of time. I shared my views with friends and their encouragement was overwhelming. They also endorsed me as its leader, since I write for magazines and have direct ties with amateur radio groups worldwide. The touring display starts here, with the hope of gaining financial sponsors and supporters so that the display can grow and continue to travel for many years hence. Additional details and booking info are available from Dave Ingram, K4TWJ, at <k4twj@cq-amateur-radio.com> or <www.k4twj.blogspot.com>.

all of his own keys and for some ham friends. As others saw Gregg's fingerpieces, requests for them increased and it became a home micro business. Photos cannot do the fingerpieces justice. They are dazzling!

Gregg makes the fingerpieces from select cuts of exotic wood, including walnut, canary wood, tulipwood, kings wood, butternut, African Padouc, Norwegian Curly Maple, Zebra wood, mahogany, and cherry. Each set of fingerpieces is made by hand, and no two are alike. If you would like more details, you can contact Gregg at <wb8lzg @sbcglobal.net>.

Conclusion

That wraps up our two-part series for this year, gang, and we invite you to send pictures and stories of your favorite keys and paddles for inclusion in next year's columns. It is already shaping up to be another blow-out special, and we always wish to include your keys in the mix. Meanwhile, keep on working CW with those terrific Morse instruments and we look forward to contacting you on 20 and 30 meters CW during the evenings ahead.

73, Dave, K4TWJ

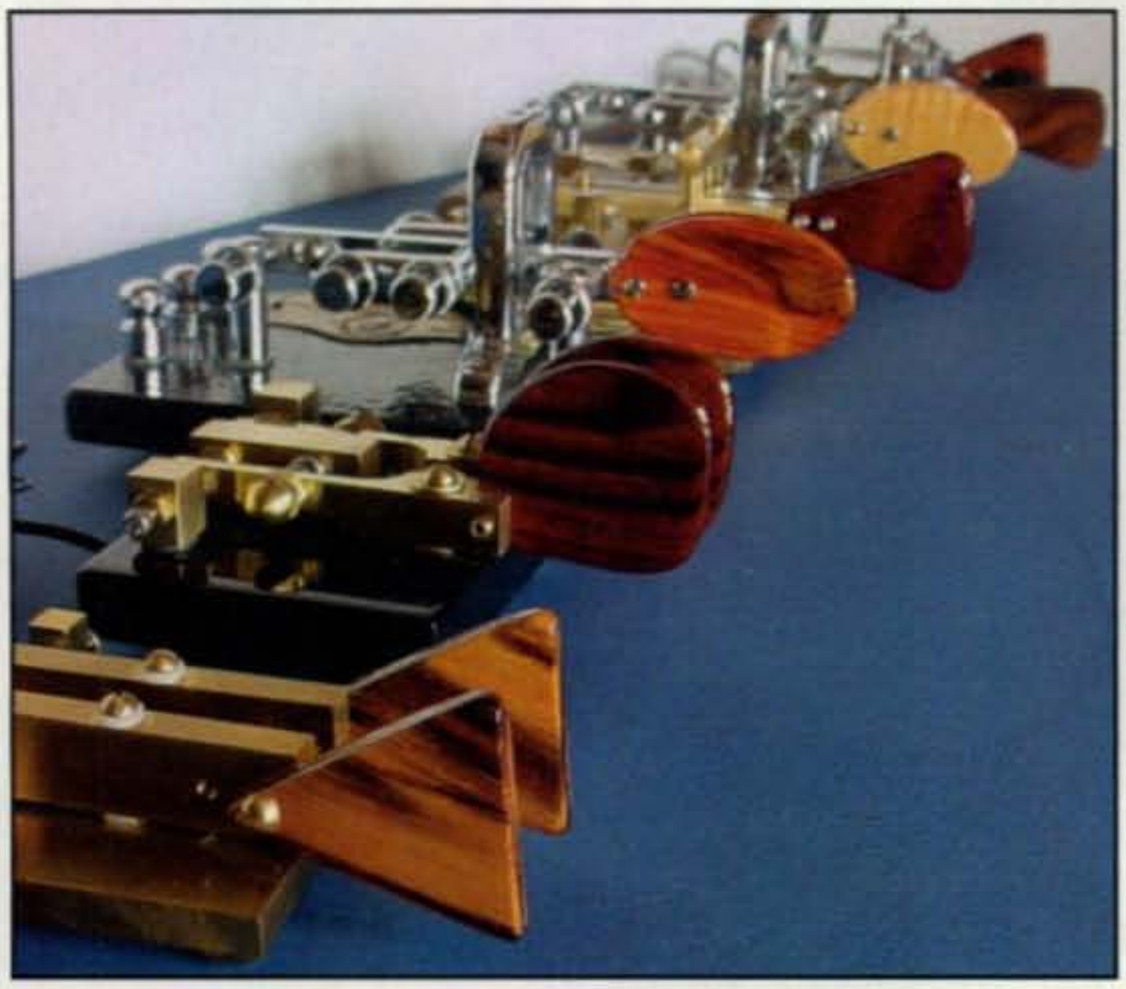

Photo 10– Gregg Mulder, WB8LZG, makes custom fingerpieces from exotic woods such as Zebrawood and Canary wood, and as this mini-collection illustrates, they really dress up a prized paddle or bug!

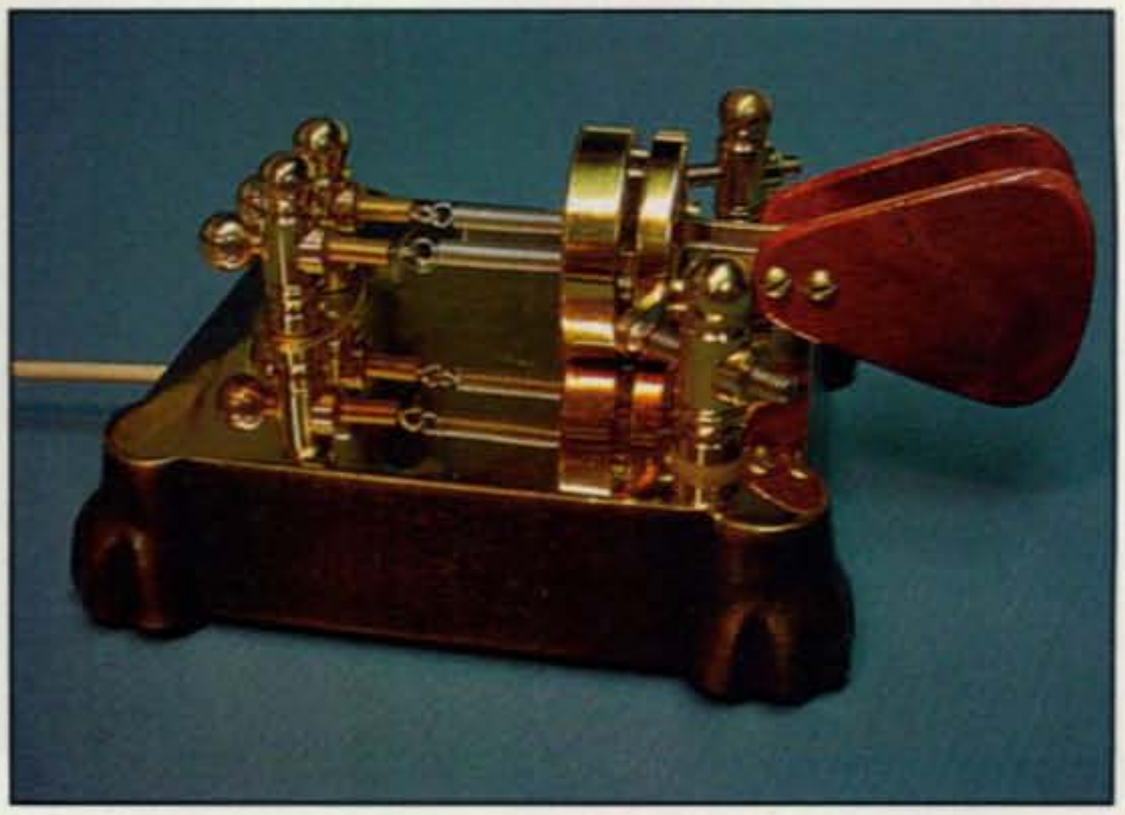

Photo 12– Is it a Bencher? No, it's a Russian-made iambic paddle decked out with custom wood fingerpieces from WB8LZG. If this doesn't get your motor running, check your pulse—err . . . battery. (Photo courtesy of WB8LZG)

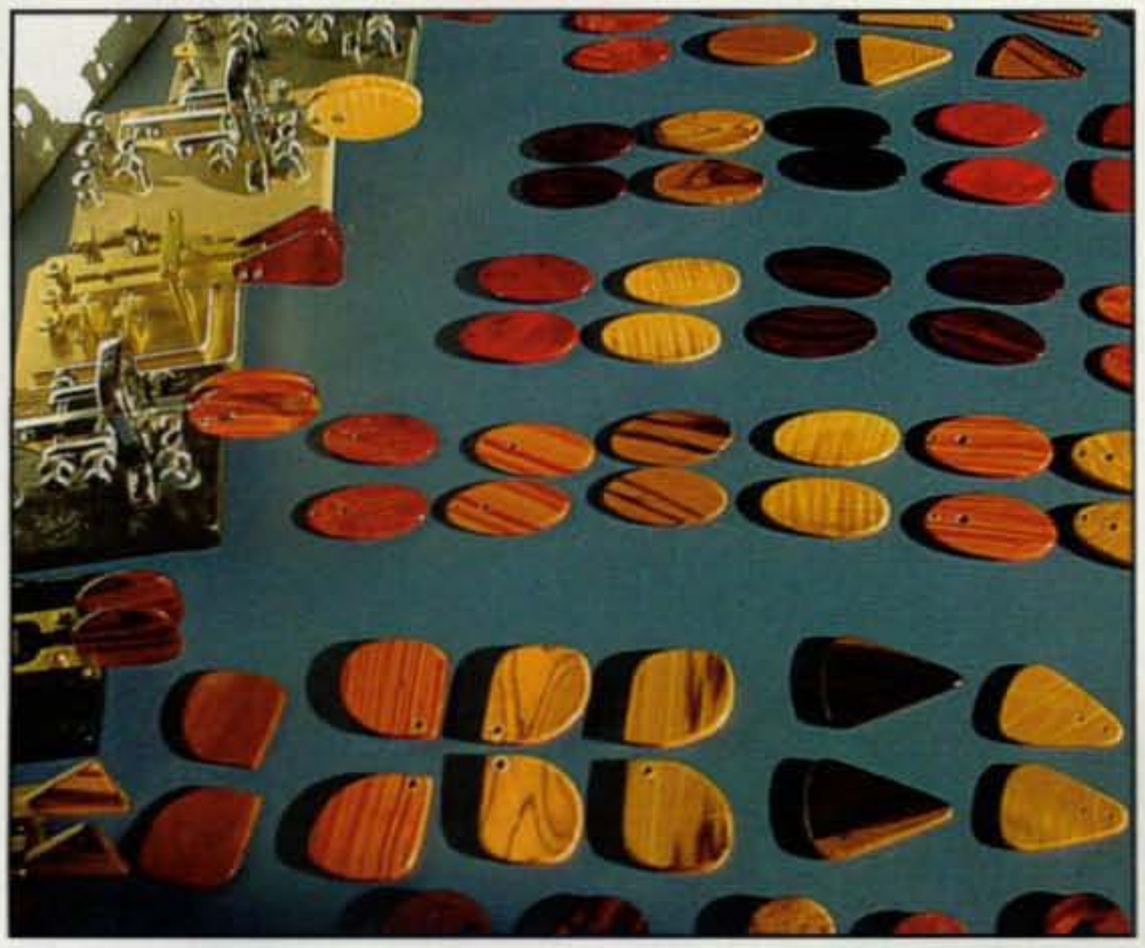

Photo 11– Some of the custom-made WB8LZG fingerpieces being readied for display at a hamfest or club meeting. With hundreds of paddles presently in production, Gregg may not have fingerpieces to go, but he can make them on short order. You can reach Gregg at <wb8lzg@sbcglobal.net>.

Photo 13– Fifty years ago Nabisco packed tiny "click-clicking" Morse keys in specially marked boxes of Nabisco Rice Honeys. My good friend Harold Kramer, WJ1B, found one on eBay (green) and he also helped me find one (yellow). Now we both feel like big-time telegraphers, just like we did as school kids. We are even giving demos at hamfests!

public service

BY BOB JOSUWEIT,* WA3PZO

APRS for Public Service – On Motorcycle and on Foot!

WA3PZO continues his extended honeymoon this month, so W2VU remains locked in the dungeon—not a bad place to be if there's a tornado!—filling in at the keyboard as editor of the column once again. Bob will be back next month.

The following is courtesy of Diane Ortiz, K2DO. Diane is a past president of the Long Island Mobile Amateur Radio Club (LIMARC) and a former columnist for CQ Contest magazine. She is also a dedicated motorcyclist and founder of the Big Apple Motorcycle School in Hicksville, NY. Here, she describes a way she found to combine her passions for ham radio and motorcycling while providing public service. — *W2VU*

Many organizations have been utilizing ham radio operators to assist in communications at events such as marathons, walk-a-thons, and bike-a-thons across the country for quite a number of years. In the New York City/Long Island area, there are many of these events and a dedicated cadre of ham radio volunteers to make sure everything runs smoothly.

Our local ARES/RACES tech guru, Walter Wenzel, KA2RGI, thought that a motorcycle with an APRS setup would be an innovative way to keep track of the lead runners in an upcoming half marathon in Suffolk County on eastern Long Island. It sounded like an interesting way to utilize technology, so I agreed to ride the route on my motorcycle and try out the APRS setup (photo A).

The Automatic Position Reporting System (APRS) was developed by Bob Bruninga, WB4APR, for tracking by combining GPS (Global Positioning System) and packet-equipped two-way radio stations. It allows for real-time tactical digital communications by the integration of maps and other data displays. (For more information about the technical aspects of APRS, see <http://www.tapr.org>.)

The setup for APRS for the Suffolk County Half Marathon event for the most part was very straightforward. The receive end (photo B) was a Kenwood TR-7400A transceiver connected to a DSRI TNC and an antenna on a 34-foot mast. The software package was the WinAPRS program by the Sproul Brothers, and the maps were the USGS TIGER MAPS. The computer was a Panasonic 300-MHz Toughbook®. The tracker end included the Byonics Micro-Trak 8000FA, which is a send-only TNC/transmitter with a Byonics GPS2 "puck-style" GPS receiver that fit neatly into my rear-seat motorcycle tailbag (photo C). We used some small

Photo A– Have APRS, Will Travel! Diane Ortiz, K2DO, is ready to roll on her APRS-equipped motorcycle in support of a local half-marathon. (Photos by Walter Wenzel, KA2RGI)

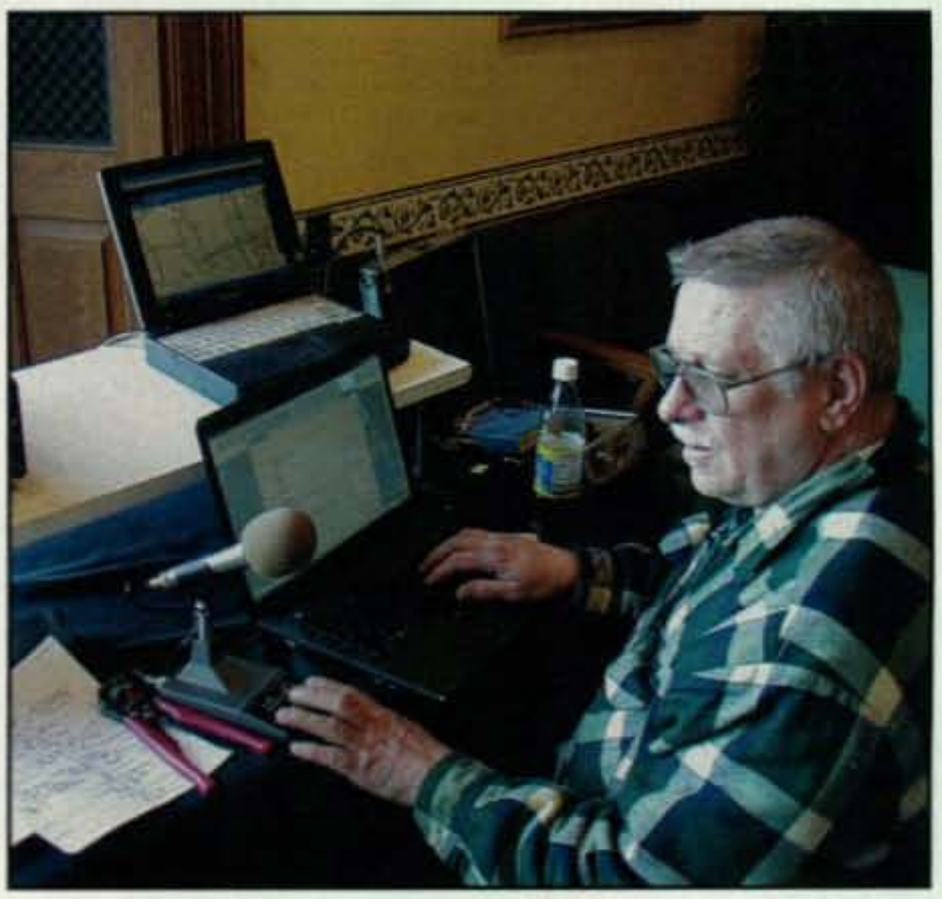

Photo B– Net Control Lance Aue, KA2EJD, coordinates ham radio communications for the Suffolk County, New York, half marathon. Note APRS map on upper laptop.

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

Photo C– The tiny TNC/transmitter unit was tucked away in storage space on K2DO's motorcycle.

rubber cones that I use for motorcycle training to keep everything in place and isolate the components in the bag.

We placed a 1/4-wave magnetically mounted antenna on the gas tank of the bike after carefully feeding the cable under the seat and tank to keep it out of the way (photo D). Some tie wraps and bungee cords kept everything in place. An additional trail vehicle used a Byonics TinyTrack 3, which is a send-only TNC, also with a GPS and connected to a mobile 2-meter radio.

Everything worked well with the motorcycle/ APRS even though we left the installation and testing for the morning of the event (*not* recommended!). I decided to use one of my

(Continued on page 60)

Photo D– A quarter-wave mag-mount antenna was attached to the top of the motorcycle's fuel tank.

President's Volunteer Service Award to KBØOFD

The following is from Ron Potter, AG1P, Assistant Emergency Coordinator for Taney County, Missouri, as well as Vice Chairman of the Taney County Local Emergency Planning Committee (LEPC) and Public Education Coordinator for the Taney County Office of Emergency Management:

We recently had the pleasure of awarding one of our volunteers, Gary Jones, KBØOFD, with the Gold President's Volunteer Service Award. Gary volunteers substantial time as net control for numerous nets, is very active in National Traffic System (NTS), and maintains several of our local bulletin board systems (BBSs) that are tied into NTS. He never misses a drill. As an Elmer, he has worked with most hams in the area. In his spare time, he volunteers in other aspects of community life, such as mowing the church lawn every week.

Chuck Pennell, Taney County Presiding Commissioner, presented the award (see photo). Chris Berndt, Director of Taney County Emergency Management, also attended and spoke about the importance of ham radio volunteers to the county. Chuck Pennell also requested that Gary attend the weekly County Commissioners' meeting so he could formally recognize Gary's accomplishments, which will be entered into County Commission minutes...

This was a rewarding experience for me, Tri-Lakes Amateur Radio Club, and Taney County ARES. We wanted to recognize our volunteers who give up considerable amounts of time to help ham radio and their community. We found this award to accomplish what we needed. The process is fairly easy. Your organization can apply to become certifying organization, which takes three to four weeks. Once registered, you can set up accounts for your volunteers to log in over the internet and record their hours. For 50–250 hours in a year, they are eligible for a Bronze award, 250–500 hours for a Silver, and over 500 hours for a Gold award. It isn't a lot of work and only costs $9.00 per award (including shipping), which includes the certificate and a really impressive lapel pin.

Gary Jones, KBØOFD (left), is presented with the President's Volunteer Service Award by Taney County (MO) Presiding Commissioner Chuck Pennell. (Photo courtesy Tri-Lakes Amateur Radio Club)

Both the County Presiding Commissioner and Emergency Management Director asked to be there for the presentation. As it turned out, this was a wonderful way to recognize our volunteers, get more visibility with our served agencies, and hopefully encourage others to get their ham radio licenses. *—Ron, AG1P*

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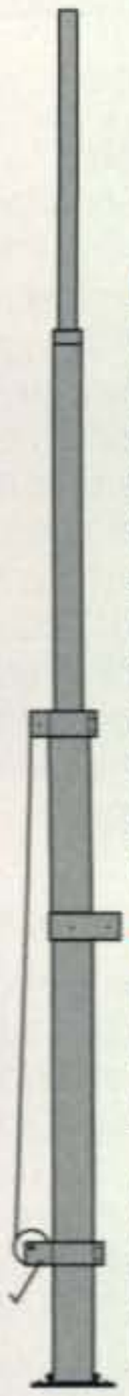

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Public Service *(from page 57)*

training motorcycles (a Kawasaki BN 125 Eliminator) because of its small size and maneuverability. It turned out to be a good choice for slow-speed riding. A factor we hadn't thought of was the weather, which was an unseasonable 28 degrees. I could have used another layer of clothing under my leathers!

The control station was able to accurately keep track of the lead runners in the race (photo E), and I didn't have to worry about transmitting via handie-talkie and could concentrate on riding the motorcycle. It was a safe and efficient way to use ham radio.

Not for Motorcycles Only

APRS can also be mounted on a bicycle or even carried, as one walker did on a recent MS benefit walk. A screen shot (fig. 1) shows a partial track that starts from the main location (KA2EJD-9), and goes east, then south, then west towards the west end of the Jones Beach boardwalk. The APRS setup was a TT3, with a GPS-1, and an ICOM IC-2AT powered by a 12-volt 7-amp/hour gel cell in a shoulder pouch carried by Tim Cregan, N2RDB, who was tracking the end of the event on foot.

"The radio work was first class, thanks to the exotic antenna system at base camp, and the professional performance of the field operators. The use of the APRS, mounted on an ARES-walker, I think, should go down in the annals of ARES support and the extremes we go to to supply it," said ARES volunteer Joe Reekie, K2KYQ. The feelings were echoed by those participating in the Suffolk County Half Marathon event.

Motorcycle, automobile, bicycle, or pedestrian-mobile APRS works and shows the versatility of ham radio communications. It also serves another purpose: It can bring back hams who may have lost interest in this aspect of public service. It worked for me, and I'm now looking forward to the next event in which I can combine my love of ham radio with riding my motorcycle!

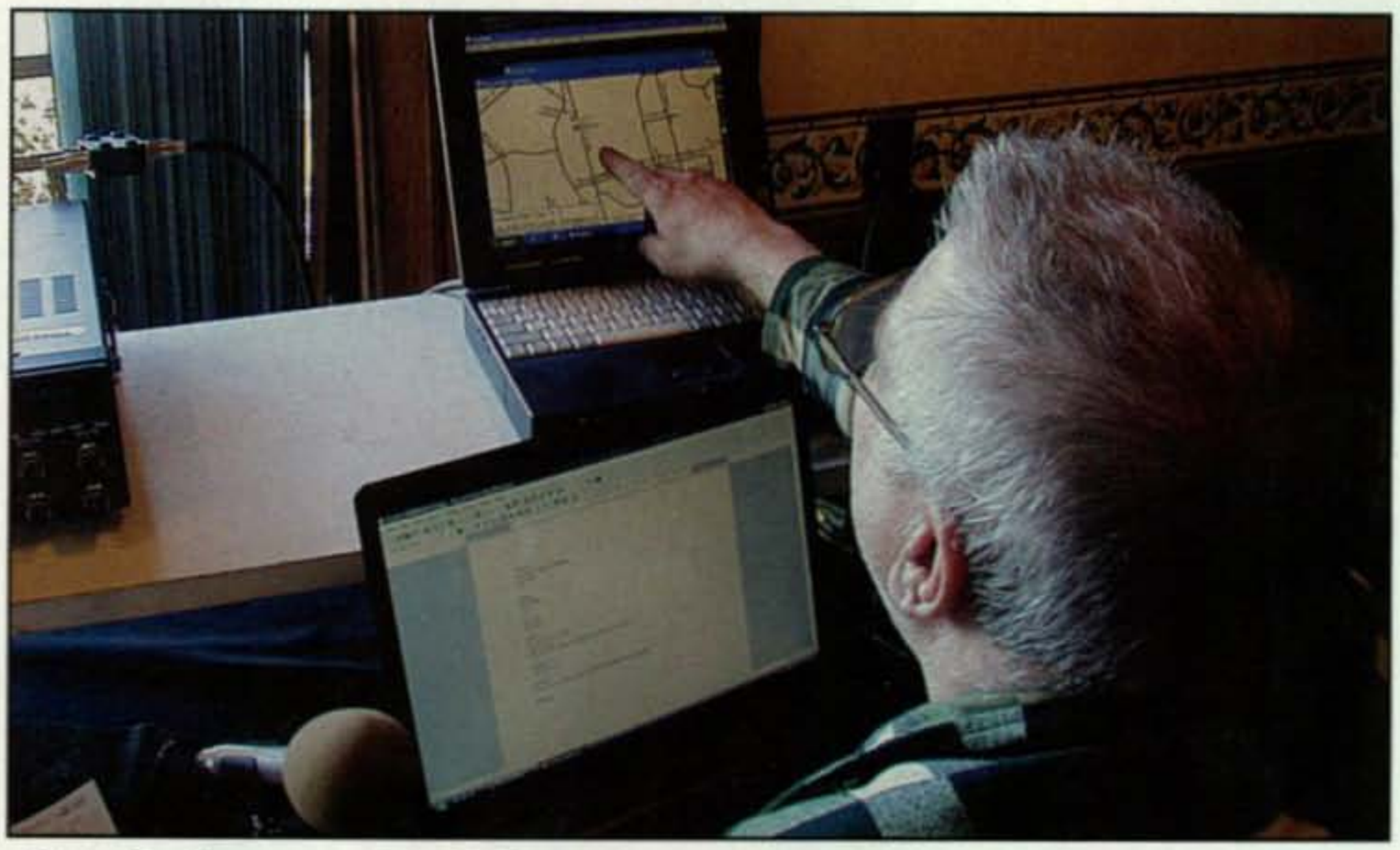


Photo E– Net control KA2EJD is able to easily track the lead runners just by looking at the APRS map screen, which constantly updated K2DO's location along the course.

With Thanks...

This month, we've looked at using APRS from a variety of platforms to help with tracking tasks, and recognized yet another ham radio volunteer who has been honored with the President's Volunteer Service Award. Many thanks to K2DO, AG1P, and all the participants in these events. 73, W2VU

Fig. 1– This screen shot tracks the movements of N2RDB as he walked the course of a charity event with an APRS-equipped handheld.

Forming an Amateur Radio Club: What You Need to Know

BY FREDERICK O. MAIA,* W5YI

If you enjoy ham radio and want to share the fun with others in your community, school, or area of interest, you might want to consider starting a ham radio club. This month let's discuss how to go about forming a club. There are specific FCC rules that apply to amateur radio clubs.

First of all, exactly what constitutes an amateur radio club is defined in the rules. Section §97.3(b) of the Part 97 FCC rules requires that a ham club be composed of at least four persons, have a club name, some sort of organizational document, management, and a primary purpose devoted to amateur service activities. That's the bare minimum requirement, *if you want your club to be eligible to hold a club station license.* Clubs may be smaller and/or more informal, of course, but those that do not meet these FCC requirements will not be considered for a club station license.

The organizational document is usually a constitution and bylaws. These consist of several articles that state the name and address of the organization, its purpose, its leadership (officers) and their duties, and who is eligible to become a member. It might also state how often meetings are to be held, dues, permanent committees, and so forth. In a nutshell, a constitution is the document that lays out the rules for the operation of your club. It is the "law of the club" and becomes the internal authority for resolving conflicts.

There is another big reason for the need of a club constitution. If the club wishes to become incorporated or apply for tax-exempt status, a constitution is required. The American Radio Relay League has an excellent sample club constitution on its website at <http://www.arrl.org/FandES/field/club/constitution.html> which can be used as a guideline.

The Club Station Trustee

One of the features of setting up a ham club is that your group may apply for a club station license and call sign. A club station license is granted only to the person who is the license *trustee* designated by an officer of the club. It is not granted to the club. The trustee must be a person who holds an Amateur Extra, Advanced, General, Technician Plus, or Technician class operator license. A Novice operator may not be a club trustee.

Being a club's license trustee is a very responsible position. The trustee is someone whom the club believes can be trusted to follow all FCC rules at all times. The club license belongs to the club, but it is the trustee who is responsible for the station's operation, and it is he/she who must answer to the FCC's enforcement branch for any rule violations. The trustee's personal ham license is on the line. In short, the trustee is the "chief control operator" for the club station.

One of the trustee's duties is to designate control operators to ensure that all FCC rules are followed at all times by everyone using the club's call sign and station. It is best to have all control operator assignments in writing, since the FCC will presume that the station trustee is also the control operator unless documentation to the contrary exists in the station records.

When the control operator is an amateur operator different from the club station trustee, both persons are equally responsible for proper operation of the station.

A club station must always have a trustee. If the trustee is deceased, or unable or unwilling to fulfill his obligations, the club must take immediate action, either by replacing the trustee or immediately taking the club station off the air.

Club Station Call Sign Administrators (CSCSA)

The FCC privatized the Club Station Call Sign Assignment System several years ago and does not accept club station applications directly. The initial club license may only be obtained by contacting a Club Station Call Sign Administrator (CSCSA). A CSCSA is an amateur radio organization that has tax-exempt status under Section 501(c)(3) of the Internal Revenue Code of 1986 and has agreed to provide voluntary uncompensated and unreimbursed services for processing applications for club and military recreation station licenses. This handling by the CSCSA replaced the old FCC Form 610-B Club Application procedure that was discontinued in January 2001.

Clubs must file the initial club license application document with one of the following three CSCSAs to obtain a new club station license. (All club station renewals and trustee changes must also be processed by a CSCSA.) The Club Station Call Sign Administrators are:

1. **American Radio Relay League, Inc.**, 225 Main Street, Newington, CT 06111. Contact: VEC Department, telephone: 860-594-0300; website: <http://www.arrl.org>; e-mail: <vec@arrl.org>.
2. **W4VEC Volunteer Examiners Club of America**, P.O. Box 41, Lexington, NC 27293-0041. Contact: Rae Everhart, telephone 336-249-8734; website: <http://www.w4vec.com>; e-mail: <raef@lexcominc.net>.
3. **W5YI-VEC**, P.O. Box 565101, Dallas, TX 75356-5101. Contact: Larry Pollock, telephone 800-669-9594; website: <http://www.w5yi.org>; e-mail: <NB5X@w5yi.org>.

The application form must contain two different signatures, the new trustee and another officer of the club. The signatures may not be the same. All

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

club applications are filed electronically with the FCC by the CSCSA. Again, the FCC will not accept club license applications straight from the club.

If a club decides to disband, a request to cancel the call sign must be forwarded to a CSCSA. The club's call sign can not be transferred to anyone.

Each of the above CSCSAs has an online application on its website that club officials may print, fill in, and mail. The same form can be used to renew the club license or to change the club's address or trustee. If you have any questions about getting a new club license and call sign, contact one of the above CSCSAs.

Club call sign administrators also process applications for military recreation station licenses. The signature of the applicant for a military recreation station must be that of the military official in charge of a station provided for the recreational use of amateur radio operators, under the auspices of the U.S. Armed Forces, and must be the official in charge of the U.S. Government premises where the military recreation station is to be located. The responsible official must not be the same as the applicant. The applicant need not be an amateur radio operator.

Club Call Sign

Your initially issued amateur radio club station call sign will contain a 2-by-3 format beginning with "K"—that is, two prefix letters, a district numeral, and three suffix letters. A club station license makes it possible for members of an amateur radio club to have a station that they may operate under a unique call sign.

A club station license carries no operator privileges. The person operating the station must use his or her own privileges. If operation takes place in the Extra class part of the band, a Technician, for example, can use the club station, but only if an Extra class control operator is present at the control point monitoring and supervising the operation. An unlicensed person may also use a club station and call sign, but only if an adequately licensed control operator is present.

Note that if the operating privileges of the control operator exceed those of the trustee (e.g., the trustee has a General Class license but you hold an Extra and are operating in Advanced/Extra Class subbands), then the station identification provisions of Section 97.119(e) that require an operator to include "an indicator consisting of the call sign assigned to the control operator's station be included after the call sign" do apply. This means you would have to sign (club call)/(your call) when you are operating beyond the trustee's privileges.

Unlike personal primary station licenses, there is no limit to the number of club station licenses that can be held by the same club. The only requirement is that the additional station licenses are legitimately needed. The FCC takes enforcement action against clubs that abuse the system and request additional club licenses as a way to stockpile preferential station call signs.

Each club station license grant is eligible for a vanity call sign and most clubs change their initial club call sign to something more meaningful ... such as having the call sign suffix letters to match those in the club's name. The vanity call sign application for a club call sign change is handled by the trustee who files with the FCC from the ULS website. The trustee does not need to go through a CSCSA once the initial club call sign is granted.

This next part is important. With one exception, the club trustee may only request a club call sign from a call sign group that is equal to or less than his own primary (personal) call sign group. For example, a General Class (Group C) level trustee may only select a club call sign from the "C" (1-by-3) and "D" (2-by-3) call sign formats; an Extra Class (Group A) level trustee may select any call sign format for the club: A (1-by-2, 2-by-1), B (2-by-2), C (1-by-3), or D (2-by-3.) Three quarters of all ham cubs have an Extra Class trustee, and there is a good reason for that. Clubs wanting a preferential (4-character) club call sign must have an Extra Class level trustee.

The one exception is for clubs that wish to reclaim a previously held (within the past two years) club call sign. A trustee may request a club station's former call sign even though it has been unassigned for less than two years, and the trustee does not have to hold a specific class of operator license to obtain it. In other words, a Technician (Group C) level trustee may request the club's former Group B or A call sign.

A club trustee may also request the call sign of a deceased person who was a member of the club even though it has been less than two years following the member's death. Upon the death of the holder, the "in memoriam" call sign is assignable immediately to an eligible club station.

It is important that the deceased amateur's license is expired or canceled from the FCC's Amateur Service database before application. If not, a copy of the death certificate, a newspaper obituary, or social-security/death-benefits documentation must be sent to the FCC, Amateur Section, 1270 Fairfield Road, Gettysburg PA 17325-7245 so that the agency may cancel the call sign.

The club must retain in its station records a written statement (do not send to the FCC unless requested) either from the deceased member before his death, or from a close family member of the deceased confirming the deceased person's membership association with the club and showing consent of the relative to the club's request. The consent is required because close family members get the first chance at a deceased amateur's call sign during the first two years following death.

The call sign format of the deceased member must be equal to or less than that of the club trustee. For example, the club trustee must be an Amateur Extra or Advanced Class operator to request a deceased member's Group B (2-by-2 format) call sign. A General Class trustee would not be able to get a club sign of a deceased member who had a Group B call sign.

A club may request a vanity call sign from any call sign district. In other words, the club's mailing address does not have to be in the call sign district designated in the sequential system for the call sign requested. (A New England ham club, District 1, may, therefore, request a call sign from any radio district, zero through nine.)

Does all of this sound confusing? Well, granted it can be, but they are the FCC's Vanity Call Sign rules which were adopted in 1995 based on comments received from the amateur community.

ARRL Affiliation

More than ten thousand of the more than 650,000 call signs in the FCC's active Amateur Service database are assigned to ham clubs. About 20 percent of these are affiliated with the American Radio Relay League. Besides giving your club extra prestige, affiliation offers benefits such as low-cost club liability and equipment insurance, use of ARRL stationery, instructor support, and other resources that will help you build your club. ARRL affiliated clubs also receive a commission for every new ARRL membership and renewal they submit to League Headquarters.

The ARRL grants affiliation to four types of clubs: (1) local amateur radio

clubs, (2) regionally or nationally organized amateur radio groups, (3) local school or youth groups, or ham clubs in homes for the elderly or disabled, and (4) club councils (organizations consisting of several clubs). Clubs must complete and submit an annual report at least once a year to remain actively affiliated.

Unless it is a school or youth group, at least half of the club's voting membership must be licensed amateurs and League members to be an ARRL affiliated *club*. School clubs only require one ARRL member ... usually the president or faculty advisor. In addition, the club name must indicate that the group is youth or school oriented. The ARRL also offers an affiliation kit online. Call the ARRL at 860-594-0230 or e-mail <clubs@arrl.org> if you need additional information.

The Club is Established; Now What?

Once you have committed to starting a ham club, you need to give it your best effort to promote its existence and expand its membership. You should put out a general announcement on places such as bulletin boards, community event listings in local newspapers, on online forums, and over the local repeater. Start a club website ... set up a weekly on-the-air net.

Be open to admitting all radio enthusiasts, not just those who are licensed. Starting entry-level ham radio licensing classes is an excellent way to attract new members. The W5YI Group offers huge discounts on study manuals to ham club instructors and has a free instructor's manual. Call (toll free) 800-669-9594 for more details.

There are all sorts of clubs. Determine your specific area of interest. Your club can be purely social/general interest, technically oriented, or focus on a specific activity such as contesting or emergency preparedness.

Periodic meetings (usually monthly) are a good way to meet the folks you talk to on the air. Select a centrally located place such as the meeting room at a local utility company, library, bank, church, or whatever. Many cities have community centers and senior citizen rooms that can be reserved at no cost for ham club meetings. Line up guest speakers or other presentations.

Leave time at the end of the meeting for socializing and sharing. Also be sure you gather contact information and call signs, so you can keep potential members informed of future club events. The main thing is to have fun.

73, Fred, W5YI

magic in the sky

BY JEFF REINHARDT,* AA6JR

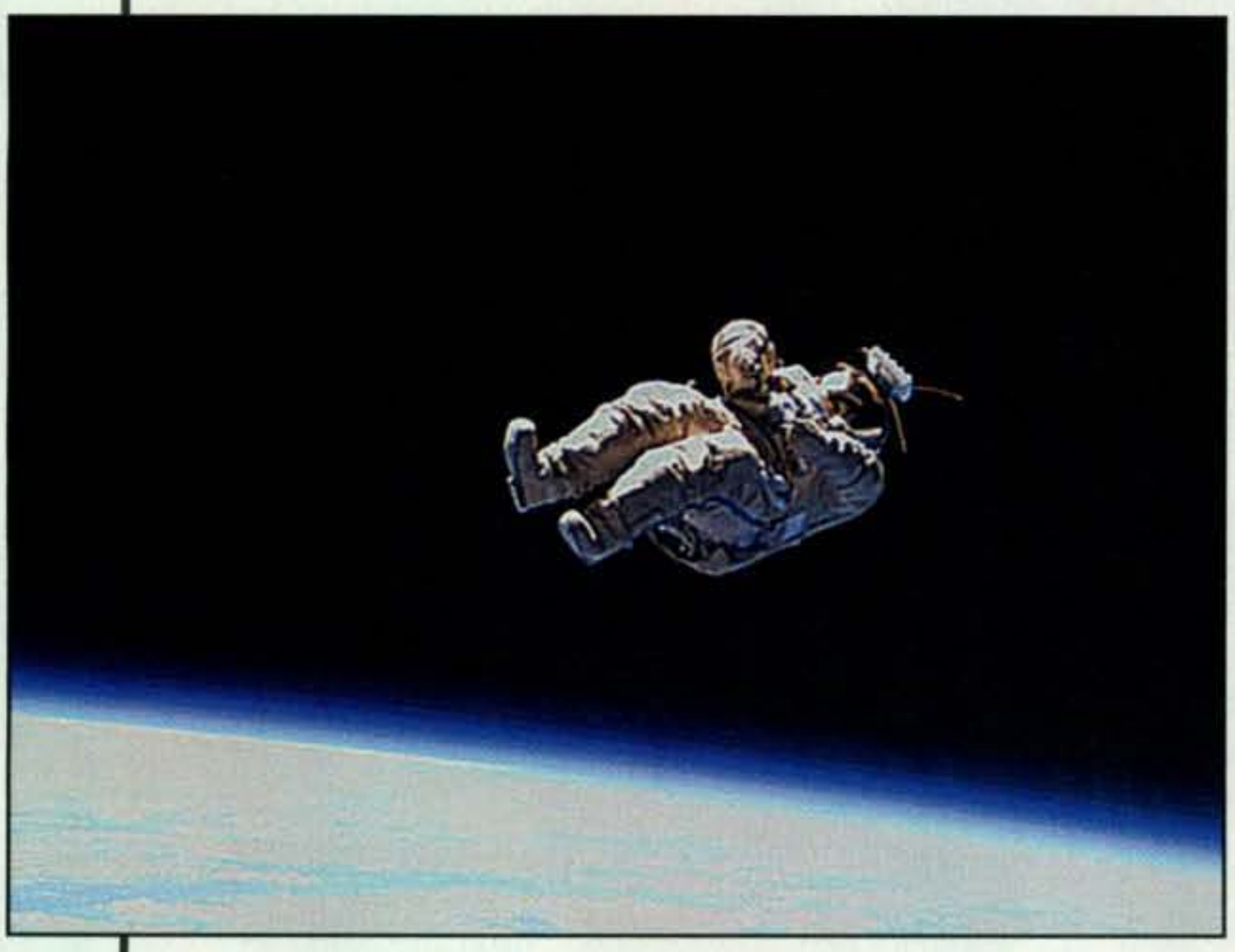
The raison d'être

The "Magic in the Sky" column that appeared in the April issue (I Miss the FCC) generated a range of responses. Some folks loved it, a few didn't like it at all, and one questioned why such subject matter would even appear in a ham radio publication. The latter stated a preference for purely technical matter in *CQ*.

Fair enough, as it's been a while since there has been any discussion on why "Magic" is here. The simple response is because of you, that person who looks in the mirror every morning. To be brief, "Magic In The Sky" is about the human element in this wonderful pursuit we call amateur radio. Instead of placing the emphasis on "radios," this column is really about the people who operate them.

Several years back, I pitched the premise of this column and I'm grateful to *CQ's* editor and publisher for granting the request for the only known "at large" column in an amateur radio publication, other than the editor's or publisher's column that appears in nearly every other magazine. "Magic" is a unique forum that allows us to explore, question, challenge, laugh, honor the past, envision the future, and discover some of the unquantifiable romance that accompanies our mutual enjoyment of the wonder that is radio. Remember the uncontrollable smile and the tingle inside that swept over you when you made your first contact? That's what this column is about.

I don't expect you to always agree with what I write. Heck, there have been times when Rich, W2VU, has held a different opinion than one stated here, as happened last April. That's OK. If some of the material in this column provokes thought or discussion, or it touches an emotion, it has served its purpose. Now on to the next subject.



SuitSat-1/RadioSkaf-1 departs from the International Space Station. (Photo courtesy of NASA)

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

What's That Coming Down From The Sky?

I recently purchased a car that came equipped with a satellite radio receiver—well, actually two, if you count the GPS navigation system. After a bit more than a month, I'm still not sure if I like it (the radio, that is). The first time I listened during my daily commute, a station I landed on unleashed a barrage of language that would make all but the most experienced sailor blush. I sure was glad my late mom wasn't in the car, and the same with young children. Anyone who knows me would tell you that if I hit my thumb with a hammer, "Oweee" is not likely to be the first thing I'd say. (I don't have a very high rating on the prude scale.) On the other hand, I wasn't quite prepared for the stream that came from my factory-fresh receiver.

After getting over that, though, it's been fun to explore the variety of material coming from the bird, from opera to opinion. On the other hand, after my sample subscription runs its course, I'm undecided at this point as to whether to drill a small hole in the bottom of my checking account to let some money leak out on a monthly basis for the service provider. One of the interesting factors is the service interruptions caused by canyons, bridges, tunnels, and the like. It takes some adjustments of one's expectations.

The upshot of this discussion is the important change satellite radio represents. Earth-bound transmitters suddenly seem old-fashioned, yet they are pushing back with syndicated programming that overlaps markets, also distributed by satellite, and "HD Radio®" also known as IBOC or *in band on channel* digital programming that's pretty amazing to listen to, especially on AM. I have two HD Radio receivers and am impressed more with the technology than I am with the programming it delivers. One drawback I've experienced with HD Radio, as with other digital RF formats, is that it needs lots of signal, but when you have it, the listening is good.

As these newer technologies emerge, it is also lamentable to note the "passing" of many shortwave stations. Our sister publication, *Popular Communications,* caters to the interests of SWLs and other radio enthusiasts, and *Pop Comm* notes even the mighty HCJB from Quito, Ecuador (just about everyone's first shortwave discovery) is scaling back, as have many other nations, including the once-magnificent BBC World Service.

Nevertheless, there's no holding back time or progress. Just as Horace Greeley advised young

men to "Go west," hams would do well to "Go up."

It's a Bird...

Hams aren't lagging satellite technology. Happily, we've been at the forefront, almost from the get-go. OSCAR I was launched in December 1961 by some hams caught up in the space race. For about a month, it sent a simple code message from above (Hi-Hi) proving that amateurs could build a bird while setting the stage for more ambitious efforts. By the way, OSCAR stands for Orbital Satellite Carrying Amateur Radio.

In 1965, OSCAR III provided hams with the first space-based repeater, and hams were just getting warmed up to the idea of satellite operations. As a result, AMSAT came to be in 1969, first as an educational organization and later as a facilitator for getting more birds in orbit. It's amazing to realize that next year AMSAT will observe its 40th anniversary. For more information on this fascinating organization, check out <www.amsat.org>. As they say on those TV infomercials, "But wait, there's more!"

Easier Than You Think

Before you "tune out" saying, "Blah! It's too hard to work satellites," stay with me for a few more lines. You don't need a room full of expensive new equipment and a three-axis rotor. Would you believe I've worked satellites using an HT and a hand-held Yagi? You can, too. It's fun, it's relatively easy, and it's inexpensive. You can do voice, packet, APRS, and a bunch of different modes.

During this elongated period of solar doldrums, if you're a frustrated HF operator, you're "missing the boat" if you've ignored satellite ops. One of the easiest "birds" to work is manned; it's the International Space Station, and if you have a 2-meter transceiver, you can hear it and work it. The uplink is 144.490 MHz FM; downlink is 145.800 MHz FM. You can program it into your 2-meter transceiver like any odd-split repeater. Like I said—easy! So much so, there is a category of birds known as EZ Sats.

Let me share a personal experience. I've worked all continents, have DXCC, and even a worked all counties award. I am among those who have had the thrill of a contact with the South Pole, so I figure my longest DX contact was maybe some 12,000 miles. Few thrills have "lit me up" as much as the first few times I heard my callsign come back from space, though. The punch line is, the space relay was maybe from an altitude of around 200 miles—*but it was from space.* That's what was so cool.

Like your first attempt at getting on the air with HF, you need to do a little prep work to work the satellites. Happily, now it's easier than ever with the internet being a ready source for much of the information you need, including the schedule of when satellites pass over your location.

Try Something New

There have been literally dozens of amateur satellites; some have worked extremely well, some not at all. Getting a bird into space is not an easy proposition. The cost of a dedicated launch vehicle is beyond our abilities as amateurs, but fortunately over the years hams have been quite adept at getting satellites aloft. This is often as "ballast" to provide the right load for a launch vehicle. Ham satellites have been launched as part of international efforts; there have been launches from the U.S., Russia, France ,and more. Several other countries have contributed time, money, talent, and technology, making hamsats a shining example of the spirit of our hobby.

Ham satellites have been basic and inexpensive (look up "SuitSat" on the internet), ranging up to elaborate and very costly, as in AMSAT's Phase III birds. No matter the cost, each adventure is a learning experience, with the added bonus of operating pleasure for those of us who simply hold a license to operate through these "high-level repeaters."

Here's a warning: Do it once or twice and you can get easily hooked on working the birds. You'll have another opportunity to score some points on Field Day and maybe have a really interesting topic for your next club meeting.

When you're *really* hooked, you'll speak with ease about ascending passes, descending passes, elliptical orbits, perigee, apogee, Keplerian elements, and more.

If you're a baby boomer or close to that age group, you can probably remember watching the first few attempts at space launches on a flickering black-and-white TV. It seemed those successes, up through the Apollo project, helped validate our efforts at math and science through the 1950s and '60s. Now we can "work the birds" with simple equipment, broadening our experiences while pausing for just a moment to appreciate the many ways we can enjoy some pretty amazing "Magic in the Sky. "

73, Jeff, AA6JR

BY PHIL SALAS,* AD5X

Build Your Own Capacitors: A Butternut Story

This month I wanted to share an interesting message I received from Roger, WAØETE, who built a replacement capacitor for his Butternut vertical antenna.

WAØETE: "It became obvious that something was wrong with my very old Butternut vertical, as the antenna tuning slowly changed with time until I could no longer resonate the antenna on all bands. The source of the problem was not obvious, as everything looked fine. Finally, however, the 80-meter capacitor fell apart—a sure sign of failure! Rather than buy a new capacitor, I decided to experiment with building one from copper tubing left over from a previous home-improvement project. The capacitor was formed by placing a 1/2-inch copper pipe within a 3/4-inch copper pipe, insulating them from one another, of course. The result was a 200-pF home-brew capacitor that replaced the original door-knob capacitor. This capacitor works fine with 100 watts of power on 80 meters. However, at 500 watts the capacitor does arc over. The remaining bands (40, 30, 20, 15, and 10 meters) all continue to handle full legal limit.

"Photo A shows the two pipes of the capacitor lying side by side. The center pipe was too small in diameter to obtain the required 200 pF of capacitance as measured with my MFJ-259B. So I increased the diameter with 1/2-inch copper splices or butt connectors until I was able to increase the capacitance to about where I needed it. These butt connectors are underneath the white glass tape. Additional glass tape was used to give increased insulation to the expanded portion of the pipe. I ended up building up the glass tape along the complete expanded section of the 1/2-inch pipe until it formed a snug fit inside the 3/4-inch pipe. I added a 3/4-inch cap to the top of the 3/4-inch pipe to make a weather seal and give me metal to mount the top to the antenna. I drilled a hole and silver-soldered a brass 8-32 nut to the top to finish it off. Be careful to not let melted solder flow on the inside of the 3/4-inch pipe or you won't be able to slide the two pipes together. When pushing the center tube inside of the outer tube, you can't push it all the way to the top, or it will arc and burn up the top

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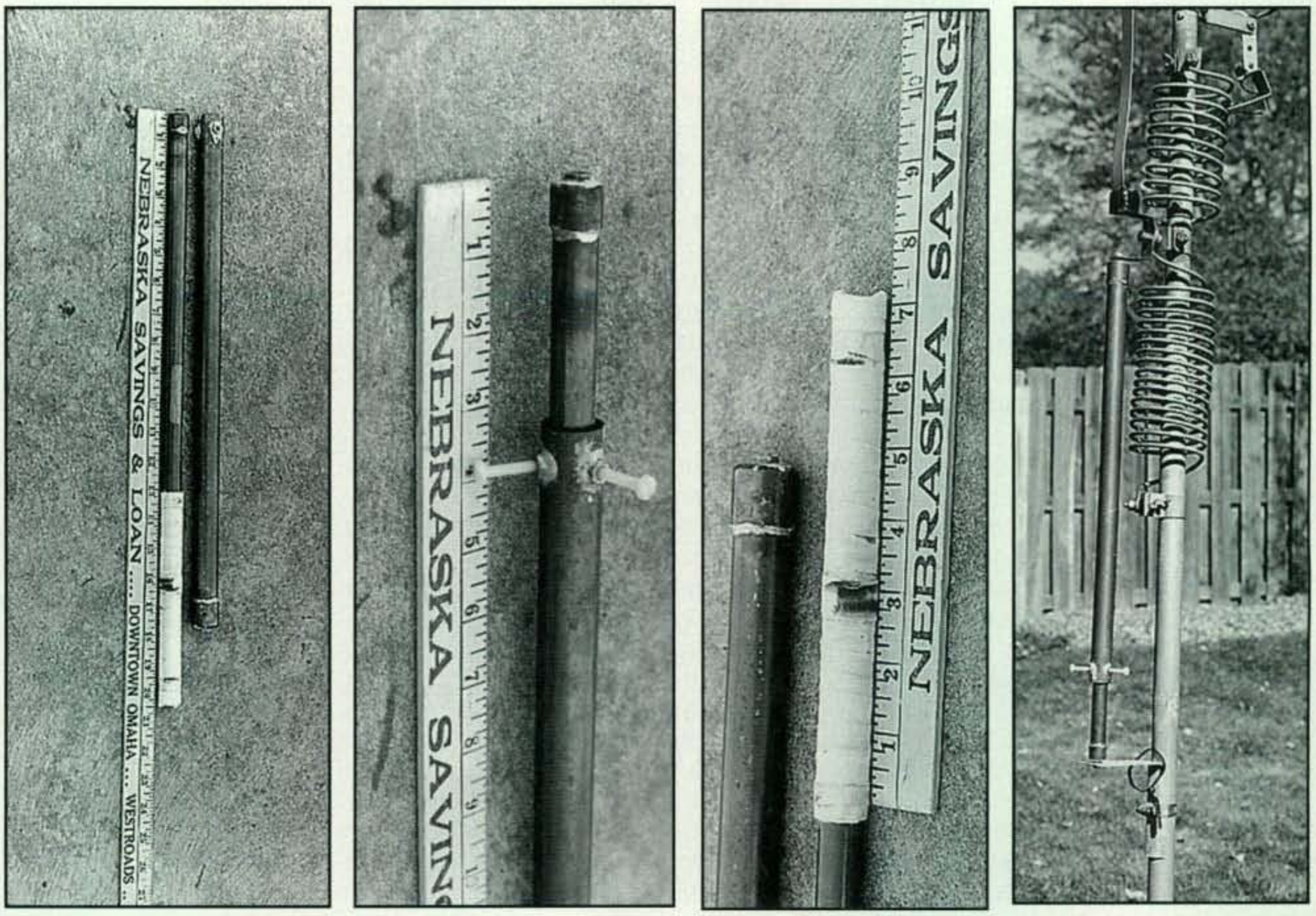

Photo A– Copper pipes used for building the 80-meter capacitor.

Photo B:–Close-up of the bottom of the home-brew capacitor.

Photo C– Close-up of the prepared inner tube.

Photo D–The final capacitor mounted on the antenna.

tape, resulting in a conductive carbonized tape. I left a 1/2-inch to 3/4-inch gap below the top of the 3/4-inch pipe. The whole thing measures about 21 inches in length.

"Photo B is a closer view of the bottom of the capacitor showing the silver-soldered 8/32 nuts on the end of the copper tube and on the sides of the tube for the nylon centering screws. I first tapped the water pipe, but the threads were too thin and the nylon screws stripped easily. I also wanted to be able to really tighten a brass mounting screw on the end of the pipe so it wouldn't come loose with temperature variations. This also shows the centering of the 1/2-inch pipe inside the 3/4-inch pipe.

"Photo C is a close up of the expanded portion of the 1/2-inch copper tube. The glass tape was wound with about 1/2 inch of extra tape on the bottom and top of the expanded sections to give a bit of extra insulation. The section of side-by-side 1/2-inch splices is about 7 inches in length. These splices were connected to short sections of 1/2-inch pipe and soldered into place with very little space between the splices. This makes a very stable mechanical and electrical element.

"Photo D shows the finished capacitor mounted on my antenna using a home-brew lower capacitor mounting bracket made from a bent piece of sheet aluminum. The white screws at the lower end are nylon 8/32 screws used to hold the 1/2-inch copper pipe securely inside the 3/4-inch copper pipe.

"The end result is a stable capacitor of about 235 pF that is impervious to rain and wind. It doesn't handle high power on 80 meters, but I don't use high power on that band anyway. Obviously, larger pipe diameters would provide more inner-pipe-to-outer-pipe spacing and improve the power handling capability." *—Roger, WAØETE*

This turned out to be a useful and interesting project that has other applications as well. The particular capacitor that Roger built was fairly high in value (approximately 200 pF). However, similar techniques can be more simply applied to lower value capacitor projects.

Well, this has given me some interesting ideas for building antenna traps using home-brew capacitors. I'll pursue some of these ideas next month. Until then... 73, Phil, AD5X

how it works

VOMs, Noise Bridges, and Antenna Analyzers

BY DAVE INGRAM,* K4TWJ

Basic test equipment such as Volt Ohm Meters, noise bridges, antenna analyzers and oscilloscopes are an integral part of our life in amateur radio, yet ground-floor descriptions of how they work and how to use them often seem a mite elusive. Why? Opinions vary, but I would say we all tend to assume newer amateurs acquire such knowledge by sheer magic—like it comes bundled in a package you receive with your license. Such is not the case however, so this month's column presents a coming-up-to-speed look at everyday test gear, and we will follow in two months with a similar keep-it-simple look at oscilloscopes. Hopefully, newer amateurs will find these notes useful both today and many years hence. Let's begin with the most often used test instrument in (and out of) any shack—the Volt Ohm Meter (also sometimes called a Volt Ohm Milliammeter).

VOMs

The classic VOM (photo A) is akin to three instruments in one: a voltmeter, an ohmmeter, and a current meter, and I would estimate that more than 50 percent of the time we use it simply for checking continuity—that is, we use it to determine if a switch is working, the filament in a tube or light bulb has a connection or an open circuit, if cable/plug connections are good, etc. The remaining time we use a VOM to check batteries, output voltage of power supplies, AC outlets around the house and, if you are technically minded or a homebrewer, to determine if a unit or circuit is drawing current (a first step in troubleshooting).

As a convenient means of familiarization, a simplified circuit diagram of a generic VOM is shown in fig. 1. Note that one meter terminal is connected to the common or negative test-lead socket, while the other terminal is switched between test-circuit sockets. Looking first at the *ohmmeter circuit* (A in fig. 1), it consists of a meter, a battery, and two resistors wired in series. In an analog VOM, the meter's probes are first touched together and the potentiometer adjusted for full-scale reading, and then the probes are touched to the item under test. The item's resistance reduces current flow, causing the meter (calibrated with a "backward reading scale") to read less than full scale and indicates the associated ohmic resistance (to current flowing through the resistors).

Assume, for example, that the battery is 3 volts and the total resistance including that of the meter is 1K ohm. Touching the probes together will cause the meter to read between three-quarter and full scale according to the "zero" setting of the potentiometer. Then touching the probes to, say, a resistor of 5,000 or 10,000 ohms introduces more resistance in the circuit so the meter reads lower, or a higher value of resistance (that is the "backwards scale" we mentioned). Digital VOMs do not need to be "zeroed" for an accurate reading.

Since basic VOMs apply a small amount of voltage to items/circuits being checked for continuity or resistance, care must be exercised to prevent damaging sensitive components such as CMOS, ICs, MOSFETS, Schottky diodes, etc. An electronic Volt Ohm Meter is required for such tests. Confusing? Just remember this simple rule: If the item has a warning about static electricity damage, heed it. Don't test it with a basic VOM.

Looking next at a VOM's *voltmeter circuit* (B in fig. 1), we see it does not use a battery, but has a "multiplier" resistor connected in series with the meter. The multiplier's resistance is quite high; its purpose is to produce a large voltage drop so only a very small (but accurate) sampling of the voltage under test is applied to the meter. As a simple example and assuming we wish to measure 100 volts, the multiplier resistor would drop 99.xx volts, so less than 1 volt (0.xx volt) is actually applied to or measured by the meter.

I should also note that a sensitive meter (one with a rating of 20,000 ohms per volt or greater) is preferable to avoid "loading down" a circuit or item under test and getting a fully accurate voltage

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Photo A– Two easily recognized examples of Volt Ohm Meters are the ever-famous (and analog-type) Simpson 260 meter (left) and the Beckman DM-15XL digital-type meter (right). I am partial to the Simpson, as my father designed the original burnout-proof model 260.

reading. Low-cost (1,000 or 10,000 ohms per volt) meters are handy for checking whether voltage is or is not present. Just remember that their accuracy is limited (ohms per volt ratings are usually marked on the meter or listed in the meter's operating manual). Finally, a front-panel switch selects different internal multiplier resistors for measuring different voltage levels.

Shifting focus to a VOM's *milliamp meter circuit*, (C in fig. 1) we see it con-

Photo B– This affordably priced MFJ-202B Noise Bridge works in conjunction with an HF transceiver to measure an antenna's resonant frequency, resistance, and capacitive or inductive reactance. Since it is small and affordably priced, some folks call it "a poor man's antenna analyzer."

Photo C– The ever-popular MFJ-259B Antenna Analyzer measures resonant frequencies, impedance and resistance of antennas, plus coax-cable link losses, faults, etc. The unit covers 1.8 to 170 MHz and indicates SWR and impedance on separate meters plus resonance frequency and inductive/ capacitive reactance on its LCD panel. It is self-contained and battery powered, so you can pre-tune an antenna before even switching on your transceiver. (Photo courtesy of MFJ Enterprises, Inc.)

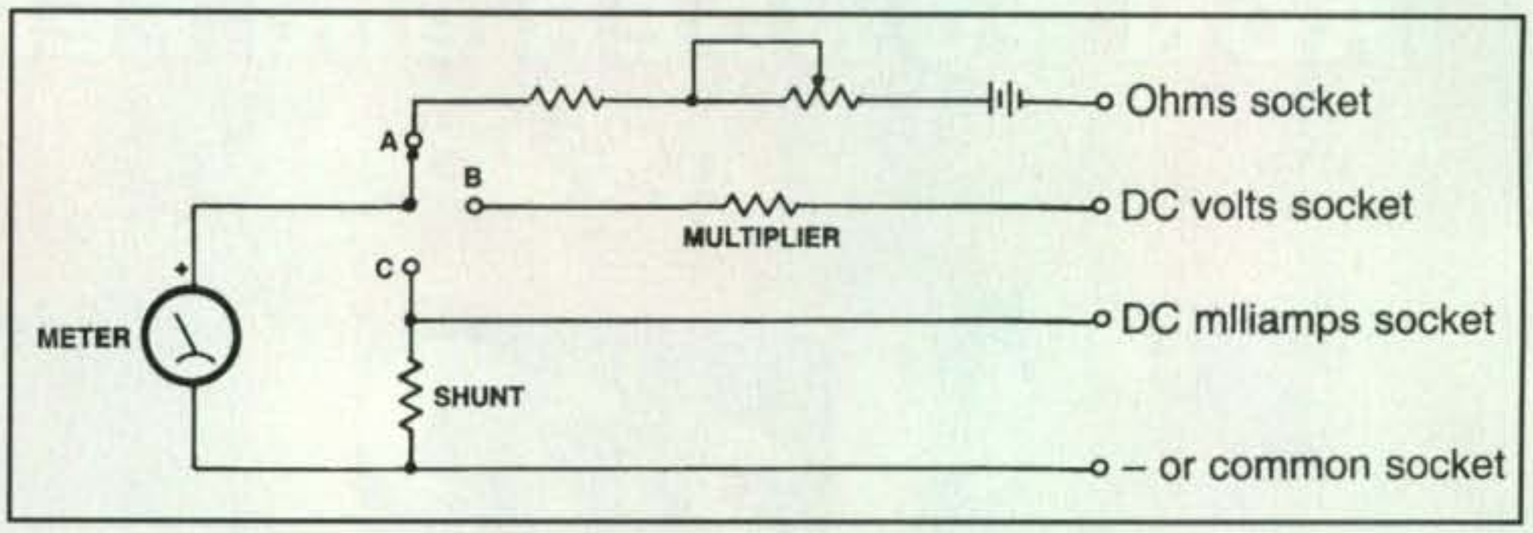

Fig. 1– Simplified circuit diagram of a classic Volt Ohm Meter indicating (A) how series-connected resistors and a battery are used for measuring ohms, (B) a multiplier resistor is used for measuring volts, and (C) a parallel/shunt resistor is used for measuring milliamps.

sists of a low-value resistor connected in shunt or parallel with the meter. Since current takes the path of least resistance and the value of shunts typically is less than 1 ohm, 99.xx percent of the current being measured goes through the shunt and less than one percent goes through the meter. Also, by switching in other value shunts, different amounts of current can be measured. Many VOMs or multimeters are also sold with external shunts for measuring high currents. The shunts typically look like a thick strap of metal that plugs into the meter's ma or amp sockets and then accepts the meter's test leads.

All of our previous notes, incidentally, relate to DC voltage and current measurements. Since (high-resistance) voltage multipliers/probes and low-resistance current shunts are made with specific and precise resistance values, they are VOM-specific and seldom are transferrable between different brands and models.

I also must emphasize to always exercise maximum care and caution when measuring voltage and current. You may be fully aware of high voltage lurking in a circuit or socket, but an accidental slip of the hand or crossing of test leads can cause a fiery short circuit. Similarly, a slip and crossing of test leads when measuring high current can cause a short circuit and, assuming sufficient current, enough heat to produce serious burns. The bottom line? Visualize what is involved and what you will be doing/ checking before actually doing it, and then proceed with maximum caution. I say that not to frighten you, but to keep you alert, focused, and safe.

The concept of using voltage multipliers, current shunts, etc., is also incorporated in digital multimeters. The main difference is DMMs utilize triangular/ ramp generator and comparator circuits to convert the variable being measured to time or voltage counts that are indicated on a digital display. That is the main difference—but there are other variations and input levels must be low—and that is where multipliers and shunts are used (to measure different ranges).

Noise Bridges

A quite handy and low-cost instrument for basic antenna analysis is the noise bridge, which is basically a wideband (1 MHz to 100 MHz or higher) noise generator feeding a Wheatstone Bridge as shown in photo B and fig. 2. When the left and right sides of the bridge are balanced, the variable capacitor and fixed capacitors' reactance is equal and the potentiometer's resistance equals the antenna's impedance; continuous "white noise" monitored on a connected receiver (or transceiver) is nulled out. The antenna's resonant frequency (the noise nulled frequency) is then read on the receiver's dial, its impedance is read on the potentiometer's calibrated dial, and any reactance (capacitive or inductive, depending on whether the antenna is too long or too short) is read on the capacitor's "zero center" dial.

Alternately, the variable capacitor can be set at "0 center," the potentiometer set at 50 ohms, and the receiver tuned to find the noise null—which coincides with the antenna's resonant frequency. Assuming zero reactance and 50-ohm dial settings still produce the deepest noise null, the SWR will be 1:1. If the deepest null coincides with 37 or 75 ohms, the ratio is 1.5:1, and if the null is near 25 or 100 ohms, the SWR is approximately 2:1. A receiver or transceiver must be used with a noise

Photo D– The new miniVNA software-defined antenna analyzer is available from <www.w4rt.com>. The unit connects to a computer and antenna and displays your selected parameters (sweep range, SWR, 2:1 bandwidth points, etc.) on the monitor's screen. (Photo courtesy of Barry Johnson, W4WB)

AMERITRON mobile *no tune* Solid State Amp

500 Watts, Instant bandswitching, no tuning, no warm-up, SWR protected, 1.5-22 MHz . . .
NEW! ARI-500 Amplifier Radio Interface reads transceiver band data -- automatically band-switches ALS-500M amp . . . NEW! ALS-500RC Remote Head gives total remote control!

Just turn on and operate -- no warm-up, no tuning, instant bandswitching. Compact.

Ameritron's ALS-500M solid state *mobile* amp gives you 500 Watts PEP SSB or 400 Watts CW output! Covers 1.5-22 MHz, (10/12 Meters with MOD-10M, $29.95 kit, requires FCC license).

Virtually indestructible! *Load Fault Protection* eliminates amplifier damage due to operator error, antenna hitting tree branches, 18-wheeler passing by. *Thermal Overload Protection* disables/bypasses amp if temperature is excessively high. Auto resets.

Typically 60-70 watts in gives full output. ON/OFF switch bypasses amplifier for "barefoot" operation. Extremely quiet fan comes on as needed. Excellent harmonic suppression, push-pull output, DC current meter. 13.8 VDC/80 Amps. 3½x9x15 inches. 7 lbs.

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Suggested Retail

Choose ARI-500 for fully *automatic bandswitching* or ALS-500RC for *manual* remote control.

***New* ARI-500, $119.95**, *Amplifier Radio Interface* reads band data from your transceiver so you can *automatically bandswitch* your ALS-500M amplifier. *See right inset.*

***New* ALS-500RC, $49.95**, *Remote Head* lets you mount ALS-500M amplifier *anywhere* and gives you full *manual remote control*. Select desired band, turn On/Off and monitor current draw on its DC Current Meter. Power, transmit and overload LEDs. RJ-45 cables plug into Amplifier/ Remote Head. Works with serial numbers above 13049 (below 13049 requires the ARF-500K, *see below*).

ALS-500M, $849, 500 Watt mobile amp.

ALS-500MR, $879, ALS-500M mobile amp *plus* ALS-500RC *Remote Head.*

ARF-500K, $179.95, Remote kit for older ALS- 500M mobile amps with serial # below 13049. Includes filter/relay board for ALS-500M, AL-500RC Remote Head, cables, hardware, instructions.

ARF-500K2, $289.95. Includes ARF-500K Remote kit for older ALS-500Ms *plus* ARI-500 *Amplifier Radio Interface* below.

Let your rig *auto bandswitch* your ALS-500M Amplifier

ARI-500
$119.95
Ship Code A

The Ameritron ARI-500 *Amplifier Radio Interface* reads band data from your Icom, Yaesu, Kenwood or Alinco transceiver so they can remotely and automatically bandswitch your ALS-500M amp. Lets you mount your ALS-500M out-of-the-way in your trunk. Works with serial numbers above 13049 (below 13049 requires the ARF-500K, *see above*). You can add the ALS-500RC for manual bandswitching and data monitoring, etc, *see left description.*

Programmable Screwdriver Antenna Controller

10 Memories . . . Super Accurate . . . AutoPark™ . . . StallProtector™ . . . Super bright LEDs

Tuning your mobile screwdriver antenna couldn't be easier or more reliable!

The SDC-102 lets you save *10* of your favorite screwdriver antenna positions in memory -- that's more than enough for all HF bands. Then, with a push of a button, you can quickly return to any saved position.

Up/Down buttons let you manually move the antenna to any desired position. A 4-digit turns counter gives you precise antenna position -- you can see its *super bright LEDs* even in direct sunlight!

Returning to a position from memory is extremely accurate for three reasons . . .

A. The antenna always moves to its desired position from the bottom, insuring that the motor is always loaded the same.

B. Ameritron's exclusive *AutoPark™* feature automatically bottoms your antenna for parking in your garage and *resets and calibrates* your counter each time to eliminate antenna slippage and turns count errors.

New!
SDC-102
$129.95
Suggested Retail

C. The momentum of the moving antenna causes it to overshoot its stop point. Ameritron's exclusive *Dead-OnSTOP™* feature automatically reverses the motor briefly just before it stops to eliminate overshoot and come to a precise stop.

Ameritron's exclusive *StallProtector™* feature prevents your expensive motor from burning out. Automatically detects motor stall and completely shuts off power to motor.

Monitor motor current on LEDs for signs of trouble and to determine stall current.

If you wire the motor backwards, you can reverse its direction from the SDC-102 front panel so the UP button is always up and the DOWN button is always down.

Compatible with single and dual magnetic turns sensors. Requires 12 VDC.

3½Wx3¼Hx1¼D inches.

SRS-100, $29.95. Magnetic sensor kit for High Sierra antennas to use SDC-102.

SRS-1001, $9.95. Magnetic sensor kit for Hi-Q Antennas to use SDC-102.

1.2 kW Screwdriver Antenna

SDA-100
$409
Suggested Retail

SDA-100 lets you operate 3.5 to 30 MHz continuous with six foot whip at full 1200 Watts PEP.

World's most rugged screwdriver antenna features . . . super heavy-duty commercial Pittman 12 Volt gear motor . . . stainless steel/ aircraft aluminum CNC machined components . . . 2-inch machine groove fiberglass coil form with 14-gauge wire wound at 8 turns per inch . . . built-in magnetic sensors . . . super durable Lexan cover . . .

SWP-100, $24.95. 6-ft stainless whip.
SDM-100, $99. Stainless steel mount.
Saves $16.85! **SDA-110, $509.95.** Includes SDA-100, SDC-100, SWP-100.

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Ultra-thin 1⅝ inch flat mobile SWR/ Wattmeter *flat mounts* on your dashboard wall or shelf for easy viewing. Lighted Cross-Needle meter and *active* electronics let you read *true* peak or average power in 3000/300 Watt ranges 1.8-30 MHz. "High SWR" LED. 5Wx3¼Hx1⅝D inches. *Remote sensor* with 25 feet thin, flexible cable is 3½Wx2¾Hx2¾D inches. Use 9V battery or 12 VDC.

Digital Screwdriver Controller

SDC-100
$99.95

4-digit *super bright* LEDs let you re-tune *exactly* -- fast, no guessing. Digital count range -999 to +999. On/off/reset switch for easy calibration. 4Wx1½H x2D". Use 13.8VDC.

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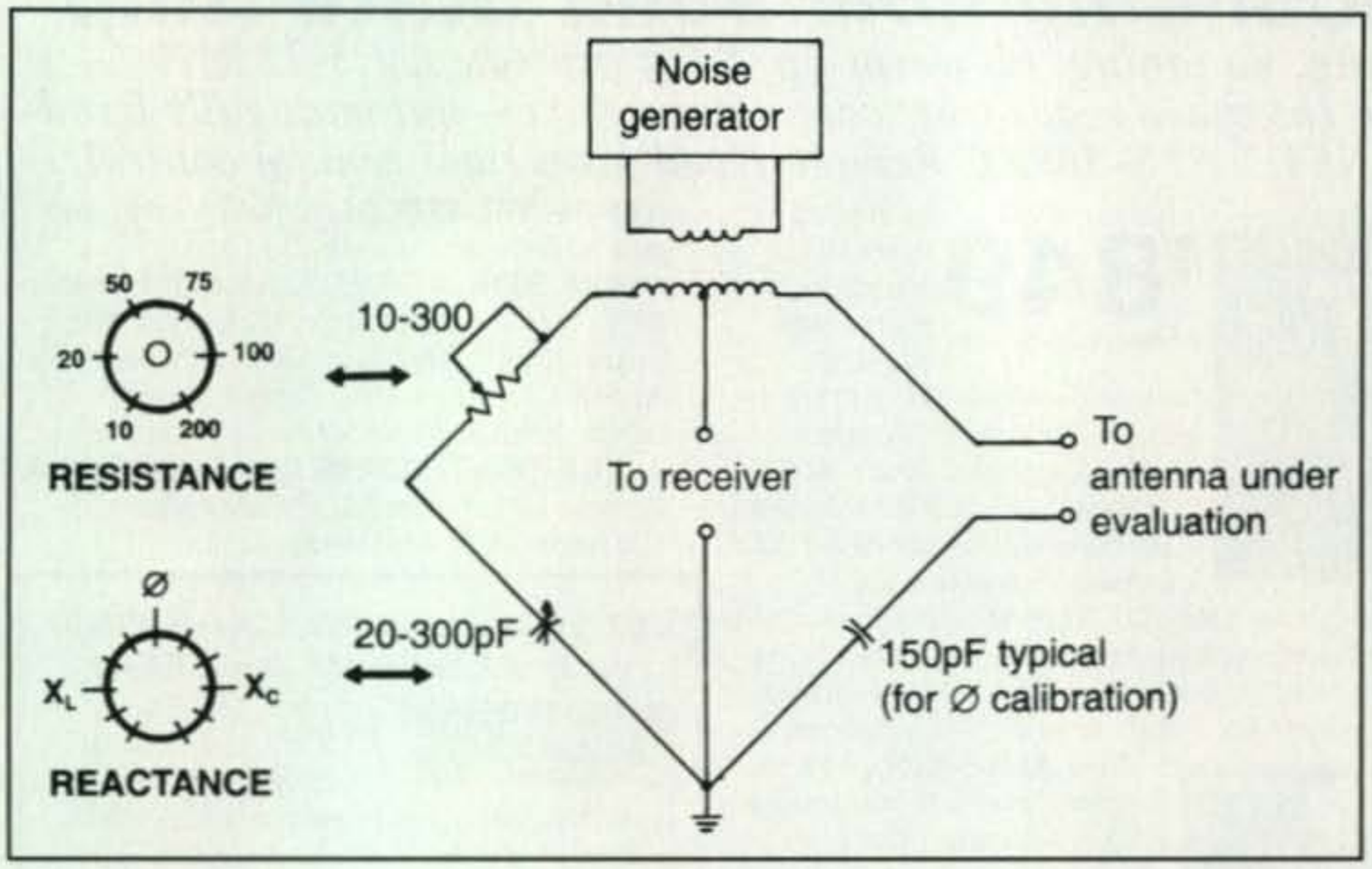

Fig. 2– Simplified circuit diagram of an antenna noise bridge. The concept involves adjusting the variable resistor and capacitor to balance the left and right sides of a Wheatstone Bridge, and then reading resonant frequency on the connected receiver plus antenna resistance and reactance on the bridge dials.

one" analyzer as shown in photo C and fig. 3. Indeed, these items have so many features, functions, and frills that we can only hit their high points here.

They directly read an antenna's impedance, SWR, and resonant frequency, plus you can direct-tune them to any frequency between 1.8 and 170 MHz and read the associated SWR, impedance, and inductive or capacitive reactance on their LED screen. By slowly tuning the analyzer's frequency control across a band while watching frequencies and SWRs on the display, you can also determine an antenna's 2:1 or 1.5:1 bandwidth and its center resonant frequency (and the exact SWR at that point). Additional capabilities include checking coax cables, tuning loading coils, presetting an antenna tuner's controls before transmitting, and, since the analyzer is self-contained, it can be used in the shack or in the automobile—or atop a tower. These gems do it all!

Looking briefly at what's inside the box (fig. 3), an antenna analyzer consists of a Wheatstone Bridge with a high-grade signal generator on its input and a metering section for measuring SWR and various other parameters on its output. One side of the Wheatstone Bridge is comprised of a capacitor and resistor. The other side is comprised of a capacitor and the antenna under test. As you tune the signal generator, its frequency

bridge (so you can tune for a noise null), but it is a good "grab-'n-go" item for home, portable, and mobile use.

Standalone Antenna Analyzers

Today, surely the most popular test instrument for antenna work is the "all-in-

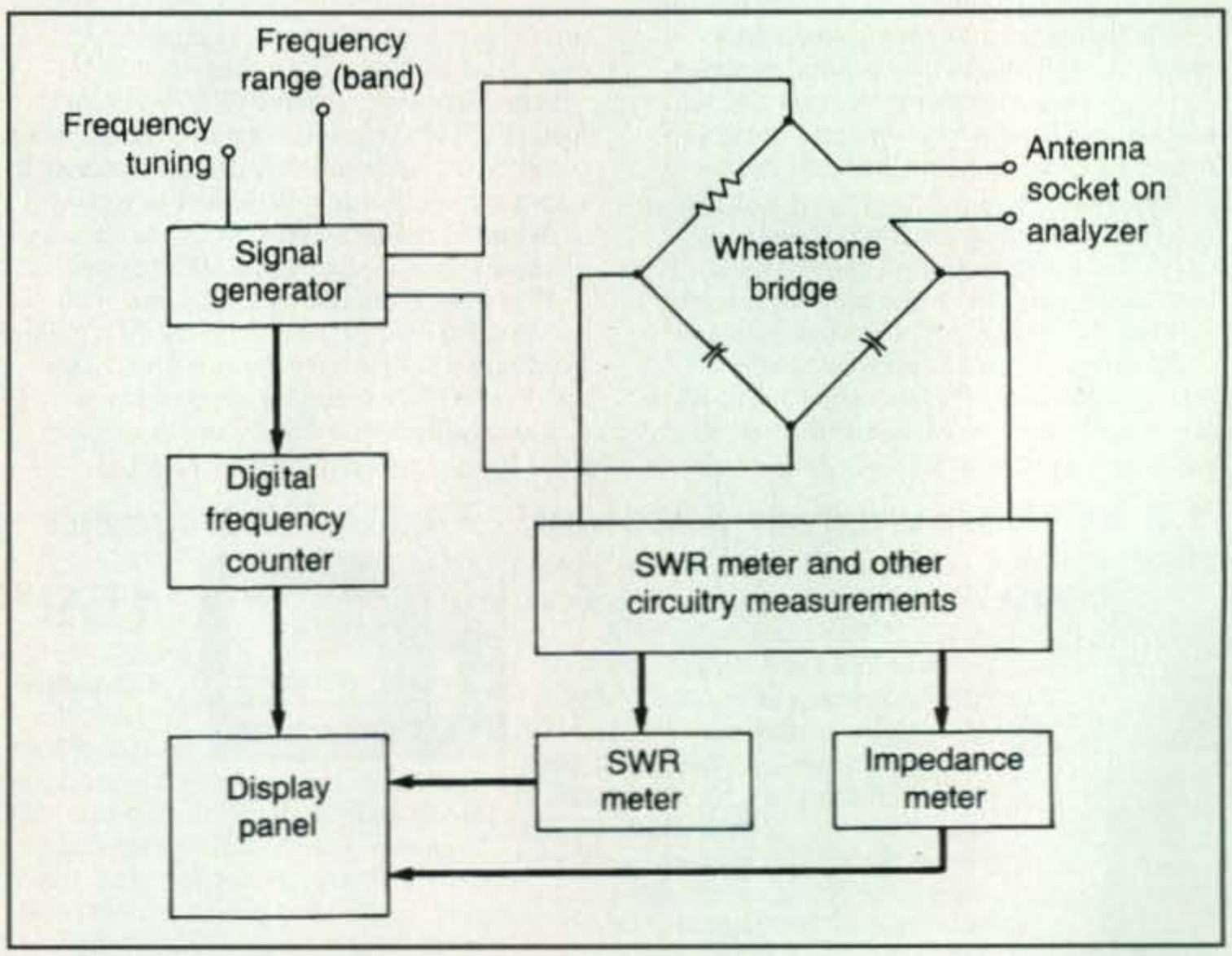

Fig. 3– Simplified diagram of a standalone antenna analyzer such as the MFJ-259B discussed in the text. It is a super-elaborate antenna noise bridge plus calibrated signal generator with frequency counter, SWR bridge, display panel, meters, etc., in one box.

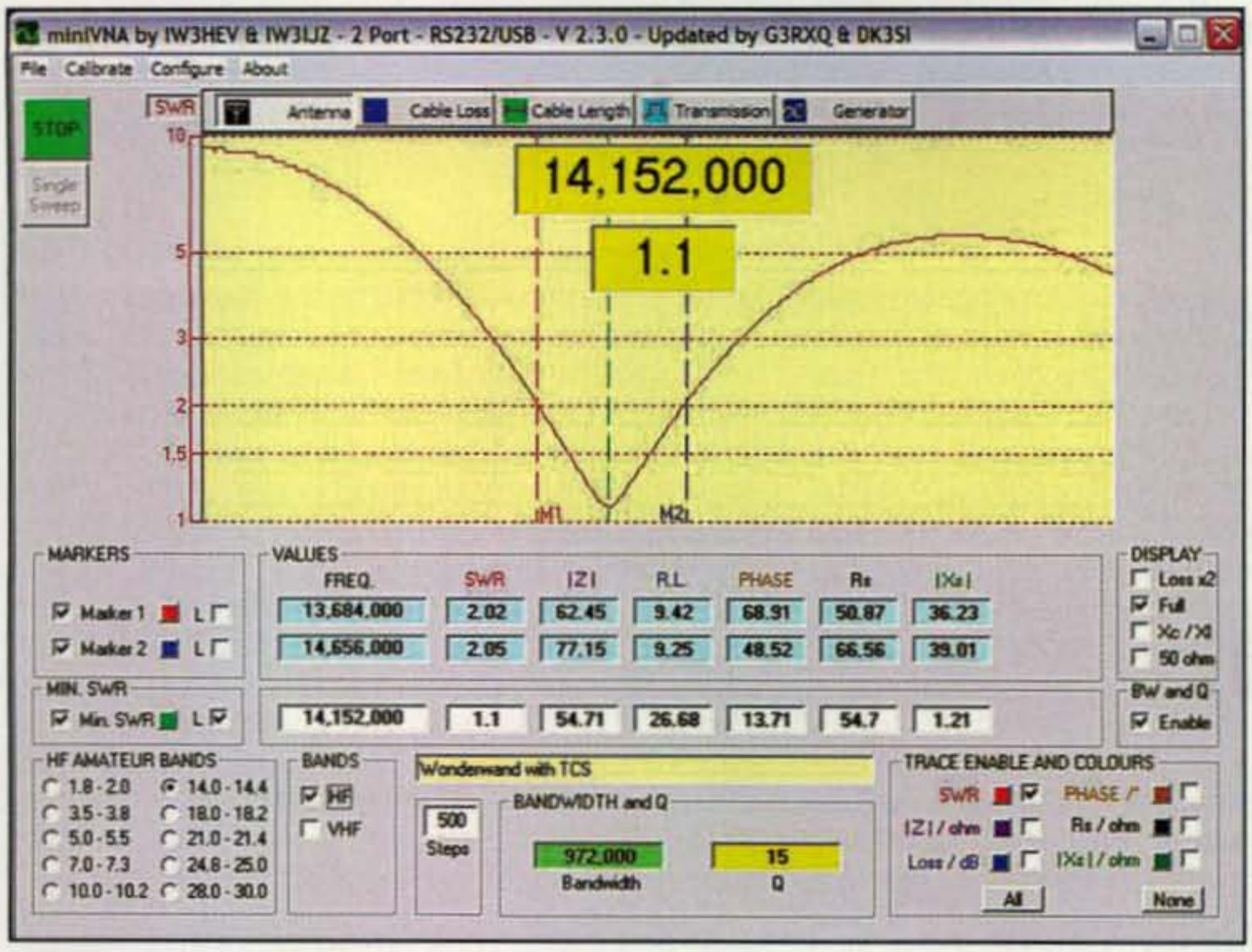

Photo E– Sample view of a monitor screen displaying the miniVNA set to sweep from 13.684 MHz (Marker 1—2:1 SWR) to 14.656 MHz (Marker 2—2:1 SWR). Note: 1:1 SWR at resonant frequency of 14.152 MHz. (Discussion in text.)

quency is displayed on the readout with resultant "off balancing" of the bridge, producing an SWR that is also displayed on the readout. In the past, consulting engineers for commercial broadcast stations had a similar setup for analyzing transmitting towers and tuning units, but it was large enough to fill the back of a midsize van. Our thanks to Martin Jue, K5FLU, for allowing me to use his model MFJ-259B Antenna Analyzer for the previous discussion.

Software-Defined Antenna Analyzer

While wrapping up this column, Barry Johnson, W4WB, called and told us about a new antenna analyzer he recently added to the W4RT.com product line. The analyzer is shown in photo D and connects by a USB cable to a home or laptop computer or a pocket PC. A connected antenna is then evaluated for resonant frequency, SWR, return loss, impedance, etc., over a user-defined frequency range. This miniVNA analyzer works over a 100-kHz to 180-MHz range. Its software is compatible with Windows® and Linux Operating Systems, and user-controlled markers can also be set at 2:1 SWR points so the miniVNA will run a sweep and display overall bandwidth results. The sweep range can also be set to cover one band, such as 20 meters, or a group of bands, such as 3–30 MHz. In fact, it can run a sweep over all the HF bands simultaneously and display the results on the screen, a neat feature for analyzing multiband antennas almost instantly.

I asked Barry if the miniVNA could be used outside the shack—e.g., for measuring mobile antennas without running a cable back to the indoor computer. That's when he mentioned using it with a laptop. Cool! However, I do not have a laptop. No problem, he said, as there is an optional Blue Tooth adapter for the miniVNA and it will work with computers also having a Blue Tooth interface. In that case, the miniVNA can be used in a car, in the yard, or atop a tower.

The full miniVNA story is longer and more interesting, but our column space is limited. Check out the full details at <www.w4rt.com>.

Conclusion

That overflows available space this time, friends, but more "what it is, how it works, and how you use it" details on amateur radio applicable test equipment is slated for our next column. Watch for it, and remember to get in some good on-the-air time every day.

73, Dave, K4TWJ

beginner's corner

BY WAYNE YOSHIDA,* KH6WZ

Mobile Power Cables for Portable Operations

For several years I had been looking for a safe and secure way to quickly bring power from my vehicle battery out of the car so that I can power my radios and accessories during outdoor or portable operating events. Previously, I used a West Mountain Radio RIGrunner (Model 4005) installed under the driver's seat. This worked well for the first few operating events, but I needed to simplify and speed up the power cable connecting process, since I had to reach under the seat to access the cables when arriving and leaving an operating spot.

Next I tried using an old pair of jumper cables, connecting the clips directly to the battery and then terminating the ends to 30-amp Anderson Powerpole® connectors. This was faster to set up and tear down, but I did not trust the clipping action, and always worried about short-circuits if something were to become unclipped at the wrong moment (see photo 1). Of course, using the giant clips meant that the hood had to be left open while operating, as well.

A Strange Inspiration

Sometimes the strangest things can inspire my construction projects. One day I saw an odd decoration sticking out of Chip Angle, N6CA's vehicle. It is a funny gift (a fake arm!) from Chip's wife Margaret, N6SNA (see photo 2). After I finished laughing, I thought about using a similar idea to pass vehicle power from the car battery, under the hood, and then out to the rigs. I had a pair of 75A Anderson Powerpoles, but I could not find a suitable place to bolt these large connectors onto my vehicle, a 1998 Honda Prelude. The plastic grille and limited space did not allow room for secure and safe mounting of the large connectors. I put this mobile power cable idea aside for a few months.

Then, near Halloween, I once again saw N6CA's fake arm sticking out of his vehicle. I just had to make this cable idea work, and I had to think of a way to make the connector fit onto the front of my vehicle grille. Then I thought, well, instead of using a single, fat cable with a single, large connector, why not use multiple, smaller wires and several smaller connectors?

The under-hood power cable (photo 3) consists of multiple pairs of No. 12 stranded wires, several ring terminals, and Anderson Powerpoles. Since I planned on running two stations, and each station uses a double-pair of 30-amp Powerpoles, I needed a total of eight individual wires with 30-amp connectors on each "equipment end" of the cable. On the "battery side," I soldered large ring terminals to the cable,and bolted the ends to the battery terminals.

Automotive-type blade (ATO) fuse holders with fuses in each lead protect the vehicle in case something goes wrong. The fuse ratings match the equipment fuse ratings. For my mobile rigs and microwave systems, the fuses vary from 10 to 20 amps. Weather-proofing was not installed for this "trial run." This installation is temporary, and the power cable is removed after each operating event. A more permanent installation should include a way to keep moisture and road debris out of the connectors, and some way to prevent curious (or malicious) individuals from accessing the battery power.

This power cable system enables fast and easy setup using my vehicle as the main power source. The hood can be left closed, too, as you can see in photo 4. With this power cable in place, all I have to do is find a safe place to park, set up the equipment, plug the rigs into the Powerpoles peeking out of the front of the vehicle, and start operating. There is no need to reach under the seat and no need to worry about the giant clips popping off the battery terminals. Tear-down is also fast, and helps reduce the time it takes to move to another location.

Important safety notes:

(1) When working on a vehicle electrical system, always remove the battery negative lead. However, before doing this, check the vehicle owner's manual to find out if there are any precautions regarding the car computer or security system. In my 1998 vehicle, removing power

*16428 Camino Canada Lane, Huntington Beach, CA 92649
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Photo1– A modified set of possibly unreliable jumper cables was used at KH6WZ while roving over the past several years. A safer and more secure solution was needed.

MFJ 2500 Watts *ContinuousCarrier™* Tuner

Silver plated Edge-Wound Roller Inductor . . .1000/500 pF Variable Capacitors . . . Antenna Switch . . . 4-Core Balun . . . true Peak Cross-Needle SWR/Wattmeter . . . Dummy Load . . . Extremely Wide Matching Range . . . Patent Pending . . .

New!

MFJ-9982

$699.95

The MFJ-9982 ContinuousCarrier™ antenna tuner handles 2500 Watts continuous carrier output on all modes and all HF bands into most unbalanced antennas -- even on 160 Meters where even the best antenna tuners fail!

The MFJ-9982 gives you every feature you'll ever want in a high power tuner -- wide matching range, 1.8 to 30 MHz coverage, 6-position antenna switch, 4-core balun, dummy load, true peak/average lighted SWR/Wattmeter, 6:1 reduction drives with detailed logging scales, 3-digit turns counter, extra large knobs.

New Components, New Technologies

The *Heart and Soul* of the MFJ-9982 is its roller inductor and variable capacitors.

MFJ's high power, high-Q *continuous current AirCore™* roller inductor is no ordinary roller inductor! It's edge wound from thick .06-inch *silver-plated* solid copper strap.

It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn up ordinary roller inductors.

Self-insulating construction reduces stray capacitance -- keeps self-resonant frequencies high and out-of-the-way. Dual, *silver-plated* compression wheels give ultra low-resistance contacts. New fast-tune crank knob.

High-current, *high-capacitance* 1000 pF and 500 pF air variable capacitors have low minimum capacitance and are self-insulating.

These newly developed air variable capacitors give you *very high efficiency* on 160/80 Meters *and* MFJ's patent pending innovation gives you *extremely wide matching range* on 10/12/15 Meters at 2500 Watts -- a feat *only* the MFJ-9982 has achieved.

Hi-Voltage/Current Antenna Switch

The antenna switch is completely isolated to handle high-voltage, high impedance antennas. High-current, low impedance antennas are handled by parallel sets of high-current contacts of *two* ceramic switches.

New 4-Core Balun

Powerful balun -- Four 2½ inch cores, 12-gauge *Teflon™* wire. Run balanced lines at full 2500 Watts SSB/CW continuous, 24/7.

New Balanced Line Feed-Thru Insulator

Allows massive transmitter currents to flow directly to the antenna without passing through lossy screws or bolts.

TrueActive™ Peak Reading Circuit

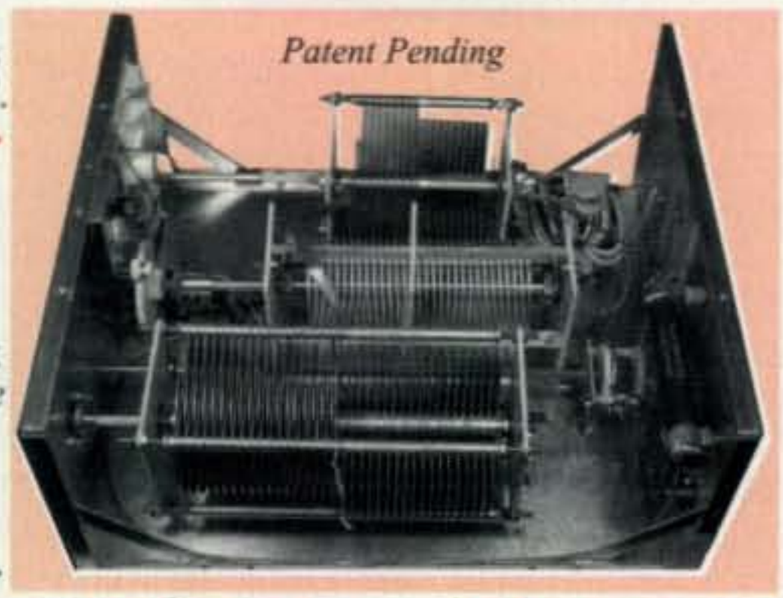
New *TrueActive™* circuit reads *true* peak or average power on all modes. *Cross-Needle* meter reads SWR/forward/reflected power.

1500 Watt Dummy Load

1500 Watt air-cooled non-inductive 50 Ohm resistor. 100W/10 min., 1.5kW/10 sec.

New Cabinet maintains high Q

New roomy cabinet maintains high Q. Vent holes. Heavy gauge, .08 inch aluminum braced chassis. Vinyl cover, non-stripping PEM nuts, heavy 10-gauge and copper strap wiring throughout. 13¾Wx7Dx16¼D inches. 15 pounds.



MFJ 1500 Watt *Fully Balanced* Antenna Tuner

Fully balanced MFJ-976 handles 1500 Watts legal limit . . . Extra-wide 12-2000 Ohms matching range . . . continuous 1.8 to 30 MHz coverage including all WARC bands . . . Four separate 500 pF in two gangs gives you a total of 2000 pF capacitance . . . Heavy duty 1:1 current balun . . . more!

New!

MFJ-976

$499.95

The MFJ-976 is a 1500Watt full Legal Limit *fully balanced* antenna tuner.

You get *superb* current balance, very wide matching range (12-2000 Ohms) and *continuous* 1.8-30 MHz coverage including all WARC bands. Handles *full* 1500 Watts SSB *and* CW.

You can tune *any* balanced lines including 600 Ohm open wire line, 450/ 300 Ohm ladder lines, 300/72 Ohm twin lead -- shielded or unshielded. Also tunes random wires and coax fed antennas.

MFJ's *fully balanced* extremely wide-range T-network gives you simple, fast three knob tuning. No complicated switching between high and low impedance and switching in additional capacitance of L-networks.

Four separate 500 pF in two gangs gives you a total of 2000 pF for highly efficient low loss operation on 160 Meters.

You get excellent 10 Meter performance because of MFJ's low minimum capacitance and exclusive *Self-Resonance Killer™* high-Q *AirCore™* roller inductor with silver plated contacts.

Heavy duty 1:1 current balun gives you *superb balance* and stays cool even at 1.5kW.

True *active* peak reading lighted Cross-Needle SWR/Wattmeter lets you read SWR, *true peak* or average forward and reflected power all at a glance on 300/ 3000 Watt ranges. 12Wx6Hx15¾D inches.

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Photo 2– The fake arm sticking out of N6CA's vehicle inspired a power cable solution for my roving radio equipment.

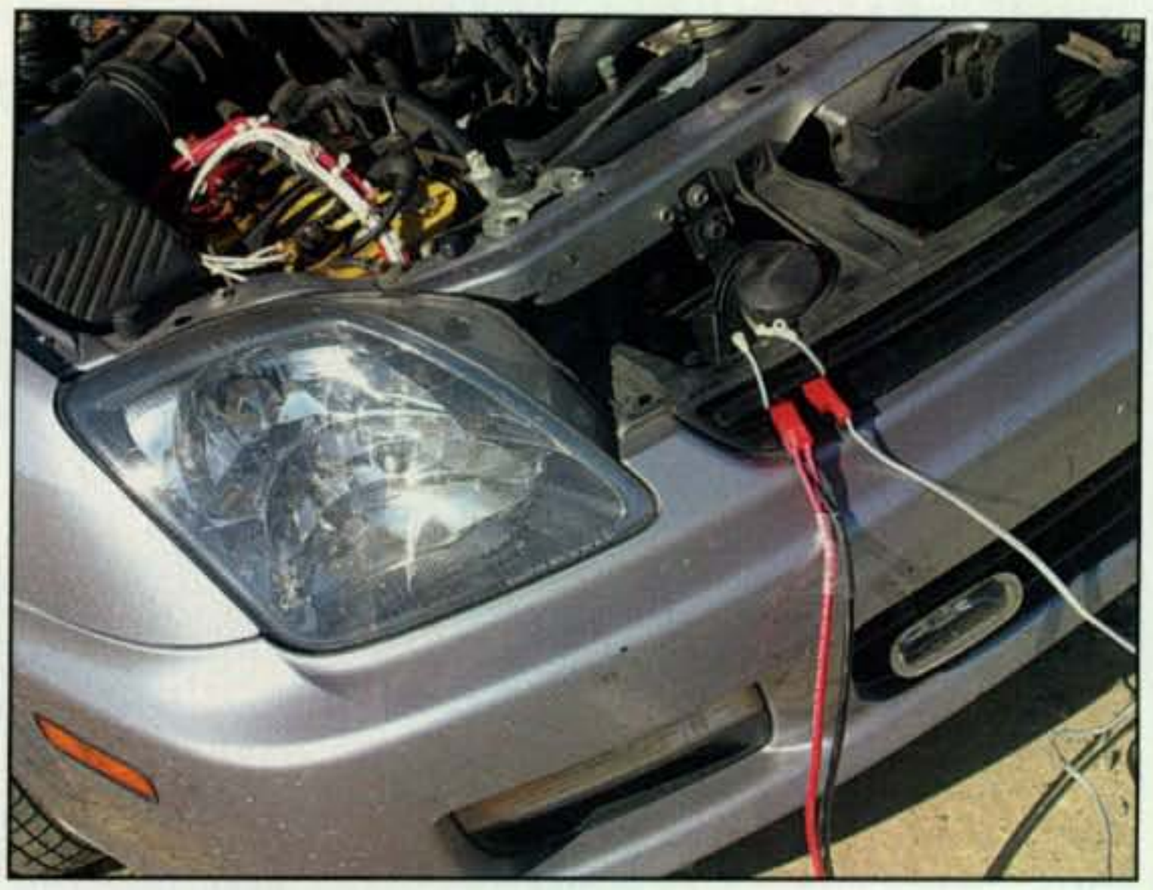

Photo 3– I built this power cable and harness in my hotel room the night before operating in one of the VHF radio contest weekends.

resets the audio system, and when it is powered back up, a security code must be entered and all the station presets must be re-entered. In addition, the automotive computer (on-board diagnostic system—ODB-II) is reset when power is removed. Although the information stored in the computer will rewrite itself after several thousand miles, if a smog check is required, the data must be restored at some cost to you. Newer vehicles are equipped with an even more advanced computers, with more precautions, so make sure you are aware of the resetting procedures to prevent troubles later.

(2) Always include a fuse in the ground terminal or wire in addition to a fuse in the positive lead. You may think this is not necessary, since everything in the car electrical system is connected to the vehicle chassis. Although probably rare, if a ground wire for the starting and charging system were to break, the only path for ground would be the ground wire for your radio system. Since automobile starting and charging systems in today's cars run in the hundreds of amps, it is a good idea to fuse both ground and positive leads in your mobile power system. Sending 100 amps through the mobile rig might do some serious damage to the rig and vehicle.

Solar Supplements and Backup Power Sources

By the way, in case you were wondering about the wisdom of using the vehicle battery for rig power, I have always connected one or more solar panels to the battery during the daytime so the engine does not have to run while operating the radio gear. The solar panels shown in the photos were purchased at a local surplus electronics store. Marine and camping stores, as well as some home centers, carry solar chargers and accessories that are suitable for portable ham radio operations.

When it gets dark, I run the engine to keep the battery topped off. In addition, the standard car battery is replaced with an Optima® YellowTop deep-cycle, sealed lead-acid battery made for monster car audio installations and for off-road vehicles.

Photo 4– A portable power cable sticks out from the front of the car to feed two portable radio systems. Just park the car and plug in the gear!

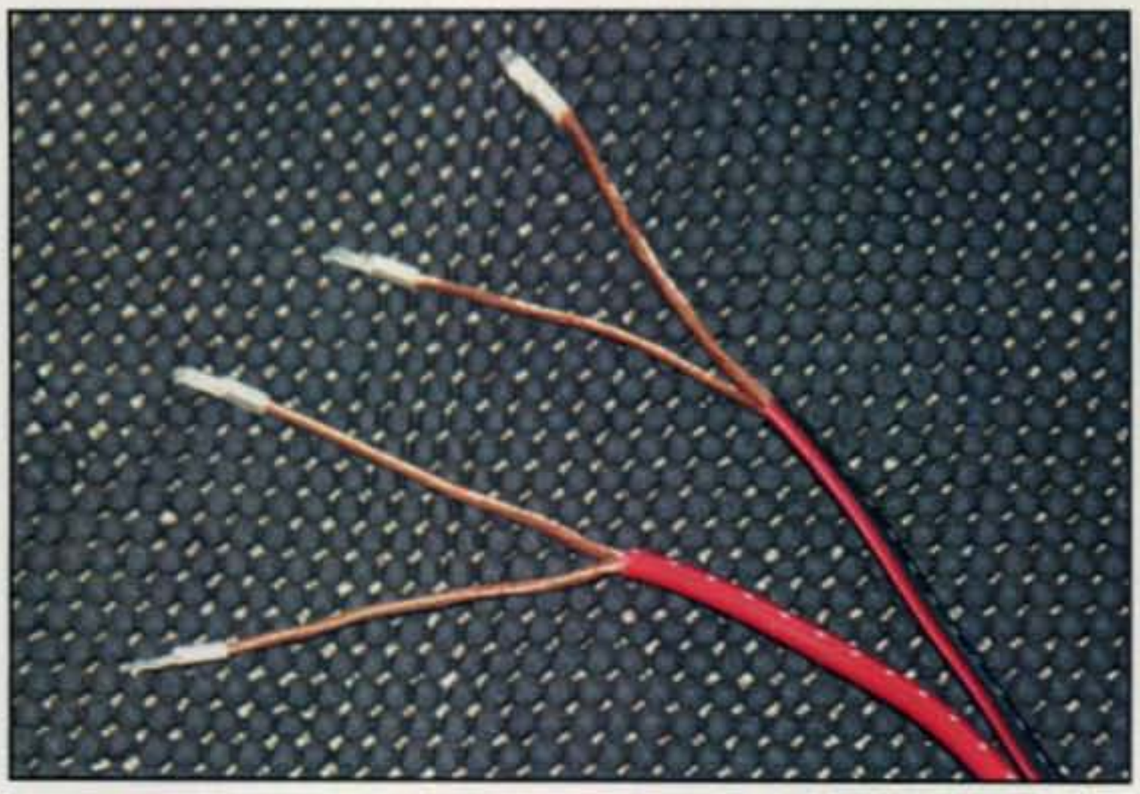

Photo 5– Strip about six inches of insulation from the thick wires, and make each wire into two smaller wires by separating the strands.

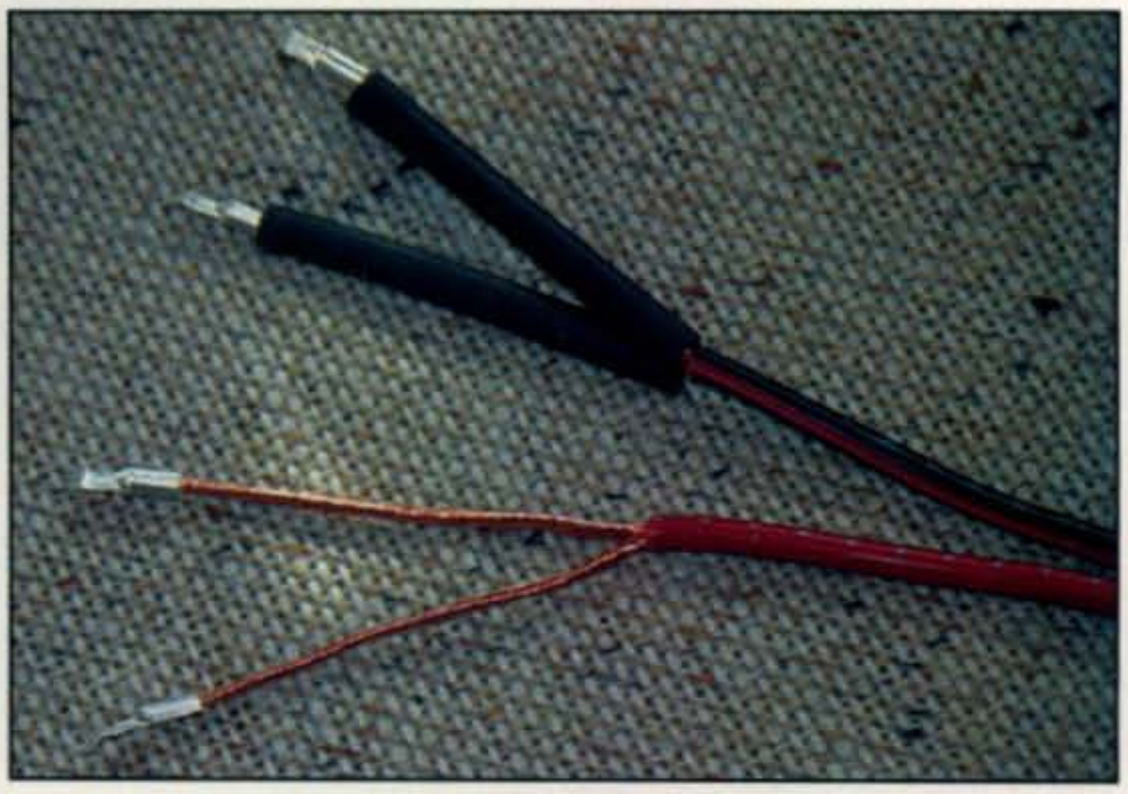

Photo 6– The two wires are now four wires. Insulate each wire, leaving a bare section for the contact.

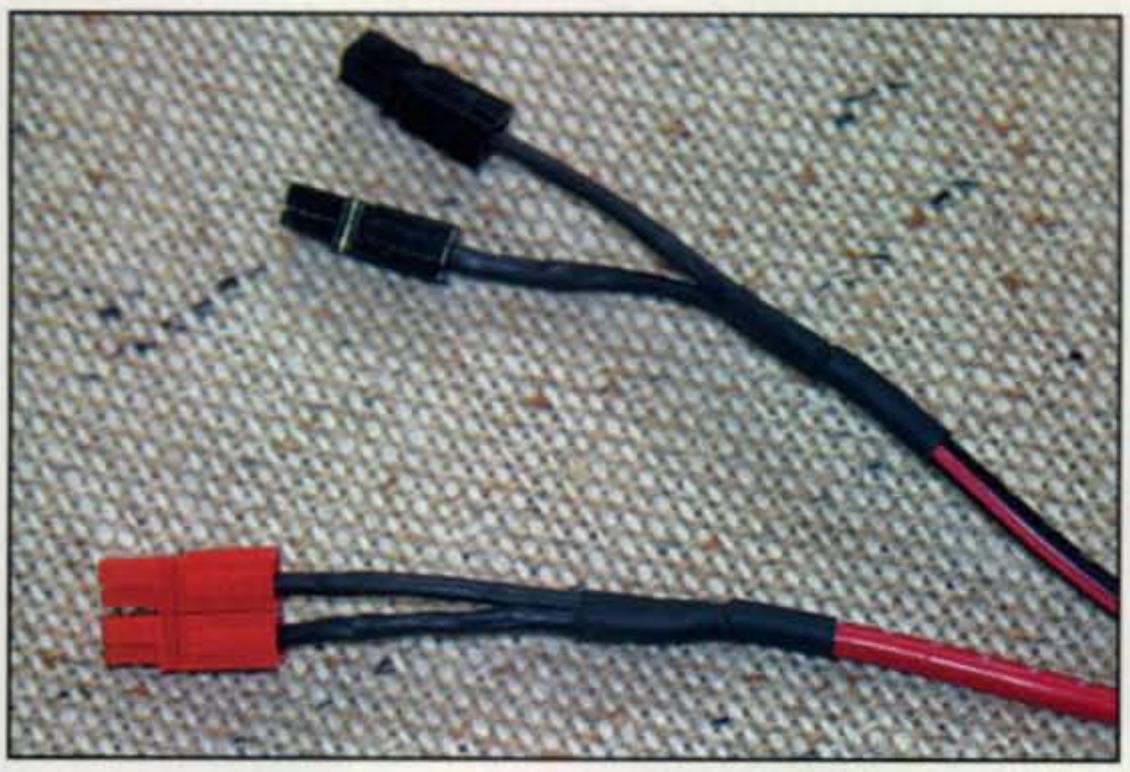

Photo 7– Snap on the plastic housing.

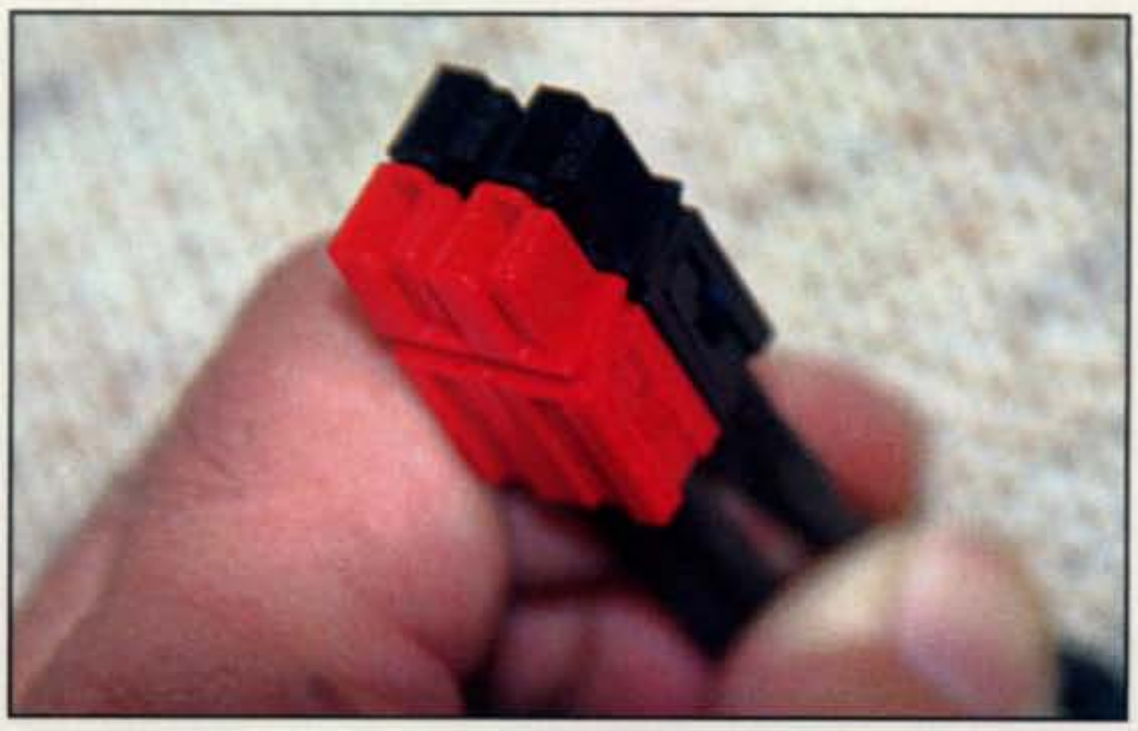

Photo 8– Slip the housings to make two pairs of cables. Make sure you have the plastic housings oriented correctly.

In addition to these precautions, I keep an emergency jump-starter unit in the trunk. These units are sold at automotive parts stores as well as hardware and home centers. They contain a large gel-cell battery in a handy plastic housing, with jumper cables and sometimes other things such as lights and AM/FM broadcast receivers. Most of them have a cigarette-lighter socket on the front or rear panel, and they are handy sources of 12-VDC power by themselves.

The Wires

The wires used in my first system are PVC-insulated, stranded 12-gauge available from the hardware store. However, it is a little stiff, and one improvement to this cable would be to use more flexible wires, and maybe a larger size wire, too.

The reason a larger size wire is an improvement is because of the voltage drop that happens when using low voltages. Compared to the 110-VAC (or 220-VAC, depending on where you live) wiring in your home, wire size is primarily selected for current-carrying capability and fire safety. In low-voltage systems such as our ham radio installations, the main concern is voltage drop caused by the resistance of the wire. There are several wire-resistance and voltage-drop calculators on-line, so all the math can be done with your computer. Check the References section near the end of this column, go to the links, and experiment with different wire gauges, wire lengths, and equipment current demands.

In addition to all the technical reasons to get fatter wires, it is wise to select heavy wires because of the mechanical stress and vibration and heat in a motor vehicle. Throw in the effects of weather, such as heat and cold and moisture, and the need for tough materials is obvious. The best advice is to use the heaviest gauge wire with a tough insulation, and keep the wires as short as possible.

Many electronic parts shops carry specialized cables for high-power car audio installations. Look for heavy-gauge (No. 10 or larger) power wire. While shopping, you can ignore the "very special" cable types and accessories such as "oxygen-free" copper and gold-plated terminals.

One challenge when using such large-diameter wire is the ability to make reliable termination connections at the ends of the wires. A friend of mine uses what he calls a "brute-force" method: He uses ring terminals suitable for the large wire gauge, and solders the wire to the terminal with a Mapp gas torch and silver solder. However, when I tried this technique, the plastic insulation on the wires melted and made a big mess.

Let's Build a Cable

This section assumes that you know the basics of assembling Powerpole connectors. There are several references on how to do this properly, so take a look at those instructions. It may also help if you find a friend who can show you how to use these handy connectors. My "split wires" tech-

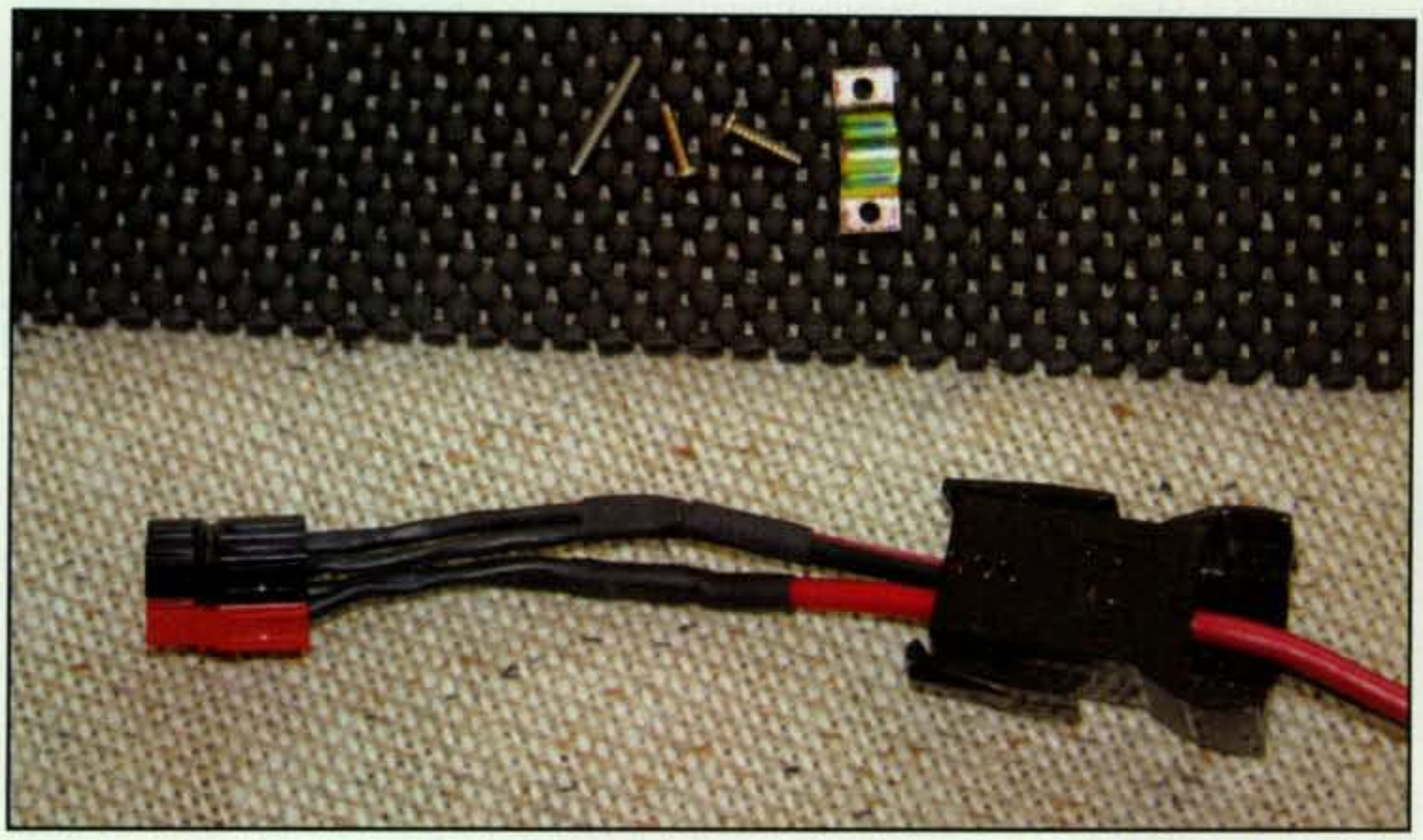

Photo 9– A deluxe housing can be added to make the cable look more professional.

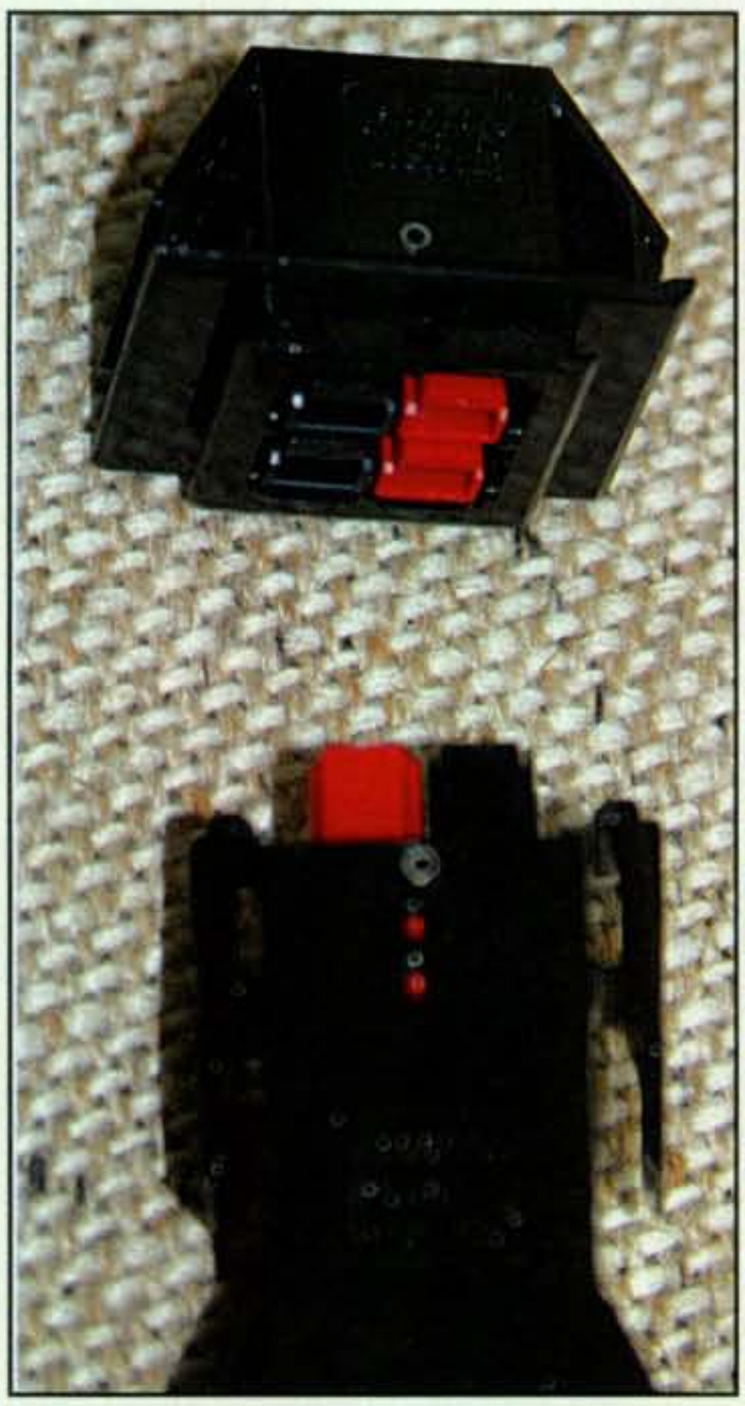

Photo 10– In my radio system I mate the cables to matching chassis-mount connectors.

nique can be applied to other connector types, such as banana plugs, Jones plugs, and others you may find at your local electronics parts store.

Here is how to make a portable, mobile power cable using 30-amp Powerpole connectors and No. 10 wires. First, break up a single fat wire into two smaller wires by stripping at least six inches of the insulation from the wires. This bare section must be long enough to clear the housing; see photo 5. In this photo, the 30-amp contacts are already in place.

Next slip some heat-shrink tubing onto the bare ends, leaving a bare section to accommodate the contact. As you can see in photo 6, two wires now become four wires. Now install the plastic housings, as shown in photo 7. The finished "radio end" of the cable should look like photo 8.

As a "deluxe option," a locking cable housing can be added to the end of this cable, making the cable look more professional and convenient (photo 9). The part number for the Powerpole Pak used in this example is 1452G3 4, and holds two pairs of 30-amp PowerPole connectors. This cable mates to a matching chassis-mount receptacle called the 1470G1 Snap-in Receptacle (see photo 10).

Photo 11– The battery end of the cable terminates with four ring terminals which mount onto the 10-mm battery-post terminal bolts. This is a secure way to attach a wire to a car battery.

Now prepare the other side of the cable the same way, stripping the insulation and untwisting the strands of wires to make two wires into four wires, and terminate the ends with ring terminals. In my car, 1/4-inch ring terminals fit onto the battery-connector fastening bolts. This is a more secure way to attach a wire to a car battery, since the connection will not come off easily when performing routine battery maintenance (photo 11). The 10-mm nut and bolt that holds the car battery positive terminal in place is a good place.

I hope this how-to article about making your car a power source for your ham station encourages you to take your rigs out of the house and into the sunshine. Think about these excursions as another way to practice your ability to communicate in fun and unusual places.

73, Wayne, KH6WZ

References

RIGrunner by West Mountain Radio: <http://www.westmountainradio.com/RIGrunner.htm>

Anderson Power Products® Powerpole®: <http://www.andersonpower.com>
Part numbers 1330 for 30A housing in red, 1330G4 housing in black, and contact 1331 for 30A contacts for 12 to 16 AWG wire.
The 1452G3 4 Powerpole Pak housings hold two pairs of connectors for larger wires.

An equivalent power connector, made by AMP, a Tyco Electronics company: <http://www.tycoelectronics.com>
Power Lock connectors, part numbers 53894-4 for 30A housing in red, 53894-2 for the housing in black and 53892-4 for 30A contacts for 12 to 18 AWG wire.

Optima® YellowTop batteries: <http://www.optimabatteries.com>

Voltage Drop Calculator: < http://www.stealth316.com/2-wire-resistance.htm>

A Wire Size and Ampacities Chart: <http://www.affordable-solar.com/wire.charts.htm>

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antennas

BY KENT BRITAIN,* WA5VJB

Yagi Basics – Plus Some History

This month we get started with a question on Yagi antenna elements from Buck, N9RJF, on why the elements are arranged the way they are along the boom.

The first work on Yagi antennas goes back to their namesake, Dr. Hidetsugu Yagi, at the University of Tokyo, in 1926. As these things tend to go, though, it was really a graduate student, Shintaro Uda, who did most of the work. Thus, you often hear these antennas referred to as Yagi-Uda arrays. Uda's work was just under our current 2-meter ham band and the elements were mounted on short wooden rods, which in turn were inserted into larger blocks of wood. This way the elements could be moved around looking for the highest gain. His final design was not that much different from many current Yagi-Uda antennas.

The Basic Yagi

In basic Yagi theory, an element slightly longer than a 1/2 wavelength tends to *reflect* radio waves. An element slightly shorter than a 1/2 wavelength tends to *bend* radio waves. In photo A, we have a light bulb representing the driven element, a mirror representing the reflector, and a lens representing the directors. In a way, a Yagi is similar to the light bulb and reflector assembly in a flashlight.

Adding a mirror behind a mirror doesn't accomplish much in a single-frequency Yagi, but you can benefit from adding more lenses. If you want to go back to the optical analogy, we really are increasing the focal length of the lens with additional directors. The gain of a Yagi is mainly determined by the distance between the reflector element and the last director element, not the number of elements. We're back to that focal length again. Now, in a practical world, you can make a 7-element Yagi with the same boom length as an 11-element Yagi,

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

Photo A– Optical equivalent of a Yagi-Uda antenna.

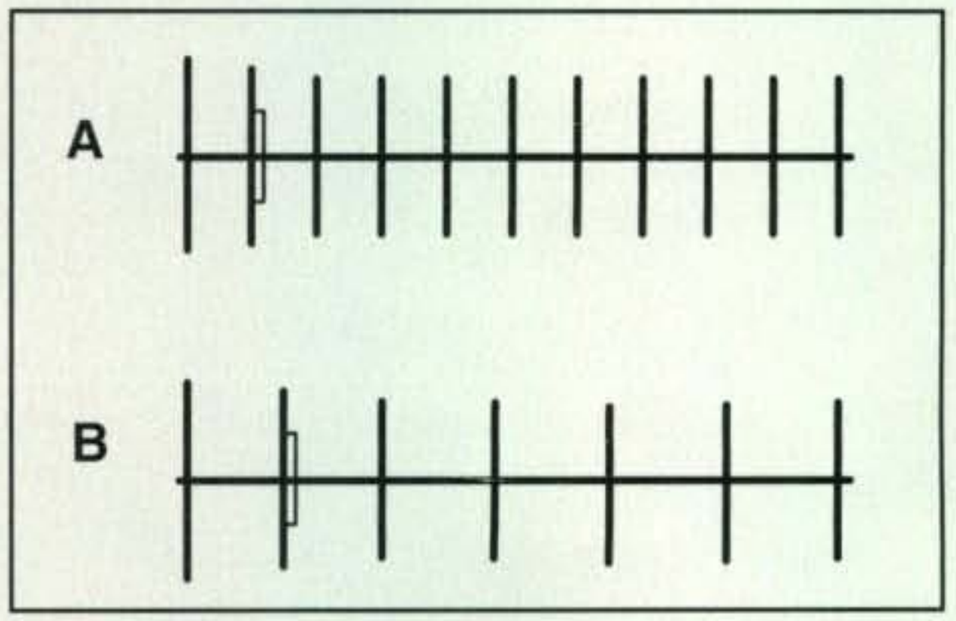


Fig. 1– (A) Normal- and (B) wide-spaced Yagis.

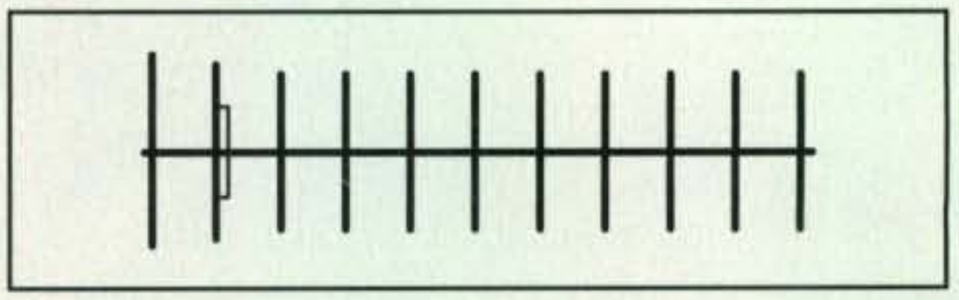


Fig. 2– Equal-spaced, equal-length director Yagi-Uda antenna.

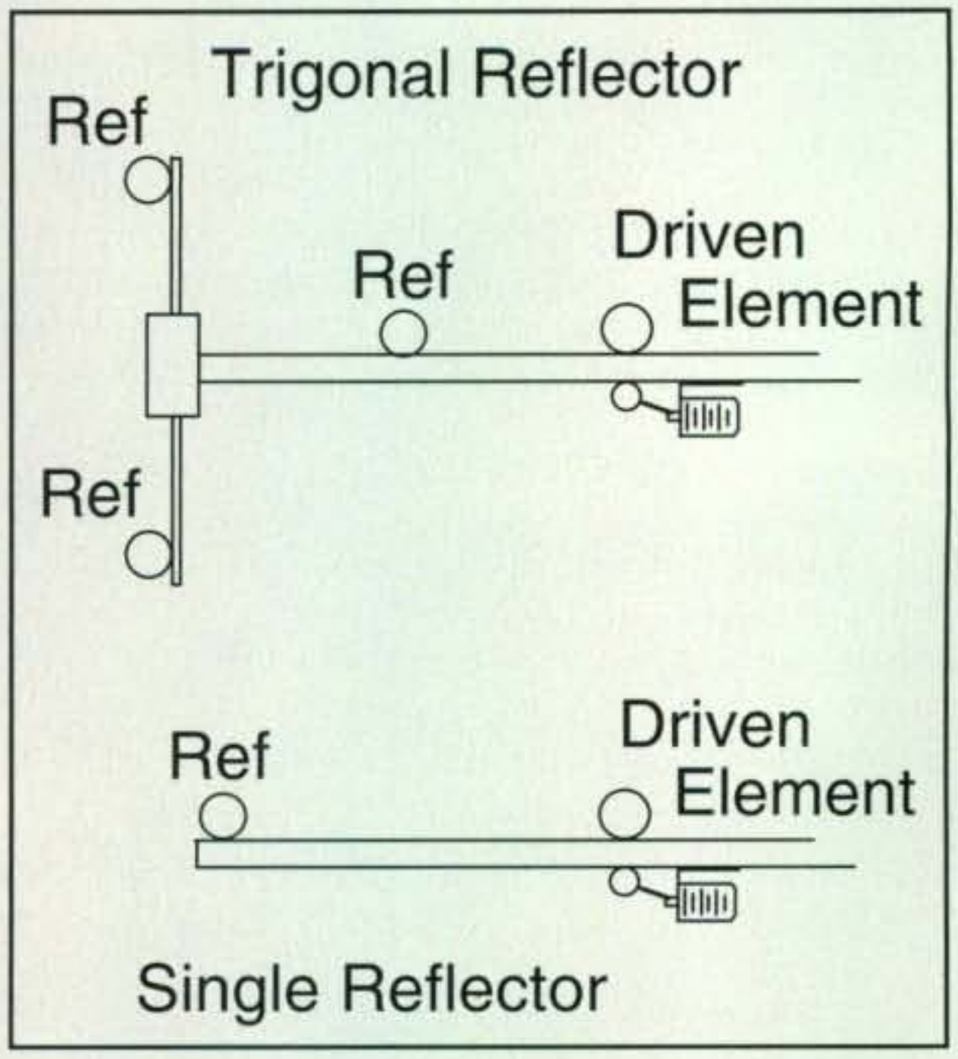


Fig. 3– A triagonal reflector vs. a traditional single-element reflector (see text for discussion).

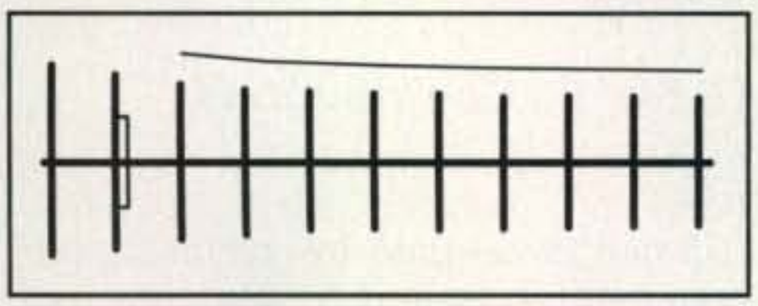


Fig. 4– Logarithmically tapered Yagi.

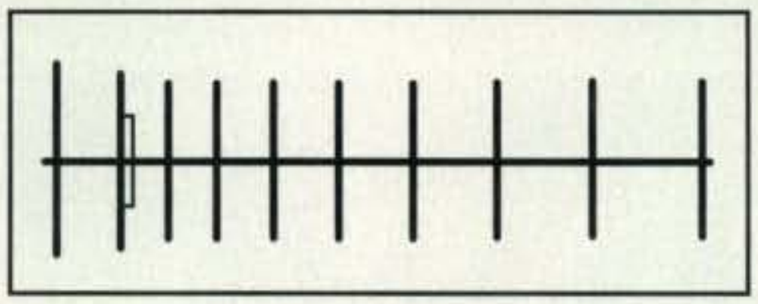


Fig. 5– Logarithmically spaced Yagi.

and it will have the same gain. However, the extremely wide-spaced Yagi like the one shown in fig. 1(B) will have a *very sharp* bandwidth.

The design of long Yagis took off in the 1950s with the study of designs that had all the directors the same length and with the same spacing. This allowed charts to be developed of element size vs. gain and the ability to zero in on optimum lengths and spacings. One disadvantage of having all the elements the same length was gain saturation. Antenna theory says that if I make the boom twice as long, I should have twice the power gain, or 3 dB more gain. In reality, though, count yourself lucky if you see 2.2–2.5 dB more gain if you double the length of the boom. Another interesting variation from theory: With the equal-length directors at equal spacing, as the one in fig. 2, the Yagi's gain pretty much peaked at 10 director elements. Longer Yagis just didn't have much more gain when you went beyond that 9th director element. For many years this gain saturation resulted in the popularity of 11-element VHF/UHF Yagis. Longer just didn't work any better.

The NBS Yagi

The next big change was the work done by Peter Viezbicke at the National Bureau of Standards on Table Mountain, just outside Boulder, Colorado. Peter arranged two sheets of Plexiglas on the antenna range with an array of holes just a few inches apart. From the side, he put elements in these holes, building a Yagi. Now he could move an element forward or back a hole, replace it with a longer or shorter elements, and slowly build a hand-optimized Yagi.

This work resulted in two noteworthy findings. First was the NBS Yagi that was the basis for many new ham anten-

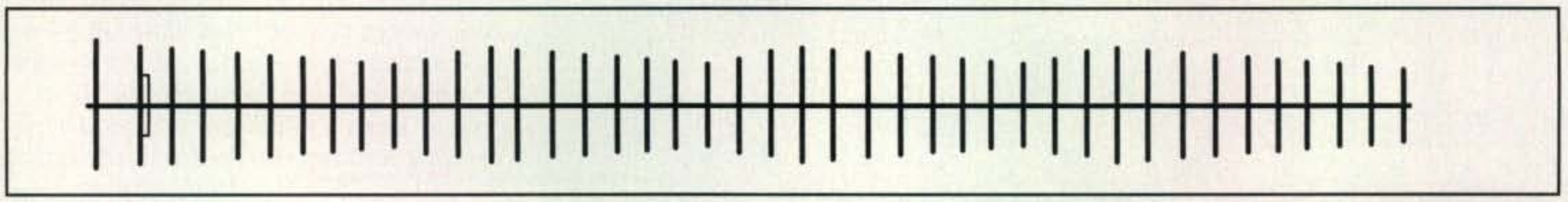


Fig. 6– Additional slow-wave structure for LONG Yagis.

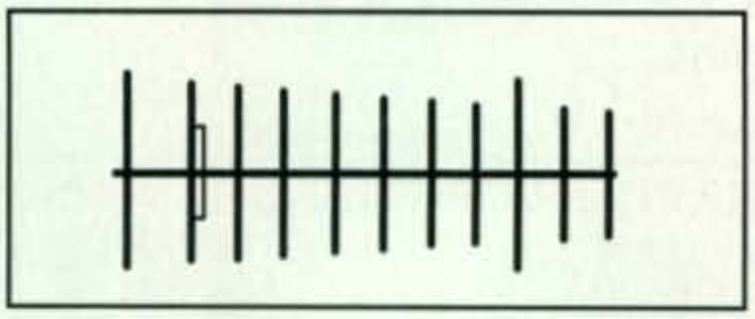
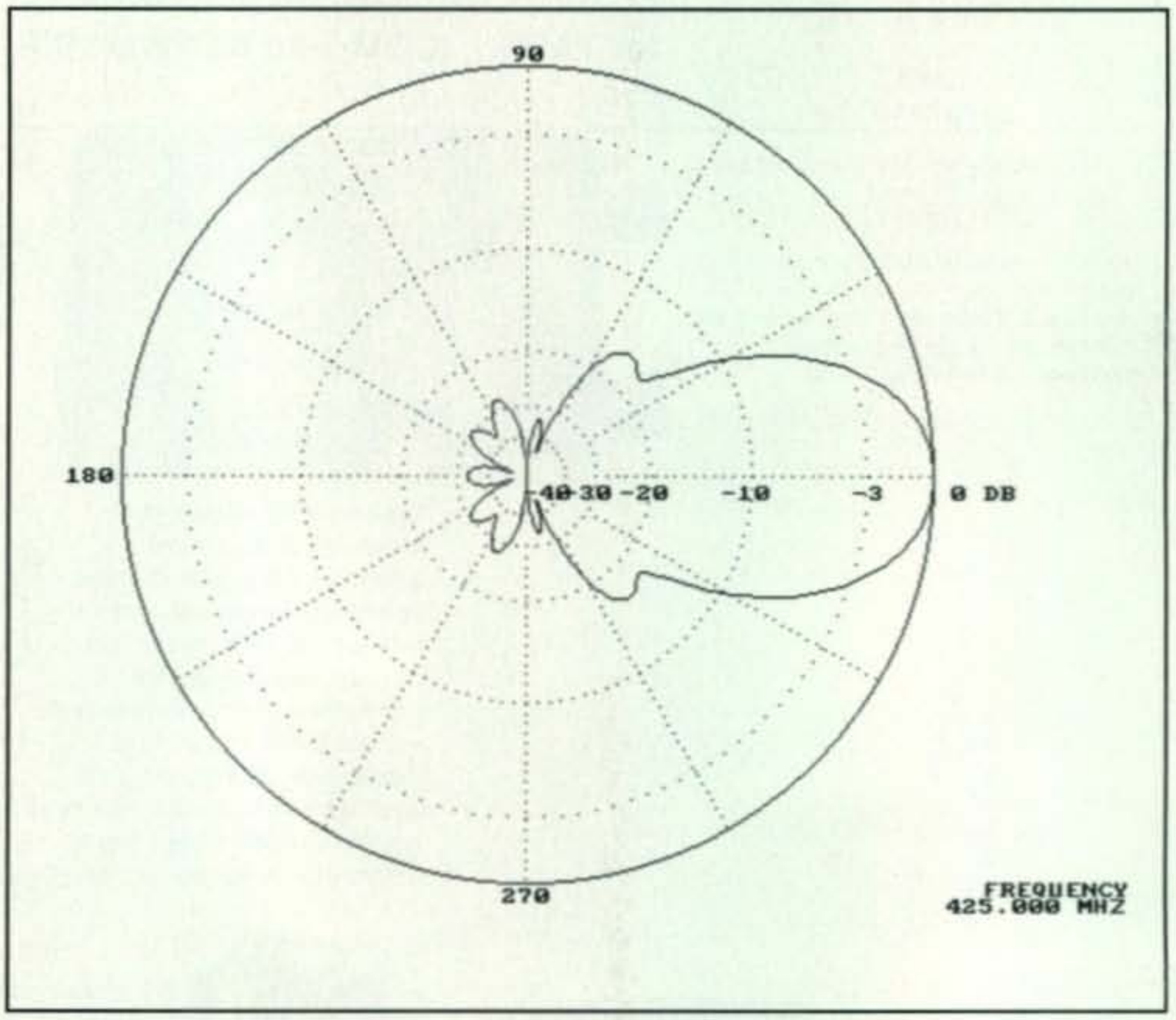


Fig 7– Results of long elements near the end of the Yagi.

nas, including the Cushcraft Jr. Boomer. Next was the three-element *trigonal reflector* (fig. 3). On the NBS Yagi, the trigonal reflector gave about .7 dB more gain than a single reflector element, but this .7 dB gain resulted *only* for the NBS Yagi structure. In short, it only gave .7 dB more gain on *that* Yagi, not necessarily on other Yagi designs, and most modern Yagis have gone back to single-reflector element designs. Also, the NBS Yagi did not expand well when additional elements were added to the basic design.

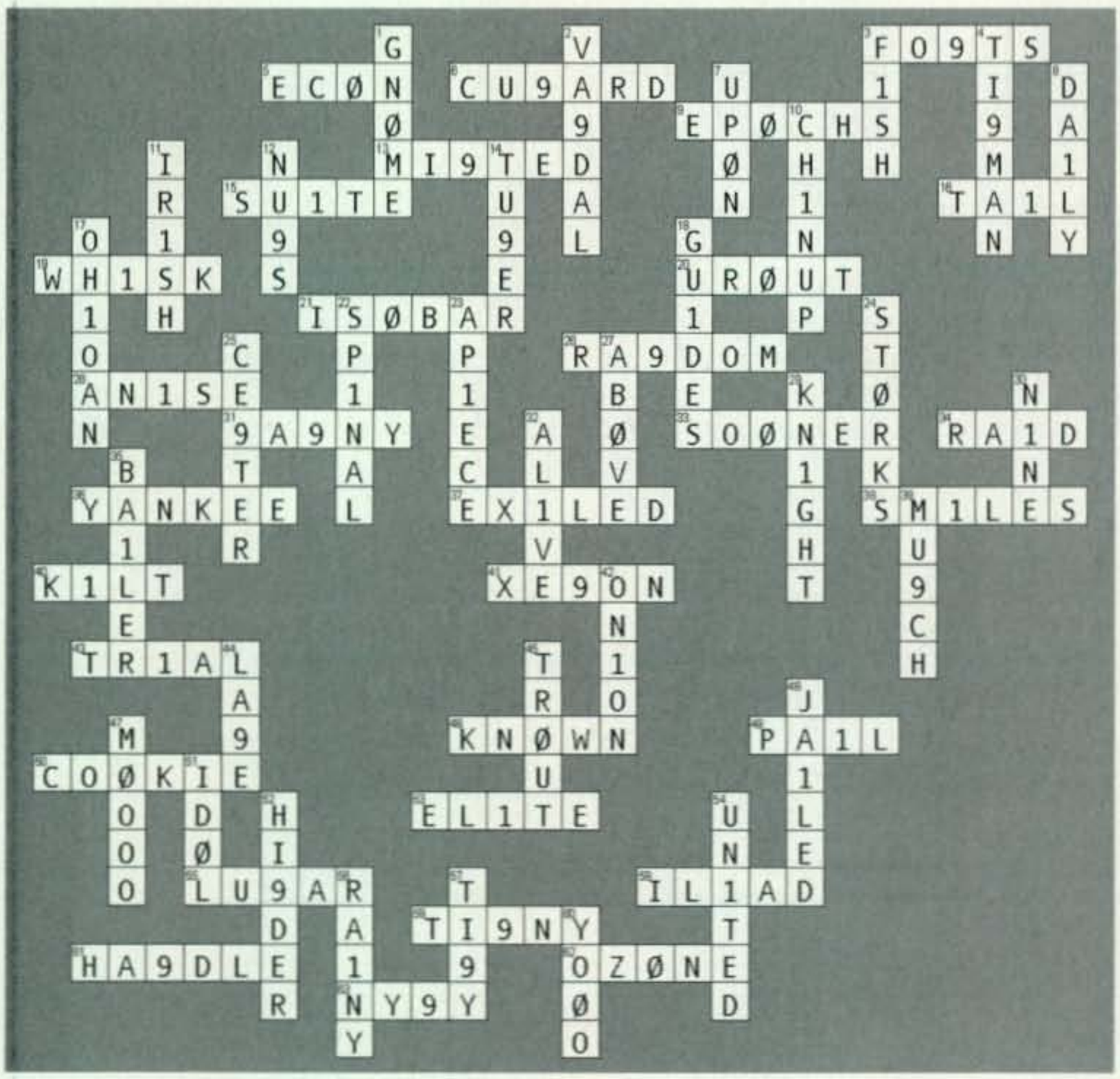
Interestingly, it took a ham, Don Hillard, WØEYE, to get Peter to publish his Yagi work some years later. If you are interested, a copy of the original paper, NBS Tech Note 688, can be



Plot 1– Pattern of a tapered DL6WU-type Yagi.

Solution To Prefix Frolics –A WPX Crossword Puzzle

(from page 34)



downloaded from the "reference" section of my website at <http://www.wa5vjb.com>.

DL6WU's Contributions

In the 1970s, there was the Yagi work done by Gunther Hoch, DL6WU. Gunther discovered the advantage of continuously tapering the directors along a logarithmic curve as shown in an exaggerated form in fig. 4. Thus, each Yagi element was shorter, the farther you got from the driven element. This allows the Yagi to be expanded virtually indefinitely. My personal record is an 80-element beam for 2304 MHz. Most modern Yagis are based on DL6WU's ground-breaking work, and even today his designs make an antenna that performs well and has a clean pattern. There are many shareware programs in both DOS and Windows® versions that will calculate a DL6WU Yagi around the frequency, boom diameter, and element diameter of your materials.

What came from Gunther Hoch's work was that we really want to taper the *current* in each Yagi element as we go along the string of directors. Therefore, if you measure the RF current in each director element, it will get smaller and smaller in a smooth curve as you go down the string of elements. It is possible, then, to build a Yagi-Uda array with all the directors the same

length, but with tapered spacing as shown in fig. 5. You can, but you really don't want to. Again, you end up with a Yagi-Uda array that only works over a very narrow range of frequencies. To give you an idea of how bad this can be, I had one 222-MHz design that theoretically only worked over a 25-kHz bandwidth! Think you can build a Yagi to better than .012% dimensional tolerance? A computer curiosity, not a practical antenna.

However, we don't have to take this to an extreme. In my Cheap Yagi designs, I often use several elements that are the same length, but I usually don't have them at the same spacing. Thus, the Cheap Yagis are also following DL6WU's curve of decreasing element current as you go farther down the director string. In the newest "optimum" Yagi designs, you will see the first director is much closer to the driven element, and the spacing of the directors is also changing. This variation of both lengths and spacings picks up a few tenths of a dB gain, maybe a whole dB on longer Yagis, but ends up with a much cleaner pattern.

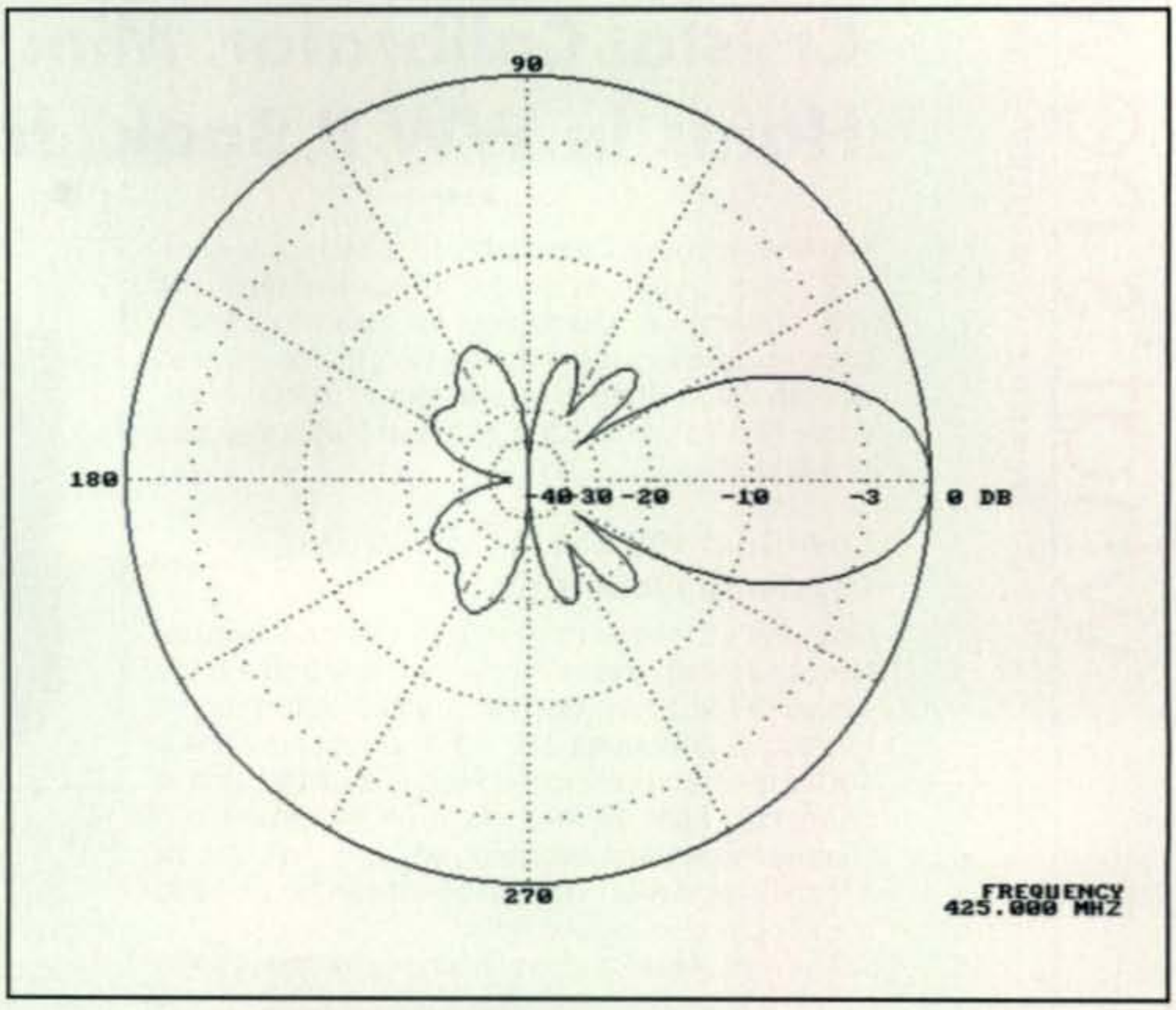
If you really want to build a 200- or 300-element Yagi, there appear to be some advantages to adding an additional slow-wave structure like that shown in fig. 6. Don't expect to read more about this in my column soon, though. I'm not planning to test any 27-dBi, 600-foot-long, 2-meter Yagis in the near future.

With all that out of the way, we get to Buck's actual question: "What happens when some of the end directors are longer than the earlier directors?"

This long director is quite common with some of the Yagi optimizer programs. The computer will go plodding along then do something like you see in fig. 7. This longer element will increase gain, and maybe even improve the antenna's front-to-back ratio, but I can pretty much guarantee that the pattern will have just developed a bunch of new sidelobes. In plot 1, I have a standard DL6WU-style Yagi. In plot 2, I have the same antenna but with the end directors longer. Note all those new sidelobes out there. You are much better off if the element lengths are tapering.

As always we appreciate your feedback, questions, and suggestions for topics. You can use either snail-mail through my address at the beginning of this column, or drop an e-mail to <wa5vjb@cq-amateur-radio.com>. The weather is nice, so go put some more antennas in the air.

73, Kent WA5VJB



Plot 2– Pattern and sidelobes of the DL6WU with a "longer" director element.

BY ANTHONY A. LUSCRE,* K8ZT

Crystal Calibrator, Mini FM Transmitter, Hams in WW II Book, from the Mailbag

This month's items include a look at a compact crystal calibrator kit, a miniature FM transmitter and charger for your iPod, and a book on amateur radio during WW II. We will also dip into the mailbag to answer some reader questions. Finally, we visit the Amateur Radio Website of the Month.

Low-Cost 100-kHz Crystal Calibrator Kit

Grandad's Electronics (a registered trade name of Novatech Instruments) is pleased to introduce the model XTAL1, a 100-kHz crystal calibrator kit (photo A). This small 2.6" × 1.7" circuit contains a 100-kHz crystal-controlled Pierce oscillator rich in harmonics past 30 MHz. Also on the board is a Hartley modulation oscillator, which allows use on AM-only receivers. This calibrator can be tuned to a ±30 ppm of true-zero beat.

The low power and small size allow the XTAL1 to fit into a small case of your choice and travel with you. The list price is $17.95, and it can be ordered online at the following: <www.novatech-instr.com/grandadselectronics.html>.

Miniature FM Transmitter and Charger for your iPod

In a few previous columns, I have mentioned websites with Podcasts geared to hams. What do you do after you download the Podcasts? Besides playing them directly on your computer, you might choose to use an iPod. If your day includes a commute in your car, you might have some time to listen to your collected Podcasts. The ear buds, besides being illegal in many states while driving, can easily become a rat's nest of tangled cables.

The Cygnett Groove Safari is a small FM transmitter and charger for your iPod (photo B). Broadcast your favorite MP3s wirelessly from your iPod to any FM car/home stereo. Simple touch-sensitive keys allow you to navigate easily through channels. It recalls the last FM frequency used so you don't have to readjust settings. It has "Superior sound quality; operates on a wide range of FM channels 87.6 MHz to 107.9 MHz; and is pocket-size, lightweight, and wireless for portable, hassle-free use on the move." It requires no batteries and switches off automatically after 60 seconds when no signal is received. Price is around $50. For more information on ordering visit <www.cygnett.com/products/fm_transmitters/g_safari.html>.

Photo B– Groove Safari iPod FM transmitter and charger. (Photo courtesy of Sygnett)

Book on Hams during WWII

WWII Radio Heroes: Letters of Compassion (2008), by Lisa Spahr and shown in photo C, tells the story of how thousands of Americans stayed awake by shortwave radios throughout the night, wrote down the names of captured POWs broadcast by the Germans, and wrote postcards, letters, and telegrams to the prisoners' worried families.

Even thought the FCC shut down all amateur radio activity during WWII, hams contributed their radio skills in many ways to the war effort. This book is a story about ham radio operators and others alerting families of POWs during a time of war. The book features more than 30 letters and postcards sent to the author's family in 1943 notifying them of her grandfather's capture and status as a prisoner of war. Upon discovering these letters, the author, Ms. Spahr, began researching the people who did this, and why, and reached out to find them or their next of kin, more than 60 years after the fact. Her journey is detailed in *WWII Radio Heroes.*

The foreword is written by John Sommer, Jr., Executive Director of The American Legion. Contributions to the book include: Flavius Jankauskas (K3JA) and Morton Bardfield, both authors of postcards and letters from 1943 to POW families. The

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e-mail: <k8zt@cq-amateur-radio.com>

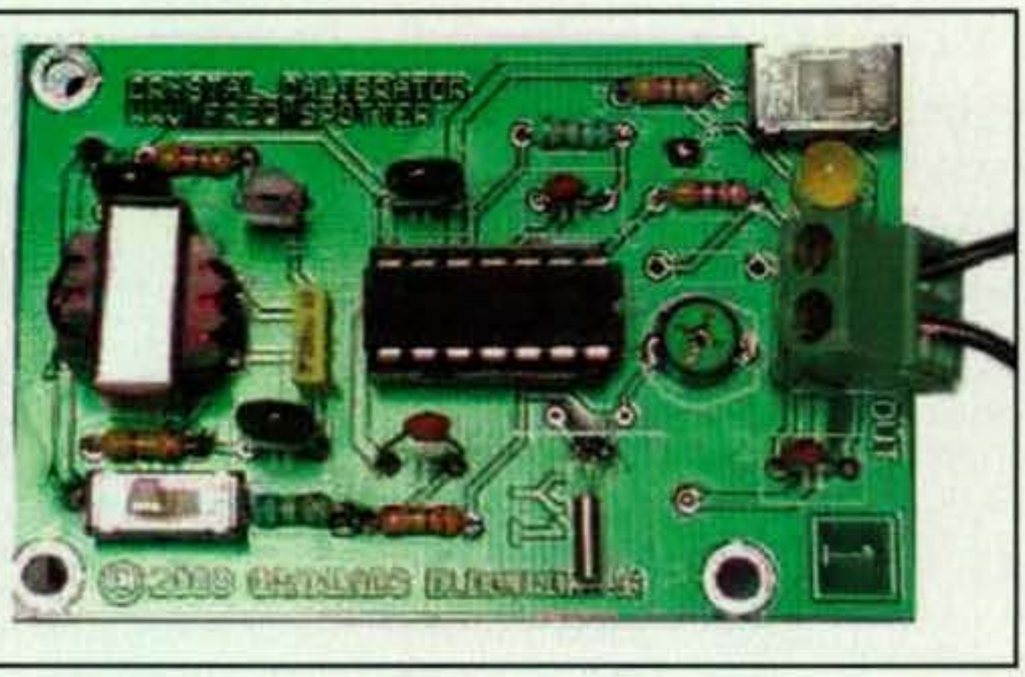

Photo A– The Novatech Grandad's Electronics XTAL1 compact frequency calibrator. (Photo courtesy of Novatech Instruments)

Photo C– Cover of WWII Radio Heroes: Letters of Compassion by Lisa Spahr. *(Photo from the author's website)*

book is available directly from the author's website (www.powletters.com/home.html), Amazon.com, and other book sellers. List price is $15.95

From the Mail Bag

Here are a couple of questions I have received regarding this column:

Q: "Why do you not always include prices for items?"

A: I am often at a quandary as to including prices. Many manufacturers provide me with only suggested retail pricing, anticipated pricing, or sometimes no pricing information at all. Also due to a wide variation in actual pricing from different resellers, I do not want to "play favorites." However, I do agree that approximate prices are of great interest to my readers, so I will plan on including pricing, when available, in this and future columns.

Q: "Why did you include an item in your column that I was disappointed in when I purchased it?"

A: Please remember that the "What's New" column is not a review column. Unfortunately, we do not receive items to try out and test. In most cases, I do not even get a chance to see or touch the actual product. Most of the information comes from vendor press releases, e-mails from readers, or other sources. If the product did not live up to their claims, I suggest you contact the manufacturer directly and let them know that you are not satisfied with the product. I cannot speak for individual manufacturers, but I know many would want to know if their product was not performing as advertised.

The Amateur Radio Website of the Month

This month's Amateur Radio Website is the work of Paolo Toscano, IK3QAR. The site is at <www.ik3qar.it>. There you will find five sections. We will focus on two:

• QSL Manager DX search (fig. 1): "A fast-growing QSL info database frequently updated in order to have always up-to-date info." Here you will find QSL Managers and addresses collected from DX bulletins, news groups, cluster-spots, and visitors to the site. The large collection is one of the best online sources for finding QSL Managers for your DX contacts.

• RTTY section: Tips, interface schemes, and cable wiring diagrams to use MMTTY, a freeware soundcard RTTY decoding program.

I find myself using Paolo's QSL Manager listings very often to quickly find managers and/or addresses for direct QSLing. The Manager Alert section is a new service aimed at DXers who are looking for QSL info for a DX station and cannot find the route. Enter the callsigns of up to 10 stations for which you can't find the QSL route. When available, you'll receive an e-mail from the system informing you that the record has been updated.

Wrap-up

That is all for this month's column. Last month I started a new feature, a web page with all of the links given in my columns. This will allow you to click on each link instead of having to type them from the written page. It will also allow me to update links as they change over time. The page will include links from all *CQ* columns I have written since my first, in the September 2007 issue. To reach the page, visit <www.k8zt.com/cq>. Remember, I welcome your feedback, questions, and/or comments. If you are a producer of a new product for amateur radio, please feel free to e-mail me or use the address, both on the first page of this column. Until next month,

73, Anthony, K8ZT

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.*

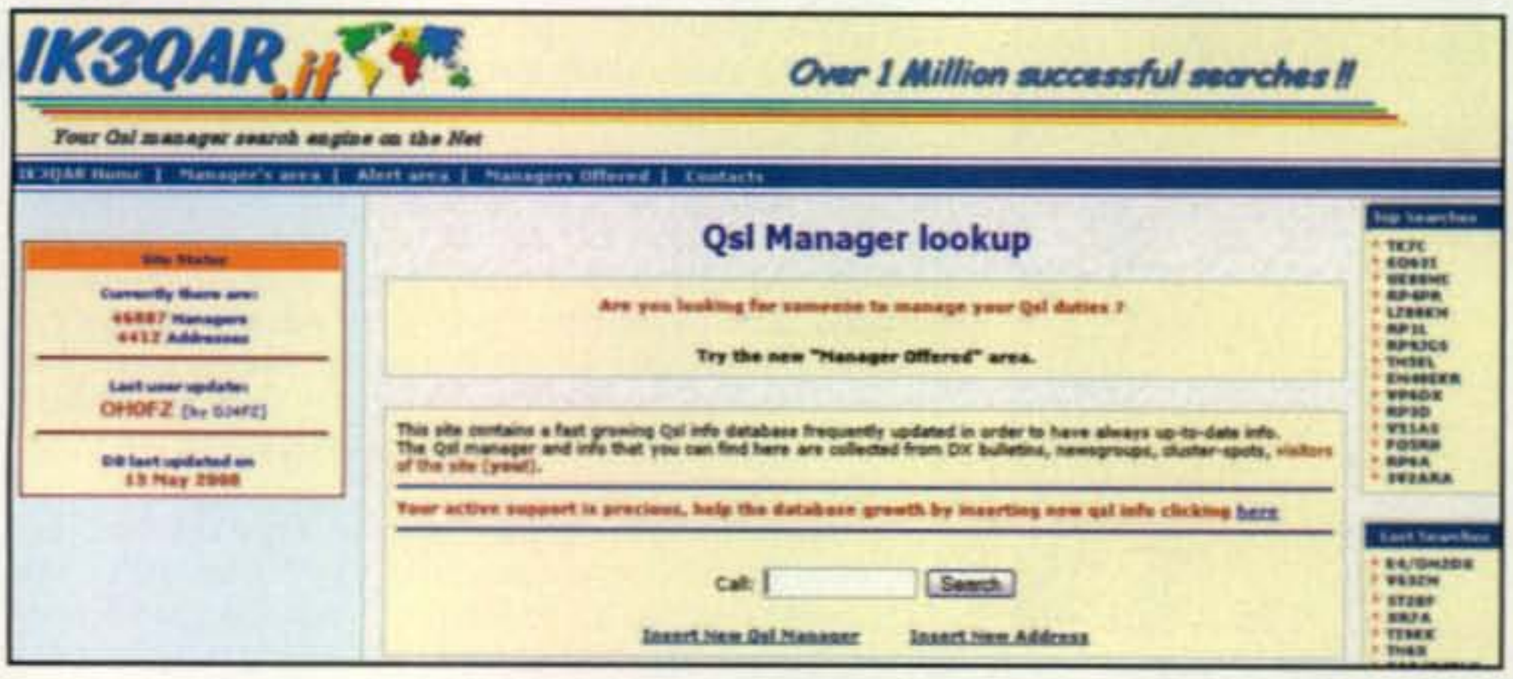

Fig. 1– Screenshot of the website of the month by Paolo Toscano, IK3QAR, featuring the QSL Manager search.

vhf plus

BY JOE LYNCH,* N6CL

The Meteor Showers Nobody Saw

Recent publications concerning the Earth's magnetotail's effect on the Moon have caused your editor to revisit a paper that I presented at the 1992 Central States VHF Society entitled "Historical Meteor Storms," which was published in the conference's *Proceedings*. Subsequently, I reprinted the essence of that paper in my August 1992 edition of this column.

In that paper I discussed the historical October 9, 1946 Giacobinid-Zinner Comet and the November 17, 1966 *Leonids* meteor showers, along with a supposed meteor shower that affected the Moon during June 20–30, 1975. I subtitled that section of my paper "The Meteor Shower Nobody Saw." The following is from that August 1992 column:

> While the Giacobinid-Zinner Comet meteor shower was spectacular in its effect on the 6-meter ham band and the *Leonids* storm displayed its wonder on the 2-meter ham band, they also were very visible showers. There was, however, a shower that apparently far surpassed these two, but that no one is known to have seen.
>
> Evidence of this shower that nobody saw came by way of the Moon. The Apollo astronauts left seismometers on the Moon during their missions in the late 1960s. During June 1975, these seismometers detected [what seemed to be at the time] a very intense meteoroid onslaught that lasted for around ten days. A group of Brazilian astronomers, headed by Pierre Kaufmann, became aware of these reports and decided to examine VLF data for the same period. They published the results of their studies in an article entitled "Effects of the Large June 1975 Meteoroid Storm on Earth's Ionosphere," which appeared in the November 10, 1989 issue of *Science* magazine (pages 787–790).

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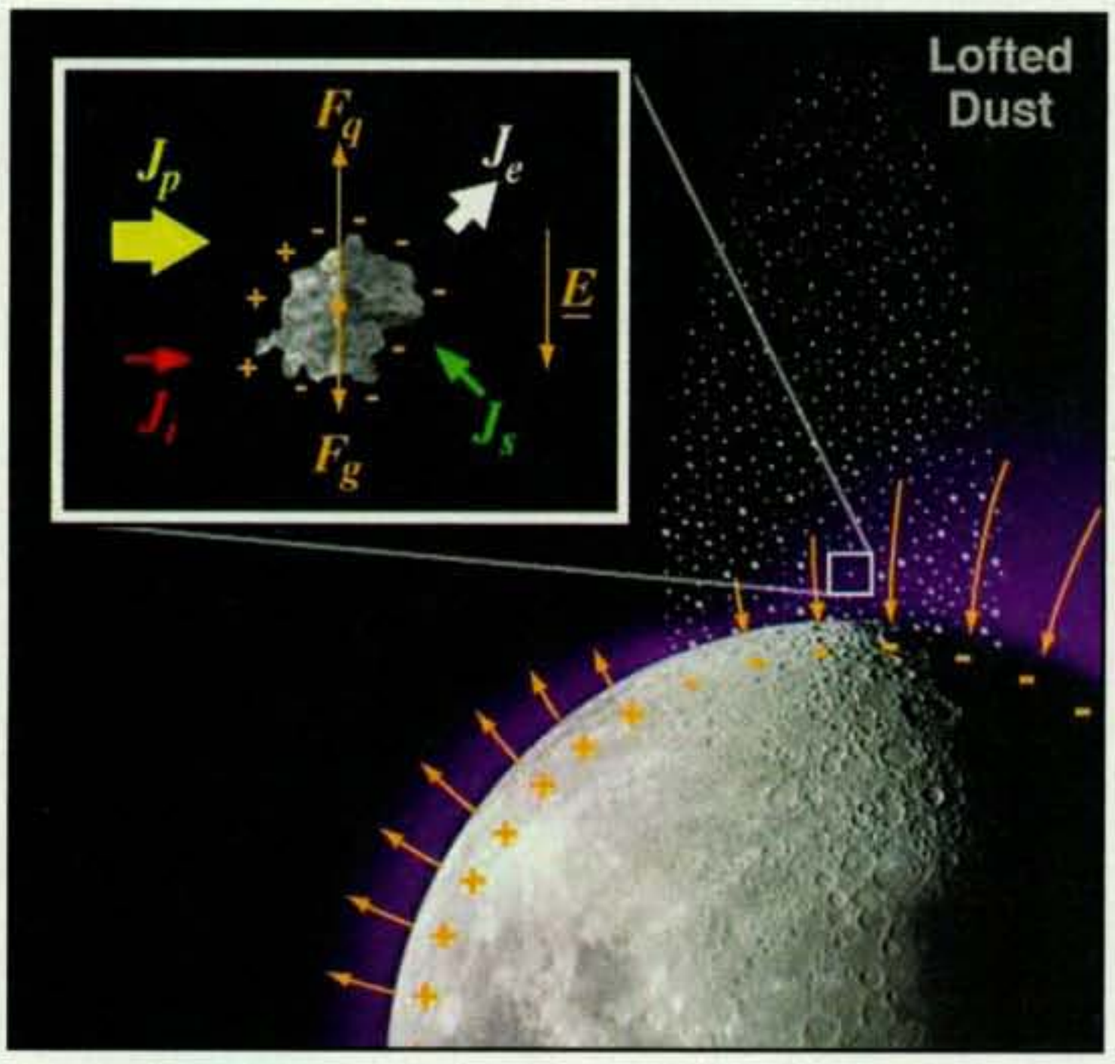


Fig. 1– Electrostatic forces acting on Moon dust may cause the dust to float off the Moon's surface. (Credit: Tim Stubbs/U. Maryland/GSFC)

VHF Plus Calendar

July 1	Moon Perigee
July 3	New Moon
July 6	Very good EME conditions
July 10	First Quarter Moon
July 13	Poor EME conditions
July 14	Moon Apogee
July 18	Full Moon
July 19–20	CQ WW VHF Contest (See text for details)
July 20	Poor EME conditions
July 25	Last Quarter Moon
July 25–26	Central States VHF Society Conference (See text for details)
July 27	Moderate EME conditions
July 28	*Southern Delta Aquarids* Meteor Shower Peak
July 29	Moon Perigee

—EME conditions courtesy W5LUU.

Was this shower otherwise detected? While it occurred during normal sporadic-*E* season, could there be any unusual events on VHF during that time frame or, did what was perceived to be normal sporadic-*E* events mask the effects of the shower?

Kaufmann et al.'s research indicated that the days of activity were between June 20 and June 30, with the prime days being June 22–23 and June 26–27. An examination of Bill Tynan, W3XO's "The World Above 50 MHz" column in the September 1975 issue of *QST* (pages 78, 136, 138, and 140) showed that sporadic-*E* type propagation occurred during these days, with especially intense reports of events occurring on June 22 and June 30.

One of the most interesting reports (to this editor) was of a three-way QSO on June 22 that Bill (then located in Maryland) had with K3AAY, and K8CAY, the latter being only 280 miles away, in West Virginia. He convincingly concludes that the mode of propagation had to be sporadic-*E*. He goes on to refer to other reports of very-short-skip contacts during the same day. Oddly, this short-distance propagation was also cited as typical during the Giacobinid-Zinner Comet caused shower.

Bill also quotes a report from W7NFC, in Athens, Oregon, that indicated contacts with all states in the W1, W4, and W5 call areas during the day of June 22. He goes on to include other reports that specified that day and others during latter June and early July. Bill concludes these reports by observing that "the day-of-days was June 22, with QSOs all over the country (being reported)."

However, these days are during the sporadic-*E* time frame and any activity could have been (and was) easily interpreted as sporadic-*E* caused propagation. As stated, June 22 seemed to be a key day for both data. However, Bill does not report any correlating data on June 26. Could it be that many hams were on the air on Sunday, June 22, and that few hams were on the air on Thursday, June 26? Could it also be that most of the activity was overnight on June 26–27, whereby many hams were in bed, not expecting or suspecting anything out of the ordinary?

For as much meteor shower activity, there seems to be little other correlating amateur radio VHF data (absence of 2- meter reports, for example). Again the question is asked, "Could the amateur radio observations be incomplete because 'nobody was on the air'?'" In conducting unrelated research, your editor looked back into his 6-meter log for the last three years and found that each

Memorial Day weekend the band had been open. No matter that the dates of the weekend have floated. Without exception, the band was open during some time of the weekend. Was the band open because people were home and on the air or was the band being open and people being home coincidental?

Now, 16 years after publishing my paper, I have come to believe that the supposed lunar meteor storm of June 20–30, 1975 was not a meteor storm after all, but rather successive sandstorms on the lunar surface caused by the Earth's magnetotail.

The first clue to my new conclusion appears on page 790 of the Kaufmann, et al., paper: "However, the lack of strict day-to-day correlations between data from Earth and Moon suggest that the meteoroid stream was not homogeneous in space." Their concluding remark tells of their inability to tie what appeared to them to be a tremendous meteor storm on the Moon's surface to anything that occurred on Earth during the same timeframe.

What began my journey to this new conclusion was a NASA report entitled "The Moon and the Magnetotail," which was published on the web on April 17, 2008 (see <http://science.nasa.gov/headlines/y2008/17apr_magnetotail.htm>). In that article author Dr. Tony Phillips discusses the work of Dr. Tim Stubbs, a University of Maryland scientist working at the Goddard Space Flight Center. He quotes Stubbs: "Earth's magnetotail extends well beyond the orbit of the Moon and, once a month, the Moon orbits through it. This can have consequences ranging from lunar 'dust storms' to electrostatic discharges." Phillips adds: "There is compelling evidence that fine particles of Moon dust, when sufficiently charged-up, actually float above the lunar surface."

When I read Stubbs' and Phillips' comments, my mind flashed back to my 1992 CSVHFS paper and I immediately wondered if what Kaufmann, et al., observed was not a meteor shower but rather a magnetotail-caused series of sandstorms. Phillips' next quote of Stubbs really got my attention: "If the Moon is full, it is inside the magnetotail. The Moon enters the magnetotail three days before it is full and takes about six days to cross and exit on the other side."

From that quote, I asked the question: Was the phase of the Moon at full during June 20–30, 1975? Indeed it was. Full Moon for 1975 was on June 23 at 1654 UTC. Going back to Kaufmann, et al., I noted that their evidence of the data from those seismometers indicated intense activity on the dates of June 22–23 and 26–27, 1975, which pretty much coincides with Stubbs' comments concerning the transition of the magnetotail across the Moon's surface.

A reservation that I had about my theory was this: What was special about those dates that the magnetotail would have a more intense influence over and against other dates? To answer my reservation, my first check was with solar records concerning Sun-caused events that might trigger a longer or more intense magnetotail. I found evidence of a minor solar flare on June 30, 1975 (which might explain the more intense sporadic-*E* reports on that date). However, absent any other events, I concluded that the magnetotail was probably not abnormally influenced by the Sun during those critical days.

While it seemed that I had reached a dead end, my research did reveal another paper, this one authored by Mike Hapgood of the Rutherford Appleton Laboratory of Chilton, Didcot, Oxfordshire, UK. His paper, "Modeling long-term trends in lunar exposure to the Earth's plasmasheet," was published in the October 2, 2007 issue of *Annales Geophysicae* (Vol. 25, pages 2037–2044), the journal of the European Geosciences Union.

In Hapgood's paper he discusses how the magnetotail affects the Moon during its crossing at solstices—in particular the peaks and valleys associated with the Moon's approximate 18.6-month nodal period precessional orbit. Concerning the June 20–30, 1975 events, the summer solstice for 1975 was on 22 June at 0027 UTC. As it turns out, this particular crossing was one of the more intense timeframes of the Moon's nodal period precessional orbit. For me, this third factor of the Moon's nodal period precessional orbit seems to be enough to support my new theory that what happened on the Moon between June 20–30, 1975 was likely a series of sandstorms probably caused by the swath of the Earth's magnetotail across the Moon's surface.

In summary, it is my hypothesis that what Kaufmann et al. investigated as a meteor storm was in actuality sandstorms caused by the Earth's magnetotail. The evidence I have found seems to indicate that Moon appears to have crossed through the Earth's magnetotail at the right timeframe (peak of the Moon's nodal period precessional orbit, during the summer solstice, when the Moon was at full phase) for a series of sandstorms to have occurred that were detected by the seismometers left by the Apollo astronauts.

While my hypothesis certainly needs more research, it does seem to indicate to this layman that this hypothesis has some credibility. As I am writing this in early May 2008, I am hoping to have evidence to support my hypothesis more fully developed for a paper that I

will present this month at the Central States VHF Society conference in Wichita, Kansas.

Concerning the significance to the weak-signal community, in particular the significance to EMEers, there might be a possible influence on EME communication during these sandstorms. Knowing when they might occur might be important to predicting possible degradation in EME communication during such events.

Much more important, however, is the significance to NASA and its new lunar exploration program. These sandstorms could be very problematic for the astronauts while they are on the Moon's surface, or even in orbit around the Moon. In particular, during the dates June 20–21, 2016 the Moon will be at full phase the day before the summer solstice during the peak of the Moon's nodal period precessional orbit.

Uruguay, Alaska Launch First Balloon Sats

Uruguay. The following is from Juan Pechiar, CX5BT:

On April 24 a team from the Faculty of Engineering of the University of the Republic in Uruguay (http://iie.fing.edu.uy) released their first high altitude balloon Globosat01. GS01 carried temperature sensors, GPS receiver, a video camera, and telemetry transmission. Data was sent on VHF using APRS™. This was the first balloon sat experience in Uruguay and got much interest from the radio amateur community and, unexpectedly, from the local media. Also air traffic control got quite nervous having something new inside their realm.

This first release was a test for subsequent missions this year which will carry scientific payloads developed in cooperation with TIMA laboratory (France) for characterizing the effect of cosmic radiation on new high density electronics. TIMA lab in Grenoble, France is specialized in "specialization" of electronics for the aerospace industry (i.e., making electronic components robust to cosmic radiation). We've had some collaboration between the two institutions over the last years, and we now have the possibility of carrying radiation tests in realistic conditions (normally radiation tests are made in particle accelerators). The balloon sat missions are partly financed by TIMA through the Alfa Nicron project (http://tima.imag.fr/qlf/alfa-nicron/).

Also, the balloon sat program is part of Project LAI (http://iie.fing.edu.uy/twiki/bin/view.cgi/Satelite). The primary goal is to develop a micro/nano satellite as a means of strengthening certain academic areas, and also providing the students with something really interesting and challenging to work on.

There is a tendency for students to prefer everything simulated on a computer, leaving aside practical electronics, practical RF experience, and tinkering. This turns into a problem when they are faced with real world problems and design. Project LAI will try to bridge this wide gap between theory and practice by offering students the opportunity to join the project's activities at an early stage in their careers, and also by relating with the industry and the ham radio community.

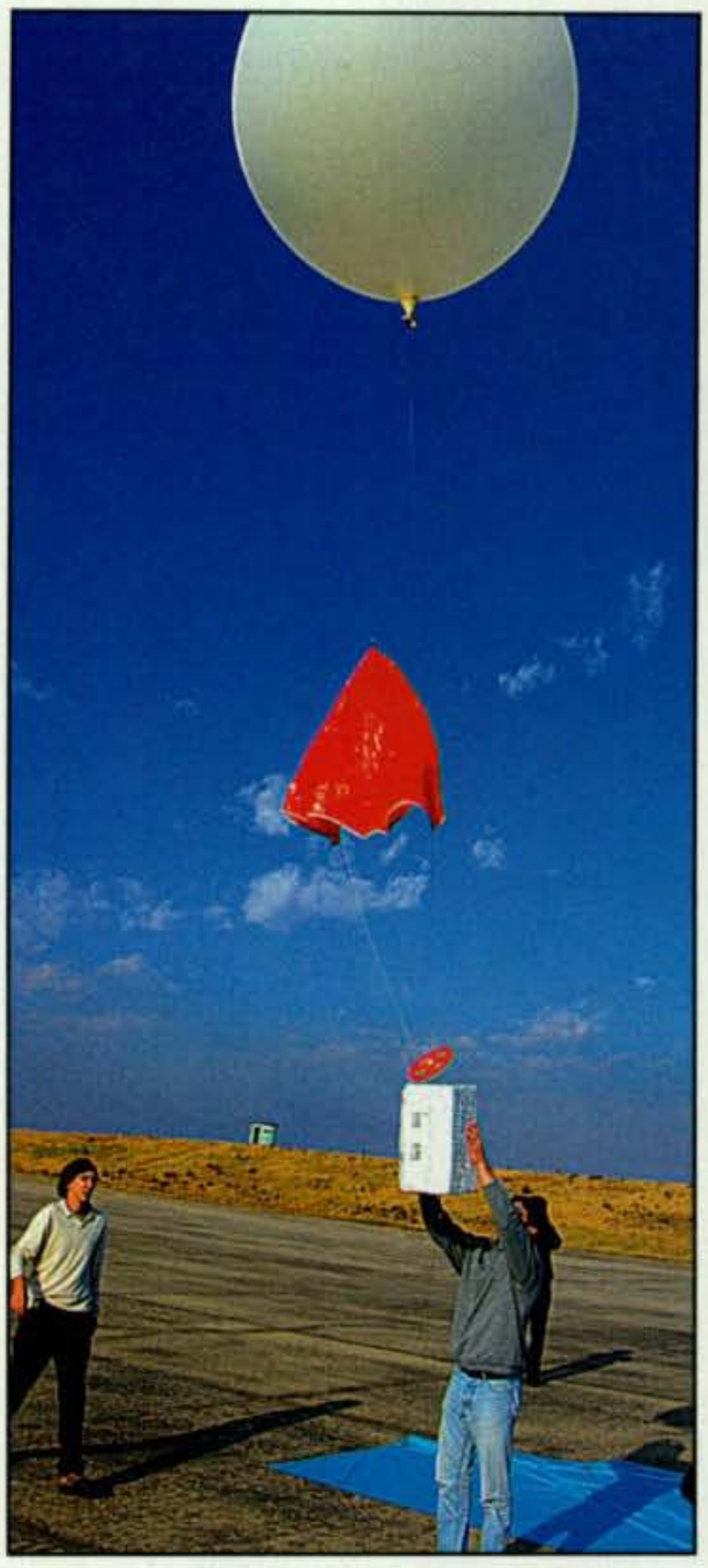


Photo 1– Launch of Uruguay's first high-altitude balloon, Globosat01.

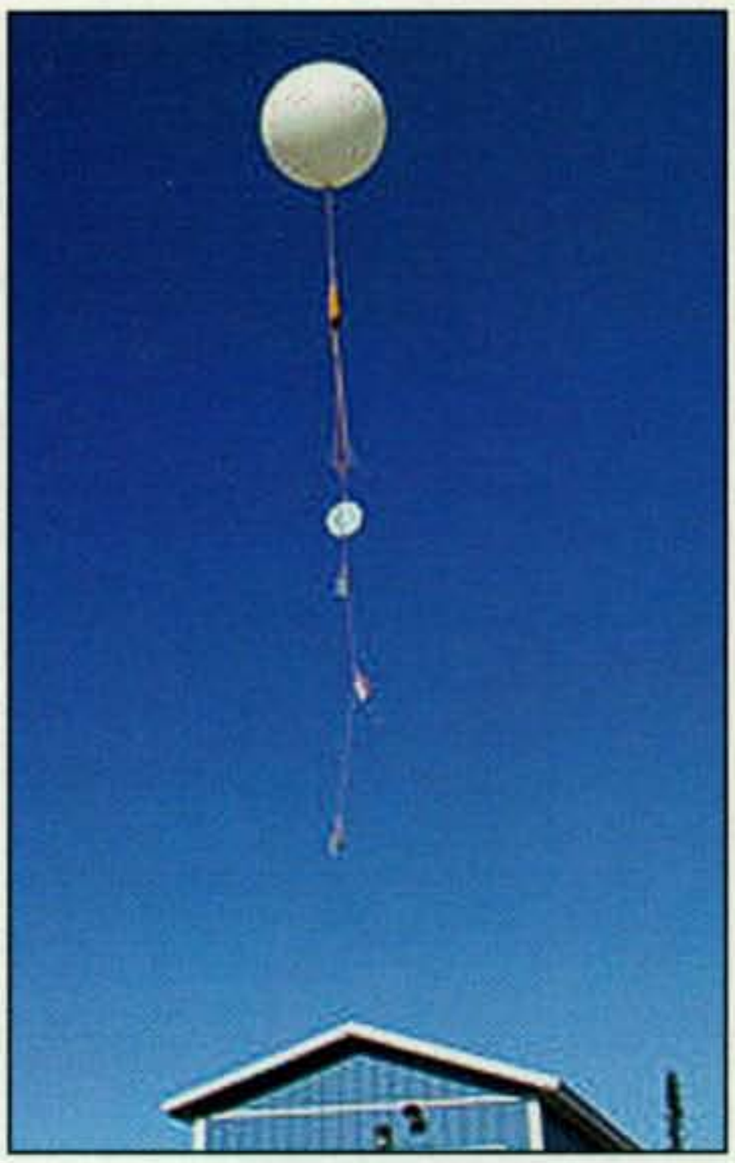


Photo 2– Launch of Alaska's first high-altitude balloon, BEAR 1.

Photo 3– Bob Lear, W4ZST, congratulating Sandra Estevez after she was presented the K4UHF award plaque. (N6CL photo)

Alaska. The following is from Daniel M Wietchy, KL1JP:

After several months of preparation, we launched the BEAR (Balloon Experimentation and Research) balloon flight number one on Saturday May 10, 2008 at 10:09 AM and watched in awe as it went to 95,170 feet before burst and subsequent descent. Our initial flight planning included an airplane intercept with on-board GPS/radio tracking gear operated by two ham radio operators who tracked the descending balloon and overflew the exact impact location.

Although we originally thought recovery would be impossible, we were thrilled with a near vertical ascent and descent with the balloon package landing about 12 miles away and within 4-wheeler reach. Within the next week, we are anticipating recovery of capsule 3, which included a still camera set to take pictures every 3 minutes as well as a data logger. I will post data, ground and air video and data, as they become available on the BEAR website (http://www.bear.437am.com/).

Now that we've successfully tested the BEAR balloon template, we anticipate using a portion of the future flights for testing the University of Alaska's "Cubesat" packages and several ham radio experiments.

Dr. Ronald Parise, WA4SIR, SK

The following is from ARRL special bulletin ARLX004, May 12, 2008:

Ronald A. Parise, PhD, WA4SIR, passed away Friday May 9, 2008 after a very long and courageous battle with cancer. He was 57. Parise flew as a payload specialist on two space shuttle missions: STS-35 on

Photo 4– Your editor congratulating Steve Hicks, N5AC, the winner of this year's SVHFS Design Contest. (Photo courtesy of W4DEX)

Columbia in December 1990 and STS-67 on the Endeavour in March 1995. These two missions, ASTRO-1 and ASTRO-2, respectively, carried out ultraviolet and x-ray astronomical observations, logging more than 614 hours and 10.6-million miles in space.

First licensed when he was 11, Parise kept Amateur Radio at the forefront of everything he did, including his operations from space. During his two shuttle flights, he spoke with hundreds of hams on the ground. He was instrumental in guiding the development of a simple ham radio system that could be used in multiple configurations on the space shuttle; as a result, his first flight on Columbia ushered in what Bauer called the "frequent flyer era" of the Shuttle Amateur Radio Experiment (SAREX) payload.

Parise was the first ham in space to operate packet radio. "His flight pioneered the telebridge ground station concept to enable more schools to talk to shuttle crew members despite time and orbit constraints," Bauer said. "In his two shuttle flights, he inspired countless students to seek technical careers and he created memories at the schools and communities that will never be forgotten. Ron was also the ultimate ham radio operator—in space and on the ground."

In an effort to continue Parise's work to inspire the next generation, his family has set up a scholarship fund in Parise's honor for students pursuing technical degrees at Youngtown State University, Parise's alma mater. Those interested are welcome to send donations to the Dr. Ronald A. Parise Scholarship Fund, Youngstown State University, One University Plaza, Youngstown, OH 44555.

Photo 5– The new headquarters of Down East Microwave. You will note that there is plenty of room for parking around the building. (N6CL photo)

Photo 6– The test bench where future prototypes of products are tested at Down East Microwave. (N6CL photo)

This Year's Southeast VHF Society Conference

For your editor this year's Southeast VHF Society conference was probably the best that I have attended thus far. The excellent presentations and the papers published in the *Proceedings* ran the gamut of weak-signal VHF communications. Program director Steve Kostro, N2CEI, did an outstanding job with both the program and the *Proceedings*.

Two honorees worth noting are Sandra Estevez and Steve Hicks, N5AC. Sandra was the recipient of the prestigious K4UHF award for outstanding contribution to the society and/or the weak-signal VHF community in general. Hicks won the SVHFS Design Contest with his project "A USB Programmable High Stability LO for Microwave Transverters. His prizes include: $2500 Mini Circuits gift certificate (Mini Circuits is a major underwriter for the prize), as well as a year's subscription to *CQ VHF* magazine, plus Steve's paper will be published in a future issue of *CQ VHF* magazine.

Next year's conference will be back in Charlotte, North Carolina. For more information concerning the society, go to: <http://www.svhfs.org>.

A Visit to Down East Microwave

Speaking of Steve Kostro, N2CEI, and his lovely wife, Sandra Estevez, it was about this time last year that they moved their Down East Microwave business from Frenchtown, New Jersey south to Live Oak, Florida. On my way home from the conference, I made the 20-mile detour to their new QTH to get the tour. While they are way out of the way of commerce, they haven't missed a beat in continuing to meet the needs of the VHF-plus amateur radio operators. For more information concerning their products see the website <http://www.downeastmicrowave.com>, or contact

Photo 7– My wife, Carol, W6CL, touching a lunar sample on display at the Kennedy Space Center. (N6CL photo)

Photo 8– Retired Astronaut John Blaha, KC5TZQ, answering questions during the "Lunch with an Astronaut" function during the Kennedy Space Center tour. (N6CL photo)

them at 19519 78th Ter., Live Oak, FL 32060, phone 386-364-5529.

Current Contest

CQWW VHF Contest: This year's CQ WW VHF Contest will be held from 1800 UTC July 19 to 2100 UTC July 20. Rules and log sheets are available on the CQ website at: <www.cq-amateur-radio.com>. The rules were also published in the June issue of *CQ*.

Current Conference

This year's Central States VHF Society Conference will be held in Wichita, Kansas July 25–26 at the Wichita Airport Hilton. For more information, go to: <http://www.csvhfs.org/>.

Calls for Papers

Calls for papers are issued in advance of forthcoming conferences either for presenters to be speakers, or for papers to be published in the conferences' *Proceedings,* or both. For more information, questions about format, media, hardcopy, e-mail, etc., please contact the person listed with the announcement. The following conference organizer has announced a call for papers for its forthcoming conference:

Technical papers are solicited for presentation at the 27th Annual ARRL and TAPR Digital Communications Conference to be held September 26–28 in Chicago, Illinois and for publication in the conference *Proceedings*. Presentation at the conference is not required for publication. Submission of papers is due by July 31 and should be submitted to: Maty Weinberg, KB1EIB, ARRL, 225 Main Street, Newington, CT 06111, or via the internet to <maty@arrl.org>. For suitable topics and submission guidelines contact Maty via e-mail; also check <http://www.arrl.org>.

Meteor Showers

This month there are a number of minor showers. The *Piscis Austrinids* is expected to peak July 27. The *δ-Aquariids* is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around July 27. The *α-Capricornids* is expected to peak on July 29.

For more information on the above meteor shower predictions see Tomas Hood, NW7US's "Propagation" column. Also visit the International Meteor Organization's website: <http://www.imo.net/calendar/2008>.

And Finally . . .

One of the last things I did following the Southeast VHF Society conference was to tour the Kennedy Space Center. It was an incredible experience. I highly recommend to anyone visiting the Orlando, Florida area to take in the KSC tour. If at all possible, you need to take two days to complete the tour, as there is so much to see.

One of the optional programs is lunch with an astronaut. Our lunch was with Astronaut John Blaha, KC5TZQ. Among his many accomplishments was his more than four-month tour of duty onboard the Russian MIR space station. As part of that program John was the first astronaut to be given permission by the FCC to make amateur radio contacts with non-licensees from the Russian spacecraft. Their waiver of the restriction against third-party traffic made it possible for him to have conversations with dozens of school children at various schools across the country.

Speaking of children, John is a wonderful, articulate spokesperson for the space program who represents himself and the program especially well with children. More than once during the lunch John took time to answer children's questions.

Speaking of his MIR experience, John has sent me a paper for possible publication in *CQ VHF* magazine. It is a three-part reflection on his experiences aboard the MIR space station which is derived from three e-mails he sent to his wife during his stay onboard the space station.

If you have a story to tell concerning your VHF-plus-related adventures or about a project that you have built, please contact me at e-mail: <n6cl@sbcglobal.net>. I look forward to hearing from you in the near future.

Until next month . . . 73 de Joe, N6CL

County Hunting: Looking Ahead

BY TED MELINOSKY,* K1BV

From the published lists of those who have earned the USA-CA Award, it is evident that activity has slowed down over the past year. Propagation and gasoline costs come to mind as the primary reasons. It was just a few years ago when you could hear counties being run on 14.336 from mid-morning to late in the evening. It may be better in other parts of the country, but from my view, on the East Coast, it's barely possible to hear a few weak stations trying to make contacts with equally weak callers.

Propagation experts continue to tell us that we are at the lowest point of the sunspot cycle, then revise that prediction ahead a few months for what seems to be a protracted "bottom." Unless this heralds a return of the dreaded Maunder Minimum, we are bound to see some improvement by the end of the year. In the meantime, we can participate in various state QSO parties, which bring concentrated action from both fixed and mobile stations. They are a wonderful way to quickly bulk up your county totals. Read the award rules, and WA7BNM has a great website: <http://www.hornucopia.com/>.

High gasoline costs put a damper on planned mobile trips to rare locations. No doubt about it. There are still special trips, but they are fewer in number. K3IMC's popular website <http://208.178.228.13/ch/index.html> has a special section on these trips. Read about them in advance and support the mobiles with your contacts.

Special Endorsements

While the USA-CA Award is a "one-time" certificate, I am always happy to provide a special endorsement for those dedicated county hunters who prove that they have worked all counties on another band or mode. Congratulations to Alan Fischer K8CW, who now has endorsements for All CW, All SSB, All Mobiles, All 40 meters, All 30 meters, and as of April 10, 2008, All 20 meters.

Australia's Milliwatts per Kilometre Award

Here's an award aimed at the hard-core QRP operators who have the capability of measuring their output power with some accuracy and can deliver a signal over a hefty distance. There are a number of internet services that allow you to enter the latitude and longitude of your location plus that of your contact and will provide distance information in miles or kilometers. The only problem left is for you is make the contact using flea-sized power during a sunspot minimum. It's a challenge, and we don't back down from a challenge, right?

Sponsored by the CW Operators QRP Club, the goal of the Milliwatts per Kilometre Award is to popularize working the farthest distance with the least amount of output power, CW and SSB. Contacts must be made on or after January 1, 1999 over distances equal or greater than those shown in Table I for different levels of the award. Applicants should specify full details of output power (key down for CW, and PEP for SSB), latitude and longitude, grid

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

USA-CA Honor Roll

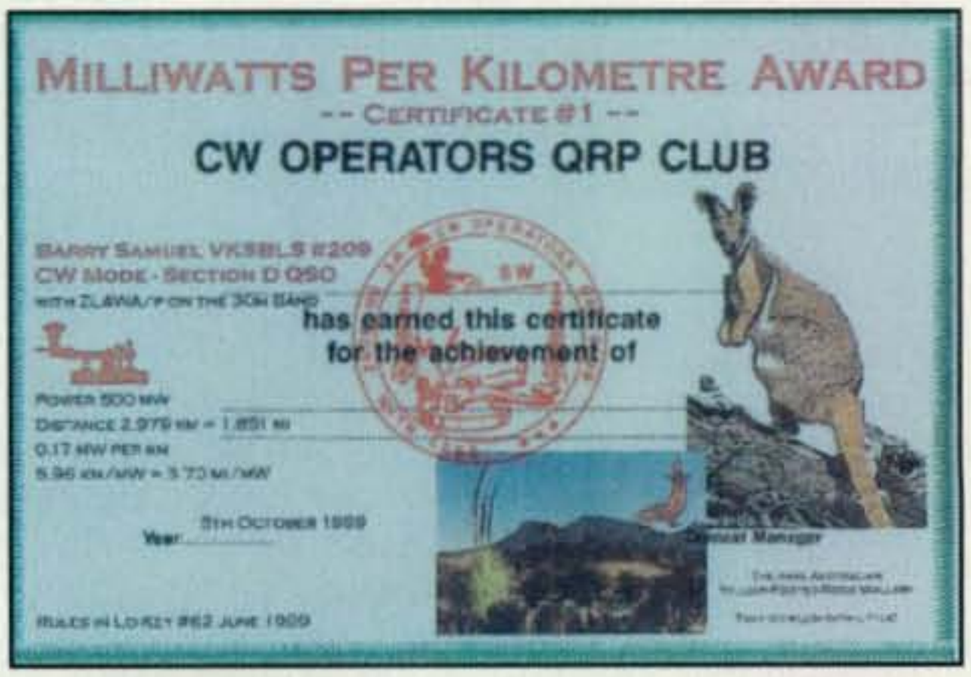
500

DL1SP	3431
DL5XJ	3432
AI8P	3433

2500

KØRCJ	1280

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.

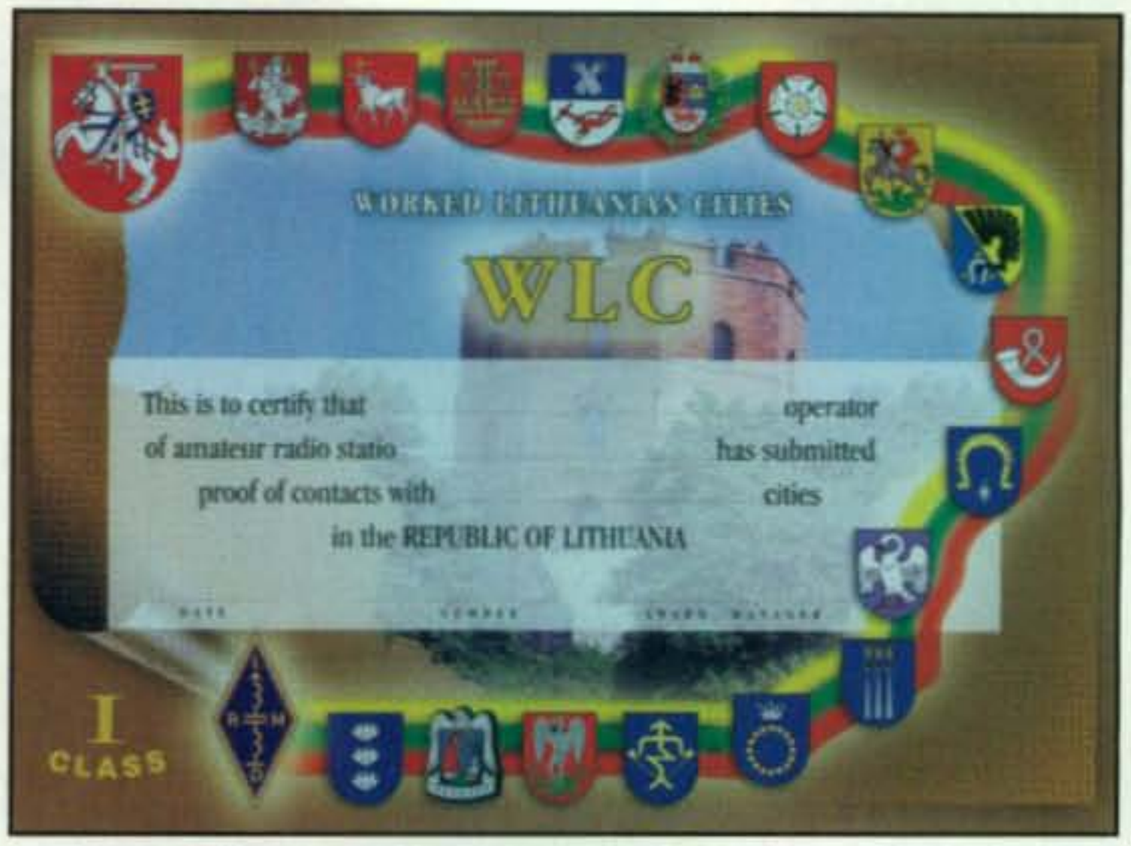


The Milliwatts per Kilometer Award is sponsored the CW Operators QRP Club, Australia.

Level	Max. Power	Min. Distance	Min. km per mW
A	10 mW	100 km	10
B	100 mW	500 km	5
C	200 mW	600 km	3
D	500 mW	1000 km	2
E	1 W	2000 km	2
F	5 W	10000 km	2

Table I– The levels of the Milliwatts per Kilometre Award and their requirements.

The Irish Radio Transmitters Society offers this award for contacting 20 of the 26 counties of Ireland.



Work cities of Lithuania to earn this award on several levels.

squares, GPS location or map reference (preferably two or more), and provide photocopies of the cards sent and received.

Fee for Australians (VKs) is $A5 or 5 IRCs (or five $1 Australian postage stamps). Fee for DX is $A10 or $US6 or 6 IRCs. Apply to: CW Operators QRP Club, Awards and Contests Manager, Ian Godsil, VK3DID, 363 Nepean Highway, Chelsea, 3196 Australia. <http://users.senet.com.au/~dc911qrp/mpk.htm>

Ireland's Worked EI Counties Award

Ireland's national amateur radio organization is the Irish Radio Transmitters Society, and it offers a handsome certificate for those who can prove contact with 20 of the 26 counties of the Emerald Isle. Earning the award can be a challenge, since 61 percent of the licensed hams in Ireland live in just five counties: Dublin, Cork, Donegal, Galway, and Limerick. Check the bands during the EI activity weekend. Many EI stations are on the bands during the weekend closest to the 17th of March, which is St.Patrick's Day, the Irish national holiday. You might also find rare counties operating during the Islands On The Air (IOTA) contest.

Work or hear (SWL okay) at least 20 of the following counties after January 1, 1982: Carlow, Dublin, Laois, Mayo, Sligo, Cavan, Galway, Leitrim, Meath, Tipperary, Clare, Kerry, Limerick, Monaghan, Waterford, Cork, Kildare, Longford, Offaly, Westmeath, Donega, Kilkenny, Louth, Roscommon, Wexford, and Wicklow. An endorsement is available for contacting all 26 counties. Send GCR list and fee of 5 Euros, IR£5, $US10, or 10 IRCs to: IRTS Award Manager, Box 462, Dublin 9, Ireland.

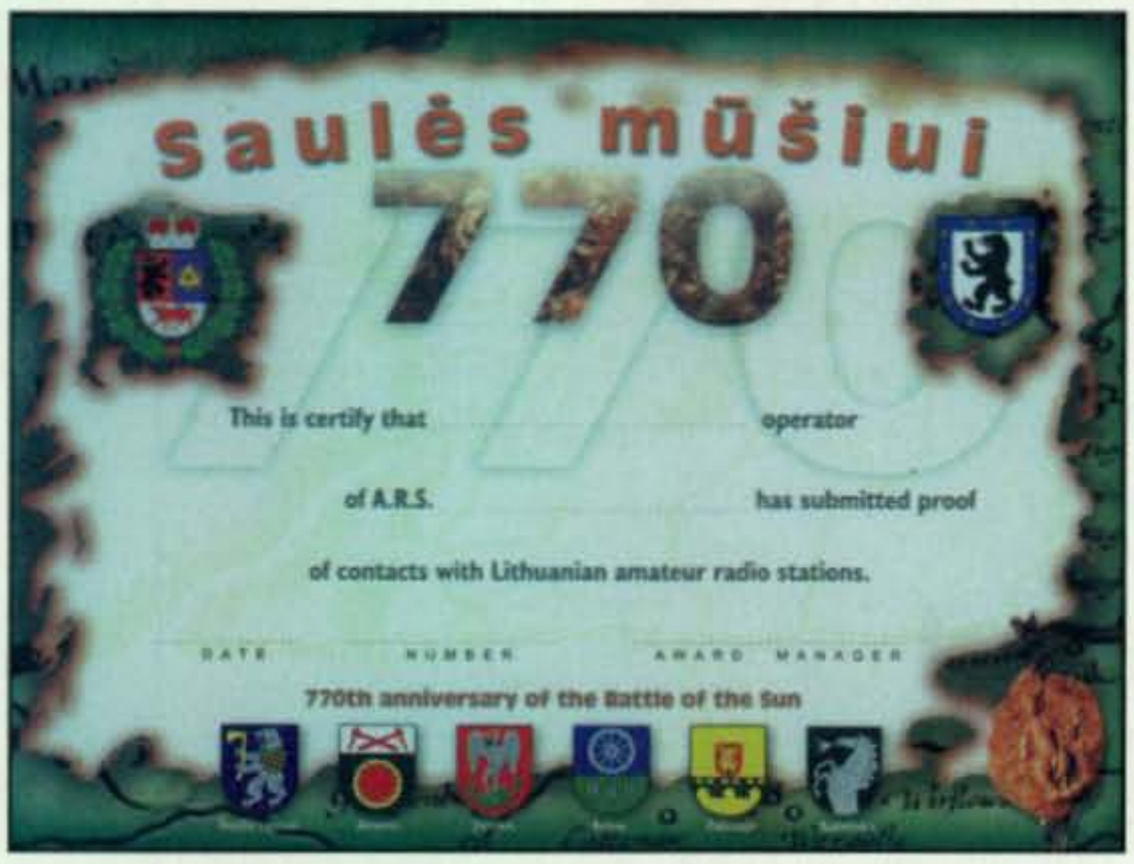
Lithuania's LY2QT Awards

Here are two handsome award certificates from Lithuania. Many of the awards from Europe are full of symbolic coats of arms, seals, flags, and insignias and are very attractive.

General Requirements: All contacts must be made on or after January 1, 1990. Send a certified list (no QSLs) of contacts with fee of 5 Euros, US$7, or 8 IRCs (LY, 5 Lt.) for the award to: Valerijus Simulik, LY2QT, P.O. Box 131, LT-78296, Siauliai-10, Lithuania.

Saules musiui 770 (770th anniversary of the Battle of the Sun). The title the "Battle of the Sun" refers to a historic battle fought in the year 1236 between the Christian knights (Livonian Brothers of the Sword) and the pagan Lithuanians in the vicinity of the present-day city of Saule (Sun). Work different LY stations (SWL okay). RPT contacts (SWL) are allowed if made on different bands and modes. Earn a total of 770 points. QSO with LY = 50 points; LY (club station) = 100 points; LY (special calls LY60, LY95, etc.) = 150 points. One QSO with Siauliai city or county is needed.

Worked Lithuanian Cities (WLC). Work stations (or SWL) of different cities of Republic of the Lithuania. No limit on bands or modes. EU: First class = 15 cities; Second class = 10 cities; Third class = 7 cities. DX: First class = 10 cities; Second class = 7 cities; Third class = 5 cities.



The 770th anniversary of the Battle of the Sun award, one of Lithuania's LY2QT series of awards.

We're always interested in hearing from clubs, special-interest groups, or individuals who sponsor and award. Please contact me at the e-mail address shown on the first page of this column.

73, Ted, K1BV

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Available in Black, White, Red, Blue, and Silver

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10-80 Mtrs.
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Model 100A-HP

10-80 Mtrs.
1.5 Kw P.E.P.
$389

Model 200A-HP

10-80 Mtrs.
1.5 Kw P.E.P.
$409

Model 300A

10 -160 Mtrs.
250 watts P.E.P.
$389

Model 400A

10 -160 Mtrs.
250 Watts P.E.P.
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contesting

BY JOHN DORR,* K1AR

2008 CQ Contest Hall of Fame Inductees

July's Contest Tip

As we begin to think about this fall's contest season firing up, can you pick one area of your operating skill/knowledge that needs improvement? Perhaps it's your CW speed, passing or simply finding multipliers, low-band propagation, ability to run stations on SSB, or a myriad of other examples. Make this the contest season in which you target that deficiency, setting specific goals and focusing on marked improvements. Talk to experienced contesters and get their input. Ask members of your contest club. Be proactive and the results will speak for themselves!

Every year, two of our esteemed colleagues are invited to receive one of the highest honors bestowed to an individual in contesting: induction into the CQ Contest Hall of Fame *(see the announcement of this year's inductees in the CQ Amateur Radio, Contest, and DX Halls of Fame elsewhere in this issue—ed.)*. Tradition has it that the ceremony takes place at the Dayton Hamvention® annual contest dinner, and this year was no exception. I am pleased to announce that the 2008 inductees are Randy Thompson, K5ZD, and Paolo Cortese, I2UIY.

Randy Thompson, K5ZD

Randy Thompson is recognized around the world as an exceptional operator and contributor to contesting. It's no wonder that he was nominated for CQ's Contest Hall of Fame! Some of Randy's on-air accomplishments include:

- 31 consecutive years of 1000+ QSO efforts in the ARRL CW Sweepstakes, from W1, W3, W5, KP4, and VE3.
- Four consecutive CW Sweepstakes wins from W5.
- Eight CQWW DX CW Contest USA single-op all band wins, including several records.
- CQWW DX SSB USA single-op all-band win
- Highest claimed USA score for 2007 CQWW—both modes!
- Single-op and multi-single wins in the ARRL DX CW from W3 and W1.
- Single-op or multi-op wins in CQ 160, WPX phone and CW, and IARU Championships.
- Recent activity in RTTY contests, including a win and at least one record.
- 34 Top-Ten finishes in the NA CW Sprint, with five high-power wins, and one low-power win.
- Four appearances at WRTC (World Radio Team Championship), with partners NN1N, K6LA, K1KI, and W2SC.
- Perennial low-error-rate op.

The K5ZD station in Uxbridge, Massachusetts, was designed and constructed entirely by Randy, and appeared on the cover of the 2008 edition of *The ARRL Operating Manual*. He has hosted well-known guest ops such as KM3T, W2SC, W4PA, N5RZ, and CT1BOH, many of whom have posted #1 scores from Randy's station. He has also guest-operated at N5AU, WA5LES (now K5RC), K3TUP, PY5EG, and others.

What differentiates CQ Contest Hall of Fame members from other contesters is their other contributions when "off-the-air." In Randy's case there are many, including:

- Three-time editor of the *National Contest Journal* (1979–80, 1983–84, and 1988–89).
- Recent appointee as Director of the CQ WW WPX Contest.
- Contributor to the WriteLog™ logging program development team.
- Instructor at Contest University at the Dayton Hamvention®.
- Active Yankee Clipper Contest Club member and frequent speaker at YCCC meetings.
- Maintainer of Super Check Partial contest call-sign data base.
- Innovator in live streaming (and archived) contest audio.
- Co-founder (with W4AN, N5KO, and KG7GA) of the eHam.net website.
- Eight-time author of *QST*'s Sweepstakes contest writeup.
- Co-author (with K6AW) of the 2007 WPX write-up in *CQ* magazine.
- Member of FOC (First Class CW Operators Club).

In addition, Randy has quietly offered words of encouragement to beginning contesters in the Yankee Clipper Contest Club and elsewhere by e-mailing them after they post their contest scores. This kind of behind-the-scenes activity has added to the enjoyment of the contesting sport for dozens of new ops, and earned the respect of contesters around the world. Congratulations, Randy!

Calendar of Events

All year	**CQ DX Marathon**
June 21–22	All Asian CW Contest
June 25	BCC QSO Party
June 28–29	King of Spain SSB Contest
June 28–29	Marconi Memorial HF CW Contest
June 28–29	ARRL Field Day
July 1	RAC Canada Day Contest
July 5–6	DL RTTY DX Contest
July 12–13	IARU HF World Championship
July 19–20	**CQ WW VHF Contest**
July 19–20	North American RTTY QSO Party
July 26–27	RSGB IOTA Contest
Aug. 2	European HF Championship
Aug. 2–3	10-10 Int'l Summer QSO Party
Aug. 2–3	North American CW QSO Party
Aug. 3	SARL HF Contest
Aug. 9–10	Worked All Europe CW Contest
Aug. 9–10	Maryland-DC QSO Party

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

Paolo Cortese, I2UIY

Paolo Cortese's involvement with contesting spans several decades and has touched almost every aspect of our radio sport. As a competitor, Paolo has won numerous contests, created several new ones, served as both a log checker and a judge for numerous contests, had magazine articles published and written a monthly column about contesting, and participated as a speaker or panel member discussing contesting at radio conventions around the world.

What follows is a more detailed listing of Paolo's background and accomplishments:

• SWL since early 1971, first with a VHF receiver, then with a surplus military HF receiver, and finally with a third-hand "real" HF receiver made by the historic Italian factory Geloso.

• As an SWL, four-time winner of the Italian VHF Championship (five contests each year), the first time in 1973 at the age of 13.

• Operated in his first contest in 1973, "stealing" his uncle's crystal-controlled VHF radio while he was not home and logging 17 QSOs.

• Passed his ham license exam in 1980, finally receiving his I2UIY callsign on April 27, 1981, after waiting nearly nine months!

• Initially began operating contests as the easiest way to quickly collect new countries, prefixes, and islands.

• After only a few months of having received his callsign, began collecting "First Italy" in many SSB/CW contests.

• In 1989 was called to serve as the A.R.I. (Italy's national amateur radio organization) HF Contest Manager, performing his duties until 2001.

• In 1992 created a domestic contest called "Contest delle Sezioni" based on QSOs between the A.R.I.'s local clubs. Over the years, this contest has grown to over 500 submitted logs.

• In 1994 created the European Sprint Contest and founded the European Sprint Gang (DL6RAI, G4BUO, I2UIY, and OK2FD). Since 1995, the European Sprint has been held four times a year. Paolo sponsors both the awards and the plaques program for the contest.

• In 1994 wrote a 120-page *Contest Manual* which has sold over 3,000 copies.

• In 1990 represented Italy at the first WRTC in Seattle. Team Italy finished #12 in the standings and Paolo was awarded a special plaque as the Most Accurate SSB Operator.

• While in Seattle, was asked to join the CQ WW Contest Committee as one of the DX Advisors.

• With the cooperation of a software writer, developed log-checking software for the A.R.I. International DX Contest and the Contest delle Sezioni.

• In 1996 was asked to be a judge at the WRTC in San Francisco and was part of the Log Checking Committee for WRTC 2006.

• In 1996 became a member of the CQ/RJ WPX RTTY Contest Committee (now the CQ WPX RTTY Contest).

• In 2005 became the chief log checker of both the WPX RTTY and WW DX RTTY Contests.

• Starting in 1993, wrote articles for *CQ, NCJ, CQ Contest, QST*, Radiokit, and from 1989 until 2001 edited the monthly "Contest" column in *Radio Rivista* (A.R.I.'s official magazine).

• Was the featured speaker at the first Contest Dinner at the Visalia International DX Convention and has served as a speaker and panel member at numerous convention contest forums.

• Has operated with numerous contest DXpeditions, including: T70A (1990), HV4NAC (1994), 1AØKM (1994), HV4NAC (1995), 1AØKM (1995), 5U2K/5U3T/5U5A (2001), 5U1A/5U4R/5U6W/5U8B/5U9C/5UØT (2002), 1AØKM (2007).

Indeed, Paolo is highly qualified to be a member of CQ's Contest Hall of Fame and it is an honor to welcome him to the group!

Final Comments

It is a great thrill in contesting to be inducted into CQ's Contest Hall of Fame. It's an honor that has been conferred upon only 52 contesters since its inception. Naturally, winning contests is great; maintaining the respect of your peers is priceless!

The summer is upon us, and I hope you're enjoying the season and on-the-air activities as much as I am. See you in the next one!

73, John, K1AR

BY CARL SMITH,* N4AA

You Can Work 'Em! Plus Brunei and St. Lucia

Here in early May we are still waiting for Cycle 24, which was expected to start sometime soon. Although there have been a few spots on the sun, it appears that the "new" cycle is very slow getting cranked up. It's pretty depressing to look at the forecast day after day and see the solar flux index still running in the upper 60s to low 70s.

Thank goodness for the quality of our equipment today, allowing us to still be able to hear and work some DX on some bands/modes in spite of those solar numbers. During the "doldrums" of previous cycles we were not so blessed with receivers that could hear a pin drop on the other side of the ocean—especially with our low-noise antenna systems. Antennas have improved to the point where we don't have to have 15 elements 190 feet in the air to be able to work DX. If you have a decent antenna tied to your mid-power-range (700–1000 watts) amplifier, you should be able to work anything you can hear. Also, decent antennas are not that hard to come by. It doesn't have to be umpteen-element mono-banders, two wavelengths up. You can do make DX contacts with a mid-range multi-band Yagi under 70 feet. Oh, it may take you a little while to wait out the "big guns," but you can do it.

I know you can, because I'm in that same category. Some of you have seen the pictures of my antenna system, a 60-foot wood pole with a 21-foot length of pipe side-mounted on a Tail-Twister rotor. The top of that pole is a bit over 55 feet high, and the top of the pipe reaches all the way up to 65 feet. The little Cushcraft A4S sits just above the pole, and the 2L Cushcraft 40-meter Yagi is at the top of the pipe. A simple dipole for 80 hangs from the top of the pole with the ends dropping down to about 30 feet. All of that is fed through a 400-foot run of 1/2-inch 50-ohm hard-line that I acquired a long time ago. A remote switch sits about 6 feet up from the bottom of the pole (so I can get to it to clean the relay contacts from time to time).

Yes, I did say 400-foot run of hard-line. That's because the pole sits 300+ feet from my house. The pole is at the crest of the hill above the house to take advantage of nature giving me a few more feet of altitude. It takes a little more length to get the feed-line into the basement ham shack, but it has been well worth the effort. I have to thank my friend Dave, K4SV, for helping me get all that cable stuffed through some PVC pipe to protect it from the guy who cuts my grass. He cut the previous feed-line and control cables several times before I decided to fix the problem.

Inside the house I have a modest station: an FT-1000MP (at least 14 years old now) and a Ten-Tec (original) Titan amplifier (bought in 1992, and still running the same tubes). That's the extent of my gear, other than a little IC-706MKIIG that I got a few years ago to have something for a backup and to be able to get on VHF/UHF for emergency purposes.

Why am I running on and on about *my* station? Just to make the point that with no more than what I have here, for DXCC I am sitting at #1 Honor Roll

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

Lars, MMØDWF, was active in February from Husvik, South Georgia as VP8DIF. He will be back later this year and again in 2009 for his work as a scientist. (Photo courtesy of Franz, DJ9ZB)

The bands were quiet when these DXers met for dinner in Atlanta, GA. Left to right: Pierl, W1NA; Max, I8NHJ; Joe, KO4RR; and Tom, N4XP. (Photo courtesy of Tom, N4XP)

CQ DX Awards Program

SSB

2507 .....KB2TGU 2508 .....VE7EDZ

SSB Endorsements

330 .....N4CH/338	330 .....K9MM/338
330 .....W8AXI/338	330 .....KØKG/337
330 .....W6BCQ/338	330 .....W2FKF/337
330 .....N4MM/338	330 .....W7FP/337
330 .....VK4LC/338	330 .....W3AZD/337
330 .....4Z4DX/338	330 .....N1ALR/330
330 .....W4WX/338	320 .....KD5ZD/326
330 .....N7BK/338	300 .....ON4CAS/312
330 .....W7OM/338	275 .....AE9DX/282
330 .....W9SS/338	275 .....K7ZM/295

CW Endorsements

330 .....K4IQJ/337	330 .....N4CH/336
330 .....N4MM/337	330 .....K4JLD/336
330 .....EA2IA/337	330 .....KA7T/335
330 .....W4OEL/337	330 .....K6LEB/333
330 .....W7OM/337	320 .....K6CU/329
330 .....K9MM/337	310 .....ON4CAS/312
330 .....W7CNL/337	275 .....KØKG/284
330 .....N7FU/337	

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 338 active countries. Please make all checks payable to the award manager.

The WPX Program

SSB

3000 .....AI8P

Mixed

2006 .....K4GHS 2008 .....XE1EX
2007 .....AI8P

Digital

4 .....N8BJQ 7 .....7K3QPL
5 .....GUØSUP 8 .....N6QQ
6 .....WB9B 9 .....KUØA

Mixed: 650 AI8P. 800 K4GHS. 2450 WZ4P.
Digital: 650 N8BJQ. 1000 GUØSUP.

80 Meters: AI8P
40 Meters: WZ3AR, AI8P
20 Meters: AI8P

Europe: AI8P
N. America: AI8P

Award of Excellence: UT3UY
160 Meter Bar: UT3UY

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, KØDEQ, DKØPM, SV1EOS, UAØFAI, N4GG, UA4RZ, 7K3QPL, EW1CQ., UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR.

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, EW1CQ, UA4LY, RZ3DX, UA3AIO, UA4RC, N8BJQ, UA3BS, UA9FGR.

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.

with all 338 entities worked and confirmed. I'm not bragging, just stating a fact. It doesn't take $10,000 radios and custom-built 10-KW amplifiers to get the job done. All it takes is a desire to do it and the dedication to make it happen.

It helps to know what is going on in the DX world and that comes from listening and looking for DX news to see what is going to be on the air and when. There are a lot of sources available, and I won't promote any one over the other. Each has its own merits and each one has its own appeal to a particular audience. Some like the person writing the news and others just like the data, so you have to look and decide for yourself which of them suits your desires/needs. If you don't know that Yemen is going to be on the air in ABC month for XYZ days, then you just might decide to take your vacation to the other end of the country that week. Wouldn't that be a mistake? Thus, you need to know what's going to happen if you want to climb the ladder. Enough said on that subject.

Brunei

In late April, news came along about ham radio coming alive in two very different parts of the world. The first is Brunei. Brunei is a pretty small country in Asia compared to others. It is surrounded by Malaysia and the South China Sea. However, ham radio is alive and well in this country.

The Brunei Darussalam Amateur Radio Association announced April 24th that it will be back on the air. The association has been inactive for the past six years, but held its reactivation ceremony on April 27th at the Dewan Kuliah of Hassanal Bokkiah National Stadium.

Part of the announcement said, "Amateur radio in Brunei Darussalam started in the late 1970s by a number of local signal experts who formed the 'Askar Muda' radio club, which helped initiate amateur radio enthusiasm among the community. One of the first known members was Al-Marhum Seri Paduka Pg Temanggong Sahibul Bahar Pg Hj Mohammed with his call-sign VS5PM.

"Brunei Darussalam's prefix Victor Eight (V8) is renowned throughout the world due to the active communication by a number of local veteran operators, such as Pg Salleh Abdul Rahaman, Lt.

The Brunei Darussalam Amateur Radio Association announced April 24th that it will be back on the air. Brunei is a rather small country in Asia and is surrounded by Malaysia and the South China Sea.

5 Band WAZ

As of May 1, 2008, 747 stations have attained the 200 zone level and 1595 stations have attained the 150 zone level.

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

None

The top contenders for 5 Band WAZ (zones needed, 80 or 40 meters):

SU1U, 199 (27)
N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W2YY, 199 (26)
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)
RU3DX, 199 (6)
N4XR, 199 (27)
HA5AGS, 199 (1)
VE3XN, 199 (26)
YU7GMN, 199 (10)
K7LJ, 199 (37)
RA6AX, 199 (6 on 10m)
RX4HZ, 199 (13)
KØGM, 199 (17)
EA5BCX, 198 (27, 39)
WØCP, 199 (18)
G3KDB, 198 (1, 12)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
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)
K9MIE, 198 (18, 21)
W9RN, 198 (26, 19 on 40)
W5CWQ,198 (17, 18)
WB9EEE, 198 (17, 18)
YU3VQ, 198 (27, 31)
K9OW,198 (34on10, 2on15)

The following have qualified for the basic 5 Band WAZ Award:

IK2RLS (160 zones)
SP1DMD (182 zones)
DKØPM (183 zones)
HA8TI (153 zones)
K9OW (198 zones)
S51U (199 zones)
OK1AVI (170 zones)
RZ3AM (197 zones)
I5KKW (170 zones)

5 Band WAZ updates:

WØMM (186 zones)

***Please note: Cost of the 5 Band WAZ Plaque is $100 shipped within the U.S.; $120 all foreign (sent airmail).**

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

640 ..... JF2SQB

20 Meter SSB

1174 ..... IW3SNW

30 Meter CW

84 ..... JG3LGD

160 Meters

271 ..... G2LZQ (40 zones)
272 ..... RU9TO (30 zones)
273 ..... G4GED (40 zones)
274 ..... RZ3AM (39 zones)
275 ..... I2PJA (40 zones)

All Band WAZ

Mixed

8505 ..... K4DZR
8506 ..... K1KS
8507 ..... N5TY
8508 ..... IKØMIB
8509 ..... K9OW

SSB

5071 ..... IZ7GXB
5072 ..... IK8IPL

CW

541 ..... OK1AVI

RTTY

186 ..... JFØEHX

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>.

Col. (Rtd.) Ambran Hj Mohd Noor Aston (Vice President), and Hj Abu Bakar Hj Awg Ahmad (Advisor), to name a few.

"In 1999, the 27th SEANET Convention, an annual event for radio amateurs, was successfully held in Brunei Darussalam for the first time. Many fellow radio aficionados from around the world who came to the convention said that it was one of the best conventions they had ever attended.

"After the event this weekend, a number of road shows have been lined up in May in all four districts: On Sunday May 11, a reactivation road show will be held at Muara Beach in the Brunei-Muara District; Sunday May 15, Seri Kenangan Beach in the Tutong District; Sunday May 25, Anduki Jubilee Recreational Park in the Belait District; and Sunday June 1, Kuala Belalong Mini Park in the Temburong District.

"Another activity that would be of interest is the 'Borneo Field Day,' to be held in Pontianak, Indonesia this July. Brunei Darussalam was the first to organise such a day some years ago, particularly by the pioneer in Brunei amateur radio, the late Hj Hassan Hj Abd Ghani, V85HG, ex-president of BDARA."

St. Lucia

The above from Brunei was followed a week later with news from the Caribbean, St. Lucia to be exact. The following announcement came from the website: <http://www.caribbeannetnews.com:80/news-7497—20-20—.html>:

"After a long period of dormancy and disorganization, during which even their club house was lost, amateur radio operators in St Lucia are regrouping and getting their act together again.

"Efforts spear-headed by long-standing ham Lionel Ellis, J6-9KZ, resulted in a series of organisational meetings over

the past few months during which the constitution was reviewed and ratified and the Saint Lucia Amateur Radio Club (SLARC) revived.

"The new executive has vowed that their key objectives in this period will be to strengthen the organization by securing training for its members, and to get its due recognition from government as it is expected to provide significant communications support to any disaster-response effort in the country.

"The National Emergency Management Organisation (NEMO) and The St. Lucia Red Cross have supported the revival of the SLARC and continue to be involved in the reorganisation effort. Nineteen (19) members attended the Annual General Meeting."

THE WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with the CQ Master Prefix list. Scores are based on the current prefix total, regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, files will be made inactive.

MIXED

5489.....9A2AA	4026.....VE3XN	3625 ....KØDEQ	3227 .....K9BG	2704.....K2XF	2248 .....VE6BF	1826 .....W7CB	1643 .....N1KC	979 .....KM6HB
4843 .....W1CU	4024 .....I2PJA	3569 .....KF2O	3107 .....W9OP	2637 ..OZ1ACB	2242.....I2EAY	1821.....W2FKF	1556.....W2OO	825 .....KL7FAP
4839 ....W2FXA	3899.....N9AF	3453 ..YU7BCD	3038.....9A4W	2457 ...JN3SAC	2202 .....N8BJQ	1741 .....AB5C	1505 ..KC9ARR	742.....K5IC
4453.....EA2IA	3749.....I2MQP	3384 .WB2YQH	2990 .....W2WC	2455.....K1BV	2024.....AE5B	1731.....KX1A	1288.....K6UXO	648 .....KWØH
4275.....N4NO	3715 .....S53EO	3379.....IK2ILH	2910 .....W9IL	2441 ....W6OUL	1947.....KØKG	1705.....W2EZ	1269 ....K5WAF	633.....ZS2DL
4213.....YU1AB	3703.....I2UIY	3271..SM6DHU	2873.....W2ME	2397 .....K5UR	1891 .....VE9FX	1662....SV1DPI	1016 ..RA1AOB	

SSB

4807.....IØZV	3349.....N4NO	2672.....KF7RU	2209....IK2QPR	1935 ..SV1EOS	1729....W6OUL	1386....IK4HPU	1045.....KX1A
4310.....VE1YX	3155.....I2UIY	2595....EA1JG	2178.....NQ3A	1849 .....K3IXD	1688.....KI7AO	1381 .....N8BJQ	1042....IZØBNR
4000.....I2PJA	3142 ..CT1AHU	2591.....IN3QCI	2135 .....W9IL	1827.....AE5B	1623 .....VE9FX	1377 .....EA3NP	1031 ....IK8OZP
3900.....F6DZU	3108 .....I4CSP	2552 ..YU7BCD	2094 .....I8LEL	1821 .....W3LL	1611 .....W2ME	1371 ....IK2DZN	978.....EA7HY
3606.....OZ5EV	2972 ..OE2EGL	2431.....G4UOL	2093 .....W2WC	1821.....W2FKF	1480 .....AB5C	1338.....AE9DX	951 .....KU4BP
3544.....I2MQP	2970 .....KF2O	2326 .....CX6BZ	2076.....K2XF	1792 ..SV3AQR	1464 ..VE7SMP	1258 .....N1KC	864 .....VE6BF
3532 .....9A2NA	2857 .....4X6DK	2300..SM6DHU	2071.....N6FX	1765 .....KQ8D	1458 ...JN3SAC	1232 .....AG4W	729.....K7SAM
3473.....EA2IA	2711 ...LU8ESU	2250.....I3ZSX	2046 .....K5UR	1754 ...DL8AAV	1412.....I2EAY	1145...EA3EQT	637 .....K5WAF

CW

4854.....K9QVB	3398 .....LZ1XL	2632.....W2ME	2551.....KA7T	2148....IK3GER	1945 .....K5UR	1465 .....AC5K	1147.....KX1A	914 .....W9HR
4825..WA2HZR	3078 .....9A2NA	2623..SM6DHU	2415 .....W2WC	2120...JN3SAC	1895....W6OUL	1402 .....WO3Z	1086 .....VE1YX	824 .....VE9FX
3864.....N4NO	2927 ....KØDEQ	2606 ..YU7BCD	2324.....OZ5UR	2111 .....VE6BF	1804..EA7AAW	1334 .....RUØLL	1053 ....K5WAF	608.....IK2SGV
3685.....VE7DP	2688.....I2UIY	2586...EA7AZA	2246.....N6FX	2089.....K2XF	1804.....I2EAY	1267.....K6UXO	1030 .....AA5JG	
3412.....EA2IA	2636 .....KF2O	2582.....I7PXV	2175 .....W9IL	1967.....I2MQP	1783 .....N8BJQ	1211 .WA2VQV	915 .....N1KC	

QSL Information

5B4/DL1DA via DL1DA
5B4XX via 4Z4DX
5H/7Q7RS via IT9YVO
5HØROA via A47RS
5HØROA/A via A47RS
5HØRS via IT9YVO
5H1CM via DL7CM
5H1HD via OK1DA
5H3EYE via AC3A
5H3SK via DL1DA
5H3VMB/3 via UA4WHX
5H3VMB/5 via UA4WHX
5R8GS via DL1DA
5R8HT via F4DBJ
5T5/DJ6QT via DJ6QT
5U7/DJ6QT via DJ6QT
5V8WS via DJ6QT
5W1DT via AA6AD
5W1JP via K6UM
5Z4/DK3FW via DK3FW
5Z4/UA4WHX via UA4WHX
5Z4ES via K3IRV
5Z4OF via DL1DA
6W/DL7CM via DL7CM
6Y3T via CT1ILT
6Y5/DJ6QT via DJ6QT
6Y5/DK3FW via DK3FW
6Y5/DL1DA via DL1DA
6Y5/DL6KVA via DL6KVA
6Y5X via DJ6QT
7J1ACS via DL1DA
7P8DA via K4TZZ
7Q7RS via IT9YVO
7S6LGT via SK6NL

(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>.)

It would seem that amateur radio is alive and well in many parts of the world and aren't we glad to hear that news? Is this DX? Well, I should hope it is. DX-peditions to Brunei have been reported and St. Lucia is only a "stones' throw" for U.S. DXers for a DXpedition. We have heard J6 stations on the air recently. It is good news to hear these places are acknowledging they know what amateur radio is and hopefully won't be ready to "throw the book" at you when you open your suitcase to reveal your DXpedition radios and antennas.

L. B. Cebik, W4RNL, SK

A well known amateur, L. B. Cebik, W4RNL, passed away on April 22 at the age of 68. L. B. was a retired Professor Emeritus of Philosophy at the University of Tennessee-Knoxville. He was the author of many books and had articles published in various periodicals—such as *QEX, QST, CQ, Ham Radio, 73*, and others—on the subject of antennas. He was considered an authority on the subject and had an extensive website devoted to antenna topics. His friend Lynn Lamb, W4NL, remembers L. B. this way:

"L. B. Cebik, W4RNL, was a friend of ham radio by his consistent effort in making the point that the signal was 'outside' with antennas rather than fancy equipment. With his many books, articles, lectures, and lessons, he was a valuable resource, which is his ham radio legacy .

"It was an honor I'll not forget when not long ago I was able to present to L. B. with a plaque for Honorary Life Membership in the East Tennessee DX Association. He was a wonderful, sharing gentleman who will be missed by so many.—RIP bro, Lynn, W4NL"

Well, that's plenty for this month, so I'll just wrap it up by saying, enjoy the chase and Have Fun!

73, Carl, N4AA

Mac, W3HC, has officially retired from the QSL Manager "business." He managed around 150 different callsigns over the years. Bob, N2OO, and The QSL Manager's Society acquired the logs and cards from Mac. Here we see the back of Joe, KQ3F's car when he picked up everything (now that's a full car load!) from Mac's house in mid-April. (Photo courtesy of Joe, KQ3F)

In March, "Radar," YI9PT, gathered some friends to help put up his new SteppIR Yagi in Baghdad. Left to right: Arin, Paulette, Dave, "Radar," Dan, Ryan, and David. gets on the air. (Photo courtesy of Tom, N4NW)

Weather and the Ionosphere

BY TOMAS HOOD,* NW7US

A Quick Look at Current Solar Cycle Conditions

(Data rounded to nearest whole number)

Sunspots
Observed Monthly, April 2008: 3
Twelve-month smoothed, October 2007: 6

10.7 cm Flux
Observed Monthly, April 2008: 70
Twelve-month smoothed, October 2007: 72

***Ap* Index**
Observed Monthly, April 2008: 9
Twelve-month smoothed, October 2007: 8

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 2008

	Expected Signal Quality			
Propagation Index.....	(4)	(3)	(2)	(1)
Above Normal: 1-6, 9-13, 28-31	A	A	B	C
High Normal: 8, 16-27	A	B	C	C-D
Low Normal: 7, 15	B	C-B	C-D	D-E
Below Normal: 14	C	C-D	D-E	E
Disturbed: N/A	C-D	D	E	E

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

HOW TO USE THIS FORECAST

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

2. With the *propagation index*, use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 1 will be fair (C) on july 1–6, poor (D) to nonexistent on the 7th, poor (D) to fair (C) on the 8th, etc.

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.

Does weather affect the propagation of high-frequency radio signals? It is a well-known fact that weather plays a role in the VHF and higher spectrum. Tropospheric ducting, wind shearing, and many other weather phenomena are important components in the radio activities of the amateur radio VHF community. However, can weather so significantly affect the radio signal propagation when these signals are in the HF spectrum?

At least in one way, the answer is yes. A team of researchers working with information gained from NASA satellites has uncovered an amazing connection between weather on Earth and the ionosphere.

"This discovery will help improve forecasts of turbulence in the ionosphere, which can disrupt radio transmissions and the reception of signals from the Global Positioning System," said Thomas Immel of the University of California, Berkeley, lead author of a paper on the research published August 11, 2007 in *Geophysical Research Letters.*

The team of researchers discovered that tides of air generated by very strong thunderstorm activity over South America, Africa, and Southeast Asia were causing significant changes to the structure of the ionosphere.

The ionosphere is the key to over-the-horizon and long-distance, global HF communications. Energized by the energy from the Sun, the ionosphere forms into layers that refract and reflect radio signals of varying frequencies. Solar energy in the form of X-rays and ultraviolet light break apart atoms and molecules in the upper atmosphere, creating a series of regions made up of electrically-charged gas known as plasma. The densest part of the ionosphere forms two bands of plasma close to the equator at a height of almost 250 miles. From March 20 to April 20, 2002, sensors on board NASA's Imager for Magnetopause to Aurora Global Exploration (IMAGE) satellite recorded these bands, which glow in ultraviolet light (fig. 1).

When the team studied the IMAGE pictures, they identified four pairs of bright regions where the ionosphere was almost twice as dense as the average. Three of the bright pairs were located over areas of the Earth where major thunderstorms were active, such as the Amazon Basin in South America, the Congo Basin in Africa, and in Indonesia. A fourth pair appeared over the Pacific Ocean. By using a computer simulation developed by the National Center for Atmospheric Research, Boulder, Colorado, called the Global Scale Wave Model, the researchers confirmed that the thunderstorms over the three tropical rainforest regions produce tides of air in the atmosphere.

At first, the team was surprised by this connection to plasma bands in the ionosphere because these tides from the thunderstorms cannot directly affect the ionosphere. The gas in the ionosphere is simply too thin. Earth's gravity keeps most of the atmosphere close to the surface. Thunderstorms develop in the lower atmosphere, or troposphere, which extends almost 10 miles above the equator. The gas in the plasma bands is about 10 billion times less dense than in the troposphere. The tide needs to collide with atoms in the atmosphere above to propagate, but the ionosphere where the

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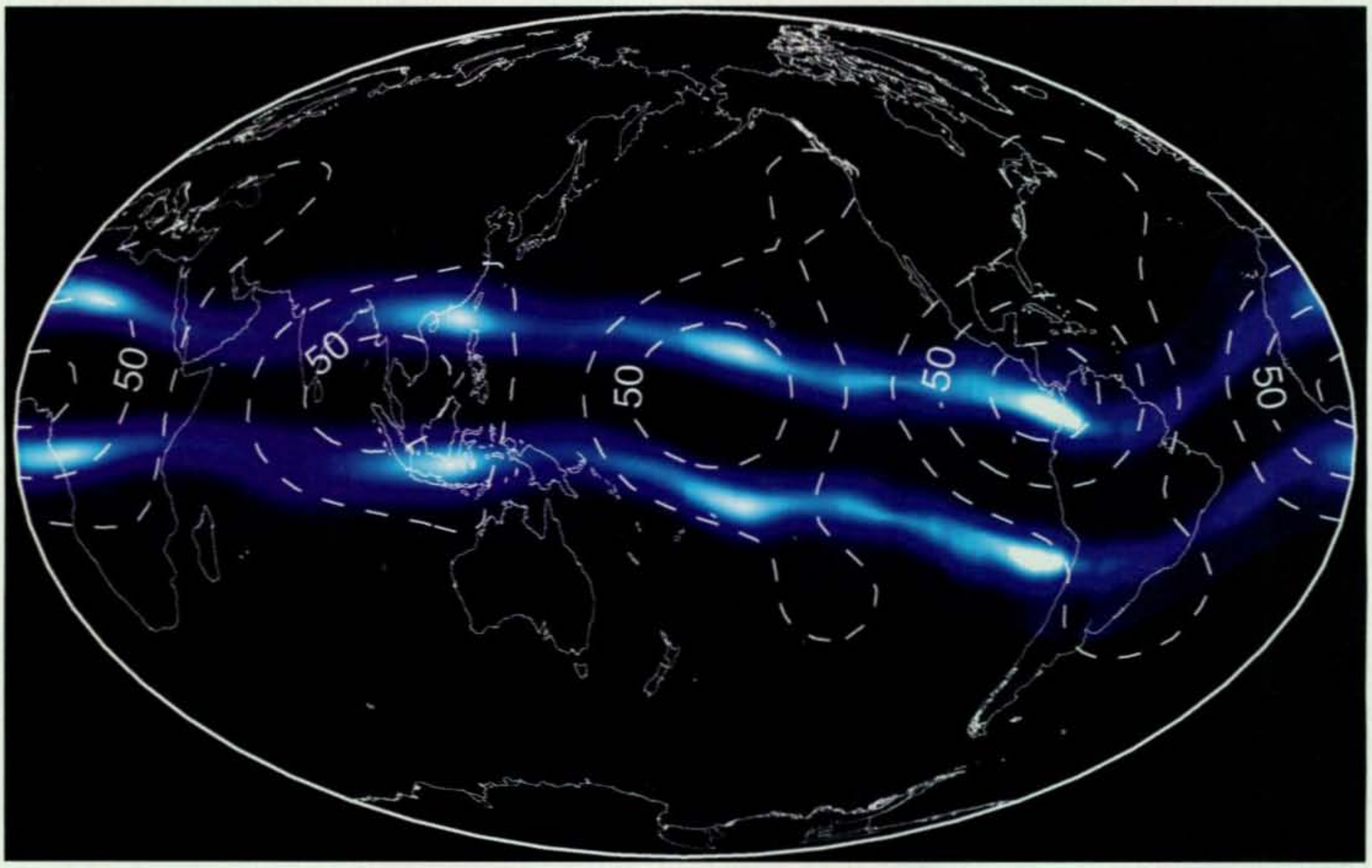

Fig. 1– This is a false-color image of ultraviolet light from two plasma bands in the ionosphere that encircle the Earth over the equator. Bright, blue-white areas are where the plasma is densest. Solid white lines outline the continents; Africa is on the left, and North and South America are on the right. Dotted white lines mark regions where rising tides of hot air indirectly create the bright, dense zones in the bands. The picture is a composite built up from 30 days of observations with NASA's IMAGE satellite (March 20 to April 20, 2002). (Credit: NASA/University of California, Berkeley)

plasma bands form is so thin that atoms rarely collide there.

However, the researchers discovered the tides could affect the plasma bands indirectly by modifying a layer of the atmosphere below the bands that shapes them. Below the plasma bands, a layer of the ionosphere called the *E*-layer becomes partially electrified during the day. This region creates the plasma bands above it when high-altitude winds blow plasma in the *E*-layer across the Earth's magnetic field. Since plasma is electrically charged, its motion across the Earth's magnetic field acts like a generator, creating an electric field. This electric field shapes the plasma above into the two bands. Anything that would change the motion of the *E*-layer plasma would also change the electric fields they generate, which would then reshape the plasma bands above.

The Global Scale Wave Model indicated the tides should dump their energy about 62 to 75 miles above the Earth in the *E*-layer. This disrupts the plasma currents there, which alters the electric fields and creates dense, bright zones in the plasma bands above.

"The single pair of bright zones over the Pacific Ocean that is not associated with strong thunderstorm activity shows the disruption is propagating around the Earth, making this the first global effect on space weather from surface weather that's been identified," said Immel. "We now know that accurate predictions of ionospheric disturbances have to incorporate this effect from tropical weather."

"This discovery has immediate implications for space weather, identifying four sectors on the Earth where space storms may produce greater ionospheric disturbances. North America is in one of these sectors, which may help explain why the U.S. suffers uniquely extreme ionospheric conditions during space weather events," Immel said.

Measurements made by NASA's Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) satellite from March 20 to April 20, 2002 have confirmed that the dense zones exist in the plasma bands. Researchers now want to understand whether the effect changes with seasons or large events, such as hurricanes.

The team includes Immel, Scott England, Stephen Mende, and Harald Frey of the University of California, Berkeley; Eiichi Sagawa of the National Institute of Information and Communications Technology, Tokyo, Japan; Sid Henderson and Charles Swenson of Utah State University, Logan, Utah; Maura Hagan of the National Center for Atmospheric Research High Altitude Observatory, Boulder, Colorado; and Larry Paxton of the Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland.

July Propagation

Many DX hunters view July as the least exciting month of the year. With generally lower daytime Maximum Usable Frequencies (MUF), the highest of the amateur HF bands are mostly unusable for stable long-distance *F*-layer propagation during the summer. Added to this seasonal change is the lower solar

activity of this solar cycle minimum. With the 10.7-cm flux levels hovering right around 70, rarely will the highest amateur HF bands wake up.

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 season. 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 (refer the Last-Minute Forecast) the band is expected to open to one area of the world or another between sunrise and 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 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.

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, on 17 and 15 meters. When conditions are High Normal or better, these bands 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 be 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 approximately 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.

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 2008 is 2.9, down from March's 9.3. The lowest daily sunspot value recorded was zero (0) on April 5–12, 15–18, 20, 21, and 25–30. The highest daily sunspot count was 16 on April 1. The 12-month running smoothed sunspot number centered on October 2007 is 6.1. A smoothed sunspot count of 6, give or take 6 points lower to 16 points higher, is expected for July 2008.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7-cm observed monthly mean solar flux of 70.3 for April 2008. The 12-month smoothed 10.7-cm flux centered on October 2007 is 71.5. The predicted smoothed 10.7-cm solar flux for July 2008 is 64, give or take about 15 points.

The observed monthly mean planetary *A*-index (*Ap*) for April 2008 is 9. The 12-month smoothed *Ap* index centered on October 2007 is 7.9. Expect the overall geomagnetic activity to vary greatly between quiet to disturbed during most days in July.

Previous Cycle 23 Conditions

(Data is rounded to nearest whole number)

Two Years Ago

Sunspots
Observed Monthly, Apr. 2006: 30
12-month smoothed, Oct. 2005: 43

10.7 cm Flux
Observed Monthly, Apr. 2006: 89
12-month smoothed, Oct. 2005: 87

***Ap* Index**
Observed Monthly, Apr. 2006: 11
12-month smoothed, Oct. 2005: 12

One Year Ago

Sunspots
Observed Monthly, Apr. 2007: 4
12-month smoothed, Oct. 2006: 14

10.7 cm Flux
Observed Monthly, Apr. 2007: 72
12-month smoothed, Oct. 2006: 79

***Ap* Index**
Observed Monthly, Apr. 2007: 9
12-month smoothed, Oct. 2006: 9

Dr. L. B. Cebik, W4RNL, SK

To the great dismay and stunned surprise of the amateur radio community, and his close friends and colleagues, one of the most prolific and authoritative researchers of and writers about amateur radio antenna systems passed away unexpectedly on April 23. A retired Professor of Philosophy from the University of Tennessee, he never seemed to tire of helping the ham radio community with his patient and extensive answers about antennas, antenna modeling and designs, and related topics. The best source of information about L. B. is perhaps his own website, <http://cebik.com>, which was hosted by *antennaX* magazine. It is now being maintained by Jack Stone, of *antennaX*.

Next month, this column will remember L. B. Cebik in greater detail, as he was invaluable in many areas related to the study and practical application of antenna theory and modeling.

Signing Off...

Please take a look at what's new at my website, <http://propagation.hfradio.org/>. It is now running on a very fast, new server computer. An overhaul of the design of the site is also taking place and should be finished during July. Included on the site is an up-to-the-day Last-Minute Forecast that you may use to access the latest forecast for the month. In addition, if you have a cell phone with internet capabilities, try <http://wap.hfradio.org/>.

Do you have a question that you'd like me to tackle in this column? Drop me an e-mail or send me a letter, and I'll be glad to cover it. I'd love to hear any feedback you might have on what I have written as well. Until next month . . .

73, de Tomas, NW7US

RTTY Results *(from page 31)*

Number groups after callsigns denote the following: QSOs, Points, Prefixes, and Final Score. Certificate winners are listed in boldface.

2008 WPX RTTY RESULTS

Single Operator All Band High Power

P49X	**2997**	**13,756**	**731**	**10,055,636**
AO8A	**2520**	**11,415**	**705**	**8,047,575**
K3MM	**2597**	**8897**	**771**	**6,859,587**
D4C	**2343**	**9201**	**709**	**6,523,509**
UA9CLB	**2320**	**9551**	**629**	**6,007,579**
K4GMH	**2347**	**7363**	**699**	**5,146,737**
DL3TD	**1749**	**8487**	**672**	**4,359,264**
UW2M	**1825**	**6661**	**637**	**4,243,057**
AJ1I	**2012**	**5902**	**716**	**4,225,832**
RG9A	1771	7118	591	4,206,738
VE3AP	**1579**	**5834**	**588**	**3,430,392**
EA1AKS	**1498**	**5681**	**562**	**3,192,722**
YN2S	**1728**	**5505**	**570**	**3,137,850**
YO9HP	**1501**	**5167**	**583**	**3,012,361**
JS3CTQ	**1418**	**5429**	**545**	**2,958,805**
I2UIY	**1451**	**5329**	**538**	**2,867,002**
RA3CM	**1550**	**5085**	**562**	**2,857,770**
JH4UYB	1327	5107	539	2,752,673
WB9Z	**1600**	**4451**	**605**	**2,692,855**
VA3DX	1367	4924	542	2,668,808
VE3UTT	1283	4626	564	2,609,064
UW2N	1287	4488	552	2,477,376
IZ1LBG	1313	4321	564	2,437,044
UZ1G	1432	4550	528	2,402,400
KH6ZM	**1462**	**5892**	**405**	**2,386,260**
SP4TXI	**1224**	**4318**	**550**	**2,374,900**
RD4WA	1496	4324	549	2,373,876
YL2CI	**1379**	**4318**	**546**	**2,357,628**
UA9OG	1351	4680	490	2,293,200
W3MF	**1344**	**4004**	**559**	**2,238,236**
YL6W	1208	4310	514	2,215,340
RG3K	1375	4112	538	2,212,256
SP9LJD	1190	4349	491	2,135,359
W4ZE	**1456**	**3657**	**580**	**2,121,060**
UA4HOX	1358	4061	511	2,075,171
W4PK	1230	3929	528	2,074,512
DJ6QT	1084	4105	502	2,060,710
4Z5ML	**998**	**4267**	**449**	**1,915,883**
HG4I	1074	3717	508	1,888,236
SO6C	1006	3731	506	1,887,886
3Z9U	1124	3772	490	1,848,280
LU4DX	**1105**	**3877**	**454**	**1,798,928**
OK2SFP	**1103**	**4075**	**439**	**1,788,925**
JM1XCW	998	4000	444	1,776,000
I1C0B	1129	3687	478	1,762,386
DL4R	1098	3621	486	1,759,806
K3MQ	1166	3454	509	1,758,086
RW4PL	1141	3369	504	1,697,976
OH2BP	**1143**	**3649**	**465**	**1,696,785**
RN3ZC	1119	3509	476	1,670,284
YT2U	**1063**	**3490**	**474**	**1,654,260**
XE2WWW	**1321**	**4021**	**410**	**1,648,610**
K8TG	**1275**	**3336**	**485**	**1,617,960**
OG6R	1033	3402	458	1,558,116
EA5DKU	1019	3427	454	1,555,858
YQ6A	989	3431	453	1,554,243
WA2ETU	**1139**	**3067**	**493**	**1,512,031**
VY2LJ	992	3237	444	1,437,228
WX4TM	1283	3135	455	1,426,425
IK2SND	940	3133	446	1,397,318
DD5FZ	886	3323	417	1,385,691
NQ1W	1054	2784	491	1,366,944
EF3A	972	3036	447	1,357,092
W3FV	972	2981	441	1,314,621
OH2LU	944	3027	428	1,295,556
OH2HAN	866	2949	434	1,279,866
KA2D	945	2699	474	1,279,326
EE3R	861	2877	429	1,234,233
RA3QN	937	2858	421	1,203,218
DHØGHU	844	2829	409	1,157,061
VE2FK	887	2890	395	1,141,550
KR4F	978	2582	439	1,133,498
RW6CR	904	2778	404	1,122,312
KH6FI	933	3553	315	1,119,195
RL3WX	808	2847	391	1,113,177
HF4K	789	2511	432	1,084,752
DK6CQ	811	2589	416	1,077,024
UA3QGT	826	2587	403	1,042,561
OV1A	**768**	**2689**	**386**	**1,037,954**
RV3WT	763	2727	380	1,036,260
EA1CJ	755	2656	388	1,030,528
DF4WC	752	2722	378	1,028,916
N6AR	**764**	**2495**	**410**	**1,022,950**
RZ3EC	764	2398	403	966,394
N4ZZ	943	2508	380	953,040
F5CQ	**652**	**2434**	**371**	**903,014**
JR3NZC	706	2437	365	889,505
AI6YL	909	2717	327	888,459
OH2MZB	738	2360	366	863,760
RV6FG	802	2248	383	860,984
KI4MF	726	2102	398	836,596
G6BOX	**682**	**2292**	**363**	**831,996**
K3WI	748	2122	392	831,824
W1BYH	794	2147	375	805,125
N8TDL	826	2002	400	800,800
RX9SA	589	2477	320	792,540
S54O	659	2138	368	786,784
RM9RZ	630	2444	321	784,524
N6CK	980	2222	352	782,144
ZM2B	**600**	**2374**	**329**	**781,046**
VK4AN	**703**	**2299**	**338**	**777,062**
LY3UV	**685**	**2173**	**350**	**760,550**
OK2PF	622	2346	315	738,990
LV5V	684	2158	342	738,036
HB9AAA	**545**	**2162**	**337**	**728,594**
RV3WD	647	2105	343	722,015
LR4E	691	2028	355	719,940
YL2NN	630	2108	340	716,720
NT2A	644	1934	369	713,646
DL5MEV	611	2094	338	707,772
NC7J	977	2133	328	699,624
US6IOT	541	2198	311	683,578
OK1KT	557	1929	351	677,079
RA6XV	691	1997	334	666,998
KØFX	772	1892	351	664,092
UA9BS	585	2153	308	663,124
UAØYAY	697	2172	304	660,288
AA3B	595	1862	348	647,976
YU1BN	714	1686	384	647,424
KR7X	949	1931	335	646,885
OK1HMP	556	1996	317	632,732
PG3N	578	1883	332	625,156
N6QQ	768	1870	330	617,100
9M6XRO	**617**	**2375**	**259**	**615,125**
WA5ZUP	1049	2073	292	605,316
JH4UTP	541	2004	300	601,200
SP3EPX	530	1857	322	597,954
GW7X	**675**	**1607**	**371**	**596,197**
VO1TA	577	1797	328	589,416
DL8SCG	575	1871	314	587,494
KH6GMP	709	2192	266	583,072
RX9LW	513	2077	275	571,175
OH3OJ	590	1902	294	559,188
WZYE	604	1642	338	554,996
NA2M	734	1628	334	543,752
OG4X	575	1817	298	541,466
UR8QR	522	1869	289	540,141
W9NGA	620	2004	267	535,068
VE7CC	629	2207	240	529,680
GØHDV	543	1887	280	528,360
UW1M	589	1645	315	518,175
LA9TY	**498**	**1730**	**296**	**512,080**
DK3GI	494	1636	312	510,432
ZS2EZ	**499**	**1715**	**294**	**504,210**

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KØWA	823	1560	318	496,080
K8AJS	591	1433	343	491,519
N3BM	555	1531	318	486,858
VA7ST	602	1790	256	458,240
DK8EY	467	1543	295	455,185
K4XD	591	1473	306	450,738
SQ7B	462	1611	272	438,192
HB9DHG	496	1538	280	430,640
DL6NCY	436	1437	298	428,226
RA3TT	527	1305	327	426,735
UAØFAI	554	1722	247	425,334
9M2CNC	**463**	**1575**	**270**	**425,250**
F5LGF	473	1477	287	423,899
AB9H	613	1443	291	419,913
K8ZZ	654	1486	279	414,594
W1TO	453	1330	311	413,630
YL2PA	398	1474	279	411,246
SC1658OZ	457	1512	270	408,240
NL7V	**493**	**1299**	**311**	**403,989**
UN6G	**459**	**1665**	**242**	**402,930**
PAØVHA	448	1437	280	402,360
GMØFGI	443	1428	280	399,840
WR3G	524	1531	261	399,591
W9KB	595	1452	271	393,492
WM6A	604	1311	300	393,300
RX3AEX	477	1392	281	391,152
N4KG	452	1462	265	387,430
KZ5AM	651	1471	260	382,460
NF6A	535	1264	302	381,728
VR2PX	451	1392	272	378,624
AI8P	533	1376	274	377,024
V31GW	**406**	**1710**	**219**	**374,490**
AF6T	743	1395	265	369,675
RUØLL	541	1521	241	366,561
XW1B	**486**	**1420**	**257**	**364,940**
PA3ADG	412	1448	252	364,896
UA3SAQ	451	1299	280	363,720
F8CRS	412	1389	258	358,362
VA2WDQ	454	1557	226	351,882
TI2JCY	497	1427	245	349,615
K7AR	571	1287	271	348,777
DL1EJA	376	1371	254	348,234
DJ2IA	414	1342	258	346,236
DF5BX	412	1384	250	346,000
RXØTX	373	1548	217	335,916
W7QQQ	633	1341	248	332,568
KØJJR	583	1286	257	330,502
UA3LEO	460	1065	305	324,825
EF5J	479	1129	283	319,507
VA3PC	384	1127	280	315,560
K4CZ	471	1116	281	313,596
DL4PY	389	1194	259	309,246
W6IIHG	374	1153	268	309,004
OT7N	361	1287	238	306,306
K3WW	374	1204	254	305,816
OK2SAR	360	1244	243	302,292
NTØV	549	1134	266	301,644
DL5YM	403	1209	248	299,832
FG5LA	**556**	**1209**	**248**	**299,832**
VE1MC	391	1180	254	299,720
DL5RBR	388	1212	245	296,940
DL1ECG	380	1195	248	296,360
OQ4B	381	1229	233	286,357
7L4IOU	416	1255	226	283,630
DJ9MH	367	1199	234	280,566
9A4W	**385**	**1066**	**262**	**279,292**
RW4WZ	389	1167	239	278,913
NN6XX	560	1133	246	278,718
JA7COI	424	1233	221	272,493
WA9IVH	462	1099	244	268,156
RWØLT	350	1122	237	265,914
K1FWE	356	989	263	260,107
K7EG	580	1006	258	259,548
NO2T	366	1055	243	256,365
PA9DD	334	1170	216	252,720
IZØKBR	418	938	266	249,508
W1EQ	423	976	251	244,976
KL8DX	416	1003	244	244,732
DL4ME	341	1165	209	243,485
W5BEN	410	982	244	239,608
DJ4QO	332	1010	234	236,340
JA7ZP	311	1160	202	234,320
N4LV	340	1037	225	233,325
UABAZ	348	1147	201	230,547
YT2FA	317	1145	201	230,145
K5ZD/1	322	941	234	220,194
K7XC	460	1031	211	217,541
DJ9RR	303	986	220	216,920
UN5J	290	1118	191	213,538
KK9T	311	903	236	213,108
JA2FSM	351	1012	204	206,448
WA2MNO	411	985	209	205,865
YL5T	358	893	229	204,497
RAØQD	352	904	226	204,304
W1ZK	336	909	224	203,616
AI9L	358	951	211	200,661
ZS2DL	304	926	214	198,164
W7SYJ	467	901	217	195,517
OK1AZK	285	1038	188	195,144
KØBX	349	818	238	194,684
UR4EI	297	946	204	192,984
DJ2YE	295	975	196	191,100
VA2AM	269	1028	182	187,096
JO1WKO	257	1108	163	180,604
OK1FED	285	888	203	180,264
KA3EAJ	325	830	216	179,280
W7VXS	463	800	223	178,400
DL1YFF	297	894	198	177,012
NN6NN	345	880	200	176,000
VE2FU	260	957	182	174,174
DK2AJ	277	804	216	173,664
JA7BME	279	959	179	171,661
DK4LI	284	853	201	171,453
MM3T	294	886	188	166,568
W5AP	415	851	195	165,945
UAØFDX	358	1056	155	163,680
UAØCW	302	771	206	158,826
N6KW	417	794	198	157,212
DM3ML	255	913	171	156,123
JN3SAC	254	899	171	153,729
VE9NC	285	742	206	152,852
K7CS	321	858	176	151,008
RK3DXS	242	892	166	148,072
LU1BJW	271	791	187	147,917
OH6MW	281	740	199	147,260
AA5VU	381	762	193	147,066
KC4SAW	301	823	178	146,494
UAØQBR	296	817	176	143,792
K3GP	287	761	188	143,068
K5BG	321	790	181	142,990
XE2K	269	922	152	140,144
N7BF	396	737	189	139,293
JR1NHD	257	813	171	139,023
PAØLSK	248	772	180	138,960
DD1JN	262	800	173	138,400
W4OJC	283	779	177	137,883
VR2YYW	332	810	170	137,700
W5ZH	295	746	176	131,296
9M2CCO	265	823	159	130,857
W7VP	318	754	173	130,442
GW4BLE	253	735	175	128,625
G3UHU	236	750	171	128,250
I2TFJ	261	690	185	127,650
KO7X	363	663	192	127,296
PY2KP	232	826	154	127,204
W4RK	320	766	163	124,858
DL7VEE	195	824	151	124,424
DU1IVT	**263**	**1026**	**119**	**122,094**
N1OKL	267	661	184	121,624
UA9JSN	258	771	156	120,276
YO5BBO	**225**	**770**	**155**	**119,350**
KY5G	290	672	177	118,944
N2SQW	275	721	164	118,244
WB2JEP	245	748	158	118,184
K7LV	300	733	155	113,615
UT7UJ	220	654	173	113,142
LX1EA	**189**	**710**	**158**	**112,180**
K3RMB	252	662	168	111,216
W9WI	282	649	171	110,979
PA5KT	194	733	150	109,950
KV7DX	333	667	163	108,721
OZ1FAO	218	662	164	108,568
KØIR	256	596	181	107,876
KD5JHE	319	652	165	107,580
RA4ST	237	679	157	106,603
PA5O	205	627	168	105,336
UXØZL	213	708	147	104,076
VE6YR	231	644	161	103,684
I2RFJ	224	573	178	101,994
DL5ST	209	618	163	100,734
JA2XYO	197	739	136	100,504
UR5LY	197	669	149	99,681
KG6ZHC	288	651	152	98,952
IK8SEU	219	574	172	98,728
UN7CN	217	762	129	98,298
WF4W	211	594	165	98,010
KD4PU	317	667	145	96,715
UAØZAM	260	652	148	96,496
VE5CPU	290	705	136	95,880
RA4LBS	211	674	141	95,034
AB4IQ	203	680	139	94,520
N7MQ	287	502	186	93,372
K6DGW	361	527	177	93,279
KØCOP	199	533	171	91,143
LA9TJA	189	637	134	85,358
OH2BCK	183	569	150	85,350
K4ZTL	199	540	158	85,320
JA2BQX	215	598	139	83,122
LU8ADX	189	577	142	81,934
F5JY	212	512	159	81,408
N6PE	254	505	154	77,770
RZ3FR	191	569	133	75,677
LZ130LO	171	616	122	75,152
RA3DX	142	591	127	75,057
PAØABM	194	481	155	74,555
RX3DTN	159	595	125	74,375
JE8CLT	210	550	132	72,600
W6OAT	212	571	126	71,946
SM2M	161	515	139	71,585
KD5JAA	200	504	142	71,568
NG3U	158	622	114	70,908
JN1RQV	183	603	117	70,551
NW6P	246	485	145	70,325
K1SEZ	206	557	126	70,182
ZM2A	159	538	126	67,788

K9BJM	226	478	134	64,052
W6SX	222	503	127	63,881
K5HDU	198	460	130	59,800
K2TV	158	418	140	58,520
W4GHD	197	452	120	54,240
VA7DM	190	505	107	54,035
DP4N	136	461	116	53,476
N6IE	176	436	121	52,756
DB3LO	144	466	112	52,192
KBAD	219	414	126	52,164
OH4MCV	137	434	116	50,344
AE4EC	167	430	117	50,310
NØRN	163	433	115	49,795
NØAT	197	352	139	48,928
JA2AXB	134	499	98	48,902
SV1DPI	147	393	123	48,339
RWØAQ	199	456	106	48,336
JA2IXS	149	456	103	46,968
N5DD	136	441	102	44,982
N3NZ	172	353	125	44,125
NA8W	174	380	116	44,080
N2BJ	157	375	117	43,875
EA1ASC	125	412	105	43,260
NØLLH	171	384	112	43,008
WB6JJJ	161	393	106	41,658
N6MA	116	413	99	40,887
SP9RQH	123	423	94	39,762
JA2BHJ	155	386	103	39,758
RK3VWB	142	303	122	36,966
NG2P	124	328	105	34,440
SP2FTL	140	318	107	34,026
PA3EBP	115	332	101	33,532
K3PH	117	365	89	32,485
UY5ZZ	101	368	83	30,544
RZ9IR	123	337	87	29,319
PY2IQ	116	311	94	29,234
PA1WLB	121	275	101	27,775
UAØACG	99	354	75	26,550
KO6LU	154	247	107	26,429
W4BCG	128	274	96	26,304
K6OI	110	305	86	26,230
W5JE	107	298	87	25,926
IZ2EWM	91	323	77	24,871
K3KO	93	264	90	23,760
SP7IIT	83	359	64	22,976
VE3EJ	97	277	79	21,883
6W1SE	**87**	**290**	**74**	**21,460**
VE3RTG	95	246	85	20,910
W1KQ	75	276	75	20,700
RN4ABD	99	252	81	20,412
K7KAR	126	234	87	20,358
AI9T	105	256	72	18,432
KC7V	121	187	94	17,578
W7WHY	98	204	82	16,728
SP4KEV	72	263	63	16,569
W6AEA	107	174	90	15,660
RA3VR	83	194	77	14,938
WØZW	99	179	81	14,499
JI1ALP	71	220	60	13,200
EE4E	64	234	56	13,104
UU2JG	55	255	50	12,750
LZ2DF	60	219	58	12,702
EA3JW	86	188	64	12,032
KE1FO	77	176	67	11,792
VE9GLF	72	181	61	11,041
N8NOE	82	164	67	10,988
IK1WEG	70	163	64	10,432
UA0SMF	64	162	51	8,262
G3SJX	56	167	48	8,016
UU2JQ	49	184	42	7,728
VE9MY	55	151	50	7,550
AD4EB	69	129	56	7,224
4U1WB	71	120	55	6,600
DL8USA	33	112	33	3,696
JF2IWL	31	105	30	3,150
W2LE	33	93	32	2,976
EA7HY	30	89	30	2,670
F4FDR	24	72	23	1,656
JI2TNT	12	49	11	539
EU7SA	9	42	8	336
KI4NSP	12	21	12	252

Single Operator All Band Low Power

5C5W	**1610**	**6926**	**602**	**4,169,452**
P4ØR	**1543**	**6479**	**565**	**3,660,635**
HI3T	**1730**	**5713**	**603**	**3,444,939**
UT9FJ	**1691**	**5354**	**619**	**3,314,126**
KS1Y	**1625**	**4527**	**658**	**2,978,766**
RT9S	**1391**	**5688**	**511**	**2,906,568**
LY6A	**1266**	**4431**	**516**	**2,286,396**
OK3C	**1157**	**4053**	**518**	**2,067,030**
AA5AU	**1634**	**3784**	**537**	**2,032,008**
SN2I	**1121**	**3969**	**481**	**1,909,089**
YU3A	**1086**	**3938**	**478**	**1,882,364**
VA2UP	**1166**	**3825**	**491**	**1,878,075**
RA9AU	1123	4190	425	1,780,750
UA3PAB	**1116**	**3601**	**472**	**1,699,672**
UR5UDX	1071	3453	491	1,695,423
LZ13UA	**1153**	**3508**	**481**	**1,687,348**
YT2T	**1076**	**3411**	**492**	**1,678,212**
J39BS	**1248**	**3801**	**437**	**1,661,037**
N2QT	**1208**	**3321**	**491**	**1,638,611**
RK9AJZ	1001	3669	438	1,607,022
3Z1ØUM	1039	3737	428	1,599,436
W3LL	**1143**	**3113**	**589**	**1,584,517**
UR4U	963	3355	455	1,526,525
VY2SS	1035	3236	470	1,520,920
IZ2FOS	992	3248	463	1,503,824
7Z1SJ	**1012**	**3339**	**446**	**1,489,194**
EE7AJR	**1077**	**3139**	**474**	**1,487,886**
LZ9R	1007	3229	439	1,417,531
IV3JCC	**977**	**3119**	**453**	**1,412,907**
XG4SS	**969**	**3208**	**435**	**1,395,480**
RA9CB	826	3570	367	1,310,190
HA8BE	**814**	**3137**	**406**	**1,273,622**
UA6CE	931	2937	426	1,251,162
UA9AL	825	3255	380	1,236,900
RA4HL	978	2765	443	1,224,895
ER5DX	**840**	**3137**	**390**	**1,223,430**
EA8OM	**774**	**3085**	**392**	**1,209,320**
GØMTN	**878**	**3004**	**394**	**1,183,576**
AB4GG	**1176**	**2773**	**421**	**1,167,433**
OK2RU	787	2904	392	1,138,368
YL2TB	**827**	**3055**	**364**	**1,112,020**
GUØSUP	**831**	**2614**	**425**	**1,110,950**
UA4HJ	917	2812	391	1,099,492
IZ7CRW	829	2494	440	1,097,360
DD5M	815	2741	393	1,077,213
E21YDP	**791**	**2828**	**373**	**1,054,844**
ON4QX	**790**	**2473**	**423**	**1,046,079**
AA4U	920	2446	419	1,024,874
T91S	**803**	**2573**	**384**	**988,032**
IZ1AVA	760	2563	379	971,377
YV5AAX	**721**	**2667**	**351**	**936,117**
OE2GEN	**775**	**2354**	**395**	**929,830**
SP9H	684	2616	355	928,680
YL2JZ	744	2603	349	908,447
OH1TN	776	2597	349	906,353
RD3PM	813	2143	421	902,203
OK1FPS	697	2584	348	899,232
WA1EHK	**749**	**2137**	**411**	**878,307**
UT8EL	759	2394	364	871,416
UA9AFS	688	2505	347	869,235
UR7EQ	710	2390	362	865,180
EE7E	**801**	**2219**	**388**	**860,972**
OM5TX	**713**	**2395**	**357**	**855,015**
XE3RBA	**908**	**2592**	**327**	**847,584**
EA5XC	710	2421	344	832,824
DJ8EW	681	2258	359	810,622
WB4YDL	886	2193	368	807,024
VE2AXO	689	2183	369	805,527
DL1ZBO	676	2294	345	791,430
VE3GSI	685	2138	365	780,370
S58P	**607**	**2305**	**335**	**772,175**
HA2ESM	629	2247	337	757,239
N4IG	815	1963	385	755,755
UT8IM	684	2216	339	751,224
YO3APJ	**650**	**2065**	**361**	**745,465**
EA4TD	637	2129	346	736,634
N9CK	**828**	**1917**	**373**	**715,041**
DH6BH	643	2090	342	714,780
KE4KWE	971	2110	337	711,070
WB2RHM	789	2007	350	702,450
DL5KUD	581	2090	334	698,060
DM2RG	619	2072	326	675,472
EA8KK	471	2377	282	670,314
RA3BB	683	1853	359	665,227
YL3CU	599	2164	306	662,184
EA4BT	617	1799	367	660,233
PA3DBS	626	1973	333	657,009
4D75J	**665**	**2714**	**242**	**656,788**
4X2Z	**522**	**2263**	**289**	**654,007**
RW6HP	653	1834	348	638,232
SP3RBG	564	1921	328	630,088
EU2MM	**531**	**1946**	**315**	**612,990**
AD5XD	900	1927	312	601,224
N6OJ	919	1771	323	572,033
SV8RX	**531**	**1724**	**325**	**560,300**
VE3JI	545	1835	305	559,675
K7RE	840	1670	333	556,110
M0CHK	507	1557	353	549,621
KS1J	593	1595	342	545,490
S51AY	539	1817	299	543,283
UA9OLO	522	1956	277	541,812
UR5MBA	519	1916	282	540,312
GMØNBM	**572**	**1749**	**305**	**533,445**
ZL1BYZ	**542**	**1654**	**322**	**532,588**
OK2SVL	534	1758	301	529,158
RV3LO	516	1755	299	524,745
IV3PGQ	537	1558	336	523,488
RNØSS	644	1767	293	517,731
OM7AG	540	1822	284	517,448
SP9AUV	507	1775	289	512,975
EB5ARP	485	1754	292	512,168
UT2M	551	1836	278	510,408
W9HLY	632	1472	339	499,008
IW2FIV	528	1675	289	484,075
RA6YDX	485	1586	305	483,730
OK1VRF	512	1587	304	482,448
RV9CBW	408	1964	240	471,360
YU1KT	495	1688	278	469,264
S57AM	459	1752	267	467,784
EA2VE	592	1555	297	461,835
SP2EXE	473	1560	295	460,200
PA1WFB	486	1665	275	457,875
EW8CY	480	1659	275	456,225
NO9C	670	1520	296	449,920
KD5LNO	776	1648	271	446,608
EH5J	501	1453	307	446,071
NTØF	611	1445	308	445,060
YO8FR	449	1547	287	443,989
N2FF	520	1367	322	440,174
IK2DKX	523	1440	302	434,880
RV3ZN	467	1627	265	431,155
DL9AS	480	1582	272	430,304
UA3PT	522	1514	284	429,976
HA6IAM	453	1547	277	428,519
DL6BR	449	1515	282	427,230
UA4LU	462	1676	254	425,704
S57U	431	1478	288	425,664
YW5T	**426**	**1658**	**255**	**422,790**
HA5NB	457	1560	270	421,200
TC1DX	**426**	**1607**	**262**	**421,034**
K6DEX	699	1518	277	420,486
ZF2XD	**582**	**1681**	**246**	**413,525**
I5WNN	440	1503	273	410,319
W3DQN	507	1463	280	409,640
VE3FH	475	1591	256	407,296
IZØFWD	473	1341	301	403,641
VE2XAA	454	1472	273	401,856
EA1OS	457	1501	267	400,767
RU3XB	452	1502	262	393,524
RA3YAO	444	1418	276	391,368
RU3BU	427	1422	275	391,050
RW9WF	390	1610	242	389,620
UA9AX	397	1478	261	385,758
OK1HEH	424	1510	252	380,520
JR5XPG	**468**	**1599**	**237**	**378,963**
RW4FE	392	1504	250	376,000
HR2/LTØE	**456**	**1566**	**240**	**375,840**
RA6XE	466	1338	277	370,626
RZ3ATE	457	1352	274	370,448
KØRC	581	1323	280	370,440
DL3KVR	431	1399	264	369,336
UN9GD	**427**	**1613**	**226**	**364,538**
GØHVQ	446	1374	263	361,362
DL1DXF	406	1403	256	359,168
OM7YC	408	1422	252	358,344
RA3MB	401	1294	276	357,144
HA1BC	397	1428	249	355,572
G4WGE	427	1388	256	355,328
OM5MX	406	1333	265	353,245
DF8XC	409	1279	275	351,725
JA5SUD	410	1515	232	351,480
YL2PJ	397	1457	241	351,137
AC9X	539	1304	268	349,472
V01KVT	443	1359	256	347,904
SM7BJW	418	1318	261	343,998
RW6HJV/6	456	1328	258	342,624
SP3DSC	407	1343	252	338,436
SIØE	405	1405	237	332,985
YO5OHY	391	1458	228	332,424
W3KB	488	1293	257	332,301
WN6K	637	1258	261	328,338
K4HAL	565	1231	266	327,446
EB2CYQ	392	1239	263	325,857
S53F	396	1399	232	324,568
UA3YAA	401	1366	236	322,376
DF7ZS	405	1274	252	321,048
SP3BJK	429	1337	240	320,880
YO8RFS	362	1385	229	317,165
RZ1OM	467	1011	313	316,443
AE1P	504	1185	266	315,210
RZ3PS	390	1235	255	314,925
RD3DT	385	1351	233	314,783
RU6YJ	380	1276	246	313,896
YO6CFB	351	1317	237	312,129
DC8QT	421	1303	238	310,114
RAØACM	444	1306	237	309,522
UR1MN	404	1349	229	308,921
RU3WR	384	1345	229	308,005
DL2RUG	357	1316	232	305,312
G4DBW	393	1266	241	305,106
JP1QDH	425	1313	232	304,616
JH7QXJ	399	1364	222	302,808
DO9ST	360	1243	241	299,563
MWØCRI	400	1151	259	298,109
SQ9CND	371	1292	230	297,160
SM6BSK	297	1000	297	297,000
SP6EIY	383	1226	242	296,692
RZ3DC	386	1172	252	295,344
N2KI	484	1140	257	292,980
RX9DJ	382	1341	218	292,338
IK2YSJ	378	1282	228	292,296
VE4EAR	457	1439	203	292,117
IK1VEK	372	1200	243	291,600
KM6Z	645	1195	243	290,385
UK8AKK	375	1314	220	289,080
9A2BW	**376**	**1211**	**236**	**285,796**
DM5Z	383	1197	237	283,689
JA1XRH	416	1275	220	280,500
EA2BNU	361	1149	243	279,207
XE2YBG	504	1145	242	277,090
UT5UKY	347	1217	226	275,042
RA9SN	333	1198	228	273,144
YBØEIN	363	1221	223	272,283
DM3HZN	372	1160	234	271,440
UA2FCT	**331**	**1286**	**211**	**271,346**
GM7TUD	347	1105	242	267,410
W4UEF	431	1193	223	266,039
WB4MSG	463	1103	241	265,823
G4OGB	351	1139	231	263,109
OK2BMC	370	1149	228	261,972
KP4ED	**441**	**1265**	**206**	**260,590**
IK5FKF	334	1179	221	260,559
KE5K	405	1094	238	260,372
RU3PU	333	1188	219	260,172
RZ6AK	384	1125	231	259,875
RV4LC	361	1090	238	259,420
F6CBL	343	1136	226	259,008
EB5CNK	321	1198	215	257,570
EW1NM	340	1159	221	256,139
YL2NK	336	1144	223	255,112
W4UK	541	1040	245	254,800
K3IU	379	1064	238	253,232
F5POJ	343	1080	233	251,640
KA1C	399	1012	248	250,976
W4PJW	479	1105	226	249,730
DF6QV	337	1086	227	246,522
K5WW	514	1026	239	245,214
UA9OW	351	1178	208	245,024
SP9BGS	308	1127	216	243,432
RA3VIA	300	1071	227	243,117
G3SNU	362	1100	221	243,100
N3CHX	403	1054	229	241,366
YRØWL	391	1009	238	240,142
K3RWN	428	1056	226	238,656
UA4PT	405	939	253	237,567
UY5TE	346	1123	209	234,707
KK8MM	448	1035	220	227,920
YO2GL	304	1112	204	226,848
WA2MCR	357	983	230	226,090
PD2JAM	341	1026	218	223,668
RX4WX	368	914	243	222,102
RN4SS	343	1004	220	220,880
DJ5TT	316	1009	218	219,962
ISØLFZ	**284**	**1101**	**199**	**219,099**
W3MEL	386	911	235	214,085
KB3LIX	388	1019	208	211,952
MØVBY	307	1004	210	210,840
EG5J	319	1023	206	210,738
W1CDX	381	925	227	209,975
HAØML	335	1009	208	209,872
OK1ZE	283	1044	200	208,800
EA4AGI	291	1026	203	208,278
RW3XB	324	878	237	208,086
RK2FXG	318	1044	199	207,756
DL6EAQ	315	856	242	207,152
NN4F	377	977	212	207,124
WA2LXE	365	947	218	206,446
OK1LO	294	993	206	204,558
OH6HLH	334	886	230	203,780
SP3DOF	284	974	207	201,618
RA3RN	309	938	214	200,732
VA7KOJ	382	1045	192	200,640
WW8Q	427	1023	196	200,508
SP3HC	283	959	209	200,431
IWØGYC	300	1011	196	198,156
SM6GKT	318	985	200	197,000
G3RSD	291	1033	190	196,270
DJ6TK	305	875	224	196,000
DL1THB	315	965	200	193,000
DJ6JH	316	914	211	192,854
D2NX	309	958	201	192,558
DL8HCO	298	967	199	192,433
DM6DL	288	898	214	192,172
XE3KGS	303	1085	177	192,045
SP6EKS	273	1084	177	191,868
AB8XG	378	987	192	189,504
SP9OHP	266	1023	185	189,255
OE3DMA	285	957	197	188,529
JA8EIU	348	1038	181	187,878
VE9IQ	300	957	196	187,572
N3XL	343	859	217	186,403
W7NNN	477	917	203	186,151
SP1DMD	327	1000	185	185,000
RN4CA	299	996	185	184,260
F1IWH	278	958	192	183,936
WB2OQQ	312	921	197	181,437
SP2IW	287	833	217	180,761
BD1BYV	299	1167	154	179,718
RA9CCO	269	1074	167	179,358
7N2UQC	372	952	188	178,976
W6FFH	454	806	222	178,932
OH2LZI	289	933	187	174,471
OK1ZP	273	891	195	173,745
EA2RU	279	938	185	173,530
MMØCBL	289	866	199	172,334
DL6TS	260	871	195	169,845
OM4TC	275	944	179	168,976
RK9UC	283	870	194	168,780
H7/AK2P	**355**	**957**	**176**	**168,432**
JA1BNW	315	944	175	165,200
KA2CYN	383	820	201	164,820
YO2RLC	286	899	183	164,517
UX3IW	261	872	188	163,936
HL5BMX	**328**	**1004**	**161**	**161,644**
UAØLKD	328	944	171	161,424
RA9HM	295	938	172	161,336
VA7AM	373	906	178	161,268
DL5JBW	264	882	182	160,524
DL3DRN	259	891	180	160,380
6K5AYC	291	966	165	159,390
AA2NA	352	808	196	158,368
SP6OJG	227	951	166	157,866
SP3NYR	244	861	181	155,841
EW7LE	241	808	192	155,136
WØVX	330	790	196	154,840
N4YZ	298	797	194	154,618
KCØNKW	403	827	186	153,822
HK6P	238	948	162	153,576
GM4KLN	298	729	209	152,361
VE3MGY	260	845	180	152,100
UT7EJ	246	899	169	151,931
VE7BSM	341	892	169	150,748
KR1ST	325	823	181	148,963
JH1GUO/4	293	852	174	148,248
G3KNU	245	770	191	147,070
OM1VA	239	794	185	146,890
VU2NKS	**232**	**833**	**176**	**146,608**
N9BHH/7	413	821	178	146,138
K7JNX	290	813	179	145,527
XE1GRR	318	856	168	143,808
EA1BAF	244	804	175	140,700
DL8UFO	234	751	187	140,437
KW7N	373	750	187	140,250
UA3UBT	249	756	185	139,860
XE1ZVO	321	837	167	139,779
WR3H	269	679	203	137,837
DL1CW	254	761	181	137,741
KØGEO	368	820	167	136,940
K1ZW	299	768	178	136,704
ON4KGL	278	723	189	136,647
UA4FCO	245	833	164	136,612
G6OKU	254	747	182	135,954
N2OPW	296	752	180	135,360
PT7AZ	249	723	187	135,201
RW3XZ	239	751	180	135,180
UXØSX	236	813	166	134,958
N7RN	438	765	175	133,875
KB3KXX	298	781	171	133,551
AM5Q	245	761	175	133,175
I2XLF	232	781	170	132,770
YBØKYM	**253**	**897**	**147**	**131,859**
IK2EBP	244	715	184	131,560
6K5AQY	280	907	145	131,515
W1HBR	323	681	193	131,433
IW5ALG	233	711	183	130,113
WA6BOB	276	797	163	129,911
DL4KW	244	761	169	128,609
K2MK	283	751	171	128,421
RU4WD	273	753	170	128,010
OH9GIT	271	670	189	126,630
KØVM	337	717	176	126,192
AA7FK	329	722	174	125,628
RV3DCZ	255	765	164	125,460
IZ8JFL	232	769	161	123,809
I4HRH	228	810	152	123,120
WØRAA	366	656	187	122,672
YL2KF	217	746	164	122,344
K3PG	263	723	169	122,187
JA2BY	241	776	157	121,832
JH3PTC	261	862	141	121,542
HA5UK	219	711	170	120,870
RK3QS	224	779	155	120,745
K9SEX	266	754	160	120,640
PA3CDN	233	719	166	119,354
DGØDG	225	757	156	118,092
DL8MRE	234	733	161	118,013
WØQQG	267	700	168	117,600
MMØRKT	238	632	184	116,288
9A1CMS	219	744	156	116,064
PA2CVD	245	669	171	114,399
DO9PL	218	733	156	114,348
DC8SG	230	680	168	114,240
PAØKHS	245	665	171	113,715
N2CQ	253	589	193	113,677
DK3WJ	220	729	155	112,995
AA1QD	272	579	194	112,326
RV3YR	219	696	161	112,056
RK4PB	246	634	176	111,584
RK9AD	223	688	162	111,456
EA5EM	250	634	175	110,950
LY2WN	202	710	155	110,050
CT2JMR	199	695	158	109,810
W8AKR	262	613	179	109,727
K8OT	235	602	182	109,564
EA4DB	224	674	161	108,514
SQ9AOR	206	685	157	107,545
K6GEP	318	710	151	107,210
SP8EEX	183	724	147	106,428
PY1NX	195	780	135	105,300
OK2BJ	209	692	151	104,492
VE3XAT	222	675	154	103,950

RD4HD	214	626	166	103,916
N6PC	327	647	160	103,520
DK7UM	238	634	163	103,342
BD3APX	270	700	147	102,900
HG5ACZ/P	179	740	138	102,120
KH6/NØCO	208	829	123	101,967
WØPC	290	667	151	100,717
DK1AUP	208	648	155	100,440
F5VMO	219	593	168	99,624
DH3RB	240	609	163	99,267
IK2BUF	210	634	156	98,904
KB9DVC	266	642	154	98,868
XE2RC	229	675	146	98,550
KA1HC	239	646	152	98,192
K2PAL	270	681	144	98,064
DGØKS	212	592	165	97,680
DL3ARK	217	628	154	96,712
RW3WX	193	677	142	96,134
DJ6UP	206	631	151	95,281
URØIQ	199	646	147	94,962
N9LF	267	620	153	94,860
WY7LL	353	642	147	94,374
6W7RV	193	611	154	94,094
JG3FEA	199	752	125	94,000
CT1BYK	177	616	152	93,632
UAØAPA	156	751	124	93,124
DK1AX	193	642	145	93,090
ABØS	293	658	141	92,778
NG7Z	306	634	146	92,564
DL5MAT	197	605	152	91,960
DL3BBY	201	603	151	91,053
RV9MN	190	664	137	90,968
UA3UHZ	199	626	145	90,770
VU2LBW	217	607	149	90,443
DK9ETM	205	649	138	89,562
N4GVA	246	613	146	89,498
K7ON	318	564	158	89,112
DL2FK	188	610	146	89,060
DK7MCX	207	561	156	87,516
WØSM	321	538	162	87,156
VA6XDX	205	662	131	86,722
DS5KJR	241	764	113	86,332
KA5EYH	300	551	156	85,956
IK3CST	196	591	145	85,695
HA5OMM	180	668	128	85,504
KA9O	243	582	144	83,808
IZ6HRT	183	576	145	83,520
WA4OSD	250	588	142	83,496
DK1LRS	190	543	153	83,079
DL6RBH	182	563	147	82,761
OH2BBT	171	568	145	82,360
RX3DFW	171	608	135	82,080
SP5GMM	157	611	133	81,263
VA3HJ	206	591	137	80,967
ON8NT	177	566	143	80,938
N3XLS	224	550	147	80,850
JA3JM	212	611	131	80,041
DF9OO	165	597	134	79,998
WAØLPV	293	484	165	79,860
EA7AZA	182	570	140	79,800
DL4EAX	193	547	144	78,768
KA3FZN	214	490	160	78,400
VA3SWG	205	607	129	78,303
DL7BW	160	575	136	78,200
WW2J	178	590	132	77,880
DF2AP	166	536	145	77,720
DL5JWL	172	563	138	77,694
G8MIA	185	551	141	77,691
KG4OLG	241	500	155	77,500
N9LYE	285	572	134	76,648
DJ5ZWS	196	543	140	76,020
K7GS	263	457	166	75,862
9M2MT	226	626	121	75,746
K7VIT	242	507	149	75,543
N5RN	210	576	131	75,456
JA3ETD	190	592	127	75,184
DH6AB	194	504	149	75,096
CT1BXE	174	575	129	74,175
KØMPH	250	553	133	73,549
DK3PM	165	487	149	72,563
DL6ABB	164	548	132	72,336
DU7/G4DUM	220	658	109	71,722
UA6YIU	156	563	127	71,501
DH2PL	158	559	127	70,993
NRØL	253	540	130	70,200
DL1KUR	178	516	136	70,176
UX8ZA	194	467	150	70,050
KD5J	242	522	133	69,426
RN6DR	160	552	125	69,000
AF3I	212	516	133	68,628
NØKBD	258	489	140	68,460
YO5OYR	153	574	119	68,306
ACØE	212	497	135	67,095
OO9O	185	456	147	67,032
IW3SOM	158	567	118	66,906
IK2WFN	177	523	127	66,421
SM7ATL	146	580	114	66,120
HL5JCB	189	599	110	65,890
NM1W	205	452	145	65,540
K5DHY	268	480	136	65,280
DL7UGN	158	541	119	64,379
SM5CNQ	151	498	129	64,242
GØVAX	154	520	123	63,960
YL2IP	151	516	123	63,468
DO3PKE	151	533	119	63,427
CT1EGW	123	581	107	62,167
KØLDS	197	474	131	62,094
SQ2BXI	134	524	118	61,832
DJ9JV	160	471	131	61,701
YO4RST	152	477	128	61,056
EA5HH	151	472	129	60,888
EA2AZ	169	479	127	60,833
DL9NDV	164	485	123	59,655
OK2CLW	145	473	126	59,598
DL8ZAJ	158	476	125	59,500
IK2NCF	148	507	115	58,305
N6VH	213	446	130	57,980
IZ1DXS	148	465	124	57,660
DB9EX	145	454	127	57,658
M5AEX	145	473	121	57,233
JA1BWA	176	566	101	57,166
OM3TLE	134	538	106	57,028
RW4AA/9	190	442	129	57,018
G4HBI	153	471	121	56,991
LA4RT	155	510	111	56,610
VE3RDN	164	478	118	56,404
KSØM	176	433	130	56,290
N1NQX	205	413	136	56,168
SM7CWI	144	452	124	56,048
UA3DPM	137	481	116	55,796
JE4AEJ/1	159	555	100	55,500
N1MD	159	433	127	54,991
OM7YL	145	469	117	54,873
SP2IKP	144	440	124	54,560
EA8AG	141	505	108	54,540
UN7JX	127	561	97	54,417
SM3JUR	176	396	136	53,856
DP5X	149	480	112	53,760
KM4JA	189	437	119	52,003
RA3FF	147	422	123	51,906
DL1NRC	157	384	135	51,840
JA1XUY	157	483	107	51,681
GØRPM	145	480	107	51,360
9M4DXX	166	422	121	51,062
AB5C	210	413	123	50,799
JK2KNR	152	529	96	50,784
RA6FUZ	129	456	111	50,616
N4VZ	146	450	112	50,400
NZ8O	211	413	122	50,386
JA1IZ	155	449	112	50,288
IW8PQ	131	441	114	50,274
9A2EU	113	526	95	49,970
DL6UAM	130	480	104	49,920
IZ2LSC	140	441	113	49,833
VE3FZ	144	488	102	49,776
DO3UWE	132	438	113	49,494
K3PP	168	418	118	49,324
AD4YQ	166	447	110	49,170
EA4ERZ	145	387	126	48,762
KB2NB	148	419	115	48,185
F5LTU	128	436	110	47,960
N2JSO	168	413	115	47,495
VE3RZ	151	461	103	47,483
EB3CML	133	445	106	47,170
DL6UYA	139	416	113	47,008
NJ1H	156	387	121	46,827
N9WKW	187	421	111	46,731
RU3VD	118	444	105	46,620
OK2FB	134	420	109	45,780
G8CSY	122	450	101	45,450
WA7YAZ	207	382	117	44,694
PY4BL	139	391	114	44,574
KN4Q	196	384	116	44,544
IQ3ME	121	454	98	44,492
PA3CWQ	142	402	110	44,220
XE1ZTW	170	445	99	44,055
DS5DYM	143	546	80	43,680
VE3DZ	149	383	114	43,662
KR7RK	167	341	128	43,648
KM4RK	128	420	103	43,260
F5KLF	114	426	101	43,026
GMØAXY	116	451	95	42,845
AM3A	148	363	118	42,834
LZ1MC	130	375	112	42,000
W4ROT	145	387	108	41,796
3Z8Z	115	400	102	40,800
KG4NET	160	361	113	40,793
KSØT	146	370	109	40,330
W6SA	175	363	111	40,293
ABØUK	208	330	121	39,930
WØTUP	187	366	109	39,894
JA2QVP	146	411	97	39,867
AE5MM	162	360	110	39,600
SP4TKO	119	405	97	39,285
KE5AQD	170	355	110	39,050
9V1UV	171	427	91	38,857
RA1WZ	110	409	95	38,855
VE3KAO	124	391	99	38,709
WR9Y	158	328	118	38,704
WØCZ	204	375	103	38,625
ES9OU	125	385	99	38,115
JF9KVT	148	411	92	37,812
AE9K	160	304	123	37,392
KC3EF	152	344	108	37,152
WA1ZYX	143	353	105	37,065
AE6RF	151	382	96	36,672
K6UM	168	306	119	36,414
HZ1PS	116	342	106	36,252
K6LE	161	336	107	35,952
OK2PHI	125	354	100	35,400
PD7BZ	107	393	90	35,370
UN7PV	120	355	99	35,145
DL2DWP	113	338	103	34,814
KE5LQ	171	328	105	34,440
N1SXL	141	338	101	34,138
KQ6ES	168	331	103	34,093
MØGBP	113	324	105	34,020
NØOJ	198	290	116	33,640
RX3MM	119	329	102	33,558
W5DG	147	334	100	33,400
WF5X	148	306	109	33,354
JE1SGH	117	421	79	33,259
KN8DMK	139	322	103	33,166
WBØULX	159	314	105	32,970
IN3FHE	100	336	98	32,928
IZ6IMN	98	390	84	32,760
W7CF	168	323	100	32,300
VR2YQU	123	407	78	31,746
UA3MON	109	325	97	31,525
KAØEIC	145	288	109	31,392
N1WQ	146	329	95	31,255
DL1HW	103	327	95	31,065
IKØXBX	96	354	87	30,798
UA9OV	118	392	78	30,576
WB2TPS	117	328	93	30,504
DM3RO	118	301	101	30,401
AC7JW	142	284	107	30,388
K4GM	133	318	95	30,210
DL1DBR	116	316	95	30,020
W4LSC	158	306	98	29,988
LA6TP	98	337	88	29,656
YB2ECG	113	380	78	29,640
YO5BYV	90	380	77	29,260
UR5XMM	111	309	94	29,046
JA1XPU	140	369	78	28,782
W2SR	131	267	106	28,302
IW6PWC	107	304	92	27,968
HL5YI	124	325	86	27,950
VA6MM	121	291	96	27,936
VE7FCO	136	304	91	27,664
EA4BGM	114	329	83	27,307
VA7ND	129	290	94	27,260
SM3ETC	114	287	94	26,978
W5SNM	115	307	87	26,709
DL1ARD	116	293	91	26,663
K9QH	121	293	91	26,663
UY5QZ	93	325	80	26,000
WO4O	126	260	100	26,000
F5UFX	108	272	94	25,568
PY1ZV	90	335	76	25,460
JA5FNX	110	342	73	24,966
KB1JUF	135	254	98	24,892
PA3EWG	100	279	89	24,831
PA3HGF	99	313	79	24,727
K3MZ	92	299	81	24,219
YU1RP	99	299	81	24,219
NQ7R	135	260	93	24,180
K6BIR	130	279	86	23,994
2EØEBV	96	282	85	23,970
DO6GZ	93	277	85	23,545
OZ1DGQ	102	254	92	23,368
UX2IQ	89	298	78	23,244
IZ7EUB	102	297	78	23,166
NFØN	129	258	89	22,962
KG9IL	114	282	81	22,842
KG6YHH	142	238	95	22,610
UA9UNG	103	288	78	22,464
K4SV	122	236	95	22,420
BG4CZX	97	322	69	22,218
DO1BEN	92	291	76	22,116
VE6EPK	101	263	84	22,092
XE1CT	93	292	75	21,900
NØUX	133	263	83	21,829
JL8MBF	134	286	75	21,450
AD5QB	115	274	78	21,372
DL1WE	106	270	79	21,330
DJ3EF	88	287	74	21,238
YC8EXL	93	263	80	21,040
SP3JIA	86	283	74	20,942
K7JE	86	282	74	20,868
WAØBNX	132	220	93	20,460
UA1WBV	88	275	73	20,075
RA9AC	94	244	79	19,276
JA1BFN	83	282	68	19,176
K9HCK	102	230	83	19,090
WA7SHP	115	278	68	18,904
LZ2UZ	85	263	71	18,673
ABØYM	121	233	80	18,640
W3DSX	100	235	79	18,565
XE2RV	100	243	76	18,468
JN4UUS	82	287	63	18,081
W7TMT	122	231	78	18,018
DF6WE	79	251	71	17,821
WØJAR	110	210	84	17,640
K4OD	103	208	83	17,264
W6RQ	107	223	77	17,171
WB5NMZ	99	220	78	17,160
KG9JP	96	204	84	17,136
N4CBK	108	231	74	17,094
UR5EIT	76	251	68	17,068
MØCOP	68	282	60	16,920
W9VQ	102	206	82	16,892
W4DDR	96	227	74	16,798
DL1JB	80	232	72	16,704
PAØFAW	80	237	70	16,590
MØAEJ	90	213	76	16,188
OK2SWD	76	228	71	16,188
DL4RU	74	249	65	16,185
KB1CJ	101	210	76	15,960
N9GGO	100	216	73	15,768
JF1HML	72	286	55	15,730
W8AKS	79	229	68	15,572
AAØAW	96	209	74	15,466
DS5DNO	70	307	50	15,350
KF6PKG	111	233	65	15,145
SP2IU	75	233	65	15,145
VE2FFE	89	248	61	15,128
WA6NOL	128	178	84	14,952
K4BX	100	212	69	14,628
UT2AB	62	258	56	14,448
SP5CQI	68	233	62	14,446
N6QEK	88	222	64	14,208
SM3Q	79	209	67	14,003
N3KHK	86	184	76	13,984
N3ME	92	177	79	13,983
JJ2PUG	72	244	57	13,908
EA1OJ	68	231	60	13,860
RKØSP	87	227	61	13,847
EA8AJO	68	209	66	13,794
DK9TN	67	222	62	13,764
VE7BGP	81	217	63	13,671
DL1DTF	79	195	70	13,650
DK7TM	85	218	62	13,516
DL1EJD	79	198	68	13,464
ADØK/5	98	184	73	13,432
EA2CYJ	74	216	62	13,392
VA7ALK	80	215	62	13,330
CT1DOV	58	246	54	13,284
XE3N	81	198	66	13,068
NK6A	97	173	74	12,802
ND4X	90	182	69	12,558
KC2PCG	95	200	62	12,400
RW4NN	60	224	55	12,320
RAØANO	68	212	57	12,084
WBØN	87	172	69	11,868
SE5S	66	197	60	11,820
EA2CCG	69	192	61	11,712
SM3DXC	57	211	55	11,605
N4LF	82	172	67	11,524
YB3MM	50	260	44	11,440
W3OFD	82	165	69	11,385
VE6MO	80	174	65	11,310
JJ3GRX/1	78	191	58	11,078
ZP9EH	70	191	58	11,078
AN2T	73	162	68	11,016
ON4CAS	68	169	63	10,647
OK4AS	60	200	53	10,600
JA2VHG	62	189	56	10,584
DL6SFR	67	181	58	10,498
DK3AX	60	179	56	10,024
JA1CPZ	65	181	55	9,955
KC9GGV	81	158	63	9,954
RL3FO	61	194	50	9,700
LA1VNA	61	160	56	8,960
WB9L	75	157	57	8,949
SP3AOT	60	150	59	8,850
DL5ZB	53	192	46	8,832
W9FFC	73	142	62	8,804
SM5OSZ	56	176	48	8,448
DL5AOJ	69	148	57	8,436
IK3ASM	58	156	54	8,424
N3RDV	75	153	54	8,262
TA1BM	59	155	53	8,215
UA3RW	69	139	59	8,201
KC8ZTJ	69	141	57	8,037
JH8KYU/1	65	166	48	7,968
NC6P	87	120	64	7,680
PY1NB	53	154	48	7,392
VK4EJ	50	175	41	7,175
WA7BME	55	140	49	6,860
JAØKJE	50	154	44	6,776
ER3ZZ	47	152	43	6,536
W8IDM	60	137	47	6,439
JE8NTJ	61	141	45	6,345
UU2JUA	50	162	39	6,318
K3TD	61	122	51	6,222
UA4ANZ	50	133	45	5,985
JF2FIU	57	129	46	5,934
KO1H	49	129	45	5,805
DL1DQJ	41	147	39	5,733
EA7KS	36	163	35	5,705
N8PUG	54	131	41	5,371
AD7BN	47	145	37	5,365
IZ5BSA	46	125	42	5,250
K3GM	54	105	50	5,250
IKØLNN	38	135	38	5,130
VE3LXL	53	125	41	5,125
F1TIM	48	118	43	5,074
IZ5HQB	50	115	43	4,945
WA2EMF	41	129	37	4,773
RKØSV	44	126	37	4,662
LU6QI	40	145	32	4,640
JF1HJX	51	120	38	4,560
N9TF	42	113	40	4,520
PY2BRZ	43	112	40	4,480
JL7IFR	42	127	35	4,445
JA2GHP	37	137	32	4,384
DL5KJR	40	118	37	4,366
G4MKP	34	140	31	4,340
EA5IY	36	124	34	4,216
SP9VRY	38	123	34	4,182
KA6GDT	47	103	39	4,017
N9ID	49	92	43	3,956
N3CZ	40	119	33	3,927
DL6UAA	37	111	35	3,885
GW3YVC	39	99	38	3,762
PT9PA	40	99	37	3,663
UTØEZ	29	125	28	3,500
SP3BGD	35	112	31	3,472
SP1DTG	29	117	28	3,276
ON5KDX	30	105	30	3,150
HA3OU	33	112	28	3,136
RW9WW	27	120	25	3,000
K3UK	38	96	29	2,784
DL2AWB	28	106	25	2,650
AI4G	40	75	35	2,625
N3JNX	38	71	36	2,556
KU5B	38	74	32	2,368
DO1MCX	25	91	24	2,184
DK6EL	31	70	31	2,170
WP3GW	28	83	25	2,075
RAØAY	25	86	22	1,892
NA6G	37	65	29	1,885
SP6NVK	29	67	28	1,876
HB9BGF	26	76	24	1,824
SP6IHE	22	101	18	1,818
VE3IAE	20	90	20	1,800
HK3/IZØGYP	26	68	25	1,700
LU7FWV	27	68	25	1,700
EA3EYD	24	69	23	1,587
IZ2GMT	24	72	22	1,584
IK2REA	23	67	23	1,541
AB8ND	27	58	26	1,508
KBØHNN	37	43	34	1,462
DL6RAI	19	76	19	1,444
JA1OHP	24	67	21	1,407
HB9TJW	23	56	23	1,288
EA3KN	24	54	23	1,242
CE3SNA	25	64	19	1,216
EA4AFP	21	57	20	1,140
PU1KYC	22	59	19	1,121
DL6DCD	18	63	17	1,071
W3ZF	28	44	24	1,056
DV1VEQ	16	68	15	1,020
JI1UDD	20	58	16	928
KA4OTB	25	40	23	920
ES8DH	16	56	16	896
PT8CWA	15	51	15	765
EA7DK	16	40	16	640
LA6BNA	15	42	14	588
UR5IKN	14	43	13	559
JR3SZZ/3	15	36	15	540
A52K	16	34	13	442
WSØZ	15	28	12	336
DO7ML	9	34	9	306
DP6M	9	31	9	279
UA4FX	11	23	11	253
7K3OZQ	7	16	7	112
G8DNH	6	15	6	90
IZØGXM	4	15	4	60
VA3WR	3	9	3	27
EA7EYQ	3	7	3	21

Single Operator 10m

LU1HF	**155**	**447**	**103**	**55,031**
JA6WJL	57	94	42	4,214
UZ7HO	22	44	20	987
IKØPEA	16	31	16	561
JE2SOY	7	13	7	91
9W2DRL	3	5	3	15

Single Operator 15m

LS1D	**1256**	**3728**	**581**	**2,165,968**
ZX2B	**1192**	**3531**	**551**	**1,945,581**
CT3FQ	**1013**	**3036**	**477**	**1,448,172**
UR6F	**710**	**1718**	**416**	**714,688**
ZS6DXB	**548**	**1629**	**341**	**555,489**
CT1AGF	**426**	**995**	**286**	**284,570**
YE1AA	**377**	**1120**	**250**	**280,000**
YY1JGT	**417**	**1230**	**216**	**265,680**
OG6G	**397**	**918**	**262**	**240,516**
TM9K	**347**	**859**	**232**	**199,288**
NJ4U	**378**	**770**	**254**	**195,580**
PX8X	328	934	208	194,272

EE2K	**278**	**668**	**211**	**140,948**
YO2R	**217**	**560**	**162**	**90,720**
CT1AOZ	228	541	166	89,806
DL9NDS	**199**	**494**	**161**	**79,534**
IW1QN	**199**	**505**	**154**	**77,770**
YU2A	**195**	**497**	**149**	**74,053**
BD4SI	**198**	**481**	**134**	**64,454**
RW9RA	**159**	**443**	**124**	**54,932**
HG3IPA	**165**	**421**	**128**	**53,888**
HP1AC	**170**	**394**	**128**	**50,432**
PY2SRB	120	325	105	34,125
JH7RTQ	**101**	**259**	**83**	**21,497**
UAØWL	86	235	68	15,980
SP5XO	75	188	68	12,784
ES4MM	73	183	65	11,895
JH2BTM	62	165	49	8,085
OM7PY	49	131	47	6,157
OK2PMS	44	120	43	5,160
RW4LQ	43	116	39	4,524
SQ9FMU	47	119	38	4,522
7N4WPY	52	109	39	4,251
VE3FJ	44	101	42	4,242
RA4LK	38	98	37	3,626
UR5GPN	36	93	34	3,162
IZ7CDB	32	86	30	2,580
ZS1JY	29	85	24	2,040
JR1NKN	20	51	17	867
DJ3WE	16	46	16	736
JA1MVK	10	28	9	252
OM4AA	5	10	5	50

Single Operator 20m

9A2DQ	**1366**	**3455**	**615**	**2,124,825**
LZ9W	**1346**	**3293**	**611**	**2,012,023**
LZ8A	**1361**	**3192**	**609**	**1,943,928**
I4IKW	**1244**	**3185**	**585**	**1,863,225**
VE2RYY	**1155**	**2982**	**607**	**1,810,074**
ZC4LI	**1106**	**3194**	**525**	**1,676,850**
CT3BD	**1076**	**3217**	**514**	**1,653,538**
TM2OFL	**1103**	**2696**	**542**	**1,461,232**
KK5OQ	**1166**	**2391**	**557**	**1,331,787**
UV8M	**1065**	**2482**	**526**	**1,305,532**
OH7MJU	**1091**	**2516**	**516**	**1,298,256**
RK3DZB	**1041**	**2438**	**504**	**1,228,752**
OK4RQ	**960**	**2407**	**504**	**1,213,128**
EA7ZY	**967**	**2242**	**480**	**1,076,160**
EG5G	1016	2245	465	1,043,925
RV3FF	920	2117	477	1,009,809
UAØAGI	**857**	**2283**	**439**	**1,002,237**
RK9JWR	801	2163	419	906,297
WG8Y	**858**	**1902**	**466**	**886,332**
GM4FDM	**831**	**1963**	**451**	**885,313**
LTØH	**744**	**2199**	**397**	**873,003**
SX1L	**896**	**1950**	**441**	**859,950**
YV1RDX	**796**	**2369**	**362**	**857,578**
HA7TM	**820**	**2106**	**401**	**844,506**
OH9MSW	850	1946	429	834,834
EU1AZ	**783**	**1863**	**420**	**782,460**
USØYW	746	1768	406	717,808
RVØAL	682	1812	370	670,440
PY2NY	632	1866	355	662,430
UR5FAV	738	1692	382	646,344
JH7XGN	**624**	**1678**	**372**	**624,216**
KZ7X	**906**	**1438**	**398**	**572,324**
YV1FM	574	1705	334	569,470
S57XX	606	1480	371	549,080
YT2B	660	1498	364	545,272
9A4D	616	1553	344	534,232
RA1AW	643	1375	372	511,500
W7ZR	860	1354	352	476,608
UT1IA	595	1318	342	450,756
SV1BJW	591	1319	340	448,460
VE2SB	528	1338	326	436,188
OH2RI	511	1161	348	404,028
DL3BQA	515	1253	322	403,466
RA9QBD	466	1344	286	384,384
TG9ANF	**642**	**1357**	**280**	**379,960**
DL1DTL	486	1139	316	359,924
UAØSR	484	1224	281	343,944
EA7ELY	481	1132	289	327,148
EU1DX	450	1098	288	316,224
RZ9OJ	415	1123	267	299,841
AKØA	**518**	**943**	**311**	**293,273**
EA5ET	427	974	277	269,798
RW6AH	434	949	273	259,077
HK6F	**382**	**1138**	**218**	**248,084**
WA1PMA	**513**	**828**	**286**	**236,808**
W4LC	**377**	**829**	**285**	**236,265**
RX9FG	339	919	240	220,560
RU9HM	335	924	219	202,356
UA1NFA	371	816	243	198,288
JF2VAX	323	854	224	191,296
YB4IR	**313**	**924**	**201**	**185,724**
SP2JLR	311	749	237	177,513
W9IL	335	693	238	164,934
JE1LFX	316	801	198	158,598
OK1EP	298	750	205	153,750
ES4RD	**313**	**796**	**193**	**153,628**
UA9OZ	276	725	207	150,075
MØUNI	295	691	213	147,183
HC1JQ	**269**	**790**	**159**	**125,610**
SO7O	**248**	**616**	**191**	**117,656**
LA1QDA	**279**	**595**	**197**	**117,215**
EA3NO	249	578	193	111,554
UR5ZMK	267	604	183	110,532
BD4SP	**275**	**653**	**168**	**109,704**
DU1UGZ	**268**	**790**	**137**	**108,230**
WA3AAN	**253**	**527**	**201**	**105,927**
YO9CWY	**245**	**577**	**179**	**103,283**
EC8ADW	**208**	**622**	**160**	**99,520**
YBØJIV	226	662	146	96,652
OQØA	**236**	**536**	**180**	**96,480**
DL6KD	219	507	172	87,204
UR7QM	236	513	169	86,697
US7IID	212	506	169	85,514
SV5DKL	**227**	**471**	**157**	**73,947**
SP9CTS	204	474	147	69,678
RA9AFZ	182	463	144	66,672
TF3AO	**197**	**421**	**157**	**66,097**
UT3FW/MM	200	428	153	65,484
YO8WW	177	424	145	61,480
IWØUWE	176	408	147	59,976
DL4NN	183	429	138	59,202
JA9CWJ	161	449	127	57,023
FBPMO	167	377	142	53,534
VR1@XMT	**188**	**442**	**117**	**51,714**
G2DWB	170	373	137	51,101
UA4FTA	163	378	132	49,896
XW1A	**192**	**426**	**113**	**48,138**
VA3PL	148	413	116	47,908
LA1YE	160	368	123	45,264
JK3GWT	151	397	114	45,258
CT1BNW	165	350	129	45,150
UX2MF	159	358	126	45,108
UN7PL	136	375	116	43,500
I4DOO	154	369	116	42,804
WR1H	137	337	124	41,788
OE1KTS	153	344	121	41,624
OQ5M	148	364	109	39,676
F5TMJ	142	308	128	39,424
H7/NP3D	**173**	**362**	**104**	**37,648**
JL3SBE	129	343	97	33,271
RW3TA	122	257	111	29,637
SP9DNO	116	281	97	27,257
URØIM	122	259	91	23,569
GMØKWW	106	243	96	23,328
BD7JLR	107	242	73	17,666
SP6BBE	90	190	80	15,200
JK1LUY	82	218	69	15,042
RX9JM/9	76	219	64	14,016
UXØFY	78	166	64	10,624
Z33F	73	152	61	9,272
KL1SF	64	159	56	8,904
RAØCL	91	174	48	8,352
DB1BMN	65	138	57	7,866
DL9XAW	56	128	50	6,400
OK6AB	52	134	45	6,030
SP9IHP	49	144	39	5,616
EA5FIV	51	112	49	5,488
WB2WPM	45	89	43	3,827
JH1DVG	37	103	34	3,502
LA5HPA	41	87	39	3,393
RA3TYL	39	83	36	2,988
HP1DCP/9	35	79	35	2,765
RW9SZ	35	86	30	2,580
N5UWY	50	64	39	2,496
S56G	33	71	31	2,201
JQ1AHZ/6	34	72	26	1,872
UA1CEC	30	62	30	1,860
W4NZ	40	56	32	1,792
LA5TFA	23	69	21	1,449
RZ3FQ	26	63	23	1,449
K7GZP	31	47	28	1,316
VE4AHZ	27	49	26	1,274
AE1T	15	19	14	266
VU2PTT	7	21	7	147
EA2DVT	6	15	6	90
9A5YY	6	14	6	84
F1OK	1	2	1	2

Single Operator 40m

CT3KY	**1132**	**6776**	**544**	**3,686,144**
YT5C	**1033**	**4720**	**516**	**2,435,520**
GW4SKA	**938**	**4354**	**488**	**2,124,752**
UT7U	**889**	**4208**	**497**	**2,091,376**
UW5Q	965	4174	466	1,945,084
OY3JE	**1013**	**4196**	**440**	**1,846,240**
AH6OZ	**852**	**5078**	**358**	**1,817,924**
IV3HAX	**819**	**3808**	**463**	**1,763,104**
AE5AA	**1038**	**3582**	**479**	**1,715,778**
IW1PNJ	792	3578	426	1,524,228
YTØA	802	3492	405	1,414,260
EA5EN	**640**	**2890**	**381**	**1,101,090**
RU9CK	**579**	**3162**	**326**	**1,030,812**
4M5RY	**548**	**3258**	**315**	**1,026,270**
RW6ATJ	622	2640	359	947,760
GM3SEK	**570**	**2496**	**333**	**831,168**
SV1DPP	**539**	**2300**	**320**	**736,000**
UTØEA	483	2086	317	661,262
EU8RZ	**497**	**2110**	**307**	**647,770**
UT4EK	471	2004	298	597,192
YY5LI	379	2250	265	596,250
SP5OXJ	439	1886	282	531,852
SP4DM	436	1844	286	527,384
USØHZ	431	1862	283	526,946
HA4WQ	442	1876	271	508,396
9A7K	431	1832	276	505,632
SN8A	430	1796	281	504,676
W2RTY	**557**	**1728**	**292**	**504,576**
USØKS	417	1804	267	481,668
SP3GTS	395	1704	274	466,896
JA1OVD	374	1866	239	445,974
HB9EHQ	**410**	**1700**	**256**	**435,200**
AF4Z	**485**	**1588**	**273**	**433,524**
EA4WC	367	1664	260	432,640
OSØS	**375**	**1616**	**261**	**421,776**
AA4VV	388	1502	259	389,018
SP5MBQ	**367**	**1566**	**248**	**388,368**
SP3VSE	334	1490	257	382,930
OK2BUT	**351**	**1482**	**242**	**358,644**
IZØEHL	346	1462	244	356,728
VA3XH	365	1590	218	346,620
F8CDM	**343**	**1426**	**235**	**335,110**
UX4LA	319	1370	227	310,990
HZ1IK	**259**	**1502**	**191**	**286,882**
M9W	**327**	**1340**	**208**	**278,720**
IK2AHB	279	1190	214	254,660
IKØRCY	263	1136	203	230,608
ON4CT	**268**	**1134**	**195**	**221,130**
G4ZOB	260	1128	193	217,704
JA3LEB	246	1210	170	205,700
CO2OT	252	1134	163	184,842
SP2GJI	**229**	**984**	**185**	**182,040**
VE3NZ	**273**	**1152**	**157**	**180,864**
F4EGA	218	984	178	175,152
DD5A	227	954	175	166,950
S53M	194	1012	143	144,716
LY2SA	209	892	154	137,368
YT1TA	205	858	156	133,848
F5VBT	202	840	156	131,040
SP4BPH	198	840	153	128,520
JH3CUL	**188**	**864**	**137**	**118,368**
YT2ACA	178	772	145	111,940
UN4PG	167	906	123	111,438
IN3XUG	179	748	144	107,712
JH1APZ	156	864	124	107,136
UA3WHO	186	744	141	104,904
IK3QAR	180	766	136	104,176
UT5SA	182	754	138	104,052
WJ5DX	**246**	**628**	**149**	**93,572**
K4QD	220	622	143	88,946
LZ1QV	168	716	124	88,784
OZ6TL	**155**	**638**	**130**	**82,940**
VE7KS	153	682	118	80,476
EA7OT	139	662	119	78,778
T99D	**137**	**678**	**114**	**77,292**
WØGJ	**215**	**560**	**134**	**75,040**
WT0O	240	548	134	73,432
W1UJ	**175**	**530**	**119**	**63,070**
TE2M	**128**	**584**	**104**	**60,736**
UK7F	**104**	**580**	**98**	**56,840**
WØBR	155	450	117	52,650
W9SE	167	478	108	51,624
HAØGK	109	470	96	45,120
KA4RAB	116	374	92	34,408
DL1DWL	94	400	86	34,400
YO2LBM	97	408	82	33,456
YN2/EW1AR	83	424	78	33,072
YO3III	81	362	76	27,512
JA6WFM/HC5	81	358	67	23,986
SM3LBP	79	320	71	22,720
EA4EQ	68	288	59	16,992
YY6JAG	54	302	51	15,402
RXØAT	52	262	51	13,362
EA7JB	49	206	49	10,094
IZ4GOL	46	226	43	9,718
FM5FJ	43	228	42	9,576
PY2ZY	41	230	40	9,200
BG1LEN	36	172	34	5,848
DL7DZ	35	146	35	5,110
DJ5IW	28	142	28	3,976
SP5TAZ	24	106	24	2,544
PY2OC	18	106	18	1,908
VK7AAP/3	12	70	12	840
IW1QLH	10	48	10	480
EA7FIQ	1	3	1	3

Single Operator 80m

S54E	**985**	**4486**	**496**	**2,225,056**
OK3R	**982**	**4328**	**497**	**2,151,016**
CT3EE	**746**	**4456**	**427**	**1,902,712**
IV3SKB	**872**	**3836**	**448**	**1,718,528**
I4AVG	873	3850	446	1,717,100
IK4MHB	874	3772	439	1,655,908
UT2IU	**791**	**3452**	**404**	**1,394,608**
7X0RY	**626**	**3750**	**333**	**1,248,750**
LY1R	**773**	**3198**	**376**	**1,202,448**
DJ6BQ	**685**	**2718**	**375**	**1,019,250**
YU5B	**653**	**2702**	**348**	**940,296**
DJ3IW	632	2468	364	898,352
HA3LI	**616**	**2538**	**334**	**847,692**
HA1YI	555	2270	303	687,810
UV5U	**473**	**1958**	**300**	**587,400**
UT5EPP	489	1954	279	545,166
IK1DFH	453	1842	288	530,496
UX1UX	482	1914	273	522,522
UW7F	462	1840	282	518,880
YU7YZ	**447**	**1844**	**278**	**512,632**
UY7C	456	1800	271	487,800
SP6DMI	**427**	**1708**	**273**	**466,284**
SA5D	**414**	**1732**	**267**	**462,444**
SN9Y	408	1622	264	428,208
IK3SSJ	410	1650	256	422,400
ON4AXU	**359**	**1496**	**241**	**360,536**
UR8QM	369	1482	238	352,716
S57AJ	**333**	**1364**	**235**	**320,540**
UT5KO	347	1354	224	303,296
RA4FW	**298**	**1138**	**212**	**241,256**
RU9TO	**253**	**1388**	**172**	**238,736**
RZ3AV	286	1142	196	223,832
UR5KAT	253	992	175	173,600
VE3FRX	**267**	**1044**	**156**	**162,864**
LZ2ZG	228	948	170	161,160
UT3N	246	942	165	155,430
UA9WIK	193	1096	138	151,248
UT5ECZ	199	776	149	115,624
UYØZG	172	678	134	90,852
DL2ZA	156	570	121	68,970
RZ6HF	147	550	113	62,150
KK8X	**190**	**530**	**117**	**62,010**
PAØMIR	**123**	**496**	**106**	**52,576**
YL2CV	**117**	**476**	**105**	**49,980**
UA3MIF	121	472	103	48,616
ISØYEK	**114**	**464**	**103**	**47,792**
NV2G	**150**	**398**	**101**	**40,198**
K4WW	**162**	**390**	**100**	**39,000**
US5EEK	107	434	82	35,588
SP7FBQ	103	398	89	35,422
ZX7A	**78**	**464**	**68**	**31,552**
RL3FA	100	380	81	30,780
KEØL	133	306	84	25,704
ES9OI	79	318	72	22,896
SQ6MS	57	222	52	11,544
K3SV	60	206	51	10,506
EA8ANE	41	240	39	9,360
NT6K	71	168	39	6,552
RA4HO	33	120	31	3,720
ER1RR	21	92	19	1,748
CU2JT	3	16	3	48

Rookie

IZ1LBG	**SO-ALL-HI**	**1313**	**4321**	**564**	**2,437,044**
RK9AJZ	SO-ALL-LO	1001	3669	438	1,607,022
XE3RBA	SO-ALL-LO	908	2592	327	847,584
LY3UV	SO-ALL-HI	685	2173	350	760,550
YY5LI	SO-40-HI	379	2250	265	596,250
IV3PGQ	SO-ALL-LO	537	1558	336	523,488
EA2VE	SO-ALL-LO	592	1555	297	461,835
K4XD	SO-ALL-HI	591	1473	306	450,738
K6DEX	SO-ALL-LO	699	1518	277	420,486
AI8P	SO-ALL-HI	533	1376	274	377,024
PD2JAM	SO-ALL-LO	341	1026	218	223,668
W1CDX	SO-ALL-LO	381	925	227	209,975
RK2FXG	SO-ALL-LO	318	1044	199	207,756
AB8XG	SO-ALL-LO	378	987	192	189,504
DK2AJ	SO-ALL-HI	277	804	216	173,664
YO2RLC	SO-ALL-LO	286	899	183	164,517
IZ8JFL	SO-ALL-LO	232	769	161	123,809
K3RMB	SO-ALL-HI	252	662	168	111,216
BD3APX	SO-ALL-LO	270	700	147	102,900
DK1AUP	SO-ALL-LO	208	648	155	100,440
DK9ETM	SO-ALL-LO	205	649	138	895,62
BD4SI	SO-15-HI	198	481	134	64,454
OM7YL	SO-ALL-LO	145	469	117	54,873
DO3UWE	SO-ALL-LO	132	438	113	49,494
G6CSY	SO-ALL-LO	122	450	101	45,450
RK3VWB	SO-ALL-HI	142	303	122	36,966
PD7BZ	SO-ALL-LO	107	393	90	35,370
PY2SRB	SO-15-HI	120	325	105	34,125
MØGBP	SO-ALL-LO	113	324	105	34,020
DL1HW	SO-ALL-LO	103	327	95	31,065
BG4CZX	SO-ALL-LO	97	322	69	22,218
DO1BEN	SO-ALL-LO	92	291	76	22,116
JF1HML	SO-ALL-LO	72	286	55	15,730
EA2CYJ	SO-ALL-LO	74	216	62	13,392
SP5XO	SO-15-HI	75	188	68	12,784
KC2PCG	SO-ALL-LO	95	200	62	12,400
VE6MO	SO-ALL-LO	80	174	65	11,310
WB9L	SO-ALL-LO	75	157	57	8,949
KC8ZTJ	SO-ALL-LO	69	141	57	8,037
UU2JUA	SO-ALL-LO	50	162	39	6,318
IZ5HQB	SO-ALL-LO	50	115	43	4,945
EA7HY	SO-ALL-HI	30	89	30	2,670
VE4AHZ	SO-20-HI	27	49	26	1,274
EA2DVT	SO-20-HI	6	15	6	90
IZØGXM	SO-ALL-LO	4	15	4	60

Multi-Operator Single Transmitter

T93M	**2520**	**9119**	**788**	**7,185,772**
UF3CWR	**2531**	**8686**	**763**	**6,627,418**
OM8A	**2212**	**8456**	**764**	**6,468,024**
RL3A	2487	8684	721	6,261,164
K1LZ	**2247**	**7635**	**731**	**5,581,185**
HG8BHQ	**2076**	**8050**	**691**	**5,562,550**
OA4O	**2075**	**8572**	**639**	**5,477,508**
RK9CWA	**2031**	**8309**	**579**	**4,810,911**
OE9R	**1864**	**7012**	**669**	**4,691,028**
TM4P	**1643**	**5822**	**578**	**3,365,116**
UO6P	**1462**	**6012**	**522**	**3,138,264**
UR4EWT	**1567**	**5211**	**578**	**3,011,958**
DL2MWB	**1441**	**4825**	**602**	**2,904,650**
SI4G	**1528**	**5143**	**557**	**2,864,651**
OM3RJB	1472	5093	552	2,811,336
PY5/OK5MM	**1446**	**5060**	**554**	**2,803,240**
RK3QWA	1508	4571	581	2,655,751
OK1KSL	**1372**	**4462**	**580**	**2,587,960**
S56A	**1290**	**4224**	**528**	**2,230,272**
WØLSD	**1593**	**4166**	**522**	**2,174,652**
RK3MWI	1375	4471	470	2,101,370
AJ9C	**1410**	**3471**	**513**	**1,780,623**
OM3KWZ	1055	3951	442	1,746,342
RZ4HZW	1165	3529	469	1,655,101
VE3XD/W4	**1175**	**3342**	**490**	**1,637,580**
R3AWA	1074	3463	448	1,551,424
KT1I	1206	2762	463	1,278,806
RK4WWF	1025	2956	419	1,238,564
OK1KMG	862	3225	383	1,235,175
V31TB	**881**	**3091**	**376**	**1,162,216**
UN1L	861	2922	390	1,139,580
DF3GY	751	2650	394	1,044,100
RK3SWS	837	2889	361	1,042,929
VE7UF	**888**	**2878**	**323**	**929,594**
DKØCU	729	2538	361	916,218
WK4Y	965	2136	404	862,944
T77NM	**698**	**2382**	**350**	**833,700**
SP9ZHR	**672**	**2238**	**359**	**803,442**
VA7RN	793	2641	295	779,095
IQ5AE	**477**	**2102**	**318**	**668,436**
DG4VX	503	1753	290	508,370
F5KEK	**498**	**1520**	**285**	**433,200**
AL1G	**482**	**1247**	**240**	**299,280**
NO4Q	529	1209	246	297,414
JF2SKV	**408**	**1183**	**222**	**262,626**
VE6AO	435	1086	223	242,178
W4HOD	388	821	195	160,095
YU7AJM	253	853	175	149,275
UU4JXI	201	838	148	124,024
LW6DW	228	744	149	110,856
IK1TWC	200	686	156	107,016
B4TB	249	775	137	106,175
UU5A	160	679	135	91,665
OL3A	132	540	105	56,700
VE7HL	160	452	103	46,556
IQ5FI	135	346	123	42,558
KØJE	113	246	86	21,156
KE3OA	105	256	77	19,712

Multi-Operator Two Transmitters

NP3U	**4387**	**15720**	**894**	**1,4053,680**
OG8X	**2746**	**9240**	**808**	**7,465,920**
TM7Z	**2602**	**9497**	**765**	**7,265,205**
DAØBCC	**2555**	**9282**	**769**	**7,137,858**
J4ØWPX	**2401**	**8176**	**649**	**5,306,224**
N2WK	**2263**	**6579**	**706**	**4,644,774**
DL15ØHZ	1910	6457	636	4,106,652
JA6ZPR	**1755**	**6402**	**628**	**4,020,456**
SPØDXC	**1802**	**5936**	**631**	**3,745,616**
WX5S	**2227**	**5546**	**523**	**2,900,558**
RK9AWN	**538**	**2402**	**286**	**686,972**

Multi-Operator Multi-Transmitter

Z37M	**3262**	**12089**	**810**	**9,792,090**
RWØA	**3257**	**12957**	**713**	**9,238,341**
WW4LL	**3293**	**10156**	**796**	**8,084,176**
OH6R	**2809**	**9604**	**805**	**7,731,220**
KA4RRU	**2403**	**6404**	**717**	**4,591,668**
KF4QQY	2195	6132	691	4,237,212
NØNI	2425	5970	665	3,970,050
DK3W	454	1552	289	448,528
WC4J	226	604	139	83,956

SWL

I1-12387	**680**	**2349**	**396**	**930,204**
DE1NCH	699	2295	360	826,560
UAØ-103-16	358	1266	207	262,062
R1A12	261	878	200	175,600
OK1-31457	145	410	125	51,250
EA-5412V	84	277	71	19,667
EA2783URE	44	182	43	7,826

Check Logs

The following logs were used as check logs. Check logs are always appreciated. V8CB, 4U1UN, DC3RJ, DE7ROW, DKØZN, DL2BQV, DL3MR, DM5EL, DM5JL, EA3/CX8CP, EA3ALV, EA7GV, F4EUN, G3RWL, HA1SN, IN3OWY/2, IW1PUR, IW2GRA, KØIDT, K2QD, KW3W, LA2GH, MØRTI, N5IJE, OH5VG, OK1DRQ, OK2BZ, OK2DW, OK2SG, RA4UVK, RA6DE, RA6EE, RA9SD, RC4Q, RN4HGP, RU1AT, RU3EJ, RU6DZ, RU6YY, RV3DBK, RW4UW, S59D, SM7N, SN2M, SP2FOV, SP4Z, SP5GDY, SP6CZ, SQ5BPM, SV1XV, UA1AKE, UA1RJ, UA3DCW, UA4WLI, UR7EY, UW5U, UXØFF, UX1IL, UZ2HZ, VK6DU, W6ISQ, W7KLL, W8RSI, WA8L, YO6OAF, YO8SAI.

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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	1⅞ x 6 x 9	3.4
SS-18	15	18	1⅞ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅝	4.2
SS-30	25	30	3¾ x 7 x 9⅝	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅝	4.2
SS-30M*	25	30	3¾ x 7 x 9⅝	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25	20	25	3½ x 19 x 9⅝	6.5
SRM-30	25	30	3½ x 19 x 9⅝	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅝	6.5
SRM-30M	25	30	3½ x 19 x 9⅝	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30-2	25	30	3½ x 19 x 9⅝	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅝	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅝	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

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GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
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MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
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SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

Oops...

In our May news column, we reported that John Evans, N3HBX, spent "more than $1650,000 in legal fees" in an ultimately-successful antenna tower battle. The actual cost was more than $160,000.

Back in "Oops" in April (p. 90), we discussed how the usual "73, W2VU" at the end of February's editorial had mysteriously morphed into an unrecognizable Morse code character, "– – – . " and we suggested a contest for a letter or symbol in need of a code character. Well, Robert Plummer, W3RP, wrote to remind us that the International Morse Code is truly an *international* code, including several characters ("extensions") assigned to non-English letters. The character "– – – . " is assigned to " ö ". W3RP included a copy of a code table from his 1967 volume of *Webster's Seventh New Collegiate Dictionary*, which lists the following:

Á = . – – . –
Ä = . – . –
É = . .– . .
Ñ = – – . – –
Ö = – – – .
Ü = . . – –

... along with various others, including punctuation marks beyond the comma, period, and question mark that the FCC used to include on its tests. Additional online sources, such as <websters-online-dictionary.com>, <wikipedia.org>, and <edinformatics.com>, agree with the above list and add a few more, including:

ch = – – – –
Å and À (same as Á) = . – – . –
Æ (same as Ä) = . – . –

W3RP also points out that "– – – ." stands for "!" in American Morse Code, used by landline telegraphers.

So it appears that our contest is over, thanks to RP's eagle eye, and his long-standing knowledge of not only the "international" part of the International Morse Code, but the American Morse Code as well. Thanks for educating us all, Robert!

ham shop

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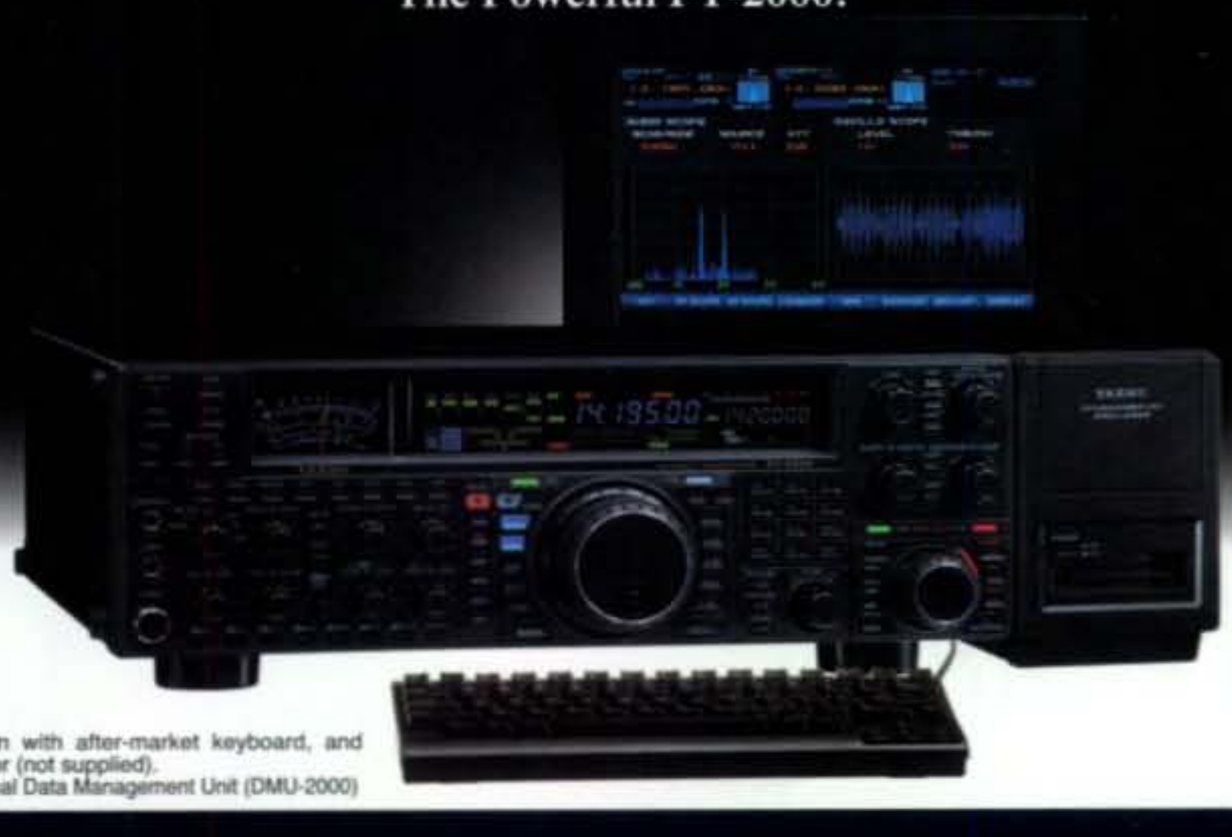

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