Official Journal of
ARRL
The national association for AMATEUR RADIO

QST

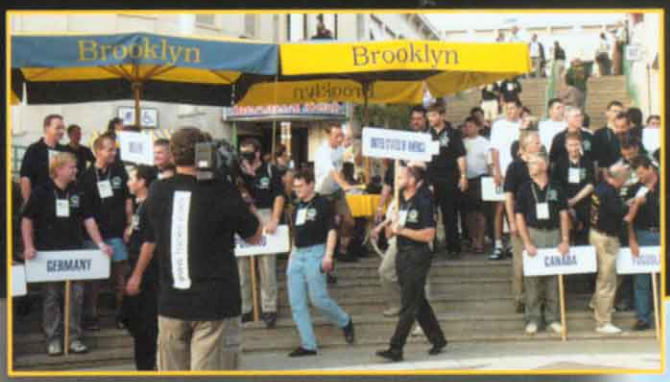
devoted entirely to
AMATEUR RADIO

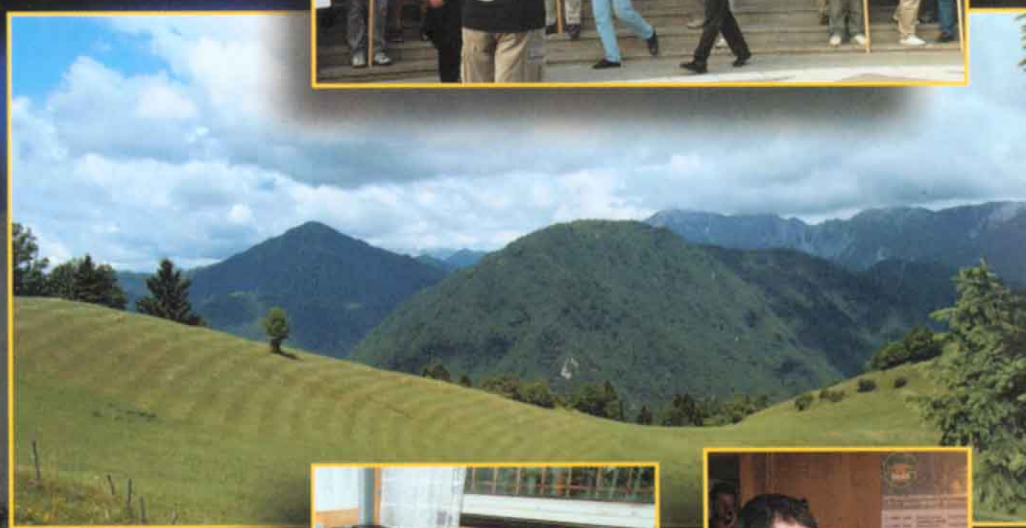
October 2000

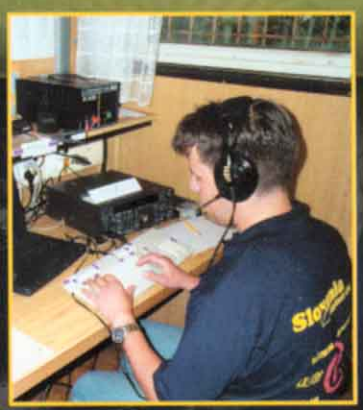
QST reviews

- **Grundig Satellit 800 Millennium receiver**
- **RadioShack HTX-245 dual-band FM H-T**

Build the *Parasol* vertical







2000 World Radiosport Team Championship

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10
0 09128 47322 2

ICOM IC-706MKIIG

PROVEN PERFORMANCE

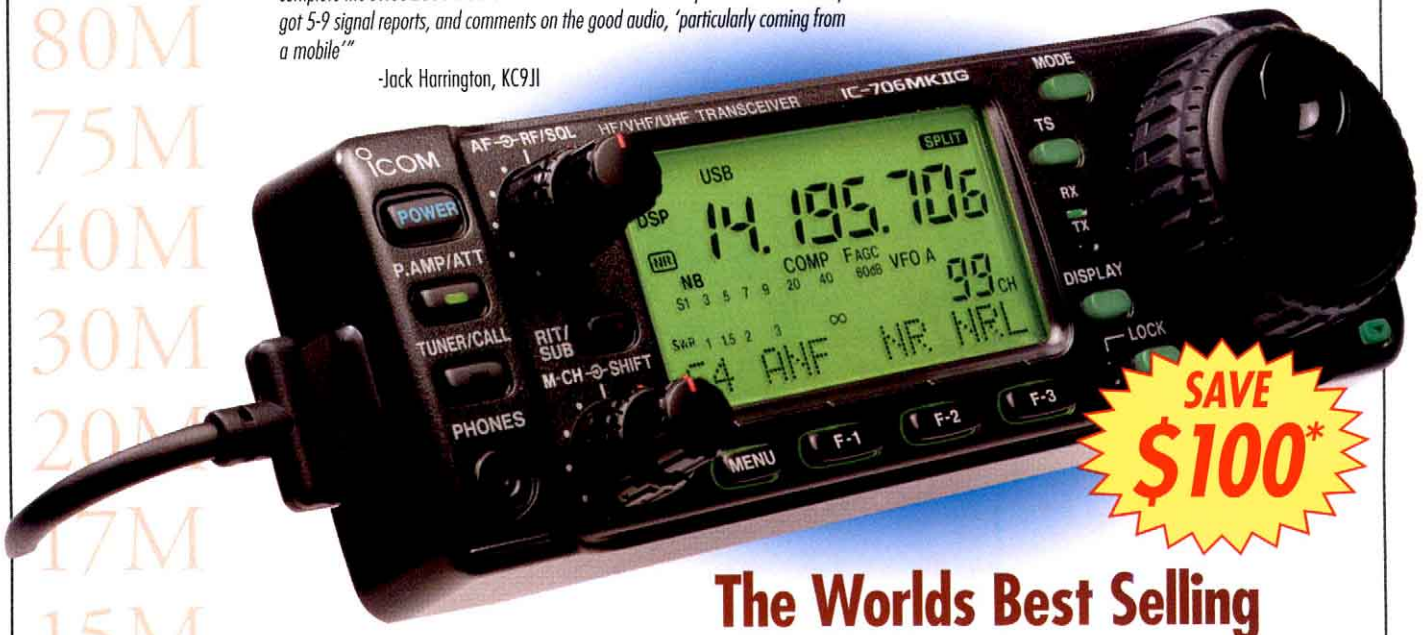
"My goal was to finish my DXCC 2000 by the end of February. Unfortunately, work got in the way. Part of my work schedule included some driving trips. Although I missed my goal by 10 days, the (radio) mounted in my vehicle allowed me to complete the DXCC 2000 much sooner than would have been possible. I consistently got 5-9 signal reports, and comments on the good audio, 'particularly coming from a mobile'"

-Jack Harrington, KC9JI

"Great portability vs. performance ratio. It's great to have a radio where you can talk on your local repeater, work on your mobile DXCC total and still not miss out on 6M openings!"

Kevin Olson, K3OX

160M
80M
75M
40M
30M
20M
17M
15M
12M
10M
6M
2M
70CM



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  - Auto Repeater Function
  - DSP Included • Backlit Keys
  - 50W on 2M • 20W on 440 MHz

Yes, You CAN Take It With You
Faceplate shown in optional Remote Control configuration. Requires OPC-581 11 ft. (3.5 m) or OPC-587 16 ft. (5 m) separation cable

In The Trunk, Under The Seat, or Under The Dash
The '706MKIIG is very compact. It measures only 6.6 (w) x 2.3 (h) x 7.9 (d) in 167 (w) x 58 (h) x 200 (d) cm. It's a mobile sized rig with base station capabilities

"The first thing I did when I flipped the radio on was work a station in Ukraine on 20M. It is a great rig! I must say that I underestimated it before, it really blew my mind."

Jon Williams, KB4NS

ICOM options required for PC operation:

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OPC-478 Connection Cable

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Matching the look and size of the IC-706MKIIG, the AT-180 offers HF and 6M antenna tuning in a handsome package – looks classy in any shack! Its small size makes the AT-180 perfect for stations where space is a primary concern.

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CAPTURE THE DX WORLD

IC-756PRO: The exclusive rig of the Clipperton Island-FOØAAA and Kingdom of Bhutan-A52A DX'peditions.

Two major DX'peditions. Two remote locations. The radios? IC-756PROs. The unrivaled processing speed of a 32 bit floating point DSP provides crisp, clear reception with virtually no background noise. 41 built-in filters - front panel selectable for your convenience - let you pull out weak signals like never before. Many other features including Dual Watch, Memory Keyer, and Spectrum Scope make this rig a contester's dream. Just ask the guys who actually used them - several members of both teams were so impressed with the PRO's performance that they now have '756PROs in their own ham shacks. "It just doesn't get any better than this" - says Glenn Johnson, WØGJ.

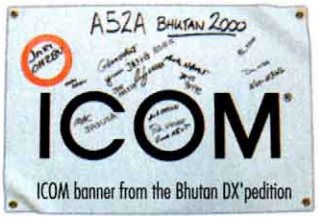
A scene from the Bhutan DX'pedition

"All seven of the '756PROs worked flawlessly. We ran RTTY perhaps more than 50% duty cycle, and the radios never even got warm at maximum output. The digital filter controls were so easy to adjust and switch...a contester's dream! We had seven radios, most of the time with three modes at once on any given band. There was NO interstation interference. All of our antennas (except for the 160M & 80M verticals) were within a 75 meter circle."

- A52A member Glenn Johnson, WØGJ

One of Clipperton Islands' main inhabitants

One of the DX stations set up on Clipperton



ICOM banner from the Bhutan DX'pedition

" I was particularly impressed with the '756PRO's front end resistance to overloading. I never heard intermod noises or de-sensing even with the huge pileups we generated. Several times I listened carefully for such problems but they simply weren't there. On CW, once I had picked out a station, I could run the selectivity down to 50Hz and hear ONLY the station I wanted. I have worked pileups from several DX'peditions and have never encountered a radio that held up so well."

- FOØAAA member Mike Goode, N9NS.

The IC-756PRO's 5" TFT color display makes the information you need available at a glance. Select from four different colors & seven different fonts.

HF/6M • 100W • All Mode • Triple Conversion Rx • Dual Watch • 32 Bit IF-DSP • Front Panel Adjustable Noise Reduction • Audio Peak Filter • Auto & Manual Notch Filter • Twin Passband Tuning • 5" TFT Color Display Shows Operating Conditions and Spectrum Scope • CW Memory Keyer • VOX • Auto Antenna Tuner • PC Controllable with Optional ICOM Software

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October 2000 ♦ Volume 84 Number 10

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News and Features

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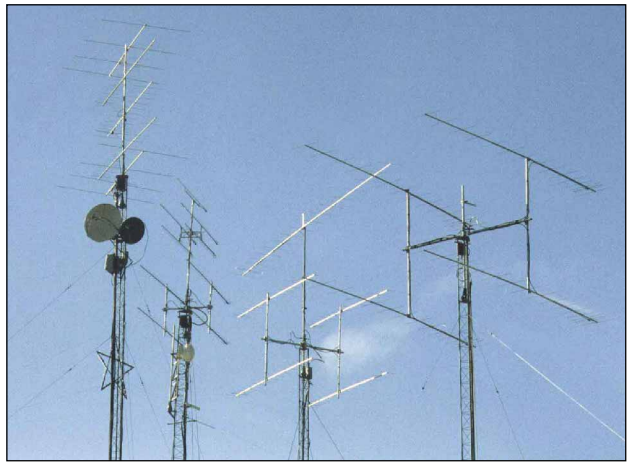

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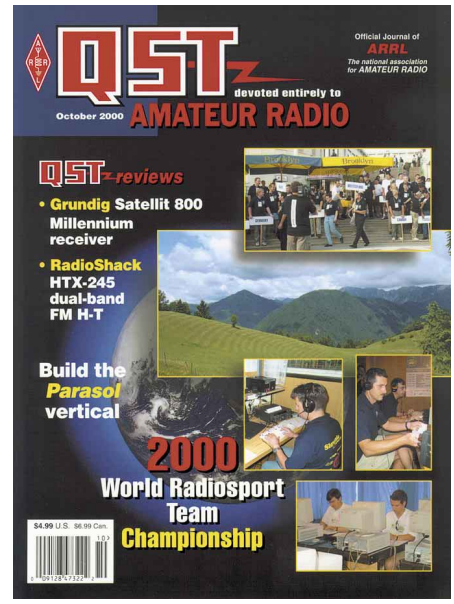
Operating

Departments



Our Cover

The green mountains of Solvenia were home to the Olympics of Amateur Radio—the 2000 World Radiosport Team Championship. What challenges did the competitors face? And who came out on top? You'll find out on page 28 in this issue.

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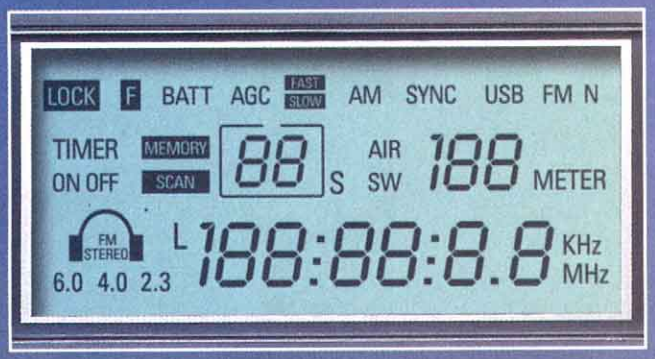
GRUNDIG The Ultimate in



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The Tuning Controls
• For the traditionalist: a smooth, precise tuning knob, produces no audio muting during use.

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Ultra fine-tuning of 50Hz on LSB/USB, 100Hz in SW, AM and Aircraft Band and 20 KHz in FM.
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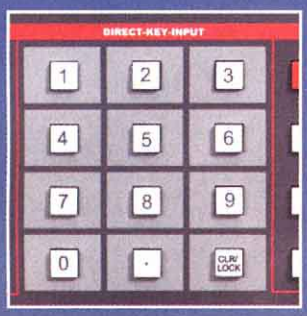
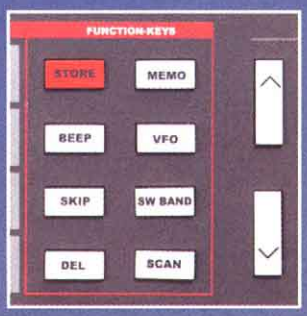
• For direct frequency entry: a responsive, intuitive numeric keypad.

Digital Technology





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"IT SEEMS TO US..."

Camaraderie

The common stereotype of the radio amateur is that of a reclusive sort of individual, cloistered in his basement, surrounded by electronic buffers against the outside world.

As is true of most stereotypes there is a grain of truth to this one. While its ultimate purpose is two-way communication, Amateur Radio can be a solitary pursuit. Some hams are heard but seldom seen.

Our British colleagues have tried for decades to bury the image created by the late comedian Tony Hancock, whose skit "The Radio Ham" described the ultimate loser. "I have friends all over the world, all over the world," he says. Pregnant pause. "None in this country, but all over the world." It's a great line; I've used it myself a few times.

Yet, quite a different picture of the typical radio amateur is emerging as we enter a new millennium. If we look at the aspects of Amateur Radio that are growing and flourishing, we find that they involve community as well as communication. They are high-touch, not just high-tech. They bring people together as well as bridge the physical distance between them.

This has long been the case with the public service communicators among us. Nets have a strong social dimension; the stronger it is, the more likely it is that the net will survive and thrive. ARES and other groups who provide communications for public events know how important it is for everyone to feel that they are a part of the team. This is what keeps them coming back.

One of our newest *QST* columns, K2TQN's "Old Radio," is about more than rusty, dusty hardware. It's about the people who lovingly collect and restore it, who help one another complete their collections, and who willingly share their skills and their enthusiasm with new converts. They bring history to life not only for their own pleasure, but for others as well—including the generations to follow. Their numbers are growing because their enthusiasm is contagious.

Another new column, K7SZ's "QRP Power," highlights another potent strain of communicable radio disease. At Dayton, one of the leading lights in the QRP movement told me about this year's Four Days in May, the annual gathering of the QRP clan. "I walked into the hospitality suite and it was filled with people I'd never seen before. It was *wonderful!*" With that as the prevailing attitude, it's no wonder that the small companies who serve the market for QRP kits and accessories have trouble keeping up with the demand. Of course, Dayton itself illustrates how fulfilling and renewing it can be to get together with like-minded individuals once in a while.

This month's cover story spotlights what, in terms of camaraderie, may be the best international Amateur Radio event yet: The World Radiosport Team Championship. WRTC began as the sort of ambitious idea that seldom gets past the talking stage. Ideas are cheap; people who will devote the time required to turn an ambitious one into reality are rare and precious. In this case, however, there was a group in Seattle whose enthusiasm and dedication measured up to the challenge. Their success in 1990 was built upon by another extraordinary group in San Francisco, in 1996. This year the process was repeated on an even more impressive scale in Slovenia, a country that did not even exist when the first WRTC was held just 10 years ago. It was a great privilege to be a part of WRTC-2000; for those who were there, the memories will last a lifetime.

Whether your operating interest involves HF, 6 meters, satellites or moonbounce, your radio puts you in contact with people in other lands who share that interest with you. Just saying hello to someone half a world away, someone who has grown up in another culture and probably speaks a different language most of the time, brings humanity a small step closer together. Add to that a common enthusiasm for a particular facet of the art of radio, bring a few hundred such people together in one place, and step back to watch the magic; that's a summary of WRTC. As radio amateurs we can indeed have friends all over the world.

This month a similar event will take place in Nanjing, China, where the 10th Amateur Radio Direction Finding World Championships are being hosted by the Chinese Radio Sports Association. It is safe to predict that the team representing the United States as well as the teams representing other countries will experience something very much like what we felt in Slovenia. The world will seem a friendlier place to those who were there. Perhaps, in a small way, it will be.—*David Sumner, K1ZZ*

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We offer tours of Headquarters and W1AW at 9, 10 and 11 AM, and at 1, 2 and 3 PM, Monday to Friday (except holidays). Special tour times may be arranged in advance. Bring your license and you can operate W1AW anytime between 10 AM and noon, and 1 to 3:45 PM!

Would you like to write for QST?

We're always looking for new material of interest to hams. Send a self-addressed, stamped envelope (55¢ postage) and ask for a copy of the *Author's Guide*. (It's also available via the ARRL Info Server, and via the World Wide Web at **http://www.arrl.org/qst/aguide/**.)

Press Releases and New Products/Books

Send your press releases and new book announcements to the attention of the ***QST* Editor** (e-mail **qst@arrl.org**). New product announcements should be sent to the Product Review Editor (e-mail **reviews@arrl.org**).

ARRL Audio News

The best way to keep up with fast-moving events in the ham community is to listen to the ARRL Audio News. It's as close as your telephone at 860-594-0384, or on the Web at **http://www.arrl.org/arrlletter/audio/**

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Just pick up the telephone and call toll free 1-800-326-3942, or send e-mail to **newham@arrl.org**. We'll provide helpful advice on obtaining your Amateur Radio license, and we'll be happy to send you our informative Prospective Ham Package.

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The 15 divisions of the League are arranged into 71 administrative *sections*, each headed by an elected *section manager* (SM). Your section manager is the person to contact when you have news about your activities, or those of your club. These news items could find their way into the pages of *QST*! If you need assistance with a local problem, your section manager is your first point of contact. He or she can put you in touch with various ARRL volunteers who can help (such as technical specialists).Your section manager is also the person to see if you'd like to become a section volunteer. Whatever your license class, your SM has an appointment available. If your ARRL section has a Web site, the address can be found at **http://www.arrl.org/field/org/smlist.html**.

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Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer . . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

MIRAGE RUGGED!

B-5016-G
$299
Suggested Retail

The MIRAGE B-5016-G gives you 160 Watts of brute power for 50 Watts input on all modes -- FM, SSB, or CW!

Ideal for 20 to 60 Watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard™*.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

Draws 17-22 Amps at 13.8 VDC. 12x3x5½ in.

RC-1B, $45. Remote Control. On/Off, preamp On/Off, selects SSB/FM. With 18 foot cable.

Power Curve -- typical B-5016-G output power								
Watts Out	130	135	140	145	150	155	160	165
Watts In	20	25	30	35	40	45	50	55

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 Watt mobile or base stations. 160 Watts out for 25 Watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT or mobile/base amplifier. 160 Watts out for 10 Watts in. For 0.2-15 Watt transceivers.

B-1016-G Great for ICOM IC-706!

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 Watts out with 2 watts in; 160 watts out with 3½ Watts in. For 0.25 to 5 Watt handhelds radios.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail
MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power								
Watts Out	25	50	75	95	100	100	100	100
Watts In	¼	½	1	2	4	6	7	8

- *100 Watts out with all handhelds up to 8 Watts*
- *All modes: FM, SSB, CW*
- *Great for ICOM IC-706*
- *15 dB low noise GaAsFET preamp*
- *Reverse polarity protection*
- *SWR Protection*
- *FREE mobile bracket*
- *Auto T/R Switch*
- *FREE handheld BNC to B-310-G patch cable*
- *Ultra-compact 4¾x1¾x7¾ inches, 2½ pounds*
- *One year MIRAGE warranty*

***Boost** your 2 Meter handheld to 100 Watts!* Ultra-compact all mode B-310-G amp is perfect for all handhelds up to 8 Watts and multimode SSB/CW /FM 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$89.95
Suggested Retail

Power Curve -- typical B-5016-G output power							
Watts Out	18	30	33	35	35	35	35+
Watts In	1	2	3	4	5	6	8

- *35 Watts Output on 2 Meters*
- *All modes: FM, SSB, CW*
- *18 dB GaAsFET preamp*
- *Reverse polarity protection*
- *Includes mobile bracket*
- *Auto RF sense T/R switch*
- *Custom heatsink, runs cool*
- *Works with handhelds up to 8 Watts*
- *One year MIRAGE warranty*

MIRAGE RUGGED!

35 Watts, FM only . . . $69.95

B-34, $69.95. 35 Watts out for 2 Watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

Power Curve -- typical B-5016-G output power								
Watts Out 2 Meters	30	40	45	45	45	45	45+
Watts Out 440 MHz	16	26	32	35	35	35	35+
Watts In	1	2	3	4	5	6	7

- *45 Watts on 2 Meters/35 Watts on 440 MHz*
- *Auto Band Selection*
- *Auto T/R Switch*
- *Full Duplex Operation*
- *5x1¾x5 inches*
- *FREE mobile bracket*
- *"On Air" LEDs*
- *Single Connector for dual band radios and antennas*
- *Reverse polarity protection*
- *Works with all FM handhelds to 7 Watts*
- *One year MIRAGE warranty*

Add this Mirage dual band amp and boost your handheld to a powerful mobile or base -- 45 Watts on 2 Meters or 35 Watts on 440 MHz! Mirage's exclusive *FullDuplexAmp™* lets you talk on one band and listen on the other band at the same time -- just like a telephone conversation. *(Requires compatible HT).*

6 Meter Amplifier

FCC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 Watts out for 10 in. For 1 to 15 Watt transceivers.

70 cm Amplifiers (420-450 MHz)

D-3010-N, $365 -- 100 W out/30 in. For 5 to 45 Watt *mobile/base*. **D-1010-N, $395**, 100 W out/10 in. *Dual purpose* -- for handhelds or mobile/base. **D-26-N, $269**, 60 W out/2 in, for *handhelds*.

Amateur TV Amps

Industry standard ATV amps -- **D-1010-ATVN, $414**, 82 Watts PEP out / 10 in.
D-100-ATVN, $414, 82 Watts PEP out/2 in. (without sync compression).

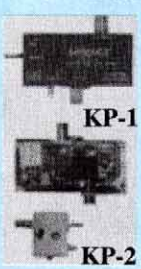
Remote Control Head for Amps

RC-1, $45, remote controls most MIRAGE amps. Check with Mirage for compatibility. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). Tiny 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all mode FM/SSB/CW repeater amps for 6, 2, 1¼ Meters, 70 cm, 450 MHz, ATV.

Low noise GaAsFET preamps



High gain ultra low noise GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 100 Watts.

Choose *In-Shack* model or *Mast Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
28-30	KP-1/10M	KP-2/10M
50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 Watts out for 2 to 50 Watts in, $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

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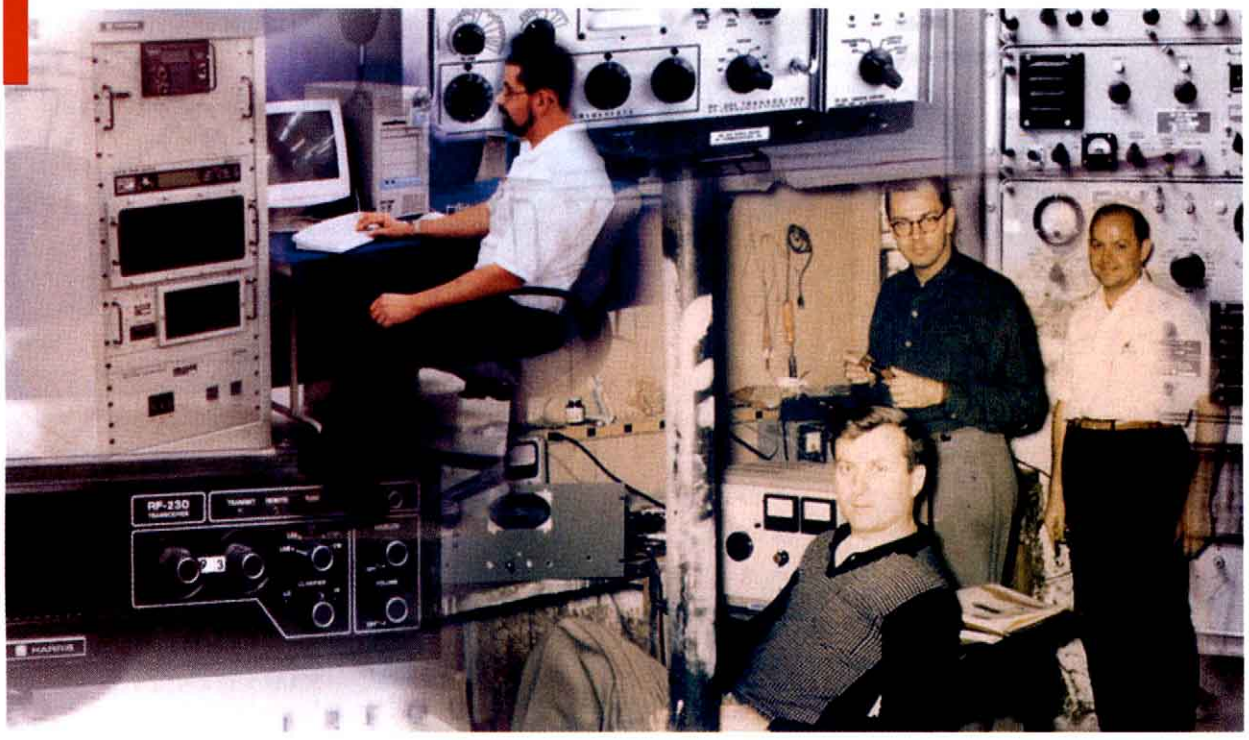

Since being founded in a basement forty years ago, the RF Communications Division of Harris Corporation has been providing premiere communications products to military and commercial markets worldwide. Though not originally intended for the amateur radio marketplace, many Harris products are in daily use as key elements of MARS radio nets and cooperative safety and public services. Harris has gained a well-deserved reputation as a premier provider of specialized radios.

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In addition to our 40th anniversary, the year 2000 also marks the 30th anniversary of the Harris RF Communications Amateur Radio Club, W2RFC. **Look for special event stations W2R and N2R during October 13 through 15.** If you are using vintage RF Communications equipment on the air, we'd especially like to hear from you! Listen for us on CW on 7050, 14040, and 21040 kHz, and on SSB on 7240, 14240, and 21340 KHz.

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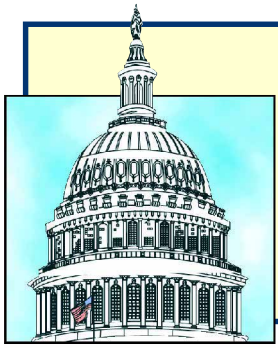

DC Currents

By Steve Mansfield, N1MZA
Manager, Legislative and Public Affairs

Just as radio waves aren't constrained by artificial boundaries, neither is ARRL's government relations effort. "DC Currents" covers behind-the-scenes activity you need to know about in Congress, at the FCC and other regulatory agencies, as well as at worldwide bodies such as the International Telecommunication Union.

ARRL Collecting "Restrictive Covenants" Tales

For a growing number of hams, the acronym "CC&R" has become a dirty word that hampers their ability to enjoy Amateur Radio. As part of an effort to document the extent of the problem, the ARRL has begun compiling a dossier of amateurs' experiences with CC&Rs—covenants, conditions and restrictions. Imposed by private homeowners' associations or by developers, CC&Rs—also known as "restrictive covenants" and "deed restrictions"—often impede or prohibit the installation of outside antennas.

In January, the ARRL asked the FCC to reconsider its denial of the League's request to extend the limited federal preemption known as PRB-1 to restrictive covenants. The League has said it would like hams to be free to negotiate reasonable accommodation provisions with local homeowners' associations just as they do now with governmental land-use regulators.

The ARRL is inviting narratives from amateurs who now are or have been denied the opportunity to install an antenna or support structure on a dwelling they own because of CC&Rs. Narratives should relate directly to situations involving restrictive covenants and should be no longer than one page for inclusion in the CC&R database. Submittals should include name, call sign, the address at which you were denied the opportunity to put up an antenna, and the basis upon which you were denied or would expect to be denied. Participants should include a copy of the contract language that would exclude your antenna or support structure and copies of any denial letters from a homeowners' association.

Submittals should be sent to ANTENNAS, c/o Steve Mansfield, N1MZA, American Radio Relay League, 225 Main St, Newington, CT 06111. E-mail submittals are welcome to **smansfield@arrl.org** with the subject line "ANTENNAS".

In declining last fall to act on the ARRL's initial request to expand PRB-1, the FCC drew the line at proposing specific rule changes to bring private restrictive covenants under the PRB-1 umbrella . In asking the FCC to rethink the issue earlier this year, the League said the FCC's disclaimer "is no longer a valid premise" and no longer accurately reflects FCC jurisdiction over private land use regulations. Different treatment in the past was attributed to the fact that the FCC—at the time PRB-1 was promulgated in 1985—believed it did not have the jurisdiction to preempt private land use regulations.

Since then, the ARRL has pointed out, the FCC has made it clear that it has Congressional authority to prohibit restrictive covenants that could keep property owners and even renters from installing antennas to receive TV, satellite and similar signals. The League asserts the same principle applies to Amateur Radio, in which the FCC has said it has a "strong federal interest."

The problem of restrictive covenants has been exacerbated in recent years as planned developments have drawn new residents from among the growing number of retired hams, who then learn they may not install a tower or outside antenna of any type. The League's Regulatory Information Branch reports that the topic of restrictive covenants and antennas is one of the most frequently raised by members contacting the ARRL for information.

Amateur Spectrum Protection Act Update

Congress was scheduled to adjourn the first week of October, and as we went to press the Amateur Radio Spectrum Protection Act (HR.783 and S.2183) had not made it to the floor of either chamber. Even so, the bills had garnered two new cosponsors. The Senate bill's cosponsor list was boosted to 11 with the addition of Senator Max Baucus (D-MT), and the House bill was up to 162 with the addition of Representative Jerry Moran (R-KS-1st). While cosponsorship has no direct bearing on the passage of a bill, it does indicate the cosponsor's general support of the legislation should it ever come up for a vote.

Both HR.783 and S.2183 would require the FCC to provide "equivalent replacement spectrum" should it ever need to reallocate any Amateur Radio frequencies to another service. Congressman Michael Bilirakis (R-FL-9th) introduced HR.783 and Senator Michael Crapo (R-ID) introduced S.2183. Both bills were bipartisan and noncontroversial, but were overshadowed by a few very large pieces of legislation that occupied the House and Senate Commerce Committees. These committees must sign-off on telecommunications bills before they are sent to the floor. For information on other House and Senate cosponsors, see last month's DC Currents column (September 2000 *QST*, p. 15).

CONTROVERSIAL PROGRAM ATTRACTS APPLICANTS

Despite all the controversy over Low Power FM broadcast licenses, the FCC reports that, at the end of the first filing period in June, it had received nearly 800 applications in the first ten states. The commission is now in the process of accepting applications from an additional ten states plus Puerto Rico. Applicants from more groups of states will be eligible in November of this year and February and March of next year. The concept of Low Power FM Broadcast Licenses has been a political hot potato on Capitol Hill because of the stiff opposition mounted by the National Association of Broadcasters, which believes the new service represents a significant potential for interference to existing FM broadcasters. Senate Commerce Committee Chairman (and former Presidential candidate) John McCain (R-AZ) has joined forces with Senator Bob Kerry (D-NE) to try to pave the way for low power broadcasters by introducing legislation (S.2989) that would allow the FCC to take rapid action to correct interference problems from the new service.

FCC Reports on Growth of Wireless Industry

• According to the Federal Communications Commission, commercial mobile radio services, including wireless telephones, mobile data and dispatch, are growing significantly, and the growth has helped drive down prices and create more competition. The FCC says that the fastest growing sector, mobile telephone, grew to 86 million subscribers in 1999, and the majority of the U.S. population has access to at least three service providers. Mobile telephony generated over $40 billion in revenues. (These figures tend to agree, by the way, with figures compiled by the industry itself through the Cellular Telecommunications Industry Association, which includes a mountain of interesting data on its web site: **http://ctia.wow-com.com/wirelesssurvey/**). Mobile data services, by contrast, are still in their infancy, although the FCC report suggests that once Third Generation technologies are introduced to the market, permitting mobile access to high speed internet and video, the sector is likely to see rapid proliferation of new service providers. The dispatch service sector, the FCC says, is beginning to compete a bit with mobile voice services.

The FCC has also issued a report on public safety communications that suggests that some change may be coming to help public safety agencies communicate among themselves. In a Notice of Proposed Rulemaking (FCC 00-271) the Commission asked for comments on how to develop standards for interoperability and discussed the formation of Regional Planning Committees to help improve interoperability among states.

Congress Continues To Explore Spectrum Issues

Even though they haven't done much with them lately, Congress can hardly be accused of not wanting to learn all it can about spectrum issues. This is especially evident after the last round of hearings on the so-called "spectrum cap" on the availability of frequencies for wireless service providers, and on the continuing rollout of high definition television (HDTV). The House Telecommunications Subcommittee heard from a range of players from both emerging marketplaces.

Under current FCC rules, PCS, cellular and SMR services can acquire radio frequency licenses that do not exceed 45 MHz in a given license area. This amounts to a "spectrum cap" that many who testified before the Subcommittee said was stifling competition and new technological development, particularly for the emerging "Third Generation (3G)" systems.

In a hearing in late July, Craig Smith, Vice President of SBC Communications, said that implementing 3G will require "new spectrum on par with and potentially surpassing the bandwidth" secured for today's first and second generation systems.

NTIA's Greg Rohde told lawmakers that the envisioned 3G systems "represent a path for the evolution of existing cellular and personal communications services" and suggested that revenues from the new service could top $100 billion by the year 2007.

Rudy Baca of the Precursor Group, testified that there exists now, and for the foreseeable future in the US, chronic spectrum shortages. He urged a streamlining of the spectrum identification, allocation and licensing process in order to keep the nation competitive in worldwide markets that are likely to be part of the emerging 3G type technologies.

The Subcommittee also heard from Dennis F. Strigl, President of Verizon Wireless, Malcolm Lee, of the State Department, Tom Sugrue, Chief of the FCC's Wireless Bureau, and Mark Kelley of Leap Communications International.

Later the same month, the Subcommittee revisited the spectrum classroom to learn more about the spectrum issues and requirements of the new HDTV systems.

FCC's Chief of Engineering and Technology, Dale Hatfield, who has become a well-known figure recently in Congressional hearings on spectrum, told the Subcommittee that "a successful transition of television broadcasting from analog to digital will free up spectrum for other uses." He went on to predict that the introduction of digital TV could "revitalize" the broadcasting industry because of the "greater robustness" of digital signals, the capability for error correction, the ease of encryption, the ability to take advantage of increasing computer power, and the ease of multiplexing signals and services.

However, one of the bones of contention over the new digitally based HDTV service is whether or not the current digital standards are sufficient to support the rapid introduction of the service. Richard M. Lewis, Vice President of Zenith Electronics, said that calls for changing the existing standards are unfounded, and said that a new standard would delay implementation of DTV significantly.

Gary Chapman, President of LIN Television, testified that, despite some perceived bugs in the standards, the industry feels an obligation to get the DTV system up and running quickly. Chapman predicted that, when DTV is fully operational, it will make possible "uses of television signals that were not possible with analog transmissions. It is possible to deliver, for example, one or more high definition program streams on a single channel or several program streams with data or interactive capabilities. The data content could be supplemental information about programs (such as deeper background on the news or sports statistics), Internet content, or other data developed either by the station or by a third-party content provider."

Many in Congress hope that Chapman is right, because many of the future plans mandated by Congress involve auctions of the so called "analog" spectrum to be returned by broadcasters who have successfully made the transition to digital.

Media Hits

• After all the Field Day results were in, it turned out that, as usual, the event generated a colossal number of newspaper clippings. According to Dan Henderson, the ARRL Contest Branch Manager, this year's crop may actually have exceeded 1500 clippings, a boon for Amateur Radio publicity.

• Among the good clips (selected at random) was a story in the *San Angelo Standard-Times* featuring Texas hams Glenn Miller, AA5PK, Marcus Bilstrap, KK5YZ, David Wolfe, KA5VTG and others. The story included a nice plug for SKYWARN.

• A Field Day story in the Ft. Lauderdale, Florida *Sun-Sentinel* featured Lenny Kainen, N4UHK, Len Wollman, N4JYG and Bob Young, KC4KME. The story focused on emergency communication with the local American Red Cross chapter, as well as ham radio involvement with the Military Affiliate Radio System (MARS).

• Members of the Santa Cruz County (California) Amateur Radio Club were mentioned in a story in the *Santa Cruz Sentinel*. Those mentioned included Charles Pennell, KE6AFE, Tom Ginsburg, K6TG and Tom Guyer, KG6AO.

• It wasn't Field Day, but it was a great story for the Manatee, Florida Amateur Radio Club, which was featured in the *Bradenton Herald*. Readers learned of club activities and how to get involved, and some of the steps necessary to get a ham license. The story included club members Frank Morton, AC4MK, Allen Turck, KE4MPQ and Bill Fort, KE4NCQ.

Correction:

The bottom line of an article on "Driving While Cellular" in last month's DC Currents concluded that a Bucks County, PA judge ruled that a local ordinance "pre-empted" the state motor vehicle code. It was supposed to read, "was pre-empted by" the state motor vehicle code.

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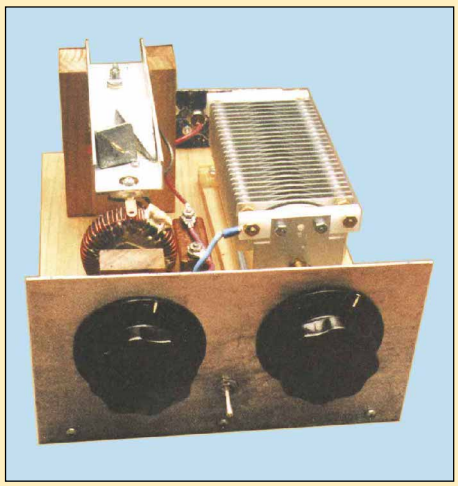
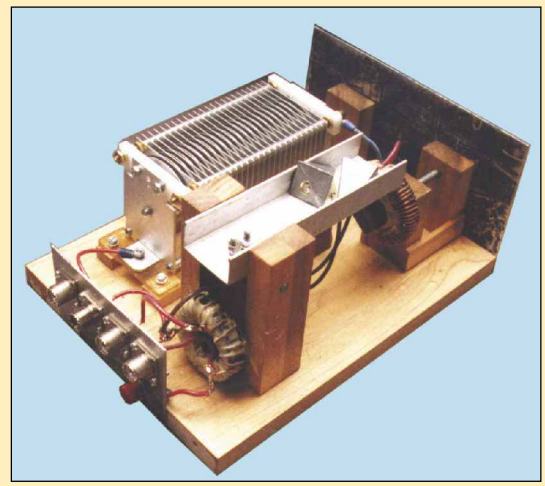
UP FRONT IN QST

Some hams sell their surplus parts at fleamarkets. Others create Halloween art! Ron, K9ZE, put together this "pumpkin station," complete with a "pumpkin tuner." Ron admits that the idea for this unusual scene came from his wife Susan, AA9MO.

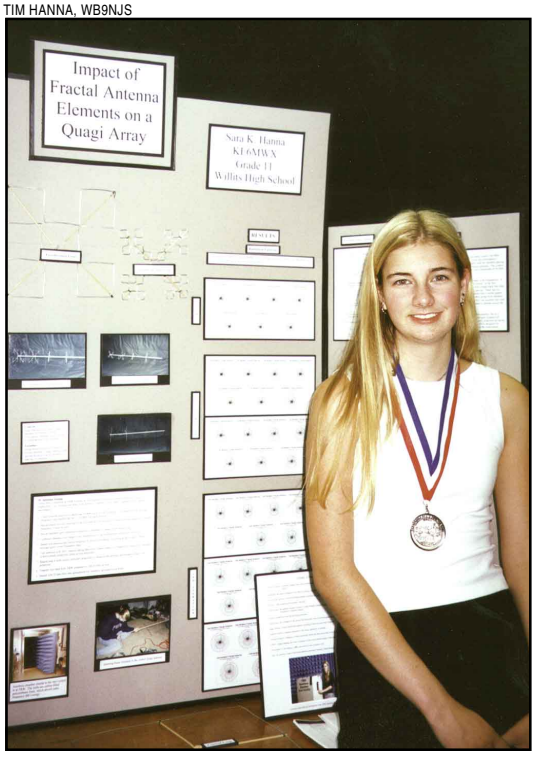
Aeronautical APRS. The window may be small, but with 30,000 feet of elevation, this H-T and GPS receiver combo is a high-performance Automatic Position Reporting System (APRS) station. Anson, N9RJX, had a unique opportunity for high-flying APRS while traveling in a fellow ham's business jet to the 2000 Dayton Hamvention last May.



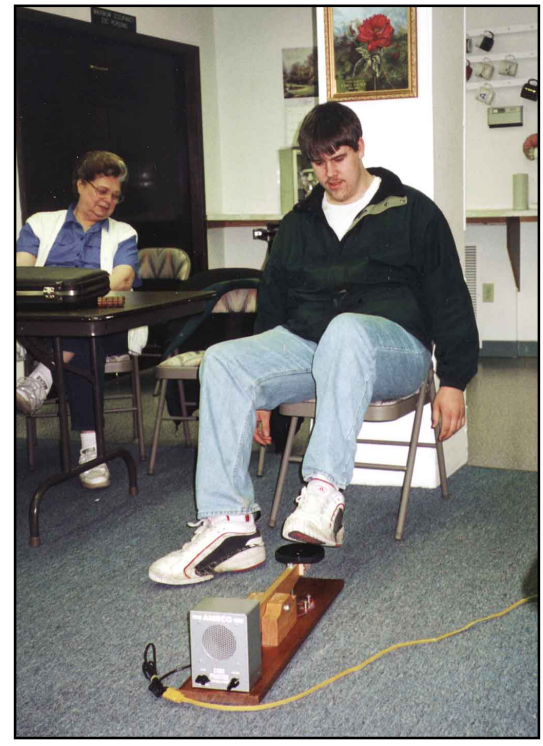


"Old Jim" Speer, W5PI, of Washington, North Carolina, has been working in wood most of his long life. So, it makes sense that he would craft this beautiful antenna tuner primarily out of wood components. Jim uses the tuner with his 84-foot dipole, which is center fed with 300-Ω transmission line.

TIM HANNA, WB9NJS



Science fair silver medallist. Sara, KE6MWX, won the silver medal at the 2000 California State Science Fair in the Electricity and Electronics Division for her fractal quagi antenna study.



The Issaquah Amateur Radio Club of Bellevue, Washington does its best to "stamp out" Morse code—so to speak. At club's April 5, 2000 meeting, every member took a turn at the CW "foot key." Even Peter, KC7UID, managed to hammer out a message with his size-14 shoes.

Mother Nature apparently had a disagreement with Howard, K2HK, concerning his tower (left). Her solution was to send a tornado to visit the site!

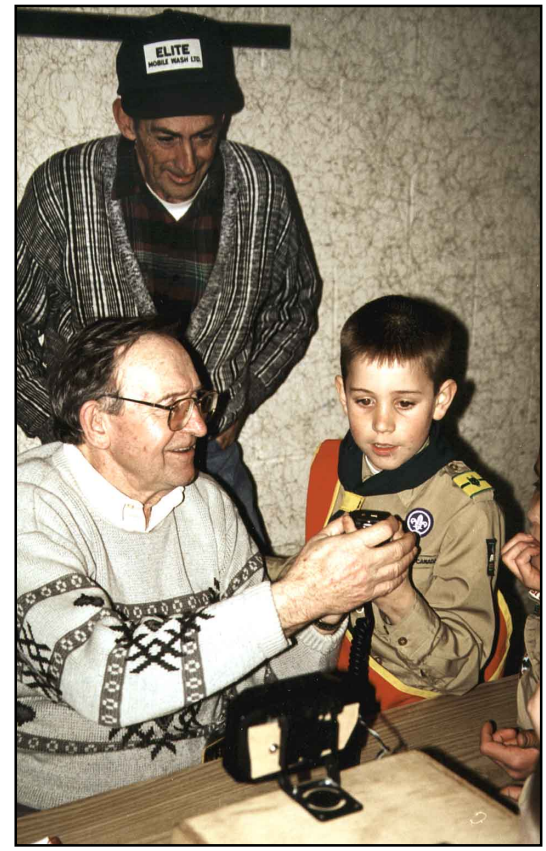
South of the border "estacion." Luis, XE1CRM, has assembled this impressive station at his home in Mexico City. Luis enjoys collecting vintage gear and his pride and joy are the Hammarlund SP-600 receiver and Multi-Elmac transmitter that are visible to the left of his computer monitor.

Jamboree On The Air ◆ October 21-22, 2000!

Every October Boy and Girl Scouts throughout the world take to the airwaves for the Jamboree On The Air, better known as JOTA. You don't have to be a Scout to participate, though. Just make your station available to show visiting Scouts the joys of Amateur Radio. See the article by Jean Wolfgang, WB3IOS, in last month's *QST*, or get on the Web and go to **http://www.arrl.org/ead/#scout**.

Kenneth, KC5VUS, introduces Cub Scouts to the excitement of 20 meters.

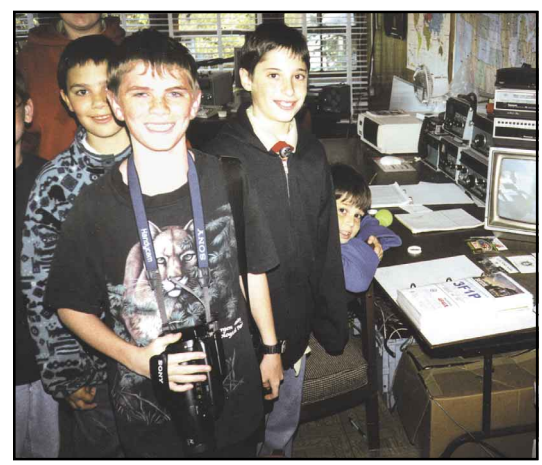
Allan Cameron, N7UJJ, puts Girl Scout Erin Dow on the microphone at Hayden Community High School in Phoenix, Arizona.



Les, VE3ALP (left), cures a case of mike fright in a young Scout while the boy's grandfather looks on.

BERNIE FULLER, N3EFN

Scouts are about more than just JOTA. Members of the Boy Scouts of America Venture Crew 828 set up a fascinating display at last July's Baltimore Radio Amateur Television Society (BRATS) hamfest. The crew, dedicated exclusively to Amateur Radio, has its own VHF/UHF repeater and is active on ATV using homebrewed gear. Starting far left (back row): Ben Taylor, KB3DAE; Tim Leyhe, N3ZSU; Carl Schlick, KA3UPR, crew advisor. In front, left to right: Ryan Wilder, Alex Christ, KB3BZA.



At station KB3OY on the Ockanickon Scout Reservation in Pipersville, Pennsylvania, Scouts are exposed to many facets of Amateur Radio from ATV (above) to QRP (left).

MOBILE DX MASTER

Since its introduction over a year ago, Yaesu's FT-100 HF/VHF/UHF Transceiver has been widely acclaimed for its outstanding performance and flexibility. Now the FT-100D builds on this success story, adding the convenience of factory-installed modules for today's Ham on the go!

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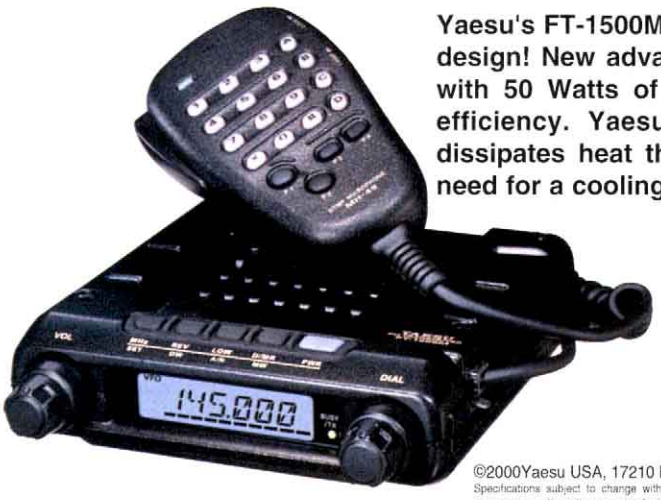

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FT-1500M

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A MISSED OPPORTUNITY?

♦ While hiking in the local mountains I got my H-T out of the car and was able to hit a repeater miles away, in spite of the fact that rocks and mountain outcroppings surrounded me. A fellow nonham hiker expressed interest in my "high-power walkie-talkie." He wanted one that he could use for emergency communication during long hiking expeditions.

When I pointed out that 5 W was about all you could get out of any amateur H-T, and that the repeater did most of the work, he became even more curious about Amateur Radio. His intent was not, like many hams, to tinker, modify, or re-engineer products, but rather simply to have a reliable form of emergency communication.

I'm wondering if the ham community has missed an excellent opportunity by not allying with the outdoor recreation folks? Yes, the amateur equipment manufacturers often run ads in *QST* showing H-Ts in use in outdoor settings, but who besides *QST* readers see them?

This idea may ellicit a groan from many hams, but maybe the availability of the codeless Technician class license ought to be made known to those who frequent such places as REI, Sports Chalet and other large chain sporting goods stores. Who knows, there may be many hikers, boaters, climbers and bike riders out there who might very well be interested in becoming hams. It might be just what we need.—*John R. Powell, KF6EOJ, Downey, California*

"STEALTH" ANTENNAS

♦ The "Doctor Is IN" column in the July *QST* discussed the idea of running a thin antenna wire out a hotel window in order to operate HF QRP when traveling. That reminded me of a story involving a ham friend of mine that occurred many years ago. His occupation at the time required a lot of travel, and being an avid ham and wanting to keep in touch with ham friends back home, he took an HF rig with him on the road. He also took along a variety of antennas that he could use depending upon the particular hotel in which he was staying.

One night when he was in Baltimore, and I was at home in southern California, we had a sked on 20 meters. He had, as the "Doctor" suggested, dropped a thin wire down the side of the hotel from his room on an upper floor. In the middle of the QSO, while he was talking, I could hear a knock in the background and he told me to stand by while he answered the door. Minutes turned to almost an hour and he never came back on frequency. Finally, my phone rang. It was my ham buddy calling from Baltimore, saying that the knock at the door was from a couple of US Secret Service Agents who were extremely concerned about the wire emanating from my friend's room. They had noticed it as it flapped against the window of the room occupied by the President of the United States who was staying in the same hotel on a lower floor. Fortunately, my ham friend was well known in political circles, the agents recognized him, and after he explained why the wire was out the window they let him go with the understanding that there would be no more "stealth" antennas used while the President was in residence!—*Jerry Boyd, K6BZ, Ono, California*

THANKS!

♦ Just a brief note to say "Thanks" to every operator who contacted WB5WOU on 15 and 6 meters this past Field Day. The operator—my grandson—was a newbie to the ham fraternity, and you will never know how you made his day! Your patience and encouragement went far beyond anything I could even dream of.

Coy, age 13, contacted nine states and Canada! A total of seventeen contacts may not seem like much, but his feet still haven't hit the ground.—*Ed Ciecierski, WB5WOU, Azle, Texas*

SPECIAL RECOGNITION FOR SPECIAL MODES

♦ I read with interest Wiley Traylor, AA5FA's recent letter concerning preservation of the CW sub bands. I normally participate annually in Straight Key Night, and have an interest in nostalgia radio, operating vintage radios from the '50s and '60s. I also enjoy using somewhat outdated modes such as AM and RTTY.

As the League considers issues associated with the changing times, I would suggest not only providing band plans, but also operating events that recognize and encourage the use of modes of historical significance.

In addition to AA5FA's proposal to preserve the first 75 kHz of each band for CW, I would suggest further dividing the CW segment into slow-speed, mid-speed, and high-speed segments. Whether these segments are associated with a particular license class is a separate issue. But from a band planning point of view, it does seem helpful to guide new hams to the higher portion of the CW segments, since their call sign will no longer indicate their level of experience. Likewise, I believe it helpful to recognize that high-speed CW operators populate the lowest CW frequencies of each band.

Finally, just as we have a Straight Key Night, it might be a good idea to sponsor a similar night for AM operations on the 160- and 10-meter bands. Both bands have plenty of unused spectrum that could be used to support such an event. And both bands have active AM populations. I leave it to others to propose similar events for other modes.—*Terrence R. Redding, W6LMJ, West Palm Beach, Florida*

AMATEUR RADIO ALIVE AND WELL

♦ I have been hearing of the death of Amateur Radio due to the Internet, lack of interest, ease of licensing and so forth. The death of Amateur Radio seemed evident in the shack of WA1GJF. It was the same-old same-old. The boredom gradually pushed me away. Almost gone, almost forgotten. Wait! Along comes the March 2000 issue of *QST*. QRP in a tuna can? Build a kit again? Where's the soldering pencil? Do I still have one? Fifteen bucks later, I'm on CW again! Wow, I remember the code! Maybe there's life in the hobby yet.

Then the April issue arrives. SSTV? With nothing needed but a computer and the dusty Yaesu, I'm on the air sending pictures! Is the Internet destroying Amateur radio? No way! It gives me shareware to use SSTV for the first time!

The hobby is starting to have a pulse again. This is getting interesting. Even my wife likes SSTV.

Then the May issue arrives. What is WB8IMY talking about now? PSK31? Waterfalls on my computer screen with signals from places I never worked on sideband. Again, the Internet supplies the software and I'm on to something new. No money spent, no noise to bother others in the room while I talk with hams all over. Thirty days later the June *QST* brings a nifty little QRP PSK-31 transceiver!

The patient has recovered. The prognosis is excellent. The cure is contagious. Amateur Radio as I knew it was dead—and I won't miss it. The new one is much

healthier, and will be around for many years to come.—*Leeds Mitchell, WA1GJF, Barrington, Rhode Island*

SETI IS NOT AMATEUR RADIO

♦ I read the letter by W8QDX in the July "Correspondence" concerning the idea of incorporating the Search for Extraterrestrial Intelligence (SETI) into Amateur Radio. Bunk, bunk and double bunk! Searching for little green men, whether they exist or not, is fine science, but it sure ain't ham radio.

I got into Amateur Radio in the late '50s, mainly by taking apart old radios and opening parts, including tubes, to see what made them tick. Then I began listening to shortwave, and when I accidentally "built" a 40-meter receiver converter out of stray 300-Ω twinlead, I discovered the "romance" of Amateur Radio.

I can understand the appeal of SETI, and EME and other exotica, but there is little romance in computer chips, FETs, digipeaters, $4000 rigs and components you can hardly see, let alone get your hands on.

There *is* romance and glamour in prowling the neighborhood with an H-T, "dropping in" on repeaters while traveling and playing with the still-not-dead-yet tube rigs. There *is* romance in snatching a signal from Venice on a piece of wire hanging in a tree in your backyard, and getting a response from him.

I don't really like to chat with machines. I prefer to cruise the bands searching for ILOE (Intelligent Life On Earth). I remember all the grand times I had as a kid just chatting on a Friday night on 15 meters, a blanket over my head to shield the light from prying eyes.

Not everyone wants to merely listen. Not everyone wants to remain anonymous. The idea of actually talking to a person through the little box on your table or in your hand ought to offer all the glamour and romance needed to keep the hobby going—as long as it can be presented as a grand and glorious thing to do in and of itself. Later, you can add the public service rescue thrills (being the only source of communication in a disaster), the telemetry, the GaAsFETs, hamfests, Tesla coils, Jacob's Ladders, bells, whistles, snaps, crackles and pops.

But—

Ham radio is *not* remote-controlled toys, moon measurements, scatter signal studies and so forth. Perhaps it can incorporate these things in some fashion, but the *essence* of Amateur Radio is personal communication between human beings. Let's not lose sight of this fact.—*Lenny Kadner, WB2GFN, Middletown, New York*

PUTTING OLD QSTs TO GOOD USE

♦ In spreading the word about the Amateur Radio hobby, there are many ways in which to reach out to the unknowing. One way we here in Austin, Texas are helping to spread the word is by dispersing the old *QST* magazines that many of us have stored.

We print 1 × 3-inch computer labels and indicate on the labels that "This publication was placed here by the Austin Amateur Radio Club and the Austin Repeater Organization" and include contact information (our Web URL and a telephone number). After applying the label to the front covers, we then distribute these magazines at the club meetings for all members to take and leave in prominent "waiting areas," such as doctor's offices, auto repair shops, barber/beauty shops, or anywhere someone might pick them up and learn a little about the hobby.

It's too early to determine how many new hams or club members we've gained in this fashion, but at least someone out there is more aware of the hobby we so dearly love. Who knows what the results might be if we all did this across the nation? At least the uninformed would be better informed.—*Roger Wines, W5WIA, Austin Texas*

FELLOWSHIP IN ACTION

♦ Since 1979, I've been an active Amateur Radio DXer. Recently I discovered that my tower and antennas, installed in 1982, were in need of repair. At my age, scaling the tower was no longer an option. Fortunately, Ed Hare, W1RFI and Mike Tracy, KC1SX, at ARRL Headquarters gave excellent advice and my friends took it from there. My old Tailtwister rotator was replaced with a temporary Ham-4 by the team of Kant Shashi, KB1DWN, Harv Boverman, K1PZS and Don Wilson, K1IN.

Everything was fine until a nasty audio problem developed last summer. W1RFI and KC1SX intervened again and diagnosed a ground loop. My friends came to the rescue again. Frank Cooper, W3NV and Walter Sevig, K9FEL, who were both visiting families in my area, stopped by and installed new ground rods for the tower legs and an outside ground replacing the older, corroded rods. Leon Goolsby, KB1CQ, pitched in with the copper wire necessary to hook everything together.

It wasn't long before K1IN and K1PZS were back on the scene to connect the new ground wire and replace all the ground straps needed for the rigs and accessories that probably caused the ground loop in the first place. Finally, on August 5, K1IN climbed my tower once again and reinstalled my newly repaired Tailtwister rotator.

All is more than well. My transmit audio is clean and I'm back in the DX game. Had it not been for the assistance of friends, I may not have been able to return to the air at all. This is just one example of what sets Amateur Radio apart from almost any other avocation. Our strength is in our fellowship. May it always be so.—*Paul R. Shafer, KB1BE, Bloomfield, Connecticut* QST

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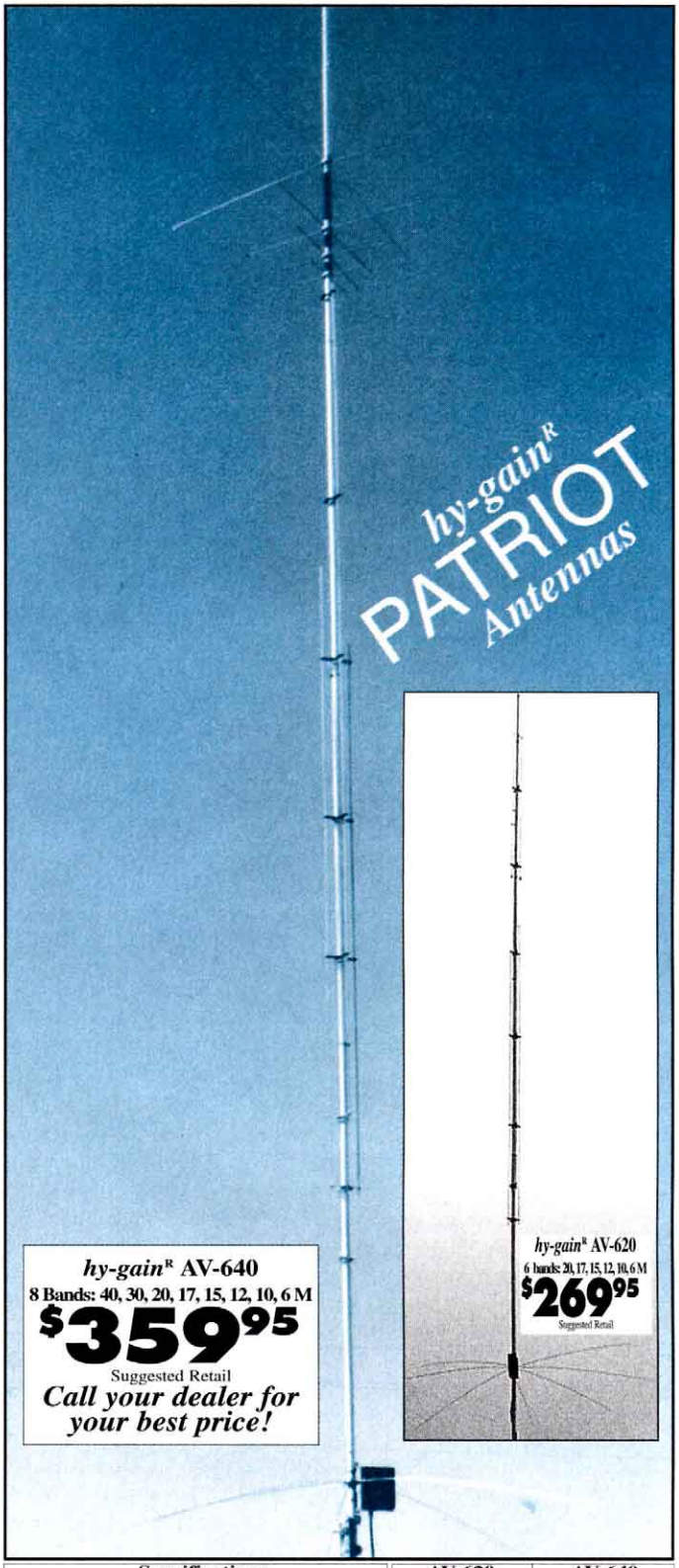

Specifications	AV-620	AV-640
Bands covered (meters)	6,10,12, 15,17,20	6,10,12,15, 17,20,30,40
2:1 VSWR Bandwidth (KHz)		
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30M	N/A	175
20M	500	500
17M	500	500
15M	500	500
12M	500	500
10M	1500	1500
6M	2000	1500
VSWR at resonance (typical)	1.5:1	1.5:1
Power handling (watts output) key down 2 minutes	1500	1500
Vertical radiation angle (degrees)	17	17
Horizontal radiation angle (degrees)	360	360
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9914	.403	PVC	90	1.0	2.1	3.8	8.7
RG-214	.425	PVC-IIA	60	1.2	2.8	5.1	13.7
RG-213	.405	PVC-IIA	40	1.2	2.8	5.1	13.7
LMR® 240	**.240**	**Black PE**	**90**	**1.3**	**3.0**	**5.2**	**12.7**
RG-8/X	.242	PVC	40	2.0	4.5	8.1	21.6
LMR® 200	**.195**	**Black PE**	**90**	**1.8**	**3.9**	**6.9**	**16.5**
LMR® 195	**.195**	**Black PE**	**90**	**2.0**	**4.4**	**7.7**	**18.6**
RG-58	.195	PVC-IIA	40	2.5	6.1	10.4	35.0
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RG-174	.110	PVC-IIA	40	5.5	13.0	25.0	75.0

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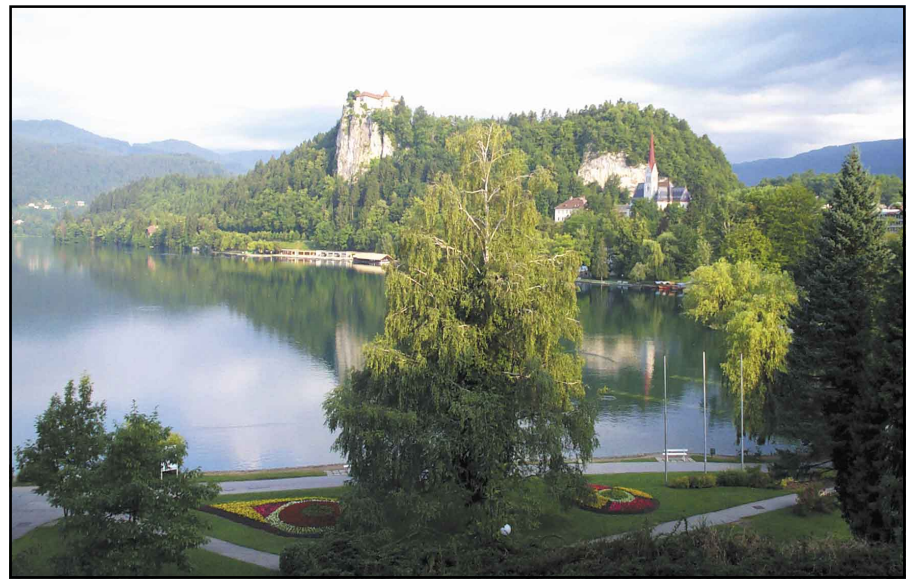
By David Sumner, K1ZZ

WRTC-2000: A Test of Teamwork in "The Green Piece of Europe"

A headline in last month's "Happenings" column carried the news: "WRTC Champs K1TO, N5TJ Do It Again in Slovenia." Competing on as level a playing field as has ever been devised for an international Amateur Radio operating event, Americans Dan Street and Jeff Steinman came out on top of a 53-team field in the World Radiosport Team Championship, held in the breathtakingly beautiful European country of Slovenia—"The Green Piece of Europe"—on the weekend of July 8-9.

Dan and Jeff's performance was a reprise of the previous WRTC, held in the San Francisco area in 1996. Not only did they win again, they did so again by a margin that put their #1 ranking in the world of Amateur Radio contesting beyond any question.



Lake Bled provided a fairy-tale setting for WRTC-2000.

What is WRTC?

The World Radiosport Team Championship is the worldwide contesting community's attempt to bring the finest operators in the world together to answer the perennial question: Who is *really* the best? In radio contests, differences caused by geography and station performance can override differences in operator skill. The WRTC concept is to neutralize the factors of geography and station performance to the greatest extent possible, so that operator skill becomes the principal variable. However, those who attended the first WRTC, in Seattle in 1990, discovered that the desire to compete that had brought them together became secondary to the sharing of their enthusiasm with like-minded people from other countries and cultures. That experience was duplicated in San Francisco and again in Slovenia.

Why Slovenia? Why Not?

This year's was the third WRTC and the first to be held outside the United States. Organized by the Slovenia Contest Club (SCC), WRTC-2000 was the most ambitious yet. The 13-member Organizing Committee accepted the challenge of finding and securing access to 53 hilltop or mountaintop locations, arranging for power and shelter if these were not already available, and installing 53 identical antenna systems (small Italian tribanders and Windom antennas, mounted about 40 feet above the ground). They shouldered the responsibility for hosting 106 competitors, 60 referees, and dozens of visitors who came to Slovenia just to be a part of the event. They wrote the rules for team selection and for the competition itself, distributed frequent communiques by electronic mail over a two-year period leading up to the event, and even responded to a late request from competitors by designing and building 53 special antenna switches to facilitate band-changing. They even arranged for the issuance of a commemorative postage stamp!

While the SCC assumed the overall burden, it would be unfair not to mention the support provided by radio clubs throughout the country. WRTC-2000 was a national undertaking for the radio amateurs of Slovenia. A former republic of Yugoslavia that became independent in 1991, Slovenia is about the size of New Jersey and has a population of a little less than two million, 7000 radio amateurs and 100 radio clubs of the national Amateur Radio society, Zveze Radioamaterjev Slovenije (ZRS). (The commemorative postage stamp was issued in part to mark the 50th anniversary of the

founding of ZRS.) A number of clubs loaned operating sites for the WRTC, in some cases stripping their regular antenna systems from towers so that the special WRTC antennas could be installed in their place.

Rules

Providing sites for 53 stations and 106 competitors was a massive undertaking, but many more contesters would have come to compete if there had been more spaces available. Some selection process was necessary. Slots were assigned to different European countries and to the other areas of the world based on the number of active contest operators in each. In the United States, which has the largest population of contest operators, each major contest club got to select a team member who then got to select a partner from another club. In addition, some "wild card" slots were filled based on individual performance in the most competitive international contests. In all, about 35 countries were represented by WRTC participants.

As in 1996, WRTC-2000 was a contest within a contest. It coincided with the IARU HF World Championship, a 24-hour dual-mode (phone and CW) event. However, WRTC stations were limited to 20 hours of operating time to provide an opportunity to take time off in the event of thunderstorms (a fortunate provision, as it turned out). No operation on 160 meters was allowed. Each team consisted of two operators. Two radios were in operation at each station, but the second could be used only for receiving. The usual limits on frequent band changes did not apply to WRTC stations; part of the challenge was to see how effectively the two operators could work together in using the second receiver to maximize their score. Transmitter power was limited to 100 W output. One computer was used at each station for logging and could be used to key the transmitter, but not for other control purposes.

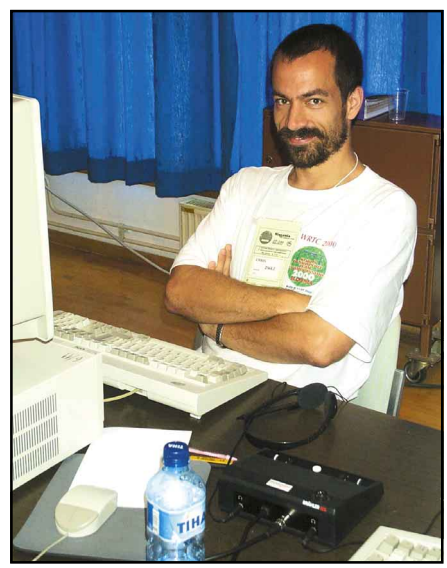
In most contests, each contact is worth a certain number of points (which may vary) and contact points are multiplied by the number of different geographic or other entities worked on each band, which are therefore called multipliers, to determine the total score. In the IARU HF World Championship, the multipliers are ITU zones and headquarters stations of IARU member-societies.

To give the WRTC-2000 competitors more to do, multipliers were counted separately on each band *and mode*. However, even though they were called multipliers they were not multiplied by the contact points to determine the WRTC score. Instead, there was a theoretical maximum score of 1000 points. The team with the highest score in a "pile-up simulation" test, held before the on-the-air operating event, was awarded 100 points. The teams with the greatest number of CW contacts, phone contacts, and multipliers were each awarded 300 points. The scores of the other teams were scaled accordingly. For example, if the team with the largest number of phone contacts had 900 contacts and your team had 600 phone contacts ($^2/_3$ of the top score), your team would receive 200 points ($^2/_3$ of the maximum of 300) for that part of the competition. To score well, a team had to balance its operating time between the two modes and to find multipliers while maintaining a high contact rate.

Referee 9A2AA (left) keeps tabs on G3SXW and G4BUO at S568Y.

The WRTC Experience

In all there are at least 300 people who shared the WRTC experience, so there are that many different perspectives of the event. Mine was that of chief referee, a post I was asked to fill by my longtime friend and Organizing Committee President Tine Brajnik, S50A. My wife Linda, KA1ZD, and I arrived in Slovenia on Tuesday, July 4. Driving into Bled, the lakeside mountain resort community that was to serve as WRTC headquarters, we were welcomed by roadside signs and overhead banners publicizing the event. WRTC was no secret: Everyone in town knew we were coming. At the registration site we immediately spotted the familiar faces of many old friends, and familiar call signs on badges of new friends who we had worked many times on the air but hadn't previously met.



Chris, ZS6EZ, radiates confidence before the start of the pile-up simulation.

The next morning, Wednesday, several of us had the special treat of conducting inspections of some of the sites from which WRTC operations would take place. What made it special was that transportation was by Slovenian Army helicopter! Slovenia is an exceptionally picturesque country from ground level and is simply spectacular from the air. Landing on top of a 4000-foot mountain is an exhilarating experience if you've never done it before. The inspections included a visit to the short but beautiful Slovenian coastline that runs between the border with Croatia and Trieste, Italy.

Back in Bled, a picnic that afternoon was the first official event followed by a meeting of referees to go over their duties. Each team was assigned a referee whose job it was to monitor the operation to ensure compliance with the rules. The teams were required to submit their logs on computer diskette to the referee within 15 minutes of the time they finished operating.

While the competitors were the highest caliber of operators, the same was also true of the referees. Some referees were former competitors who could have qualified to compete again, but who chose instead to let someone else have the opportunity.

Thursday morning the competitors met with Organizing Committee President Tine Brajnik, S50A, and Competition Director

It was cold last night! Referee N5KO (left) fills in visitors N6AA, K4VX, and S50A outside the mountaintop S512T shack.

The American winners display their trophies: #3 K1DG, #1 K1TO, chief referee K1ZZ, Organizing Committee president S50A, #1 N5TJ, and #3 K1AR.

Robert Kašca, S53R, to hear explanations of the rules and to ask any last-minute questions they might have. Most questions had been answered in advance thanks to an efficient e-mail reflector set up by Tack Kumagai, JE1CKA. In the afternoon the pile-up simulation tests were held. These consisted of listening to recordings of simulated CW and phone pile-ups—that is, many stations calling at once—and trying to copy as many as possible of the 100 or so call signs in each recording. If you think this sounds easy you should try it sometime! In fact, you can: the recordings used in Bled are available on the WRTC Web site at **http://wrtc2000.bit.si/**. One team member could participate in both simulations or they could split the responsibility—it was up to each team to decide for themselves.

The first official task of my team of seven "main referees"—which included N6AA, UA2FZ, S53R, S50R, K4VX, and JE1CKA—was to adjudicate the pile-up simulation tests. We soon knew that K1TO and N5TJ had jumped into an early lead, largely on the strength of Dan's exceptional CW copying ability, but we weren't allowed to tell anyone.

At this point, Lew Gordon, K4VX, along with his wife Terry, NS0Z, and Ward, N0AX, were keeping busy as ARRL Volunteer Examiners filling the demand for dozens of FCC license exams. The pass rate was pretty high—the Morse code and the technical questions were no problem for this group!

Thursday evening saw the official opening of WRTC-2000 at an Olympic-style ceremony in a modern version of a town square, presided over by the mayor of Bled. The teams were introduced by country and marched into the square carrying signs for their country; their national flags festooned the square.

On Friday morning everyone gathered for the drawing of call signs. The call signs assigned for WRTC use were very unusual, consisting of the national S5 prefix fol-

From a Tiny Seed—WRTC 1990

By H. Ward Silver, N0AX

Extended conversations with other contesters have a certain element of danger to them. One often winds up with a brand-new, exciting project. Many of the popular on-the-air events got their start in just that way—over a cold 807 in a hospitality suite or on a tablecloth at a pancake house.

The event that became WRTC-1990 was the brainchild of Danny, K7SS, plus the midwifery and encouragement of Steve, K7LXC; Bob, K3EST; Rusty, W6OAT; Adam, K7ST and myself. The general idea was, "Why not eliminate the geographical inequities of contesting by bringing the contesters together to compete?" Seattle was hosting the Goodwill Games in 1990, so it seemed a natural to piggyback onto them an international ham radio event.

A committee was formed from the Seattle contesting community and planning got underway in 1989. Remember that in those days, the most advanced form of communications available was the fax machine! No email, no cellular phones. Looking back, it seems like we were chipping out messages on stone tablets to be carried back and forth on donkeys.

The teams were invited by the organizing committee—we received an excellent response almost instantly from every corner of the globe. As it turned out, 22 teams were able to attend. Our first big get-together in the back yard at K7SS was delightful; many of these top operators had never met in person.

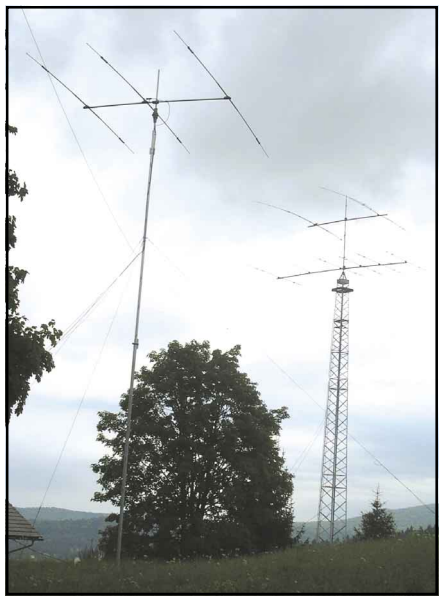
Interestingly, for several participants from the USSR, just then in the first flowerings of *perestroika,* this would be their first journey to the West. George, UA1DZ, for example, had even been forbidden to meet with foreigners at all just a few years before.

It was very difficult to arrange the licensing for so many foreign amateurs to use American call signs, which were randomly assigned from the pool of host stations in Seattle. This was not normal FCC procedure! The permission was really in doubt until just days before the contest when a Special Dispension was made by the FCC and a fax came through with the permission to go ahead.

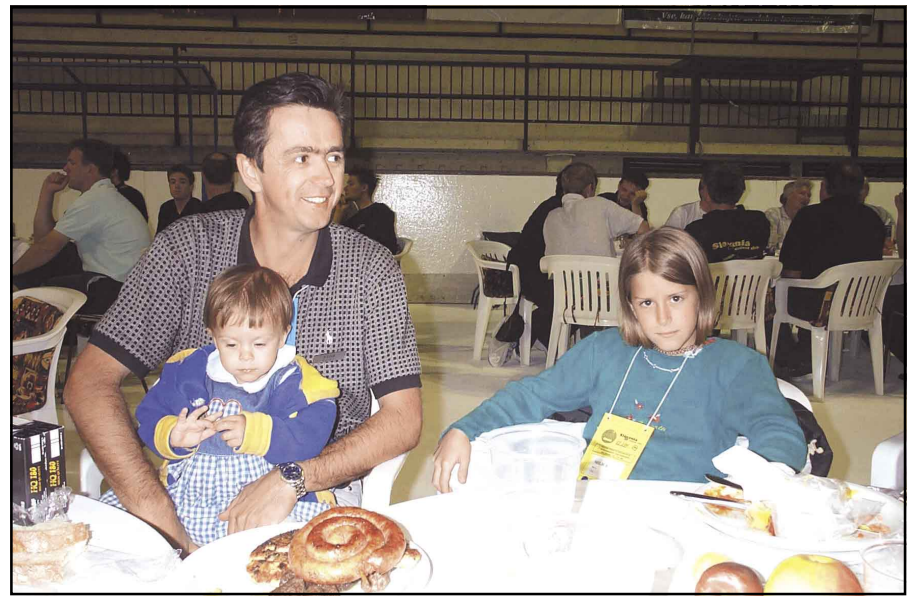
WRTC that year did not run coincident with the IARU HF Championship—it was a unique contest created just for that event. The committee had publicized it in the amateur press, but we had no idea if anyone other than the competitors would actually get on and operate. Once the opening bell rang, it was clear that those fears were groundless—QSO rates were great! The top stations made around 2000 QSOs and worked hams from every part of the globe. The contest ended with a spectacular over-the-pole midsummer's night opening to Europe. K1AR and K1DG brought home that first WRTC trophy.

Ham hospitality powered through and made the initial gathering a tremendous success. The operator teams were housed by individual families around the Puget Sound that provided transportation and entertainment. I took my team of UW9CA and UW9CN to a baseball game—a very strange sport to Yevgeny and Mikhail. Following the contest, everyone went to the Pacific Northwest DX Convention in Portland, Oregon, and a picnic in Olympia, the Washington state capital. When it became time to say goodbye, I can tell you that it was tough. Some lifetime friendships were formed that July.

So, the initial vision of WRTC lives on today, bigger and better than ever. The event is clearly gaining momentum and will be a mighty oak on the amateur scene for a long time. If you ever get a chance to attend, regardless of whether you're a competitor, take it! You'll be amazed at the energy you encounter, the friendships you'll make, and the good times you'll have. All this from the tiny acorn planted in Seattle a decade ago.



The regular station antennas at S59L in the background dwarf the WRTC tribander used by S539D.



WRTC-2000 was a family affair for many including referee Ranko, YT6A, from Montenegro. Ranko passed his FCC General Class exam and is now K3ZAX.

lowed by two more digits and one letter—for example, S511E, S522R, S584M, etc. They were selected so as to be nearly equal in length when sent on CW. Because they were so unusual, the complete list of 53 call signs was publicized in advance so operators in the IARU contest would know what to expect. However, no one—not even the referees— knew in advance which call signs were assigned to which operators. The assignments were made by random selection of the team members themselves who picked a sealed envelope with the call sign inside and handed it to their referee, who kept it sealed until five minutes before the start of the contest.

After the drawing the competitors headed with their referees and equipment to the station locations, which in some cases were several hours away. Slovenia is a small country but is very mountainous; getting from one place to another seldom involves going in a straight line. Station locations were spread all the way from the border with Hungary in the east to the Italian border in the west. Teams had the rest of Friday and Saturday morning to set up and check out their equipment, although in many cases there were also local parties held in their honor on Friday evening.

The contest began at 2 PM local time on Saturday. In some locations, thunderstorms were an immediate problem. Leo, S50R, Linda, KA1ZD, and I visited three sites Saturday afternoon and evening. The first was at the summer home of Leon, S59L, where the Belgian team of ON4WW and ON6TT were operating S539D. They had gotten off to a slow start: electrical power, normally very reliable in Slovenia, had been off just before the start and Leon had brought an emergency generator to use in case it didn't come back on in time. The storm had forced them to take their first hour of "off time" after just 8 minutes! When we arrived they were back on the air and unfazed by their bad luck; Mark and Peter ended up with the highest number of phone contacts.

Team Finland, OH1EH and OH1NOA, listen to final instructions.

Robert, S57AW, and Mario, S56A, ran the pile-up simulation (and much more).

Our next stop was at the home of Drago, S50Q, a few miles to the west of Leon's. Here, the Argentine team of LU7DW and LW9EUJ were operating S522R under the watchful eye of referee Tom Frenaye, K1KI. Drago had taken down his stacked 10-meter monobanders to make room for the WRTC tribander, but his stack of 15-meter monobanders on a second tower was impressive enough. Claudio and Martin were doing well in an unfamiliar environment; ultimately they achieved the highest score of any team from outside Europe, Russia, and North America.

It was getting dark and Linda was driving us down narrow, unfamiliar roads, but we had time for one more visit: To the summer home of Tine, S50A, and his wife Maca, S56MM. Tine was otherwise occupied, so Maca was hosting the British team of Roger, G3SXW, and Dave, G4BUO, along with referee Tom, 9A2AA. Roger and Dave's preference for CW was influencing their operating strategy, but they were clearly enjoying themselves. They might have wished they were using Tine's regular station antennas, which include 3-element beams for 80 and 40 meters at 130 feet!

Linda had a family commitment in Italy on Sunday, so I was invited to accompany Tine, Dick Norton, N6AA, and Lew, K4VX, on three more inspections. Our first trek took us to a genuine mountaintop, more than 1000 meters high, where the Lithuanian wild-card team of LY3BA and LY2BM were operating S512T from a

shack at the top of a ski lift. The ski lift was not operating, of course, but we could see snow that had fallen overnight on higher peaks nearby. Referee Trey Garlough, N5KO, told us it had been a pretty cold night on the mountain. The Lithuanians were intent on their operating and probably didn't know we were there. When the results were tabulated they were in a virtual dead heat with the other Lithuanian team, LY1DS and LY4AA, operating S524G.

Our second Sunday stop was just a couple of miles away as the crow flies, but we had neither crows nor helicopters to transport us so we had to drive back down the mountain, across the narrow valley through the interesting town of Idrija, and up the other side. Here we parked on the side of a hill at the bottom of a footpath that disappeared upward into the forest at about a 45-degree angle. Could this be the right place? After a climb of several hundred feet it turned out that it was: At the top of the hill was a tower with the now-familiar tribander and a cabin with the German wild-card team of Ben, DL6FBL, and Markus, DL1MFL, operating S511E. They were doing by far the best of any team we visited. Unfortunately, the diskette they turned over to referee Steve, HA0DU, at the end of the contest contained a truncated log file; the fruits of their last hour of operating were not on the disk. When the problem was discovered more than 24 hours later, the main referees had to make our most difficult decision of the week. We determined that under the rules, we could only accept the log as submitted at the end so we'd have a place to nap during the contest. We were served meals with the family and they brought in food while we were operating. Our experience was typical—except that our call sign, S5S, was the shortest and probably the worst that I can imagine inflicting upon a pair of CW enthusiasts. People would come by our run frequency, send "?" a couple of times just to hear us send our call, and then laugh at us. It was a great conversation topic at the closing event, though. Phil and I are still laughing about it.

There were many high points in the week of WRTC-2000. Pre-contest meetings were held with the organizers, competitors and judges to iron out last-minute rule changes. I was so impressed at how well the inevitable last-minute rule changes were handled. I remember the stress level I felt at that point in 1996, and I really appreciated how well our S5 colleagues handled the load of questions and little things that had to be taken care of.

After the contest, we all went on an excursion to an immense underground system of caves in Postojna. We took a quick little train for some minutes to get in and out of the caves. Because of the cold, several of us had rented green wool capes with hoods.

The final afternoon closing ceremony and evening dinner were the climax of the event. There were cameras everywhere. The winners were obviously elated and enjoyed the sincerely felt esteem of their peers.

After the closing ceremony we went back to the Ice Palace for a final meal together, lots of talk, great food and drink, more pictures, and more friends. Lane and his wife, our station hosts, drove up to Bled again to share in the festivities. Many of the station hosts were there to share the dinner with their teams. It was a very special time.

The world is smaller for us now. I'd never been to Slovenia, and I wasn't quite sure what to expect. What I found was a very pretty forested little European country. The food is great. The people are really friendly. And we've made some life-long friends. And that, for me, is what this hobby is about.

How WRTC has Grown!

By Dick Dievendorff, K6KR

The 1990 WRTC in Seattle (see the sidebar by N0AX) was a groundbreaking event and brought together for the first time contesters from both sides of the then existing Iron Curtain as well as a handful of prominent contesters from other countries.

When the Northern California Contest Club was given the opportunity to host WRTC-96, a handful of the club's officers joined forces to organize a somewhat larger effort. We received some guidance from our Seattle predecessors but decided to expand the format and made the contest our own. It was a great success but, given the great contestants, invited officials, host stations, sponsors, and guests, it couldn't have turned out any other way.

We were surprised at the size and commitment of the Slovenian contingent to the San Francisco WRTC. We'd all worked these guys in years of contests, and it was a delight to put faces to call signs. During one of the final parties a good number of the WRTC competitors were wearing badges with calls like S5/WN4KKN. The beverages flowed; wonderful pizzas were consumed by one and all; it was a great event. I remember thinking that "someday" I'd have to get to Slovenia.

WRTC-2000 offered the perfect excuse to realize my dream of finally visiting Slovenia, even though I wouldn't be officially involved in the event. My wife Laurene, bless her heart, was genuinely enthusiastic about becoming a tourist in Slovenia. She'd had a good time at WRTC-96 and was looking forward to meeting another great group of contesters again. She even passed her license exam in honor of the event!

So we made our way to Bled, knowing that we would have a great time. And we certainly did! Our colleagues learned from what went well at WRTC-96 and also from what could have gone better. These delightful people extended a tremendous effort to make us all welcome. The Slovenian Post Office issued a commemorative stamp. There were WRTC stories in the media and several of the teams gave interviews to television news shows. There were posters all over town. The hotels knew who we were.

At the formal opening the teams were introduced, in the style of the Olympic Games, country by country, each carrying their national sign. There were short speeches by the organizers, judges and Bled's mayor. There were demonstrations of folk dancing and jazz dancing. And when the WRTC-2000 president, Tine Brajnik, stepped up to talk with us, it took a while for the chants of "Tine! Tine! Tine!" to die down.

Many of the contestants had wonderful stories of special events as each town greeted "Our Team." There were parties, meals, outings, dancing, fireworks, plenty of time to swap lies, and some genuinely emotional moments. Despite some political difficulties in this area of the world, we saw numerous examples of individuals, sharing a love of amateur radio and a passion for contesting, seeking each other out for reunions and new friendships.

The organizers had even made arrangements for some of the non-competitors to "find a seat" and operate in the contest. Phil Goetz, N6ZZ, and I were offered an opportunity to operate at the home of Lane, S54AA, in Kranj. Lane and his wife gave up their bed

The Slovenian post office issued a WRTC commemorative stamp.

WRTC 2000 Results

See text for explanation of points. "Q" =QSOs; "% QSO" is the percentage of contacts removed for logging errors.

Place	OP1	OP2	Call	Score	On-Air	Pileup	Pts/CW	Pts/Ph	Pts/Mul	Q-CW	Q-Ph	Q-Total	Mult	%QSO
1	K1TO	N5TJ	S584M	965.31	865.31	100.00	300.00	299.37	265.94	1277	957	2234	367	-0.7
2	RA3AUU	RV1AW	S587N	910.86	830.33	80.53	253.48	276.85	300.00	1079	885	1964	414	-0.7
3	K1DG	K1AR	S582A	867.15	784.85	82.30	266.64	299.37	218.84	1135	957	2092	302	-1.4
4	DL1IAO	DL2MEH	S517W	866.10	779.37	86.73	244.09	269.34	265.94	1039	861	1900	367	-1.3
5	OH1EH	OH1NOA	S537L	846.15	757.65	88.50	236.57	265.28	255.80	1007	848	1855	353	-1.1
6	DL6FBL	DL1MFL	S511E***	845.19	766.43	78.76	192.87	284.67	288.89	821	910	1731	390	-1.0
7	UT4UZ	RW1AC	S523W	837.19	745.15	92.04	230.46	241.50	273.19	981	772	1753	377	-0.8
8	9A9A	9A3GW	S573O	825.02	747.14	77.88	210.02	294.37	242.75	894	941	1835	335	-1.3
9	KQ2M	W7WA	S519I	820.29	745.07	75.22	209.79	269.34	265.94	893	861	1754	367	-1.9
10	DL6RAI	OE2VEL	S533G	813.16	723.78	89.38	199.92	236.18	287.68	851	755	1606	397	-1.6
11	VE7ZO	VE3EJ	S581I	812.11	736.89	75.22	204.62	267.78	264.49	871	856	1727	365	-1.3
12	K6LA	K5ZD	S518N	808.71	715.79	92.92	214.02	243.07	258.70	911	777	1688	357	-1.2
13	K1ZM	N2NT	S531R	804.89	711.97	92.92	224.35	277.48	210.14	955	887	1842	290	-1.6
14	LY1DS	LY4AA	S524G	793.93	701.01	92.92	192.17	218.98	289.86	818	700	1518	400	-1.3
15	LY3BA	LY2BM	S512T	789.31	705.24	84.07	206.73	265.90	232.61	880	850	1730	321	-1.1
16	UT5UGR	UU2JZ	S548X	782.03	694.42	87.61	234.69	229.30	230.43	999	733	1732	318	-1.6
17	RZ9UA	UA3DPX	S549L	780.90	711.87	69.03	189.12	268.40	254.35	805	858	1663	351	-1.2
18	HA3OV	HA3NU	S536P	770.73	688.43	82.30	202.74	239.31	246.38	863	765	1628	340	-2.0
19	ON4WW	ON6TT	S539D	762.44	710.23	52.21	185.59	300.00	224.64	790	959	1749	310	-1.2
20	IK2QEI	I2VXJ	S562P	759.55	684.33	75.22	252.31	205.21	226.81	1074	656	1730	313	-2.3
21	EA3NY	EA3KU	S567F	755.26	695.97	59.29	224.35	227.42	244.20	955	727	1682	337	-1.2
22	OM3BH	OM3GI	S528D	753.65	676.66	76.99	227.64	221.48	227.54	969	708	1677	314	-0.8
23	K8NZ	W2GD	S526O	751.33	683.19	68.14	228.58	206.78	247.83	973	661	1634	342	-1.4
24	G3SXW	G4BUO	S568Y	745.19	657.58	87.61	268.75	143.90	244.93	1144	460	1604	338	-0.8
25	YT1AD	YU7NU	S544Z	741.77	669.20	72.57	171.73	265.59	231.88	731	849	1580	320	-2.0
26	UA9BA	RN9AO	S577V	738.10	663.76	74.34	176.90	215.85	271.01	753	690	1443	374	-1.1
27	K4UEE	N6IG	S546Q	733.57	666.31	67.26	227.88	203.65	234.78	970	651	1621	324	-1.2
28	LW9EUJ	LU7DW	S522R	726.77	654.20	72.57	210.26	249.01	194.93	895	796	1691	269	-1.7
29	K9TM	N2IC	S574V	719.80	649.00	70.80	217.07	205.84	226.09	924	658	1582	312	-1.0
30	9A3A	9A2AJ	S542B	714.54	635.78	78.76	266.41	129.51	239.86	1134	414	1548	331	-1.0
31	DL2CC	DL5XL	S583D	712.67	639.22	73.45	231.87	157.35	250.00	987	503	1490	345	-2.1
32	WC4E	W0UA	S588S	709.69	629.16	80.53	205.09	207.40	216.67	873	663	1536	299	-1.8
33	ZS6EZ	ZS4TX	S572L	705.67	621.60	84.07	177.84	224.92	218.84	757	719	1476	302	-0.4
34	K4BAI	K6LL	S534J	703.51	611.47	92.04	227.88	149.53	234.06	970	478	1448	323	-0.5
35	5B4WN	5B4LP	S529A	697.96	635.13	62.83	215.19	194.58	225.36	916	622	1538	311	-1.3
36	S59A	S58A	S541F	694.05	626.79	67.26	241.97	176.12	208.70	1030	563	1593	288	-1.2
37	K3NA	N6TV	S571W	691.31	603.70	87.61	244.32	137.64	221.74	1040	440	1480	306	-1.3
38	PP5JR	PY2NY	S532N	689.28	631.76	57.52	204.86	239.94	186.96	872	767	1639	258	-1.4
39	VE7SV	VA7RR	S521H	683.68	615.54	68.14	198.28	195.52	221.74	844	625	1469	306	-0.6
40	OK1QM	OL5Y	S586U	679.75	622.23	57.52	228.82	190.51	202.90	974	609	1583	280	-0.9
41	JM1CAX	JO1RUR	S514U	667.35	614.25	53.10	204.62	186.44	223.19	871	596	1467	308	-1.4
42	K9ZO	K7BV	S566Z	661.86	600.80	61.06	181.13	200.83	218.84	771	642	1413	302	-2.1
43	PY5CC	PY1KN	S578R	653.71	597.07	56.64	175.49	234.62	186.96	747	750	1497	258	-2.0
44	S50U	S51TA	S538F	644.92	578.55	66.37	190.99	167.99	219.57	813	537	1350	303	-2.8
45	VE3BMV	VE3KZ	S561C	644.16	593.72	50.44	190.76	194.26	208.70	812	621	1433	288	-1.5
46	F6BEE	F6FGZ	S543C	642.02	581.84	60.18	236.57	146.72	198.55	1007	469	1476	274	-1.2
47	SP8NR	SP9HWN	S547B	638.69	582.05	56.64	233.05	132.33	216.67	992	423	1415	299	-1.9
48	JH4NMT	JK3GAD	S527K	618.51	557.45	61.06	198.04	142.02	217.39	843	454	1297	300	-1.4
49	JA8RWU	JH4RHF	S513A	617.99	554.27	63.72	241.03	127.01	186.23	1026	406	1432	257	-0.9
50	EA7GTF	EA7KW	S516M	582.68	536.66	46.02	140.96	192.08	203.62	600	614	1214	281	-2.3
51	N3AD	N3BB	S563X	567.29	511.54	55.75	224.12	106.99	180.43	954	342	1296	249	-1.5
52	VK4EMM	VK4XY	S564Q	511.92	448.20	63.72	194.52	79.77	173.91	828	255	1083	240	-1.7
53	I5NSR	I5JHW	S576K	431.76	405.21	26.55	94.91	163.92	146.38	404	524	928	202	-6.3

*** S511E score based on submission of truncated log, missing approximately one hour of operation

of the contest and could not count the missing contacts. Even with the missing hour, Ben and Markus placed a strong 6th—a remarkable showing in an extremely competitive field.

Our final visit was to a farm belonging to the parents of Darko, S54DL, who has his contest station at the top of an impressive hill behind their home. The contest wasn't quite over, but John, K4BAI, and Dave, K6LL, had used their 20 hours of operating time as S534J without taking a break and had already dismantled their station. John and Dave had been on separate teams that had placed 2nd and 3rd in San Francisco and it was plain to see that they were disappointed with their results this time. They weren't unhappy, though; they both had a custom-made wooden clock that had been given to them by Darko and by their referee, Mirko, S57AD, bearing all four call signs and a depiction of the hilltop on which they had spent their weekend. John and Dave have plenty of certificates and plaques on their shack walls, but I suspect they made room for those clocks as soon as they got home.

By the time we made our way back to Bled, some teams had already returned and it was time for the main referees to go to work. Well, most of the work was done by Dick, N6AA, with off-site assistance by Larry, N6TW, in California; the rest of us contributed more opinions than actual labor. Thanks to the cooperation of contesters throughout the world, we were able to use a data base containing more than 300 logs to help us adjudicate the results. Even with a computer, scoring 53 logs contain-

"Dobor Den (Good Day)" from Slovenia—WRTC-2000

By H. Ward Silver, N0AX

My goodness, it's a long way from Seattle 1990 and the very first World Radiosport Team Championship! For one thing, there's e-mail—I can't imagine how we pulled it off back then. I was honored to have been a referee at the 2000 edition of the WRTC, hosted this summer by the Slovenia Contest Club. I was also a member of the group that created the first WRTC ten years ago and was also a referee at the 1996 WRTC, held in San Francisco.

There was never a serious question of whether I would attend WRTC-2000—it was only a question of how long I'd stay and whether my whole family would go. When I was invited to attend as a referee that was just icing on the cake! As it turned out, my wife, Nancy, and sons, Lowell KD7DQO and Webster KD7FYX came along and we had the adventure of a lifetime.

I was assigned to "European Wild Card Team #4"—Wolf, OE2VEL, and Ben, DL6RAI. We were hosted by Stanko, S50S, whose station was in far eastern Slovenia in a region called Pomurje ("PO-mur-ya"). There were six stations hosted by members of the Pomurje Radio Club. I had never met Ben, Wolf, or Stanko in person before, but as hams know, the ice breaks quickly and with only a little language barrier to overcome, we quickly turned into a lean, mean, WRTC machine.

On July 7 we took in the final instructions, received the sealed envelopes with our callsigns, the latest software, and were told to move out! I believe that of all the teams, we had the longest drive so Stanko began earning his nickname, "Speedy." We flew through picturesque towns and valleys—I particularly enjoyed the protocol for passing on two-lane roads...it's a LOT like contesting. Soon, we passed the largest city of Pomurje, Murska Sobota, just a few km from S50S. There was a welcome interlude at a roadside "Gastilnje" (restaurant) with a tall, cool Lasko beer and a plate of meat, cheese and vegetables. During our trip, I think Stanko set a record for number of cellular phone calls received. His phone plays the first four bars of "The Hungarian Polka" for a ringing signal—I believe I have it memorized.

Stanko's QTH is on a hilltop in rolling countryside. From his tower you can see Austria, Hungary, and Croatia as well as Slovenia. Below us stretched a vista of red clay tile roofs, church spires, and farmland turning a summer yellow and green. The operators immediately set up the radios—uh, oh! S9 static crashes were abundant, even on 10-meters, due to the thunderstorms making their way across the country. This could be trouble!

But there was no time to worry about it—we were bundled back into the Stanko-mobile and rushed to a banquet. We arrived at a hilltop local club with a pig on a spit and a number of the local hams making our dinner. All six of the Pomurje teams were greatly pleased with our locations and in awe of the hospitality.

At the banquet, we were greeted with a speech from the mayor and also received a bag of presents, including some excellent Pomurje wine! I did my best to make a thank-you speech with the able translation of Jelka, S57NW. Dinner, along with the roast pork, consisted of a spicy stew called "Bogorich" which I understand was somewhat milder than usual in deference to our tender palates. Beer and wine flowed with the toasts and there was much conversation with the local hams who spoke excellent English. It would have been very easy, indeed, to carry on until the sunrise opening, but duty called and we headed back to our respective QTHs. On the way, Stanko pulled over in a tiny hamlet, where another round of Laskos was ordered for me and Rich, N6KT—this was an inn adjacent to where Stanko was born! We hoisted our glasses in his honor.

Saturday morning was cool and cloudy. While Wolf and Ben were left to assemble and test their station, N6KT, Jelka, Stanko and I set off in pursuit of Visited All Pomurje. During the next three hours, we dashed about getting a look at the Canadian, Croatian, French, Slovenia, and Lithuanian locations—all excellent hilltops sporting the requisite 3-element tribander at 12 meters and off-center Windom-style dipole. The French team was adjacent to a large vineyard—ah, but *oui!*

Arriving back home, S5/N0AX made a short appearance. Then Wolf and Ben were up in the blocks and ready to go. At 1155Z, I made as much ceremony as possible out of opening the secret envelope with the call sign—S533G! Knuckles were cracked, throats were cleared, chairs were shifted and—they're off! Ben started on CW with Wolf tuning for multipliers.

As with all contests, the action was fast and furious. The static crashes of the previous day were notably absent—the low clouds had begun a soft rain, which turned out to be a tremendous blessing. While teams further west were taking the brunt of the weather, even to the point of losing power, our S meters stayed far to the left. That night, the team was even able to run on 75-meter 'phone, picking up a number of valuable multipliers on 40 and 80.

Ben and Wolf finished with a good hour and pulled the plug. It looked like we were the local champs, but what of the 47 other teams? Rapidly, the station was disassembled, we toasted our hosts and his excellent QTH, wishing we could have used all that steel and aluminum so close at hand. Then back to Bled we sped. As it turned out, Wolf and Ben finished tenth. They had never operated together before and should be extremely pleased with their performance. They gave me very little to report as a referee and I enjoyed their excellent operating.

Concluding, I would like to once again thank our host, S50S, and all the members of the Pomurje Radio Club that made our visit to their part of the world an excellent and memorable event. Wolf and Ben, thanks for being such a great team. All I can say is, the next group has a high standard to meet and I'll be there for that one, too!

ing 85,000 contacts in less than 24 hours is no mean feat. The positions of the first two finishers were very clear, but there was a real horse race for #3 and we had to be very careful to apply the same standard to both contenders for that coveted position. I don't think Dick would mind being called a perfectionist, so I will because it's true; he was still working to perfect the results 15 minutes before the awards ceremony.

When the dust settled, Doug, K1DG, and John, K1AR—the winners of the first WRTC in 1990—were in third place. In second place was the European Russian team of Harry, RA3AUU, and Arno, RV1AW—the first time anyone other than Americans have finished "in the money." They also collected the award for achieving the highest multiplier. First place, along with the awards for the most CW contacts and the highest score in the pile-up simulation, went to K1TO and N5TJ. What did it take to win? Dan and Jeff made 2234 contacts in 20 hours—a rate of just under two contacts per minute. And remember, this was with 100 watts and small antennas. You can look at their log—indeed, at all 53 logs—at the WRTC Web site.

And so it was over—well, not quite. The closing party went on past 3 AM and was interrupted only by a quick trip to the lake at midnight to watch fireworks in our honor. As I said, everyone in town knew we were there. It was hard to say goodbye.

WRTC-200x?

When and where will the next WRTC be held? That's hard to say. Hosting such an event represents a commitment to raise a lot of money, and for volunteers to devote thousands of hours to many thankless, behind-the-scenes, but absolutely essential jobs. One thing is certain: Once you've been to a WRTC, you won't want to miss the next one. QST

By Wayne Mills, N7NG

Chesterfield Islands—TX0DX

Stirred in the winds of political change, a new DXCC entity is born—and a DXpedition team is already on the scene!

This sign, "Archipel Chesterfield" located on an island just south of the TX0DX site, indicates the ownership of the Chesterfield Archipelago.

For DXers, working a new DXCC Entity is always a challenge. To work it once on any band, to work it on all bands, the chase is the thing. Every opportunity is a thrill. To make the Honor Roll or to meet the Challenge, DXers play the game often for the better part of a lifetime. For DXpeditioners, a "new one" is more than a challenge. It's an obsession; it's a multi-faceted effort that starts months or years in advance of the event. It proceeds through strenuous operating sessions, and it culminates all-too-often in a long ride home. A group of DXpeditioners will expend great effort in researching, planning and executing a successful trip just for the chance to operate at the far end of the pileup. The challenge of controlling the throng and maintaining control is exhilarating. Sometimes the actual operating is delayed for months, sometimes for years. Yet the opportunity to activate a new one keeps him going. It's an irresistible end.

Focus now on the South Pacific. Propagation during the equinox is often very good. DXers and DXpeditioners alike love good propagation. Think of the South Pacific, think of warm beaches, swimming pools, luxurious hotels and room service. At the end of winter in the northern latitudes, the warm beaches of the South Pacific can be very inviting. In particular, think of the islands of New Caledonia, a French outpost which served an important role during the early days of WW II in the Pacific as a support base aiding the action in the Solomon Islands. Existing on a mining industry and aid from France, these is-

One of the most exciting parts of the adventure is the initial landing. Here, OH1RY and FK8GM make their way to the first landing.

Having found this island satisfactory for two, relatively isolated station areas, and after spending several hours moving equipment to the two locations, work is begun setting up the CW/WARC band site.

lands lie some three hours flight distance northeast of Sydney, Australia.

Some 400 km west of New Caledonia lie the Chesterfield Islands. These islands are French, administered from New Caledonia. This group consists of a long string of reefs and islands. The islands are very reminiscent of other islands at the same latitude in the South Pacific. The similarity to Conway Reef (Fiji) to the east is striking. For DXCC purposes, if New Caledonia were a political entity, the Chesterfield Islands would be another DXCC entity. Read on.

Political Entities

As often happens, the indigenous people of an area eventually tire of control by a foreign, colonial power. In New Caledonia, some degree of unrest has existed for a number of years. In 1995, progress was made toward possible autonomy and self-rule. In 1998, a French law was passed which could lead to a vote for independence in 15 years. In light of these moves toward self rule, and a significant population of ham radio operators in the islands, the time seemed right for more active representation in the world of Amateur Radio through the IARU.

Coincidence

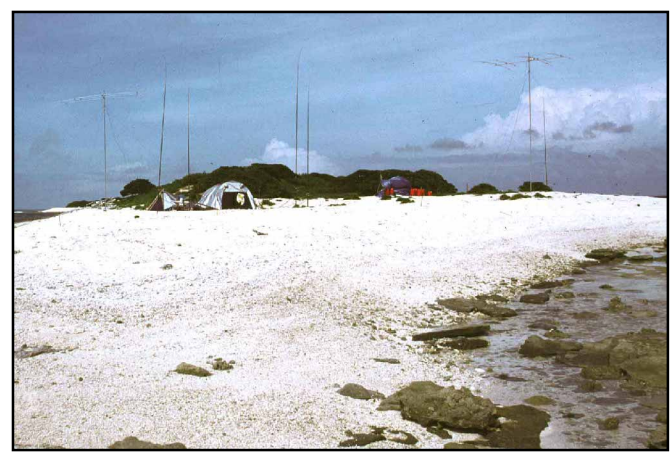
The coincidence of a political movement in the South Pacific and rules changes in the DXCC program could not be ignored. Kan Mizogouchi, JA1BK, saw the possibilities early on. Engineered by Kan and Martti Laine, OH2BH, the making of a new DXCC Entity was laid out. In the past, New Caledonia existed in DXCC as a geographical separation from France. If New Caledonia were to be a unique DXCC political entity, the next territory in the area would need to be only separated by 350 km. Under the current DXCC rules, a "new one" would result if an Amateur Radio society in New Caledonia were to represent the Island's amateurs in the International Amateur Radio Union, the IARU. If the local ham radio society, the ARANC (The Association of Radio Amateurs of New Caledonia) were to become a full IARU member society, under DXCC rules, New Caledonia would become a political entity and the Chesterfields would become a new one.

In view of the changing political climate in New Caledonia, and the changed DXCC rules, a request was made of IARU Region III for consideration of ARANC as an IARU society. Soon, Region III approval was obtained and the issue was presented to the full IARU. A vote was conducted over a period of five months. At the end of the allotted period, the votes were counted and it was confirmed that the ARANC had been elected to membership in the IARU. "By administrative action," New Caledonia became a political entity, and the Chesterfields could qualify as a new DXCC entity. The Chesterfield Islands had become the newest DXCC Entity.

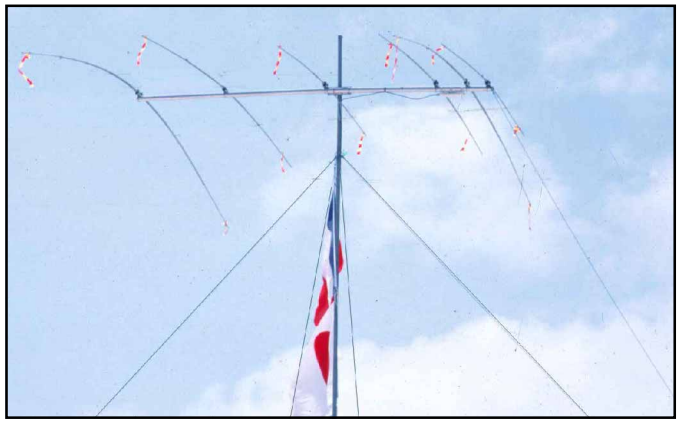
Financing

Major expeditions have become very expensive. If the DX spot is located far off the beaten path, or if it is subject to severe weather conditions, expenses can be astronomical. A weeklong trip to the South Pacific for eight to ten people, however, can still be done for less than $75,000. This group preferred not to go to the public in advance of an expedition. Rather, we wanted to accept donations from those who enjoyed the "performance" and felt moved to contribute after the operating has taken place. In keeping with this preference, we decided to seek outside funding only from the major foundations. A major contribution was made by INDEXA. For this effort, four of the TX0DX group invested over 60% of the needed funds. Less than 30% of the bud-

The completed CW/RTTY/WARC band site consisted of a FinnFet tribander, a two-band WARC beam, a 6-meter beam, an elevated R7 vertical and a low-band dipole. The protection of the blue tarp provided effective protection for the Suzuki generators from the nightly rainstorms.



The SSB site consisted of an assortment of beams and a ComTek four-square vertical array, which allowed for minimal interaction between stations and little need for filtering.



Birds are always a problem when we are invading their habitat! The brightly colored strips of cloth on each of the tribander elements seemed to eliminate any bird-caused antenna damage.

Here, OH2BH takes on a CW pileup. Martti is highly proficient in maintaining control of huge pileups on both SSB and CW. "The pileup is a mirror on the DXpedition operator," says Martti. Even the "unruly" Europeans will respect a fine operator.

geted funds were obtained from outside sources. OH2BC, JA1BK, OH2BH and N5KO provided major shares. Others of the group contributed differing amounts while contributing substantially in other areas.

Planning for a Major Expedition

Driven by that irresistible urge to activate a new DXCC Entity, every effort was made to take advantage of the opportunity. Planning began during the IARU vote. We felt that the chances of ARANC being elected were good. Since the timeframe was fixed, the window of opportunity was known. Unfortunately, the window began at a bad time of the year in terms of the weather near the Chesterfields. If a typhoon cropped up in the area during the operation, it could be at best very unpleasant, and at worst, downright dangerous.

The weather was not the only uncertainty. It would not be possible to wait for the outcome of the IARU vote before the most important DXpedition business was conducted. If an operation were to be mounted at the time the Chesterfields became a DXCC Entity, much planning and commitment would be necessary. Arrangements for large items such as the charter of a suitable vessel, airline reservations, and major items of amateur radio equipment would need to be made well in advance.

Kan, JA1BK, and Pekka Kolehmainen, OH1RY, traveled to eastern Australia in order to secure a vessel suitable to take us to the Chesterfields. Tim Totten, N4GN, who made the initial contacts, had researched a number of possibilities. Among the potential vessels was the *Night Crossing* harbored in Gladstone, Australia. This boat provided the necessary seaworthiness, size and comfort. Considerable range was necessary since the boat would have to come all the way to Koumac, New Caledonia in order to clear French customs. While in Australia, Kan and Pekka arranged for other items for the trip. Antenna hardware was prepared to load on the boat. Similarly, generators were ordered delivered to Gladstone for the voyage to the Chesterfields.

After long stints operating at a break-neck pace, a short nap can be all too little relief. No one suffered from too much sleep on this trip.

Martti, OH2BH invested much time organizing the equipment list and distributing it via e-mail to each of the operators. Each person was responsible for his own personal equipment and additional items such as power strips, footswitches, amplifier RF and switching cables. Everything necessary was listed and the responsibility assigned.

Equipment

Equipment included a set of four FT-1000MP transceivers from Yaesu. Backup radios, two Alpha amps, two FL-2100Zs and a FinnFet amp were also included. Antennas were tribanders by FinnFet, Nagura for 6 meters, and a foursquare "gun" for 20-meter SSB by ComTek. Four Suzuki generators supplied power with JA2JPA assisting with shipping arrangements from Japan to Australia.

For this trip virtually all logging was done with computers. In order to avoid network difficulties and possible virus contamination, each computer was the property of an operator, kept entirely separate from all other computers. Throughout the planning process, attention to reliability and simplicity led to an absolute minimum of technical difficulties.

Operating Strategy

In making the initial operation from a "new one," it is important to develop a well thought out method of operating. Omitting this step and operating haphazardly can lead to chaos on the bands. For new ones, we generally strive to make contacts with the maximum number of different stations. At least one QSO gives everyone a piece of the action during the first round. Other DXpeditions will follow to provide contacts on other bands and modes. In order to work

the smallest stations, we need to make up the difference with good antennas and the maximum permissible power. In addition, we must pick the band which seems likely to provide the best propagation throughout the day, and put a SSB and a CW station on that band at all times when it is open. By concentrating on a minimum number of bands, we greatly reduce the number of band dupes on an overall basis and help to maximize the number of different callsigns in the log. On his QSL card, one PA0 DXer put it this way: "A good policy to work mostly on 15 meters! Not like [XX0YY] giving 20 QSOs to the people with kWs and big antennas and [no] QSOs to the poor people like me with an indoor dipole at 6 meters high!"

The consideration of an Optimum Operating Strategy has been an area of great attention by this group for many years. We began to formalize various strategies in what may have been the first formal DXpedition Operating Manual for the Albania Project (ZA1A) in 1991. The "state of the DXpedition operating art" was presented in *DXpeditioning Basics* by this author in 1994. Many of these concepts have been widely copied. Picking the best bands, and putting the most "firepower" and the best operating resources on those bands has result in many successful DXpeditions over the years.

Operators

The crew for this trip is very experienced. Several have traveled together before. First-time members of the group were Eric Esposito, FK8GM, the international liaison for the ARANC, Franck Petijean, FK8HC, along with Trey Garlough, N5KO, and Kari Leino, OH2BC. Eric and Franck provided a logistical function in Noumea, building hardware and arranging for items to be obtained locally. Eric was part of the SSB crew, while Franck concentrated on CW. Trey filled in for Tim Totten, N4GN, who was unable to participate for business reasons. Tim continued to provide yeoman support for the expedition by handling data processing chores. Trey, who is well known for his winning contest skills (eg HC8N) formed more than half of the core CW team.

Regulars included Kan Mizogouchi, JA1BK, Martti Laine, OH2BH, Pekka Kolehmainen, OH1RY, Pertti Turunen, OH2RF and myself. Kan and Kari concentrated on 6 meters with over 2500 QSOs. In addition, both spent some time on 75/80 meters. Aside from his 15-meter duties, Trey, N5KO, would make a major effort on RTTY.

Operating on the Chesterfields

I have referred to the Chesterfield trip as "The South Pacific Revisited," and I have subtitled it "An Oldtimer's View of the South Pacific." Our last full "beach assault" was conducted on Conway Reef in 1990. The Chesterfield trip was very much the same. If you refer to the articles written about that effort, and view the photos, you see amazing similarities. The photos accompanying this article are self-explanatory. The beach, the bushes, the birds, the surf are all the same. This trip differed primarily in that we were all 10 years older with all that entails. The antennas are the same; the radios are more modern, but just as large, or larger. The generators required more manpower to transport up the beach. The boat was just as slow, and the sea was just as rough.

A happy JA1BK relaxes after the successful activation of another new DXCC entity.

The operating was different, though. Since 1990, we have learned a lot and the audience has learned a lot about DXpedition operating. Other things are different, as well. In the early nineties, we generally made approximately two QSOs per call sign. Even in Albania, with over 63,000 ZA1A QSOs (after dupes), we had about 32,000 different calls in the log. Now, ten years later, we are working nearly three QSOs per callsign. What this means is that even when trying to concentrate on a primary band, DXers are demanding operation on more bands than ever. This requires more antennas and generally more operating time over the duration of an expedition. We are making more QSOs than ever. What this means to the operators is that they will be much busier and will make many more contacts during their stay on an island. In the end, there was no allowance for age! It was just another week-long "contest."

Our plan for CW, for example, was to have two operators responsible for keeping a single 15-meter station on the air 24 hours per day. The demand for 15 and 10 meters was so great, however, that the two of us kept both of the stations going on those bands for nearly three days, nearly nonstop. Pekka, OH1RY, put in a single band phone effort over the CQ WPX Contest weekend, while the rest of the phone crew kept up their own frantic pace. For 48 hours, with TX0DX handing out contest QSOs way up the band, more contacts than ever were logged. Using the Internet information network we were able to advise DXers of our contest presence.

The nature of the DXer's operating has changed as well. In recent years, for example, fewer DXers are asking about QSL information. Fewer are asking when we are going to QSY to 160 meters. Some of this can be attributed to the spread of information on the Internet. CW skills seem to have improved, with more and more DXers chasing rare ones on that mode. With improved solar conditions, the CW bands are a bottomless pit of DXers. When given reasonable operating situations, DXers are well behaved, too. This is where the DXpedition operators have a chance to shine. Good op-

When traveling across international boundaries, there are always Customs formalities. Pondering the equipment list was this officer from Noumea who drove four hours to Koumac to check our ship.

Finally ready to step on "terra firma" after a rough voyage home, the crew pauses for a few final photos before finally heading back to a few days rest, and more DXing, in the capital.

erating minimizes the poor behavior on the bands. Even the "unruly" Europeans fall in line for the good DXpedition operator.

Off and Running

The votes were counted and the results made public on March 22, 2000. According to DXCC procedure, The Chesterfield Islands immediately became a separate entity. As we were setting up our stations we operated with the call sign TX8CI. At 0000Z on March 23, we stopped using the TX8CI call sign and started the TX0DX operation.

Operating was fast and furious. In all, over 71,000 QSOs would end up in the log in just six days. Of those contacts, nearly 23,000 were with different stations. Nearly 22,000 were with the US, 27,500 with Europe and 17,500 with Japan. These numbers are in close proportion to the size of the ham population in those areas, considering the proximity to Asia. Over 2500 contacts were made on 6 meters. Nearly twice as many QSOs were made on 15 meters as on any other band, over 24,500. 610 QSOs were made on 80/75 meters, while 819 QSOs were made on RTTY. The daily rate for four-plus stations totaled 12,000 Qs, not bad for eight guys and six days.

Information Network

An information network, consisting of hams from New Caledonia, France, the United States, Australia, Japan and Finland, was headed by Bill Avery, K6GNX, and aided by webmaster Tim Totten, N4GN. We believe it was extremely valuable. The information crew, FK8CR, F6AJA, K6GNX, VK3EW, JH1KRC and OH2BN, provided a two-way information channel which helped to keep on-the-air traffic to a minimum. Bill fielded well over 300 individual Internet queries. He acted as weatherman as well. Since weather was a particular threat in this case, Bill's knowledgeable handling of this important area was crucial. Using Internet resources, he was able to keep the *Night Crossing* captain advised as to the specific weather and wave heights for the area. Local meteorological data from FK8CR was integrated into the mix.

A Hasty Retreat

As time wore on, the weather became an issue. The first three days were beautiful. At midnight on the fourth day, the wind came up as though someone had switched it on. It never stopped blowing after that. As the wind continued to blow, the seas began to rise. The easy landing that we had experienced on arrival could turn into a nightmare for our departure. For this reason, we decided that we would leave a day early in order to forestall potential difficulties in getting everything and everyone safely off the island. We pulled the plug at 0000Z on March 29, exactly six days after we made the initial TX0DX contact. It took less than three hours to pull everything down and move it to the *Night Crossing*. Shortly thereafter, we were headed back. The seas, while not threatening, were substantial. We were moving into the wind, and the waves provided a challenge for those of us who don't travel often via water. The fact is, it was a mighty unpleasant voyage. Enough said.

Thanks

We all owe a big thank you to Yaesu for its generous support of the TX0DX DXpedition. The FT-1000MP radios, as usual, performed flawlessly, causing no interstation interference. We also would like to thank INDEXA for its support. Thanks are also due ComTek for the loan of its very efficient foursquare antenna system. Most of all, DXers everywhere should applaud those members of the TX0DX team who funded a major part of this expedition.

There is no doubt that activating a new DXCC entity can be a real adventure. The creation of new DXCC Entities based on the geographical criteria, however, may have come to an end. Changes in "Geographical and Political Entities" will likely always be with us, though, and this is really what DXCC is all about. Whenever there is significant demand for the activation of DX, DXpeditioners will spend countless hours trying to figure a way, trying to persuade officials and do whatever is necessary to make that operation a reality. It has been suggested that regulations will lead to the end of activity for certain entities. Political regimes may completely reject the idea of Amateur Radio. But administrations change, personnel and even leaders change. When they do, DXers will be there to make it happen. Count on it!

Wayne Mills, N7NG, is the ARRL Membership Services manager. You can contact him at ARRL Headquarters, 225 Main St, Newington, CT 06111; **n7ng@arrl.org**.

By Gerry Fasse, W8GF

A Basic Stamp Morse Call-Sign Generator

Basic Stamp projects are popular! Get familiar with them with this simple and useful project.

Years ago—when I was cursed with poor antennas, low transmitter power and high expectations—I sat through many DX pileups hoping to increment my DXCC score only to be foiled time and again. One could sit for *hours* trying to break the pileups with the likes of Bob Denniston, W0NWX, Danny Weil, VP2VB, Gus Browning, W4BPD, and Don Miller, W9WNV, at the business end. After signing my call over and over and over with my ragged J-38 straight key or Brown Brothers paddle, I often thought how great it would be to have a mechanical device—a Morse call-sign generator—to do the grunt work.

During one of the ARRL DX Contests—probably around 1960 or so—I worked Bob Denniston, who was signing VP1JH at the time. Bob was knocking 'em off with what I thought was a precision bug fist. Later, during a QSO with Bob, I was surprised to find that he was using a pair of motor-driven code wheels to generate signal reports and his call sign! (All the signal reports were the same—599.)

Some time later, I heard stories about a device called the "Gus Stick" that could be used to mechanically send one's call sign. I was surprised at its simplicity! A typical Gus Stick consists of a 12 to 16-inch-long phenolic strip, two to three inches wide, with copper strips cemented along its length. The copper strips are sized and spaced such that when stroked lengthwise with a conductive stylus, you can send your call sign (or other information) coded by the copper strips. With a Gus Stick, the sending speed is determined by how quickly you move the stylus across the copper strips. With a bit of practice, nearly perfect CW results. I constructed one using a piece of 1×2 lumber and copper-flashing strips. Some time later, I built an elegant model using etched copper-clad glass-epoxy PC-board material.

The Gus Stick is not without its drawbacks, however. In the 1960s, vacuum-tube rigs with cathode keying were still common. Cathode-to-ground voltage at the key jack could exceed 300 to 400 V, and it wasn't uncommon to get a bit of shock therapy along with a new one for the log!

About that time, Motorola introduced DTL (diode-transistor-logic) ICs. I acquired a handful of quad gates and flip-flops and built my first keyer that greatly improved my lousy bug fist. Armed with this success, I decided to build a Morse call-sign generator. After some fine-tuning, it worked extremely well—so well in fact, that I continued to use it for the next 25 years!

In the early 1980s, many amateurs had VIC20 computers lying around the shack. *QST* published an article about using the VIC20 as a Morse keyboard[1] allowing the VIC20 to generate nearly perfect Morse over a wide range of speeds. The program was written in BASIC, but contained some machine-level routines (remember PEEK and POKE?) and had provisions for storing short messages triggered by function keys. This approach has one major drawback: The VIC20 uses an external audio-cassette recorder for data storage. It was clumsy (and time-consuming) to load the program and prerecorded messages.

A number of newer logging programs include provisions for storing and sending short messages. Some, however, are unable to send Morse slowly as is often needed during VHF contests. In any event, you need a computer and an appropriate program. The unit I am about to describe suffers from none of the previously mentioned disadvantages.

Hardware

Recently I discovered the Parallax Basic Stamp.[2] My first thought was to use one to construct a modern version of my old DTL call-signer that had developed some warts over the years caused by badly plated through holes in the circuit board. I purchased a couple of Stamps along with an interface cable and software-development tools. I was astonished to discover that someone at Parallax had produced a Morse routine from the BASIC-like instruction set! The hard work being done, I went to the workbench to clean up the details. Still needed was an interface to key my transceiver, an audio monitor and some means of controlling speed. Also, it seemed like a good idea to have the capability of remotely triggering the call-sign generator.

I know of at least three versions of the Basic Stamp. Parallax originally sold the unit packaged in an 18-pin DIP. There were some early reset problems with this device, which eventually evolved into its present form, a 14-pin SIP package.

Jameco Electronic Components sells the Basic Stamp part number BS1-IC for about

[1]Notes appear on page 42.

$34. A carrier board furnished with breadboarding space costs about $15. A programming package sells for about $100, including software, connecting cable, Basic Stamp device and carrier board. You don't need to purchase the programming tools to complete this project—*programmed* Stamps are available.[3] But should you want to program your own Stamp, the code is available, too.[4]

Construction

I first constructed my Basic Stamp call signer on the Parallax carrier board. However, a glass-epoxy PC board is available that will give your unit a professional look (see Note 3). The enclosure I used was purchased at a local swap meet for $3, but a similar unit is available from Jameco for about $5. I suggest housing the PC board in a metal cabinet to reduce the effects of RF that might be floating around your shack. Use shielded cables for the transceiver keying input and external trigger switch, if used.

There is nothing particularly critical about wiring the Morse Call-Sign Generator. Front-panel controls include a power on/off toggle switch and LED indicator, a six-position rotary switch to select Morse code speed, a push-button switch to trigger

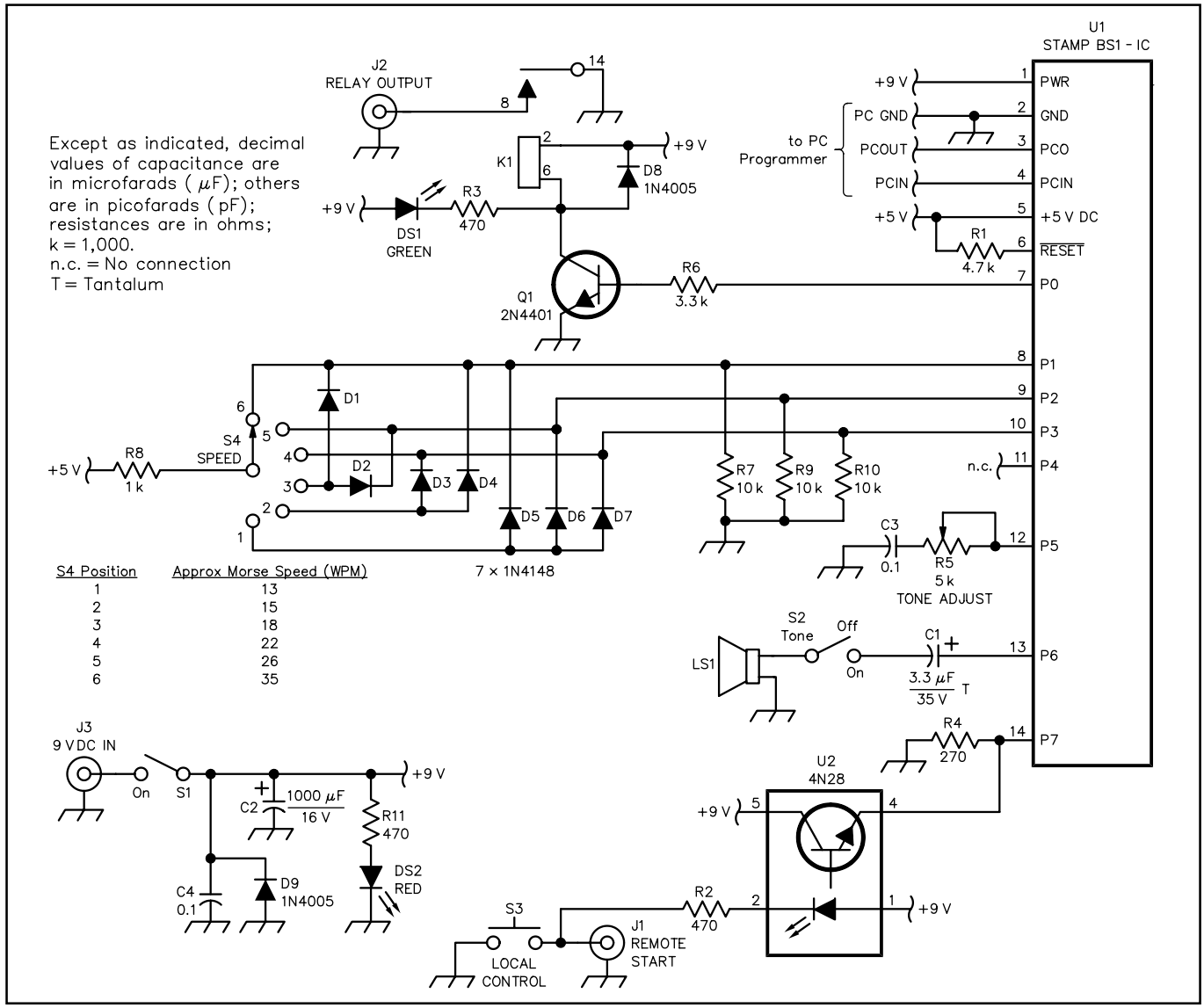
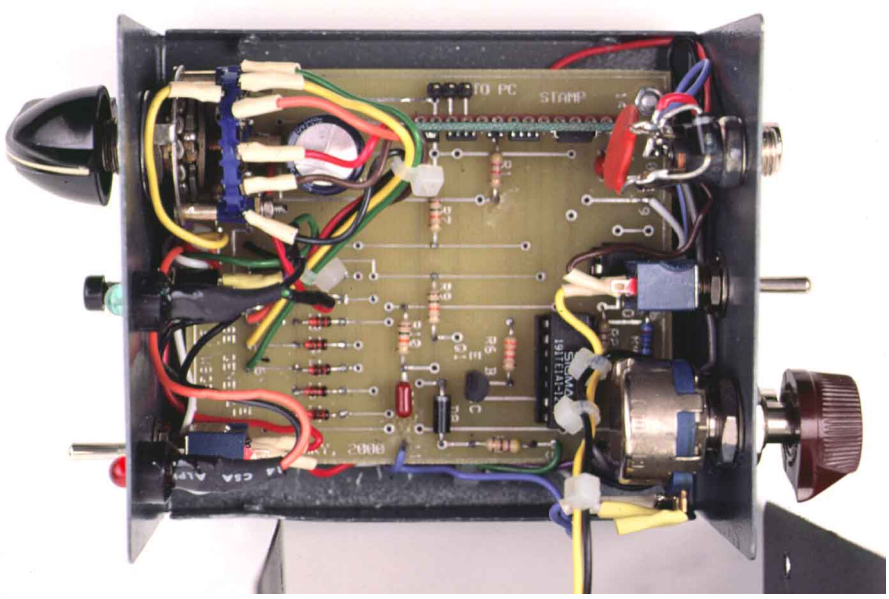


Figure 1—Schematic of the Morse Call-Sign Generator. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or film units. RS part numbers in parentheses are RadioShack; JC part numbers are Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002; tel 650-592-8097, domestic fax 800-237-6948, international fax 650-592-2503; info@jameco.com; http://www.jameco.com. Equivalent parts can be substituted; n.c. indicates no connection.

C1—3.3 μF, 35 V tantalum (JC 33769)
C2—1000 μF, 16 V electrolytic (RS 272-958)
C3, C4—0.1 μF (RS 272-1069)
D1-D7—1N4148 (RS 276-1122)
D8, D9—1N4005 (RS 276-1104)
DS1—T1-3/4 green LED (RS 276-022)
DS2—T1-3/4 red LED (RS 276-041)
J1, J2—Phono jack (RS 274-346)
J3—Power connector (RS 274-1582)
K1—SPST DIP reed relay (JC 106462)
LS1—8-Ω speaker (RS 273-092)
Q1—2N4401 (RS 276-2058)
R5—5 kΩ potentiometer (RS 271-1714)
S1, S2—SPST toggle switch (RS 275-612)
S3—Normally open push-button switch (RS 275-1547)
S4—1-pole, 12-position rotary switch (RS 275-1385)
U1—*Programmed* BS1-IC Basic Stamp; see Note 3.
U2—4N28 optical isolator (JC 41013)
Misc: PC board (see Note 3); knob (RS 274-407); 14-pin DIP socket for K1 (RS 276-1999); 14-pin SIP socket (JC 101282); 8-pin DIP socket (RS 276-1995); three-pin 0.1-inch male header (JC 109575); two LED bezels (RS 276-079); enclosure (JC 11914); wall transformer, 9 V dc, 300 mA (RS 273-1455)



An interior view of the Call-Sign Generator. The front panel, to the left, supports the six-position SPEED control switch (S4) and the START and POWER LEDs. Below the LEDs are the LOCAL CONTROL pushbutton, S3, and S1, the power ON/OFF switch. Mounted on the rear panel, on the right, are J2 (RELAY OUTPUT), S2 (TONE ON/OFF) and R5 (TONE ADJUST). At the top of the picture is an edge-on view of the Basic Stamp. The speaker, LS1, is mounted in the cabinet top.

At the top left of the rear panel is the sidetone level pot (SIDETONE). S2, the sidetone on/off switch, is in the middle of the panel. J1 (REMOTE START), J2 (RELAY OUTPUT) and J3 (9V DC IN) fill the remainder of the panel.

the device and a second LED indicator that provides visual effects when the unit is sending your call sign. On the rear panel are three jacks, a toggle switch and speed control pot. J3 connects to the plug-in wall transformer, J2 to the transceiver keying input and J1 to a remote switch to trigger the Call-Sign Generator. S2 enables and disables the internal speaker sidetone. A second push-button switch could be added to the front panel to reset the microcomputer and stop the call-sign transmission in progress.

Circuit Description

The circuit is straightforward. A 4N28 optoisolator (U2) is used for the remote start function. Although not truly isolated (both sides of the circuit share a common ground) RF feedback through this line is diminished considerably. A small switch or similar device can be located close to the main station keying system to trigger the call signer.

K1, a reed relay, provides a normally open contact for keying the station transmitter. It easily handles most modern solid-state transceivers because their keying systems operate with low voltage and current. Some older vacuum-tube equipment that employs grid-block keying can also be keyed with no problems. Don't try keying high-level cathode keyed transmitters with this relay; it is *not* recommended. For such circuits, a huskier reed relay with mercury wetted contacts is a better choice.

Because of inherent limitations in the Basic Stamp, a total of six discrete speeds are available: approximately 13, 15, 18, 22, 26 and 35 WPM. I find these settings to be about ideal for general use.

D9, connected directly across dc-input jack J3 protects the Basic Stamp from reverse-polarity supply voltages. C4 provides a shunt path for any stray RF that may be picked up by the wall transformer and line cord.

Testing and Use

Once construction is complete and you're ready for testing, be sure that the Stamp is not in its socket. Connect the wall transformer and toggle the power switch **ON**. DS2, the red LED, should glow. Use a voltmeter connected between ground and pin 1 of the Stamp socket to measure the voltage present: It should be in the range of 8 to 12 V dc. If this checks okay, turn off the power, disconnect the wall transformer and insert the Stamp into the SIP socket. *Be sure to observe proper pin 1 positioning when inserting the Stamp.*

With the wall transformer connected and the **POWER** switch set to **ON**, set the **SPEED** control switch to your desired sending speed and press the **START** button. If all is well according to the speaker output, connect J2, the **RELAY OUTPUT** jack, to your transceiver and the **REMOTE START** jack to an external switch, if desired. Now, when a rare one pops up, you can prevent an attack of "glass arm" as you attempt to break the pileup!

Notes

[1]Dan Whipkey, N3DN, "A Keyboard Keyer and Code-Practice System," *QST*, Jan 1984, pp 13-16.

[2]You can obtain Basic Stamp information at **http://www.parallaxinc.com/**.

[3]A glass-epoxy PC board, *preprogrammed* Stamp device and reed relay are available from C&M Enterprises, 280 Bell Branch Ln, Fruit Cove, Florida 32259; tel and fax 904-287-6448; **www.atlantic.net/~CMENT**. Included with the board are a PC-board part-placement diagram and detailed assembly notes.

[4]A complete program listing and an explanation of how the program functions is available in *FASSEGEN.ZIP* from the ARRL download site **http://www.arrl.org/files/qst-binaries/**.

Gerry Fasse, W8GF, was first licensed in 1954 as W8UCI, later as W8PX. He is a DXCC Honor Roll member. Gerry is self-employed designing machine-tool control hardware and software. During the Korean War, Gerry served with the Eighth Army, later attending the Electronics Institute of Technology and Wayne University in Detroit. You can contact Gerry at 11320 Darla Ct, Warren, MI 48089; **W8GF@aol.com**

Photos by Joe Bottiglieri, AA1GW QST

NEW PRODUCTS

CURRENT BALUN KITS

◊ Palomar Engineers now offers two new current balun kits. The baluns are effective from 3.5 to 60 MHz, but two kits can be combined for 160-meter applications.

Each includes a total of six inches of ferrite beads sized to slip over the outer jacket of coax cable and three pieces of heat shrink material to hold the beads in place. Kit BA-58 is intended for use with RG-58, RG-8X and other cables up to 1/4-inch in diameter. Kit BA-8 fits RG-8, RG-213, 9913 and similar cables up to 1/2-inch in diameter.

Kit BA-58 is priced at $7.50; Kit BA-8, $15. Shipping (on any number of kits) is an additional $6. For more information contact Palomar Engineers, PO Box 462222, Escondido, CA 92046; tel 760-747-3343; fax 760-747-3346; **Palomar@compuserve.com**; **http://www.Palomar-Engineers.com**. QST

Next New Product

By Al Christman, K3LC

The Parasol: A 160-Meter Vertical Antenna with a Difference

This shorter, grounded Top-Band radiator can be scaled for use on other frequencies.

This article describes an unusual vertical-antenna design having several features that should be attractive to hams. First, its height is about half that of a conventional $^1/_4$-λ monopole. Second, the vertical portion of the antenna is grounded at its lower end, which eliminates the need for a base insulator. Third, the feedpoint is at the *top* of the structure, which means that virtually the entire length of the tower is available for other purposes. Two of these antennas have already been built and operated with satisfactory results on the AM broadcast band in northwestern Pennsylvania. Here I'll describe 160-meter band applications of the antenna, but you can easily adapt the design to other frequencies by scaling the dimensions accordingly. To construct the computer models shown in this article, I used *EZNEC Pro*,[1] with a *NEC-4* calculating engine.[2]

Basic Concept

I christened this antenna the "Parasol," because of its shape. It consists of three basic parts: the vertical portion, the ground system and the parasol section. At the low-frequency end of the spectrum, the vertical portion would probably consist of tower sections, but at higher frequencies, aluminum tubing, solid rods, or even wire can be used. The physical height of the vertical portion is typically on the order of $^1/_8$ λ, although somewhat longer or shorter dimensions can be used. In general, the gain increases with increasing height. The vertical section is grounded at the bottom, so no base insulator is needed, but one or more driven ground rods may be added for lightning protection. If metallic guys are used, break them into nonresonant lengths with insulators and insulate them at their tower-attachment points.

To minimize losses, a good ground system is needed, and the classical AM-broadcast configuration of 120 $^1/_4$-λ buried radials works well. Radials may be laid on the ground surface if burying them is not an option. Although the exact dimensions of the ground screen aren't critical, performance improves as the number and/or length of the radials is increased. As an alternative, gull-wing elevated radials[3,4,5] may be used with the Parasol antenna. Connect these bent radials to the grounded tower base, sloping them outward and upward from that point until they reach their final elevation (perhaps 15% of the tower height), where they are bent into a horizontal position for the remainder of their length. A slope angle of 45° is fine, but steeper or shallower angles will also work. Typically, eight of these gull-wing radials provide satisfactory performance if they are equally spaced around the tower and are long enough—a span of $^1/_4$ λ for each radial is good. Keeping all radial lengths equal helps ensure a circular azimuthal radiation pattern. Elevated radials that are horizontal throughout their entire length can also be used, but this appears to reduce the gain slightly; such radials would not be bent at their inner ends, but would be electrically connected to the tower at some distance above the ground.

At the apex of the tower, several downward sloping parasol wires are added, which serve as the ungrounded part of the antenna. Three such wires are generally sufficient, although more can be used. If only two parasol wires are installed, the azimuthal-plane radiation pattern becomes less circular. All of the parasol wires are anchored to, but insulated from, the tower top, and should be spaced symmetrically in azimuth around the tower. The wire lengths can be chosen arbitrarily, or they may be pruned in the field to achieve a feedpoint impedance that is purely resistive (ie, zero reactance). Computer simulation indicates that resonance can be achieved when these three parasol wires are shortened to less than $^1/_8$ λ, although this has not been verified experimentally. The outer (lower) ends of the parasol wires should be connected to their guy cables with insulators. The guying material may be nonmetallic, or conductive (steel) suitably segmented with additional insulators.

Generally, the antenna gain increases as the parasol conductors are made more horizontal. Therefore, make the downward slope angle of these elements as small as possible, within the limitations of the property. Instead of using sloping wires for the parasol conductors, a horizontal structure composed of metal tubing could be built. Such a top hat would resemble a wheel with metal spokes, whose outer ends can also be joined together by a perimeter conductor. As the number of spokes is increased, their resonant length decreases, thus shrinking the required dimensions of the parasol structure.

No matter which parasol design is used, the center of this symmetrical assembly must be located at the tower apex, but insulated from it. If sloping parasol wires are used, then equal-length, insulated pigtail leads should extend from the upper ends of these wires to a common point, where they are bonded to the center conductor of the transmission line. If the tower has a top plate, a suitable chassis connector for the transmission line may be installed in the center of the plate, facing downward, to terminate the

[1]Notes appear on page 49.

feeder. The pigtail leads would extend upward from the inner ends of the parasol wires and be soldered to the connector's center pin. The outer shield of the feed line, of course, is bonded (via the connector) to the metal tower itself, thus completing the electrical circuit.

Secure the transmission line to the tower throughout its length. It may be helpful to electrically bond the line's outer shield to the tower at ground level, midway up and at the apex. Ideally, the feed line should be run on the *inside* of the tower, but this may not be feasible. If a horizontal parasol top hat is employed, its hub must be placed on an insulator located at the tower apex, forming the feedpoint of the antenna. Typically, a section of the desired transmission line would be installed which is long enough to reach from the tower-top feedpoint to the ground. At the lower end of this line, a simple L-network can then be used to match the resulting input impedance to that of the station coax. As an alternative, an impedance-matching network could be placed at the feedpoint at the tower apex.

No input impedances have yet been measured on existing antennas, but depending on the system parameters, resistance values in the range of 15 to 60 Ω have been obtained by computer analysis. Resistances of 50 to 60 Ω are indicated when the tower height is around 0.15 λ. The input reactances predicted by *EZNEC* vary widely, depending not only upon the length of the parasol wires, but also upon the assumed diameters for the various conductors. Overall, increasing the tower height and/or making the parasol conductors more horizontal will yield increases in antenna gain and input resistance along with a decrease in the resonant length of the parasol conductors.

Reference Antennas

To serve as a standard against which the performance of several Parasol models could be compared, I computer-simulated an AM broadcast-style, ground-mounted, 1/4-λ vertical monopole antenna for use on 160 meters. This reference antenna was placed over real earth with a soil conductivity of 0.005 Siemens/meter and a dielectric constant of 13. The vertical element is constructed from two-inch diameter tubing, while the radials are made of #12 AWG wires. The ground system consists of 120 radials buried six inches; a five-foot-long, 1/2-inch diameter ground rod is also included. Except for the ground rod, each conductor was specified to be 134.368 feet long, which is a 1/4 λ at 1830 kHz. *EZNEC-4* predicts a peak gain of 1.28 dBi at a takeoff angle of 23° for this antenna and an input impedance of 40.83 + *j*22.89 Ω.

Because of software limitations, all of the metallic elements in any particular computer model must be composed of the same material. Since many Top-Band ham antennas are made from galvanized steel tower sections and copper wires, I decided that each *EZNEC-4* antenna simulation should be constructed entirely of aluminum, which has a conductivity between that of copper and steel.

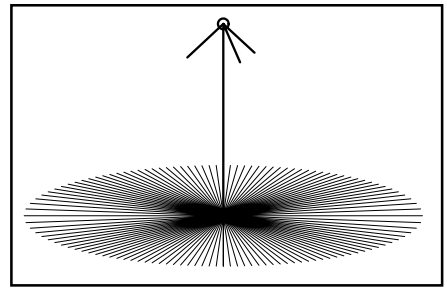


Figure 1—A Parasol antenna composed of a 70-foot tower with 120 buried 1/4-λ radials. The three parasol wires are each 46.533 feet long, and slope downward at an angle of 30° below the horizon. The small circle at the apex of the tower denotes the feedpoint.

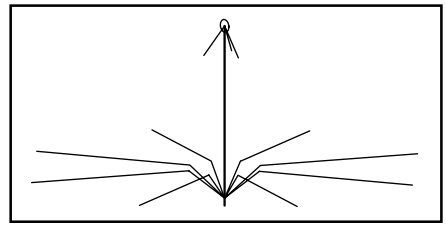


Figure 2—A Parasol antenna which again utilizes a 70-foot tower, along with three 51.894-foot parasol wires sloping downward at 30° below the horizon. The ground system is composed of eight gull-wing radials whose wing span is 134.4 feet (1/4 λ at 1830 kHz). These bent radials slope upward from ground level at an angle of 45° until reaching a height of 12 feet, at which point they become horizontal for the remainder of their length. The small circle at the apex of the tower denotes the feedpoint.

I also modeled a typical elevated vertical antenna. I combined a two-inch-diameter monopole with four horizontal #12 AWG radials, with the base of the antenna 30 feet above ground. All wire lengths were set to 134.368 feet, or 1/4 λ at the operating frequency of 1830 kHz. Now the gain slips to 1.12 dBi at an elevation angle of 19°, while the feedpoint impedance becomes 34.18 + *j*1.99 Ω.

Computer Models of Parasol Antennas with Quarter-Wave Radials

I computer-simulated several versions of the Parasol to determine the effects of changes in the ground system and to see how they would compare with the reference antennas mentioned earlier. In each case, the apex of the structure was fixed at 70 feet, which is just over 1/8 λ at 1830 kHz. The tower is made from a two-inch-diameter aluminum conductor, and there is also a five-foot-long, 1/2-inch-diameter aluminum ground rod.

The inner ends of three aluminum #12 AWG parasol wires were placed at the top of the tower and spaced uniformly around its axis at 120° intervals. From the tower apex, each of these wires slopes toward the ground at an angle of 30° below the horizontal. The feedpoint is between the junction of the three parasol wires (coax center conductor) and the top of the tower (coax outer conductor).

For the first Parasol model, an extensive ground system of 120 buried 1/4 λ (134.368 feet) radials was used, just as for the initial reference antenna described earlier (see Figure 1). The three parasol wires were trimmed to achieve resonance, obtained when each one measured 46.533 feet. The resulting gain was 1.26 dBi at a takeoff angle of 24°, and the input resistance was 28.62 Ω. The azimuthal-plane radiation pattern is highly circular, with a maximum gain variation of less than 0.01 dB at any compass heading.

The second Parasol model is similar to the first, with the exception of the ground system. If an extensive number of buried or on-the-ground radials cannot be installed, the Parasol may be equipped with gull-wing elevated radials. In this example, four #12 AWG radials were attached to the tower-base at ground level, and spaced 90° apart. These wires slope upward at an angle of 45° until reaching a height of 12 feet. The radials then extend outward horizontally at a height of 12 feet until they reach a maximum distance of 134.368 feet (1/4 λ) from the tower axis. Because they are bent, the physical length of these wires is a bit more than 1/4 λ. Resonance occurred when the length of the parasol wires was 51.595 feet, at which point the maximum antenna gain was 0.51 dBi at an elevation angle of 24°. With only four radials, the azimuthal-plane gain varies from 0.48 to 0.51 dBi, for a noncircularity of 0.03 dB. The input resistance is 16.59 Ω.

The third Parasol model uses eight gull-wing radials (see Figure 2) instead of the four that were included in version two mentioned earlier. Now the elevated radials are spaced 45° apart, but their bent configuration and length are the same as before. The vertical tower and ground rod are also unchanged, but the resonant length of the three sloping parasol wires increases slightly to 51.894 feet. Now the peak gain rises to 0.87 dBi at 23° take-off angle, while the input resistance is 15.16 Ω. Doubling the number of elevated gull-wing radials from four to eight increases the maximum gain by 0.36 dB, and also reduces the noncircularity in the azimuthal-plane radiation pattern to 0.01 dB.

The final Parasol model in this section again includes eight 1/4-λ radials, but now they are completely horizontal throughout their length. The inner ends of these eight wires are connected to the vertical portion of the parasol 12 feet above the ground and, of course, they're uniformly spaced at 45° intervals around the tower. To achieve resonance

here, the length of the parasol wires had to be stretched to 60.012 feet, at which point the gain was found to be 0.76 dBi at an elevation angle of 23°. The input resistance is just 12.44 Ω, and the noncircularity of the radiation pattern in the azimuthal-plane is 0.03 dB.

Table 1 summarizes the results thus far, and a number of observations can be made. First, all four versions of the Parasol antenna generate less gain than the classic 1/4-λ base-fed vertical monopole with a traditional ground system of 120 buried 1/4-λ radials. However, the performance of a Parasol with the same extensive ground system falls short of the reference antenna by only a small amount, and it actually exceeds the gain of an elevated vertical with full-size 1/4-λ radials and monopole. Second, a Parasol with eight 1/4-λ gull-wing elevated radials is only about 0.4 dB behind the AM-broadcast-style antenna. Surprisingly, radials that are completely horizontal don't do quite as well as those configured as gull wings. Lastly, the Parasol with many buried radials has a feedpoint resistance approaching 30 Ω, while those using gull-wing radials have values for R_{in} that are only about half as great.

Table 1

Comparisons of power-gain and input-impedance values for two reference antennas and four versions of the Parasol antenna, all of which employ full-size quarter-wave radials. Each Parasol configuration includes three wires that slope downward from the tower apex at an angle of 30° below the horizon. The length of the parasol wires was adjusted to achieve resonance in each case. At the operating frequency of 1830 kHz, a quarter-wavelength is equal to 134.368 feet.

Power Gain (dBi)	Take-Off Angle (Degrees)	Feedpoint Impedance (Ohms)
Ground-mounted, 1/4-λ, base-fed vertical monopole with 120 1/4λ radials		
1.28	23	40.83 + *j* 22.89
Elevated (H=30 feet), 1/4-λ, base-fed vertical monopole with four 1/4λ radials		
1.12	19	34.18 + *j* 1.99
70-foot Parasol, 120 buried 1/4-λ radials; 46.533-foot parasol wires		
1.26	24	28.62 + *j* 0.0006
70-foot Parasol, eight 1/4-λ elevated gull-wing radials; 51.595-foot parasol wires		
0.51	24	16.59 + *j* 0.0034
70-foot Parasol, eight 1/4-λ elevated gull-wing radials; 51.894-foot parasol wires		
0.87	23	15.16 + *j* 0.0019
70-foot Parasol, eight 1/4-λ horizontal elevated radials; 60.012-foot parasol wires		
0.76	23	12.44 – *j* 0.0044

Computer Models of Parasol Antennas with Shortened Radials

Next, let's take a look at what happens to the performance of a Parasol antenna when its radials are truncated to lengths less than 1/4 λ. Because the Parasol in these Top-Band examples is only 70 feet high (just over 1/8 λ), we can use computer analysis to learn how well this antenna works when the radials are also 70 feet long. For our reference antenna, a full-size 1/4-λ base-fed vertical element will be combined with a ground system of 120 buried 70-foot radials. The gain of this antenna is found to be 0.79 dBi at 22° take-off angle, while the feedpoint impedance is 45.05 + *j* 20.35 Ω.

If a 70-foot-tall Parasol is teamed with the same type of ground system described earlier (120 buried 70-foot radials), then the maximum gain is 0.59 dBi at a 24° take-off angle. To resonate the antenna, the parasol wires must have a length of 46.758 feet, which leads to an input resistance of 33.15 Ω. In this case, the down-slope angle of the three parasol wires was held constant at 30° below the horizontal. This means that either their earth-anchor points must be *outside* the limits of the smaller ground screen, or else they must be tied to elevated supports such as posts or trees. If we lower the outer ends of the parasol wires until their down-slope angle is 45°, then ideally their earth-anchor points would coincide with the perimeter of the 70-foot-radius ground screen (assuming no sag in the parasol wires). By doing so, the antenna gain falls to 0.24 dBi at an elevation angle of 24°, a drop of roughly 1/3 dB from that which was attainable when the down-slope angle of the parasol wires was only 30°. In this scenario, the parasol wires must be lengthened to 50.478 feet to achieve resonance, with a resulting input resistance of 27.93 Ω.

Table 2

Comparisons of power-gain and input-impedance values for one reference antenna and four versions of the Parasol antenna, all of which employ radials that are only 70 feet long (just over 1/8 λ). Each Parasol configuration (with one exception noted by the asterisk [*]) uses three wires that slope downward from the tower apex at an angle of 30° below the horizon. The length of the parasol wires was adjusted to achieve resonance in each case. At the operating frequency of 1830 kHz, a quarter-wavelength is 134.368 feet.

Power Gain (dBi)	Take-Off Angle (Degrees)	Feedpoint Impedance (Ohms)
Ground-mounted 1/4-λ, base-fed vertical monopole with 120 buried 70-foot radials		
0.79	22	45.05 + *j* 20.35
70-foot Parasol with 120 buried 70-foot radials; 46.758-foot parasol wires		
0.59	24	33.15 + *j* 0.0036
***70-foot Parasol with 120 buried 70-foot radials; parasol wires are 50.478 feet long, with a down-sloping angle of 45°**		
0.24	24	27.93 – *j* 0.0037
70-foot Parasol with eight 70-foot gull-wing, inductively loaded elevated radials; 51.397-foot parasol wires		
–0.43	25	22.90 – *j* 0.0049
70-foot Parasol with eight 70-foot, totally horizontal, inductively loaded elevated radials (parasol wires are 61.69 feet long)		
–1.15	25	20.24 + *j* 0.0069

Next, eight gull-wing radials were used for the ground screen, but their outer tips were extended to a horizontal distance of only 70 feet from the tower centerline. Recall that, because these radials are bent, their actual length is somewhat greater than 70 feet. Because the major portions of these gull-wing radials are raised to a height of 12 feet above ground, supports are needed to maintain this elevation at their outer ends. Thus, the down-slope angle of the parasol wires was kept at only 30°, with the expectation that similar elevated supports would also be used to anchor them. After trimming the parasol wires to resonance, the resulting antenna had a peak gain of only –3.32 dBi, which is quite low.

At this point, I decided to tune the shortened radials in an attempt to improve the antenna performance. With this in mind, the eight radials were divided into two adjoining groups of four. Next, each set of four adjacent gull-wing radials was converted into one leg of a very low dipole antenna by shorting their inner ends together, just above ground level. Then, equal loading inductances were added to both dipole legs to obtain resonance at 1830 kHz, which required a 7.06 µH inductor at the inner end of each leg. With the two loading inductors now in place, the parasol wires had to be retuned (to a length of 51.397 feet) to resonate the entire antenna at 1830 kHz. Now the gain rose to –0.43 dBi at 25° take-off

angle, with an input resistance of 22.9 Ω.

Last of all, eight shortened radials that were completely horizontal were used to form the ground system of the Parasol antenna. Each radial was 70 feet in length, and their height above ground was fixed at 12 feet, as usual. The peak gain for this configuration was very disappointing, at just −6.76 dBi. So, once again, a low dipole was created by joining the inner ends of four adjacent radials together to form one leg of a 12-foot-high dipole. This time, two 9.13 µH loading inductances were needed to resonate the radials at 1830 kHz. When the parasol wires were trimmed to resonance, the antenna yielded a maximum gain of −1.15 dBi at 25° take-off angle, and an input resistance of 20.24 Ω.

Table 2 lists the outcome for all of the "short-radial" antennas that have been examined. First, we can see that the classic AM broadcast-style antenna loses almost exactly half a decibel of gain when shortened radials are used instead of full-size quarter-wave wires (gain = 0.79 dBi for 70-foot radials, versus 1.28 dBi for radials that are 134.368 feet long). The 70-foot-tall Parasol antenna generates a gain of 0.59 dBi, which is only 0.2 dB down from the full-size 1/4-λ tower over the same (truncated) ground screen. However, when we increase the down-slope angle of the three parasol wires from 30 to 45°, the gain of the Parasol drops by another third of a decibel, to 0.24 dBi. Note that this version of the Parasol is roughly half as tall as the traditional 1/4-λ base-fed vertical monopole, and its ground screen consumes about one-fourth of the acreage of the typical quarter-wave-radial counterpoise, yet its gain is just 1.04 dB less than that of the normal antenna (at 1.28 dBi). If we substitute elevated radials that are inductively loaded, the gain drops still further, although gull-wing radials are superior to those that are horizontal throughout their entire length.

Parasol Arrays

Computer simulation indicates that multiple Parasol elements can be used effectively together. A 4-square array composed of conventional elevated quarter-wave monopoles is shown in Figure 3, where 12 quarter-wave horizontal radials are arranged in a tic-tac-toe fashion at 30 feet above ground. As usual, the vertical elements are two inches in diameter, while the radials are #12 AWG. This antenna yields excellent performance, with a forward gain of 6.37 dBi at 19° take-off angle, and an azimuthal-plane F/B of 31.46 dB at the same elevation angle.

If we lower this entire antenna by 30 feet, so the vertical elements have their insulated bases at ground level, then we can still use elevated radials if we convert them into gull-wing types (see Figure 4). With the modified radials sloping upward from the ground at a 45° angle until reaching their final height of 30 feet, we must extend their length in order to keep the same overall wing span as before (134.368 feet, or 1/4 λ at 1830 kHz). In

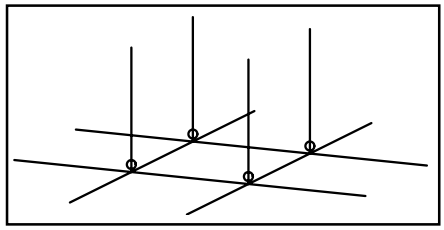


Figure 3—An elevated, base-fed, four-square phased array, using 12 horizontal radials arranged in a tic-tac-toe fashion. The length of each radial and each vertical element is 1/4 λ at 1830 kHz, while the elevated bases are 30 feet above the ground. The small circle at the base of each tower denotes the feedpoint.

Table 3

Comparisons of forward gain and azimuthal-plane F/B for several versions of the four-square phased-vertical array. All of the Parasol configurations use 70-foot-tall vertical elements in combination with three parasol wires that slope downward at an angle of 30° below the horizon.

Power Gain (dBi)	Take-Off Angle (Degrees)	Azimuthal-Plane F/B (dB)
Elevated (H=30 feet) 1/4-λ base-fed elements with 12 elevated, horizontal 1/4-λ radials		
6.37	19	31.46
Ground-mounted, 1/4-λ base-fed elements with 12 elevated, gull-wing 1/4-λ radials		
5.16	19	22.11
70-foot-tall parasol elements with 12 elevated, gull-wing 1/4-λ radials (parasol wires are 51.595 feet long)		
4.83	22	23.86
70-foot-tall parasol elements with 12 elevated, horizontal 1/4-λ radials (parasol wires are 60.012 feet long)		
4.74	23	25.26
70-foot-tall parasol elements with 196 buried, 1/4-λ radials (parasol wires are 46.533 feet long)		
5.16	23	23.43

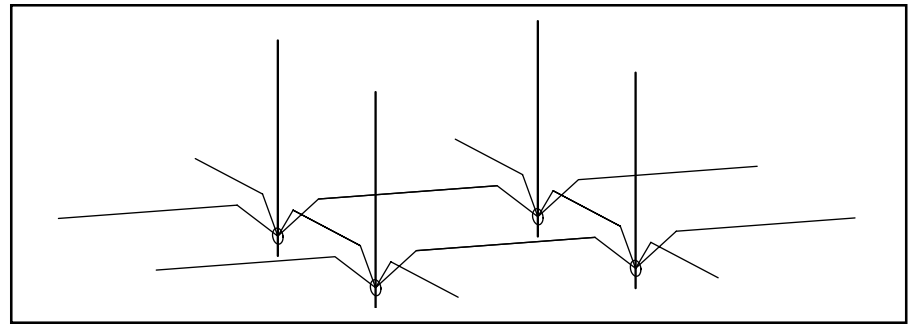


Figure 4—A ground-mounted, base-fed, four-square phased array, using 12 gull-wing radials arranged in a tic-tac-toe fashion. The height of each vertical element, and the wing-span of each radial, is 1/4 λ at 1830 kHz, while the horizontal portion of each radial is elevated 30 feet above the ground. The small circle at the base of each tower denotes the feedpoint.

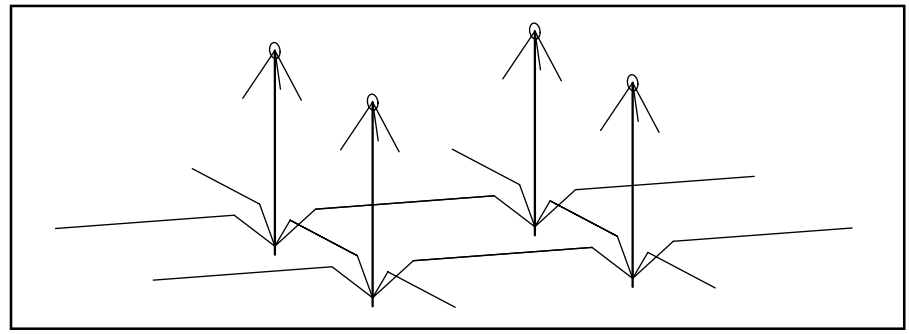


Figure 5—A four-square parasol array using 70-foot towers and 12 gull-wing radials. Each radial has a wing span of 134.4 feet (1/4 λ at 1830 kHz); its horizontal portion is elevated 12 feet above ground. Each element has three 51.595-foot parasol wires that slope downward at an angle of 30° below the horizon. The small circle at the apex of each tower denotes the feedpoint.

this configuration, the gain falls to 5.16 dBi at 19° elevation angle, and the corresponding F/B in the azimuthal plane is now 22.11 dB.

A Parasol four-square for the Top Band, using 70-foot towers is, of course, considerably shorter. Figure 5 is a drawing of such an array, with 12 gull-wing radials whose horizontal sections are only 12 feet off the ground. Again, the radials have been extended so their span remains at 134.368 feet. As usual, each element has three parasol wires (length = 51.595 feet) sloping downward at 30° below the horizon. The gain here is 4.83 dBi at 22° take-off angle, and the F/B is 23.86 dB in the azimuthal plane. Adding four more gull-wing radials (one oriented along the bore-sight in each of the four directions of fire) bumps the gain up only slightly, to 4.89 dBi. On the other hand, if the four "shared" radials are omitted, so that each vertical element has just two gull-wing radials all to itself, then the forward gain drops to 4.65 dBi.

Returning to the design shown in Figure 5, the 12 gull-wing radials may be replaced by elevated $^1/_4$-λ radials that are completely horizontal throughout their lengths. When this is done, the forward gain falls slightly to 4.74 dBi at an elevation angle of 23°, but the azimuthal-plane F/B improves to 25.26 dB.

If better performance is desired, we can resort to the classical tradition of "lots of radials in/on the ground." Figure 6 shows a parasol 4-square that is similar to that of Figure 5, but the elevated radials have been removed, and the length of the parasol wires is adjusted to 46.533 feet. Now each element has 49 buried radials that are spaced 3° apart, spread out in an arc directly in front of each tower. In this manner, none of the radials overlap each other, and all can be a full-size quarter-wave long. This array yields a gain of 5.16 dBi at 23° elevation angle, with an accompanying F/B of 23.43 dB in the azimuthal plane.

Table 3 provides the important data for the various four-square arrays outlined here. Notice that none of the Parasol four-squares is as good as the full-size elevated array, which is roughly 94 feet taller. However, the parasol array which includes four sectors of buried radials has just as much forward gain as the ground-mounted base-fed four-square with quarter-wave vertical elements and full-size gull-wing elevated radials. Further, even the worst of the parasol arrays has roughly 3.5 dB of forward gain compared to a single (omnidirectional) AM broadcast-style antenna, with the added benefit of 20+ dB of F/B. The elevation- and azimuthal-plane radiation patterns for most of these arrays are shown in Figures 7 and 8 respectively.

Computer Models Using Other Metals

If a Parasol antenna is constructed for operation on the Top Band, it is likely that a galvanized (zinc-coated) steel tower, with a height of 60 to 80 feet, would serve as the vertical element. *EZNEC4* models of all-zinc versions of the antennas described in this article show gain values that are within 0.1 dB of those given for the equivalent aluminum designs.

On-the-Air Tests

Two different versions of the Parasol antenna were built at commercial AM broadcast stations in northwestern Pennsylvania. The first was constructed in the fall of 1998, and the second during the latter part of 1999. Subjectively, both of these antennas performed satisfactorily, although no detailed measurement data was collected in either case. A Top-Band four-square parasol array

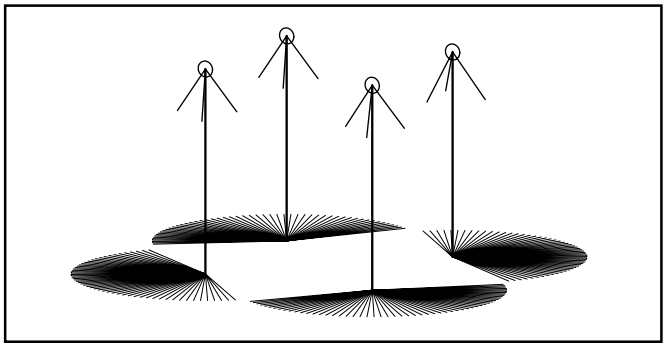


Figure 6—A four-square parasol array using 70-foot towers and buried radials. The ground screen for each element consists of 49 buried $^1/_4$-λ radials, that are spaced 3° apart in azimuth and cover a 144° sector directly in front of that element. Each antenna also has three 46.533-foot parasol radiator-wires that slope downward at an angle of 30° below the horizon. The small circle at the apex of each tower denotes the feedpoint.

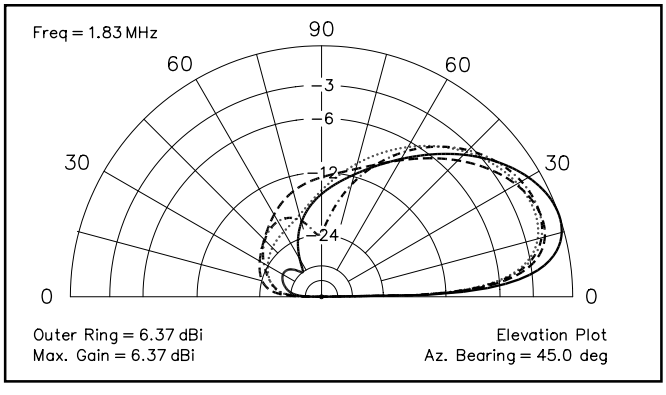


Figure 7—Elevation-plane radiation patterns for several of the four-square phased arrays discussed in the text are represented by different line types: The solid line represents the elevated base-fed array (H = 30 feet) using $^1/_4$λ vertical monopoles and 12 $^1/_4$-λ radials. The dashed line is the pattern of the ground-mounted base-fed array utilizing quarter-wave vertical monopoles and 12 gull-wing radials with a wing span of $^1/_4$-λ. The dotted line is the pattern of the Parasol array using 70-foot towers and 12 gull-wing radials with a wing span of $^1/_4$ λ. The combination dashed/dotted line is the pattern for the Parasol array using 70-foot towers and 196 buried $^1/_4$λ radials (49 radials per element).

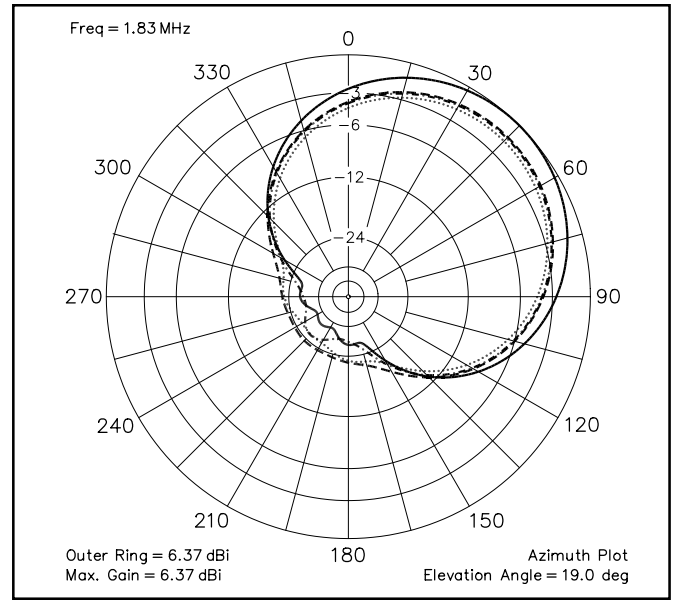


Figure 8—Azimuthal-plane radiation patterns for several of the four-square phased arrays discussed in the text are represented by different line types: The solid line represents the elevated (H = 30 feet) base-fed array using quarter-wave vertical monopoles and 12 $^1/_4$-λ radials. The dashed line is the pattern of the ground-mounted base-fed array using $^1/_4$-λ vertical monopoles and 12 gull-wing radials with a wing span of $^1/_4$ λ. The dotted line is the pattern of the Parasol array using 70-foot towers and 12 gull-wing radials with a wing span of $^1/_4$ λ. The combination dashed/dotted line is the pattern for the Parasol array using 70-foot towers and 196 buried $^1/_4$-λ radials.

How Does the Parasol Work?

Imagine a horizontal wire located some distance above the ground. If this wire is a half-wavelength long at some particular frequency, then the distribution of current and voltage on it will be as shown in Figure A. Notice that the voltage is greatest at the ends of the wire, while the current peak is in the middle. If we place the feed point at the center of the wire, then the input impedance will be low, because the voltage is low and the current is high at this point (Z = (V/I)). If we move the feed point so that it is off center, then the input impedance will be higher because we will be driving the antenna at a location where the voltage is larger than before, while the current has diminished. The shape of the radiation patterns of the two antennas should be the same because the voltage and current distributions are unchanged. This isn't strictly true, in general, due to the presence of the feed line, loss in the wires, and so on.

Let's take our half-wavelength horizontal dipole and move the feed point back to the center. Next, rotate it 90° (stand it on one end) so that the lower tip is a few feet above the ground. We can do this by hanging the wire from a high branch in a tall tree. Ideally, the distributions of voltage and current on the wire will be the same as when the wire was horizontal, although the ground and the tree may have some impact (which we will ignore). See Figure B. As a practical example, let's examine a half-wavelength of No. 12 aluminum wire at 14.175 MHz, suspended over average soil so that its lower end is 3 feet above the ground. When center fed, the gain is 0.39 dBi at 17° take-off angle and the impedance is 92.37 +*j*40.14Ω.

As was true for the horizontal antenna, we can easily move the feed point so that it is off center. This shouldn't change the radiation pattern shape or size since the distribution of current and voltage will remain as before. However, the input impedance will rise because of the increase in the ratio of voltage to current at the new feed point. Referring again to our half-wavelength center-fed 20-meter vertical dipole, let's move the feed point upward by 1/8-wavelength as shown on the right side of Figure B. Now the gain falls slightly to 0.23 dBi at 17° take-off angle, while the input impedance rises to 214.6 +*j*64.25Ω. When we compare the radiation patterns for these two vertical dipoles, we find that they are very similar in both size and shape.

Now suppose that our tree support isn't quite tall enough for our needs, and as a result, we aren't able to make the extreme top portion of our wire antenna completely vertical. To solve this problem, we replace the upper tip with a couple of horizontal wires, forming a "top hat." From experience, we expect that both the gain and the input impedance of this modified antenna will decrease somewhat because we have had to shorten it. Returning to our 20-meter off-center-fed antenna example, we will remove the upper 1/8 wavelength (the entire portion above the elevated feed point) and replace this single conductor with a top hat composed of three 1/8-wavelength horizontal wires that are spaced uniformly, 120° apart in azimuth, around the top of the remaining vertical wire. See the left-hand side of Figure C.

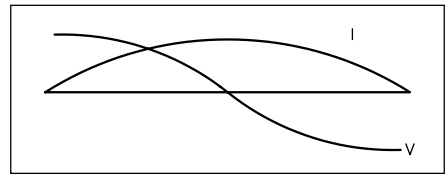


Figure A—The current and voltage distribution on a half-wavelength horizontal dipole system.

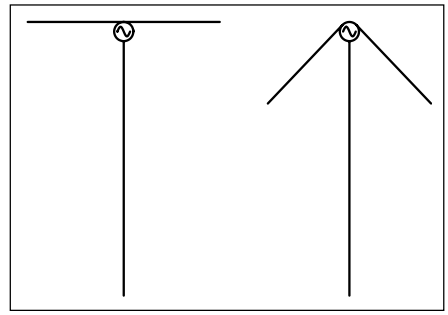


Figure C—The upper 1/8-wavelength of the vertical dipole is replaced by several symmetrically disposed horizontal top hat wires, each of which is 1/8-wavelength long (left). These top-hat wires can also be allowed to droop at bit, as shown on the right.

Notice that if you turn the drawing upside down, it looks just like a 3/8-wavelength tall "ground plane" with three 1/8-wavelength radials. Our 20-meter example antenna, when configured as shown, has a gain of 0.09 dBi at 19° take-off angle and an input impedance of 123.9 +*j*267.1Ω. The gain and the input resistance have fallen, as we expected. The input reactance has become quite large, however, since we used three 1/8-wavelength top hat wires to replace a single 1/8-wavelength vertical section. This makes the antenna look quite a bit "longer" and the input impedance becomes highly inductive as a result.

If we can't make the top hat completely horizontal, we can allow it to droop a bit, as shown in the right-hand side of Figure C. However, this will cause the gain to fall, since the current flowing in the top hat wires will now partially oppose the current flowing in the vertical wire. For our 20-meter antenna example, allowing the top hat wires to droop at an angle of 25° below the horizontal yields a gain of –0.01 dBi at a 19° take-off angle, and the input impedance falls to 105.6 +*j*238.1Ω.

Finally, we are ready to perform the very last step in the transformation of our half-wavelength vertical antenna into a "parasol." As is often seen in AM broadcast installations (as well as ham applications), the lower half of the half-wavelength vertical can be removed and replaced by a system of radials. The voltage is zero at the electrical center of the half-wavelength element, so the antenna may be grounded at that point. The radials may be buried in the ground, laid on top of the ground or elevated (see Figure D). To modify our 20-meter vertical with the drooping top hat, we chop off the bottom 1/4-wavelength portion of the vertical section, leaving only the upper 1/8-wavelength portion behind, along with the feed point and the three 1/8-wavelength parasol wires. If a classical AM-broadcast-style ground system of 120 1/4-wavelength buried radial wires is used, then the gain of this parasol antenna is 0.10 dBi at 29° take-off angle and the input impedance is 22.06 +*j*224.9Ω. As mentioned in the text, resonance is usually achieved when the parasol wires are shorter than 1/8-wavelength, and this is borne out here. Also, making the parasol wires more horizontal (and/or increasing the height of the vertical section) will generate more gain and a higher value for the input resistance.—*Al Christman, K3LC*

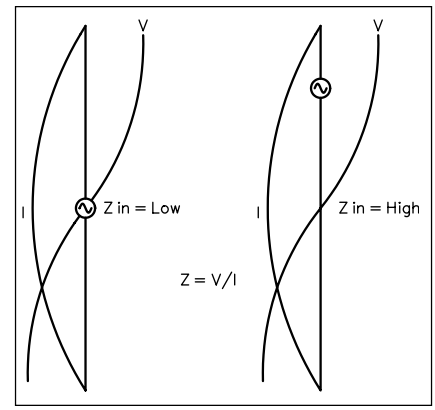


Figure B—Moving the feed point on our now-vertical half-wavelength dipole changes the input impedance from a low value (left) to a higher value (right), but doesn't alter the current and voltage distribution on the wire.

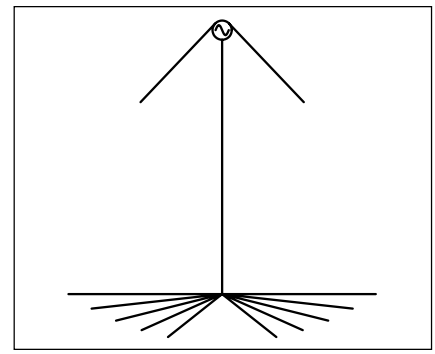


Figure D—The entire lower half (1/4-wavelength) of the original vertical dipole can be removed and the remaining portion placed directly over a ground plane consisting of in-the-ground, on-the-ground or elevated radials.

similar to the one shown in Figure 6 is planned for installation at a station in northwestern Pennsylvania in the near future.

Summary

This article has provided information on the design of a low-profile vertically polarized antenna that is appropriate for a variety of applications. The structure is only about half as tall as a conventional $^1/_4$-λ monopole, and computer analysis indicates that its performance is very good, considering its size. Although this material has focused on Top-Band antennas, the parasol can be used on any frequency at which its particular design attributes are needed. In locations where antenna- or tower-height restrictions are strictly enforced, the parasol can provide relief. For example, a four-square parasol array for the 40-meter band would require elements that are less than 18 feet high. Although several of the antennas that are analyzed in this article make use of *buried* radials, it is likely that similar results would be obtained if *on-the-ground* radials were utilized instead.

To obtain maximum performance from these short antennas, it is important to pay close attention to system losses. Keep the contact resistance at all connections as low as possible. If galvanized tower sections are used, it is very important to maintain the integrity of the zinc coating. Further, when adjacent tower sections are joined together, a low-resistance joint is necessary. The use of conductive grease is helpful, along with tight mechanical bonding. The "parasol" wires make up the ungrounded portion of the antenna, so their electrical conductivity should be as high as possible. Use large-diameter conductors made of copper or Copperweld for these wires (or aluminum tubing if the frequency is high enough).

Finally, realize that computer models are imperfect representations of the real world. They cannot possibly include all of the features that are actually present, such as buildings, vegetation, other conductive objects, variations in wire diameter and composition, irregular terrain, changes in ground conductivity and permittivity, etc.

Notes

[1]*EZNEC* antenna software is available from Roy Lewallen, W7EL, PO Box 6658, Beaverton, OR 97007; tel 503-646-2885, fax 503-671-9046; w7el@teleport.com. Price: $89 postpaid; add $3 outside the US and Canada. Visa and MasterCard charge cards accepted.

[2]G. J. Burke and A. J. Poggio, *Numerical Electromagnetics Code (NEC) - Method of Moments*, Naval Ocean Systems Center, San Diego, California, January 1981.

[3]Al Christman and Roger Radcliff, "Using Elevated Radials with Ground-Mounted Towers," *IEEE Transactions on Broadcasting*, Volume 37, Number 3, September 1991.

[4]Al Christman, R. Paul Zeineddin, Roger Radcliff, and Jim Breakall, "Using Elevated Radials In Conjunction with Deteriorated Buried-Radial Ground Systems," *IEEE Transactions on Broadcasting*, Volume 39, Number 2, June 1993.

[5]R. Dean Straw, N6BV, "Antennas Here are Some Verticals on the Beach...", *The ARRL Antenna Compendium*, (Newington: ARRL, Vol 6, 1999), pp 216 to 225.

Al Christman, K3LC, has a PhD in electrical and computer engineering from Ohio University and is currently serving as a professor in the EE department at Grove City College in western Pennsylvania. Al is a Vietnam-era veteran, having served on active duty with the US Army. First licensed as WA3WZD in 1974, Al is an active DXer with more than 320 countries worked on 20-meter SSB. He and his wife, Lynn, recently celebrated the birth of their first grandchild. You can contact Al Christman, K3LC, at Grove City College, 100 Campus Dr, Grove City, PA 16127-2104. QST

NEW BOOKS

THE VICTORIAN INTERNET

By Tom Standage

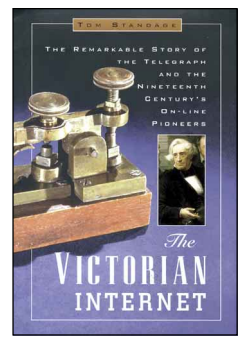
Published by Walker and Company, 45 Hudson St, New York, NY 10014. 6 x 9 inches, 227 pages. First edition, 1998. Hardcover. Available from Barnes and Noble retailers, or online at **http://www.bn.com/**. *$22 (suggested list price).*

Reviewed by Steve Ford, WB8IMY
QST Managing Editor

◊ We consider high-speed communication networks to be a purely modern idea, but people have recognized the need for rapid communication for centuries. For most of the history of mankind, messages could travel over long distances no faster than a courier could on horseback. And for much of that time people have attempted to improve on this painfully slow method of exchanging information.

As Tom Standage points out in *The Victorian Internet*, experiments with electrical signaling predate the telegraph by nearly 100 years. In fact, *The Victorian Internet* begins with a description of a curious experiment by French scientist Jean-Antoine Nollet. With the cooperation of about 200 monks who were joined to each other by pieces of wire, Nollet discovered that electrical impulses appeared to propagate through this "circuit" at fantastic speed —instantaneously, as far as he could tell. Apply a voltage to the monk at one end and all of the other monks, including the one at the opposite end, writhed in pain at the same moment.

Although this experiment sounds like something out of a Monty Python comedy skit, it foreshadowed the communication revolution to come. *The Victorian Internet* chronicles the detours and frustrations that finally led to the first global communication network.



I was surprised to learn that the first "high speed" network was not electric in any sense. As described in *The Victorian Internet*, the first successful networks were based on a system of *visual* signaling towers. The tall towers were positioned such that they would be within visual range of each other, spanning distances of several miles or more. The operators at each tower would manipulate gigantic semaphore "flags" to spell out words, relaying messages from one tower to the next. Crude as this sounds, the system was a marvel of its day. Finally, one could send short messages over tens or hundreds of miles in less than 30 minutes. Although the towers have long since disappeared, they once comprised a network that spanned much of Europe and even found popularity in the US.

It was the visual "telegraph" network that inspired Samuel Morse and his contemporaries, such as Cooke and Wheatstone in England, to create an electrical system that would be faster by orders of magnitude and would cover much greater distances. You'd think that such a system would be embraced immediately but, as you'll discover in *The Victorian Internet*, stone walls of skepticism blocked the pioneers' innovative ideas. Morse, for example, had few supporters in Congress for his system even after he proved repeatedly how well it worked. Even after Congress grudgingly allocated the necessary funding to develop the first electric telegraph network in the US, the public regarded it as an intriguing novelty and little else.

Through sheer persistence Morse finally won the war and by the 1870s the telegraph had evolved into a global network with undersea cables linking every populated continent and telegraph offices in the most far-flung locations. The telegraph was no longer a novelty but, instead, had become a necessity. Only the birth of the telephone would finally bring down the curtain on the "Victorian Internet."

Tom Standage does an outstanding job of uniting the disparate threads of the history of the telegraph and weaving them into a compelling story. (I found myself muttering in astonishment at the incredible stubbornness and shortsightedness of the technological naysayers of the era. It's a miracle that the telegraph got off the ground at all!) *The Victorian Internet* is an apt title because the parallels between the telegraph network and the modern Internet are uncanny. We face many of the network communication challenges today that would have been familiar to our ancestors. (The problems of increasing "bandwidth" needs, privacy concerns and network overload, just to name a few.) And, of course, we have our own naysayers peering into our future through darkened glasses. QST

By Andrew S. Griffith, W4ULD

A 146- and 445-MHz J-Pole Antenna

Pipe your signals to 146 and 445 MHz with one antenna!

Getting on 146 and 445-MHz with a single J-pole antenna can be done inexpensively. I did it by building the dual-band J pole shown in Figure 1. The total materials cost about $21, and only commonly available hand tools are required for assembly. Interested?

Some Background

A vertical J-pole or dipole designed for use at 146 MHz will resonate at 440 MHz because it's about $^3/_2\lambda$ long at that frequency. However, according to *EZNEC*,[1] most of the 445-MHz radiation is at an elevation angle of about 45° instead of a lower angle desired for repeater and ground-wave communication. Also, the antenna's input impedance at 445 MHz is about two and a half times that of the 146-MHz value. For dual-band operation, both of these hurdles can be overcome by simply placing two 445-MHz elements close to the feedpoint of the 146-MHz $^1/_2$-λ element. The vertical radiation pattern of the resulting antenna at 445 MHz is shown in Figure 2. The 445-MHz elements have little effect on 2-meter operation. Once the antenna is adjusted for 2-meter operation, the 445-MHz antenna input impedance can be adjusted to equal the 2-meter impedance by adjusting the spacing of the 445-MHz elements from the main element. Increasing the spacing between the elements increases the impedance at 445 MHz and vice versa. The length of the 445-MHz elements primarily affects the resonant frequency and to some extent, also affects the input impedance. The length of each 445-MHz element is less than $^1/_2\ \lambda$ at 445 MHz. At a true $^1/_2\ \lambda$, the impedance and resonant frequency appear to be insensitive to spacing and length adjustments.

At 146 MHz, this antenna's input impedance is about 65 Ω, delivering an SWR of about 1.3:1 at resonance. Placing a $^1/_4$-λ Q section in the feed line at the feedpoint can lower the SWR between 144 and 148 MHz. The Q-section impedance is about 59 Ω. Because the Q-section length is about $^3/_4\ \lambda$ at 445 MHz, it also works at this frequency.

Table 1

Materials Required

10 feet of copper water pipe (type L or M; see text)
5 inches of $^1/_2$ inch PVC pipe
1—$^1/_2$ inch copper T
1— $^1/_2$ inch copper L
2—$^1/_2$ inch copper pipe caps
15 inches of $^3/_8$-inch OD copper tubing (0.331-inch ID)
2—Pieces of $1^1/_4$ in × $6^1/_8$ in × $^1/_4$-inch-thick Plexiglas
5 ft of RadioShack RG-8 coax (RS 278-1312)
1—Teflon-silver PL-259 connector.

How It Works

The antenna's main vertical element (see Figure 1 and the title page photo) is about $^1/_2\ \lambda$ long at 146 MHz and employs a $^1/_4$-λ stub at the bottom to decouple the main element from the mast and feed line. The antenna is similar to a standard J-pole antenna[2, 3] except that it's *fed at the center of the main element* instead of tapping the feed line partway up the stub. The coaxial-cable feed line passes through the main element. Two elements, almost $^1/_2\ \lambda$ long at 445 MHz, are placed near the antenna's feedpoint and parallel to the main element. These elements are parasitic and don't need a separate feed line; they are excited by the main vertical element. The antenna is quite efficient because no lossy matching networks or coils are used. The gain on both bands is about the same as a vertical dipole or single-band J pole.

As described later, the Q-section is made by replacing $13^5/_8$ inches of the coaxial-cable feed line shield braid with $13^5/_8$ inches of $^3/_8$-inch copper tubing.

Construction

The antenna elements are made of $^1/_2$-inch copper water pipe and soldered fittings. The center insulator (see Figure 3) is made from $^1/_2$-inch PVC pipe and the standoff insulators (see Figure 4) for the 445-MHz elements are made of $^1/_4$-inch-thick Plexiglas. You can purchase the $^1/_2$-inch copper pipe, copper fittings and $^1/_2$-inch PVC pipe from a building supply outlet. (If you're going to build two antennas, you can purchase the copper pipe much cheaper in 20-foot lengths at a plumbing supply.) The Teflon-silver PL-259 connector and RG-8 coax are available from RadioShack. (You can find good buys on such connectors at hamfests.) Short lengths of $^3/_8$-inch-diameter tubing can be pur-

[1]Notes appear on page 53.

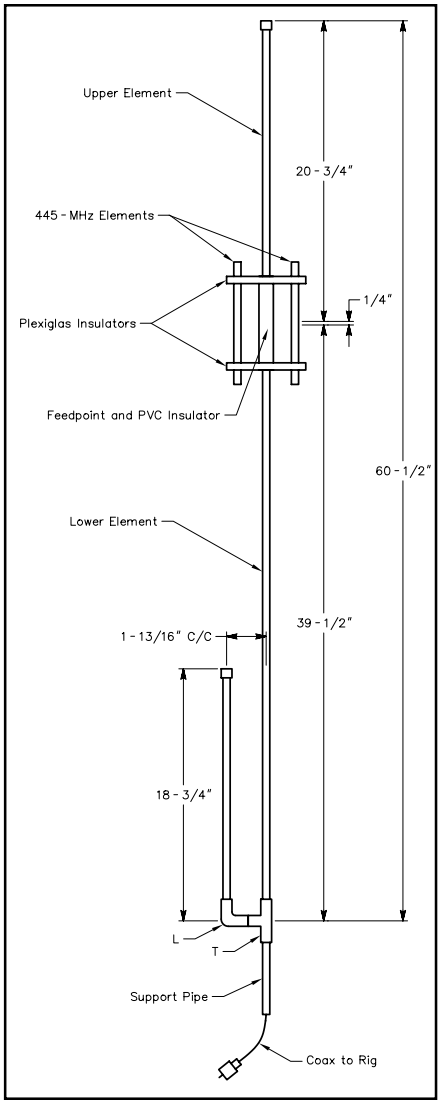


Figure 1—General dimensions of the two-band J-pole antenna. The copper-plumbing L and T at the bottom of the antenna fix the spacing between the stub and lower portion of the main element.

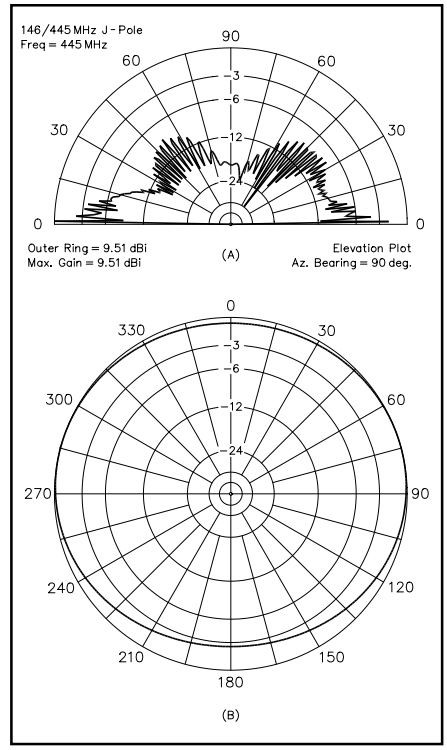


Figure 2—*EZNEC* plot of the antenna's vertical (A) and azimuthal (B) radiation patterns at 445 MHz.

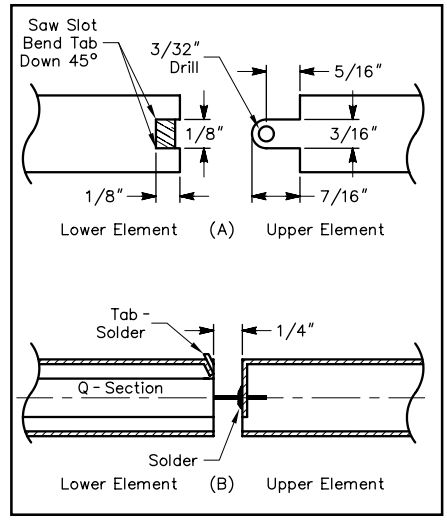


Figure 3—Feedpoint detail. The tab on the upper portion of the main element accepts the center conductor of the coax of the Q section. See Figure 9.

chased at a hardware store. Small pieces of $^1/_4$-inch-thick Plexiglas can usually be found as scrap at a glass shop. Broken golf-cart windshields are another source of Plexiglas.

In any 445-MHz antenna construction project, it's important to adhere to the given dimensions. A dimension deviation of even $^1/_{16}$ inch is considerable at 445 MHz, especially at the feedpoint. It's practically impossible to construct a feedpoint connection at 445 MHz without introducing some transformation of the antenna impedance. Therefore, you should closely follow the dimensions and feedpoint detail described. I built a second antenna using the plans provided here and it performs exactly like the prototype. If you intend to mount the antenna on a mast, use type L copper pipe for the elements. Use type M pipe (it's lighter than type L) if you intend to suspend the antenna from a support.

Before soldering, polish all mating pipe pieces with #0000 steel wool. I recommend using a propane torch for soldering the joints. The trick in soldering copper pipe and fittings is to get the copper hot enough to melt the solder *before* applying solder. The solder then flows into the joint without leaving drips that require cleanup.

First, cut two pieces of copper pipe to make the stub and the $39^1/_2$ inch lower element. Cut these pieces to their final lengths after soldering each piece to the respective **L** and **T** at what will be the bottom ends of the stub and lower element. Measure the length of these pieces from the *center* of the **T** and **L** connection. Cut the stub pipe to a length of $18^{11}/_{16}$ inches allowing about $^1/_{16}$ inch for placement of a cap at the top of the stub. Use a 1-inch length of pipe to join the **T** and **L**. The **T** and **L** butt together to fix the $1^{13}/_{16}$ inch center-to-center spacing between the stub and the lower element. The mounting/support section below the lower element can be any length, but should be at least 12 inches to allow clamping to a mast.

Make two hacksaw slots in the top of the lower element as shown at the left in Figure 3A. Bend the tab between the slots about 45° toward the center of the pipe.

Before cutting the upper element to length, some work must be done. At what will be the bottom of the upper element, cut a tab as shown at the right in Figure 3A. Drill a $^3/_{32}$-inch diameter hole through the end of the tab. (It is at this tab where the center conductor of the feed-line coax will later be attached.) Dress the tab with a file and tin the tab using a propane torch or high-power soldering iron. Bend the tab 90° toward the pipe center as in Figure 3B. *Once the tab is bent,* cut the upper element to a length of $20^3/_4$ inches allowing about $^1/_{16}$ inch for placement of a cap on the upper-element top.

You can fabricate the standoff insulators shown in Figure 4 from $^1/_4$-inch-thick Plexiglas or $^1/_2$-inch PVC pipe. Plexiglas is easier to use because the $^5/_8$-inch-diameter holes can be made using a hand-held drill and a common wood spade bit. Drill at a low speed to prevent melting the Plexiglas. If you use PVC pipe for the standoffs, use a drill press to keep the holes properly aligned. Cut the two 445-MHz elements to a length of $11^1/_{16}$ inches (see Figure 5). Make the center insulator from a 5-inch length of $^1/_2$-inch PVC pipe (see Figure 6). Cut a longitudinal slit the entire length of the pipe; I used a hacksaw to do this.

The coaxial-cable feed line extending from the antenna's feedpoint to just below the support section can be any convenient length, but use RadioShack RG-8 (RS 278-1312)[4] to get the proper velocity factor and impedance for the Q section. The Q-section details are shown in Figure 7. The Q-section consists of a $13^5/_8$-inch length of $^3/_8$-inch copper tubing (Figure 7A) slid over the center insulation of the top end of the feed line (Figure 7B).

On the Q section, fashion a tab on the end of the tubing similar to that at the bottom of the upper element (see Figure 7A). Following Figure 7B, cut the end of the feed

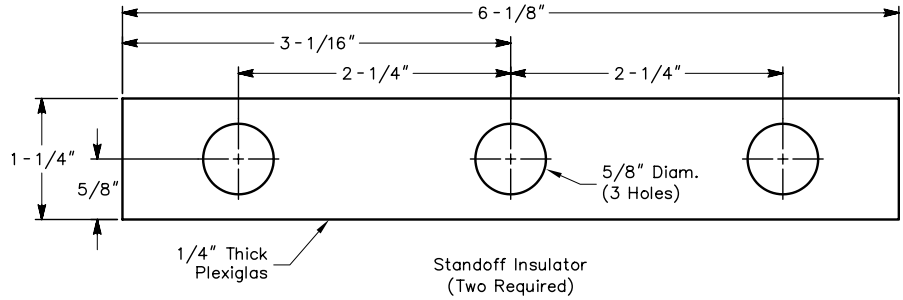


Figure 4—Two standoff insulators made of 1/4-inch-thick Plexiglas sheet or 1/2-inch PVC pipe are required to hold the 445-MHz elements adjacent to the main element.

line with a sharp knife to expose 7/16 inch of the center conductor. (Figure 8 shows the finished feedpoint end of the Q section.) Remove 13 1/4 inches of the coaxial-cable feed line's outer cover and the shield to expose the dielectric. Then remove an additional 5/8 inch of the coaxial cable's outer covering exposing the shield braid. Clean and tin the tab and the opposite end of the Q-section tubing. Slide the tubing over the coax and under the shield so that the end of the tubing with the tab is even with the end of the center dielectric (Figure 7B). Using a high-power soldering iron or low torch flame, solder the shield to the tubing, allowing the solder flow through the braid. Dress the joint so that it passes through the lower element.

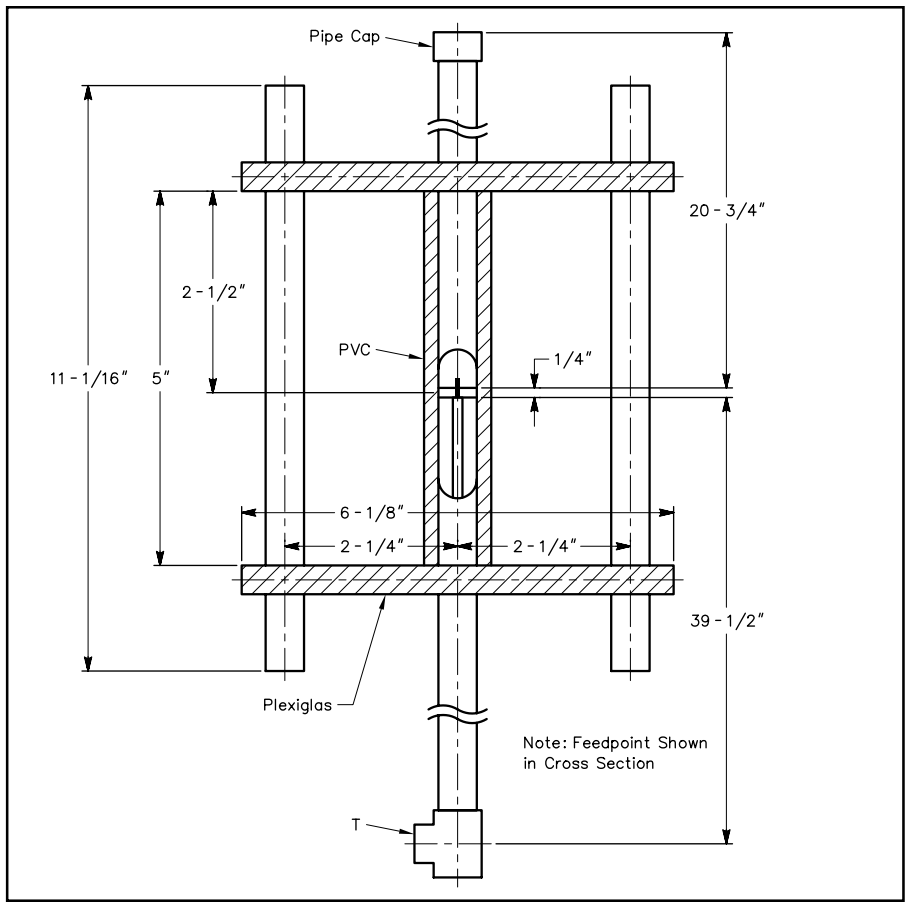


Figure 5—A cross-sectional view of the two-band J-pole's feedpoint.

Assembly

Clamp the lower element and stub assembly horizontally in a vise about 14 inches from the top of the lower element. Slide the Q section and feed line into and through the support section until the Q section is exactly even with the top of the lower element. While keeping the Q section in the center of the lower element (Figure 3B), bend the tab on the Q section over the tab on the lower element. Solder the tabs together. Snip off the excess tab length of the Q-section and file the joint flush with the surface of the lower element.

Slide one standoff onto the lower element until it is about 10 inches from the feedpoint. Open the slit in the center insulator and hold open the slit by inserting two pennies (or something similar) side by side at four points within the slit. Slide the center insulator over the lower element until it touches the standoff. Bring the upper element into place passing the center conductor of the coax into the hole in the tab according to Figure 3B. To hold the feedpoint in place, clamp the lower and upper elements to a strip of wood using hose clamps. Solder the coax center conductor to the upper-element tab by heating the upper element near the base of the tab and letting the heat flow down the tab.

Remove the hose clamps and wood strip around the feedpoint. Slide the center insulator up until it is centered over the feedpoint and remove the pennies. The center insulator will clamp tightly around the feedpoint. As shown in Figure 5, assemble

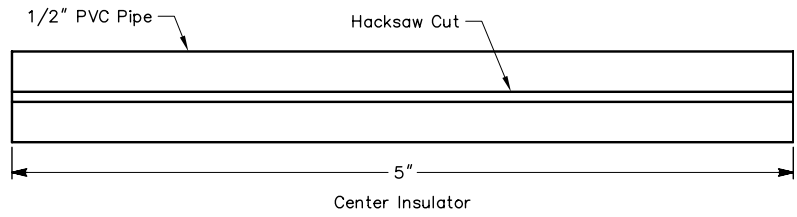


Figure 6—Center insulator dimensions.

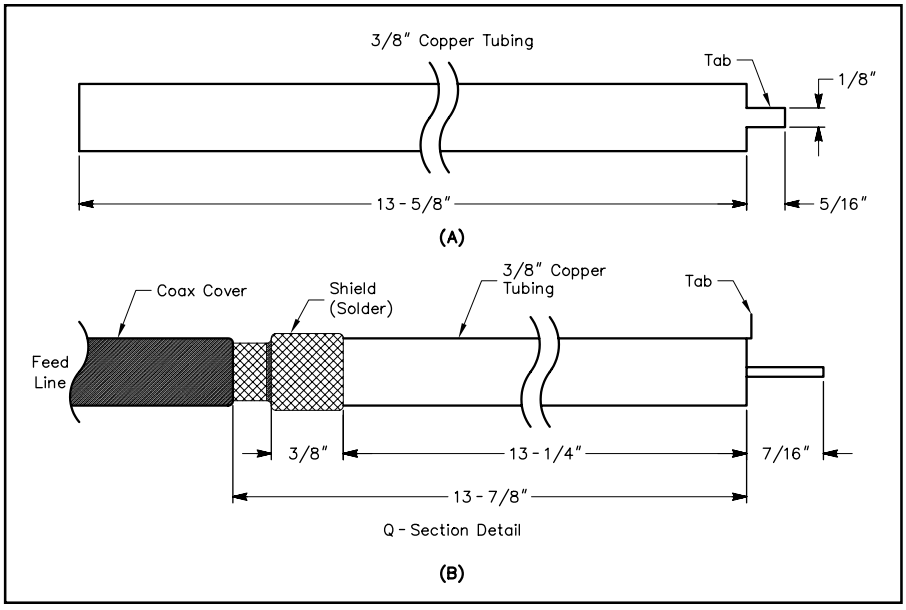


Figure 7—Q-section detail. A length of copper tubing is slid over the coaxial cable's dielectric and soldered to the shield braid at one end; see text.

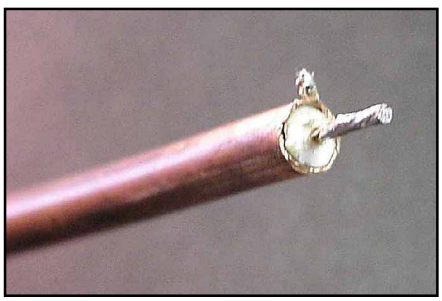


Figure 8—Feedpoint end of the Q section prior to final assembly.

Figure 9—This cutaway view shows the tabs of the Q section and lower element soldered together.

the 445-MHz elements and upper standoff. Use silicone cement or caulking to hold the 445-MHz elements in place. Seal the top, bottom and slit of the center insulator with silicone cement or caulking. Install the cap on the top of the upper element.

If you intend to suspend the antenna by its top in a tree, install a top insulator made from PVC pipe and provide a support for the feed line at the bottom of the support section.

Evaluation

I found that the SWR and frequency range of the antenna are about the same when the antenna is mounted on a 20-foot mast as when it's suspended by its top at 40 feet. With 50 feet of CQ-4XL cable[5] ("poor man's Hardline"), the SWR measured 1.3:1 or less from 144 MHz to 148 MHz and 1.5:1 or less from 438 MHz to 450 MHz. Because I don't have a tower, I suspended the antenna in a tall pine tree. With the top at about 40 feet, I got the expected signal reports on 2 meters from repeaters within a 40-mile radius. The only repeater available to me in the 440-MHz band is about 30 miles away and at an elevation of only 100 feet, with its antenna on the side of the tower opposite my location. Six of seven bars on my LCD S meter lit up and I received good reports from stations that I worked. I've concluded that the radiation patterns and gain predicted by *EZNEC* are close to those realized on the air.

Notes

[1]*EZNEC* antenna software is available from Roy Lewallen, W7EL, PO Box 6658, Beaverton, OR 97007; tel 503-646-2885; fax 503-671-9046; **w7el@teleport.com**. Price: $89 postpaid; add $3 outside the US and Canada. Visa and MasterCard charge cards accepted.

[2]John Post, KE7AX, "The Copper Cactus J-Pole," *73 Amateur Radio Today*, Feb 1992, pp 9, 10 and 27.

[3]*The ARRL Handbook*, 1998 Ed, pp 20.56-20.57.

[4]RadioShack RG-8 cable has the following characteristics: a solid dielectric of 0.280-inch OD, a 13-gauge center conductor (7×21) and a velocity factyor of 0.66.

[5]The Wireman, 261 Pittman Rd, Landrum, SC 29356-9544; tel 800-727-9473 (orders only), technical assistance 864-895-4195; fax 803-895-5811; e-mail **cqwire@juno.com**, **n8ug@juno.com**; **http://thewireman.com**.

You can contact Andrew at 203 Lord Granville Dr, Rt 2, Morehead City NC 28557; **w4uld@mail.clis.com**.

Photos by the author QST

NEW PRODUCTS

KENWOOD TS-940 IF-10B/IF-232C UNIT FROM PIEXX

◊ If you own a Kenwood TS-940 transceiver and have wanted to run it under computer control, you have probably encountered the frustration of trying to locate the internal computer interface board—the IF-10B—that was once available as an optional accessory.

PIEXX has designed a product that not only takes the place of the discontinued Kenwood IF-10B, but also incorporates the functionality of Kenwood's IF-232C level converter, making it a complete system for interfacing the TS-940 to your computer.

The price of the IFB/C system is $89 plus $6 shipping (US). For additional information contact PIEXX Inc, 13 Main St, Hillsboro, NH 03244; tel 603-464-5625; fax 603-464-5411 **piexx@conknet.com**; **http://www.peixx.com**.

GOLIST QSL MANAGER SEARCH PROGRAM

◊ The Golist has introduced a new *Windows* program—*GoSearch*—designed to search the Golist Online Database for the QSL routes of DX stations.

GoSearch appears as a small window on your screen when active and rests on your task bar when idle. Enter a DX call sign into the search box and the program will automatically launch your Internet browser, search the Golist Online Database and display the results. The software will work with *Windows 3.1*, *95/98* or *NT*.

A demo version of *GoSearch*—that allows a limited number of lookups on the online database—is available free of charge. Registered versions include a one-year subscription to the online database with an unlimited number of lookups. *GoSearch* can be downloaded from the Golist Web site or provided via e-mail.

Price: $24. For more information contact The Golist, PO Box 3071, Paris, TN 38242; tel/fax 901-641-0109; **golist@golist.net**; **http://www.golist.net**. QST

Next New Product

FEEDBACK

◊ In the September 2000 *QST*, page 64, the Web address of Electronic Design Specialists is shown incorrectly. It should be **http://www.eds-inc.com**.

◊ Please refer to the article by Rick Littlefield, K1BQT, "A Wide-Range RF-Survey Meter," *QST*, Aug 2000, p 43. In the sidebar, second column, first paragraph, last line, the RadioShack part number for the ferrite core should be RS 273-105.—*tnx Carl Soltesz, W8PFT* QST

By Michael A. Covington, N4TMI

Some Desoldering Tips and Techniques

O-o-o-p-s! Got that part soldered to the wrong pads? These pointers and tools will help you get things straight.

Can I get that part out of there? That's a question many of us have asked ourselves while trying to remove an IC from a modern multilayer PC board. Gone are the days when all you had to do was heat up your hefty soldering iron, melt the joint and pull the wires loose. Nowadays, you're likely dealing with PC boards often having two or more layers, and find the solder joints are hard to melt and easy to damage. If you're working slowly, removing a 40-pin IC properly can easily take half an hour. That's probably $30 worth of technician time, including overhead expenses. Few ICs are worth that.

Of course, there are shortcuts. If you know the IC is bad, you can crush it and remove the pins from the board one by one. If all you want is the IC from a salvaged board, you don't have to worry about damaging the board. But can you unsolder a component, try a substitute and then replace the original? Yes—if you use the right tools. My recent acquisition of a Weller SCD100 vacuum desoldering iron prompted me to compare all of the desoldering techniques I had available. I tried them all on a four-layer circuit board from an old PC AT. As Table 1 shows, some of the techniques worked a lot better than others.

The Basics

Regardless of your desoldering technique, it's important to know *what* you're desoldering. Figure 1 shows the four kinds of solder joints you'll encounter: wires soldered to terminals, single-sided circuit boards, multilayer boards and surface-mount components.

It's easy to deal with wires on terminals: Just melt the solder. You don't even have to remove the solder, although the desoldering job is less messy if you do so. Single-sided PC boards are a bit more challenging to work with because you often have to desolder several pins to remove a component such as an IC, but removing the solder from each pin is relatively straightforward. Desoldering is

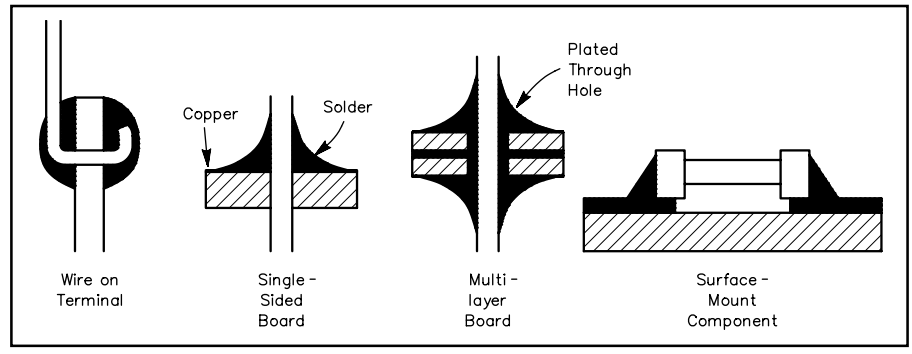


Figure 1—Four common solder joints.

Table 1

Method	Performance (Single-Sided Board)	Performance (Four-Layer Board)	Usable with Surface-Mount?	Speed	Remarks
Desoldering iron with vacuum pump (Weller SCD100)	Excellent	Excellent	No	Fast	Disposable tube costs $10 per 300 to 500 desoldered joints.
Desoldering iron with rubber bulb (Weller DS40)	Good	Inadequate	No	Fast	Heat transfer is critical; keep tip clean; add flux.
Soldering iron and vacuum pump (Edsyn Soldapullt)	Excellent	Good	Maybe	Slow	Must keep pump clean and lubricated. Replace **O** ring periodically.
Soldering iron and copper braid (Chemtronics Chem-Wik Lite)	Excellent	Good	Yes	Very slow	Good for cleaning up after other techniques. Performance varies greatly among brands.
Soldering iron with special tip for heating all pins of IC at once	Excellent	Good	No	Fast	Installing a different tip for every size of IC is time-consuming. Tips can be homemade.
Hot-air gun	Excellent	Excellent	Yes, with care	Very fast	Can blow droplets of solder onto the component side.

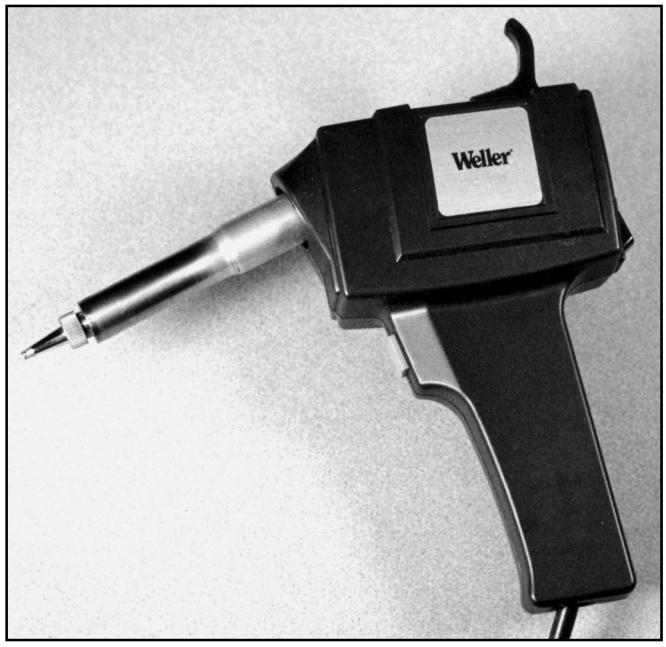


Figure 2—The Weller SCD100 makes continuous-vacuum desoldering affordable.

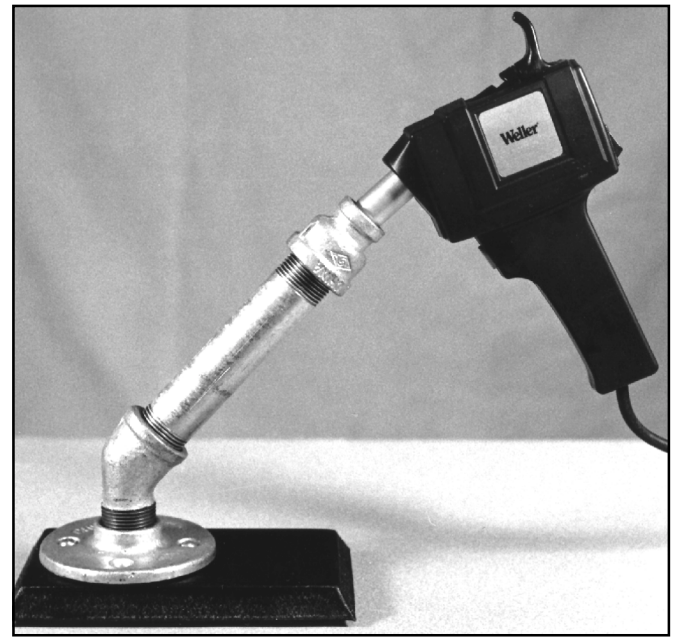


Figure 4—The SCD100 tip touches this homemade stand only on the internal pipe threads, so the stand doesn't draw off much heat.

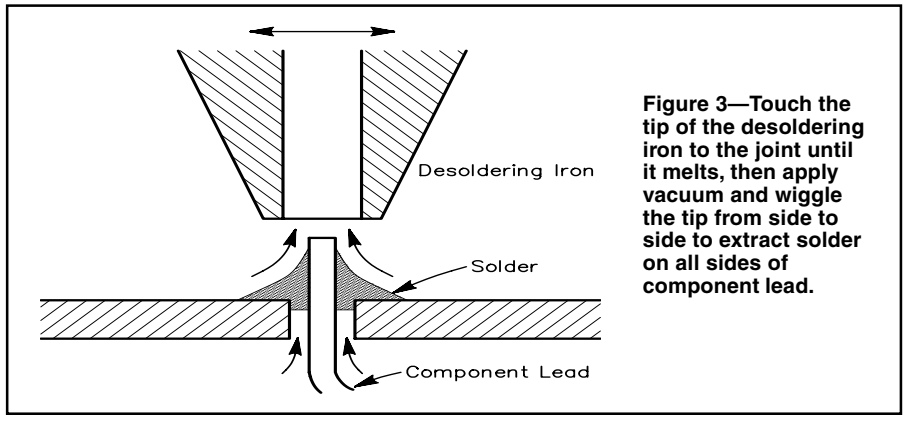


Figure 3—Touch the tip of the desoldering iron to the joint until it melts, then apply vacuum and wiggle the tip from side to side to extract solder on all sides of component lead.

much harder with multilayer boards, and surface-mount components require techniques all their own. In this article, I'll deal with through-hole boards, both single-sided and multilayer.

The first step in desoldering is always to ensure that the solder melts. I usually start by re-melting each joint and in some cases adding a bit of solder. Doing this penetrates any protective coating that might be present and ensures there's enough solder to make a reasonable-size drop for removal by suction.

The iron that you use for desoldering should be *hot*. Desoldering requires a hotter iron than soldering. A temperature of 650° F may be fine for assembly, but turn the temperature up to 750° when desoldering. Paradoxically, a hot iron is less likely to overheat components because it works faster. Naturally, you need a fine tip, though not always the smallest one available. The tip should cover the component lead with some room to spare.

When desoldering, *time is critical*. If you heat a solder joint too long you'll likely damage the PC board or component. But if you don't heat the joint long enough, you won't melt all the solder. My rule of thumb is: Heat until the solder melts, *then for one to two seconds more.* The extra time helps ensure that all the solder is melted.

Desoldering Tools

The Weller SCD100

The best desoldering tools incorporate a heated tip and a continuous vacuum pump. Such tools usually cost hundreds of dollars and often require "shop air" (compressed air to generate a vacuum by the Venturi effect). But the new Weller SCD100 (Figure 2) is handheld, electrically operated and costs only $200. It resembles more expensive Hakko and Denon desoldering guns of similar design.

Although it looks like a soldering gun, the SCD100 doesn't heat up instantly; it takes about four minutes to reach the working tip temperature of 800° F. Then you apply the hollow tip to the solder joint, melt the solder, *wait another one or two seconds* (the extra seconds really help) and press the button. "Slurrrrrp!" The solder disappears into the gun. Each joint takes only about five seconds to work; you can remove a 40-pin IC in three or four minutes.

On the whole, this is the best desoldering tool I've used. (I haven't tried $1000 industrial desoldering stations.) Desoldering is quick; IC pins usually end up completely free, not sticking to the edges of the hole. To ensure that sticking doesn't occur, wiggle the tool tip from side to side while applying vacuum (Figure 3). That causes air to flow along all sides of the component lead. The tip of the SCD100 is grounded to prevent static damage to ICs.

Two things you should know about the SCD100: First, it desperately needs a stand, but Weller doesn't make one. I made my own (Figure 4) out of plumbing parts: a $^3/_4$ to $^1/_2$-inch reducer, a $^3/_4 \times 5$-inch pipe nipple, a 45° street elbow and a floor flange. I used a metal base, but a large block of wood would work just as well; for safety, there should be metal directly under the floor flange so hot solder can't drip onto wood. Because the barrel of the SCD100 touches the pipe only on its inside threads, not much heat is carried away from it.

Second, there's a hidden operating cost. After desoldering 300 to 500 joints, you have to replace the tube that collects the solder (Figure 5). A replacement tube costs about $10, so the hidden cost works out to about two cents per joint. However, this is more than made up for by the time saved: With this tool you can do in seconds what would otherwise take minutes.

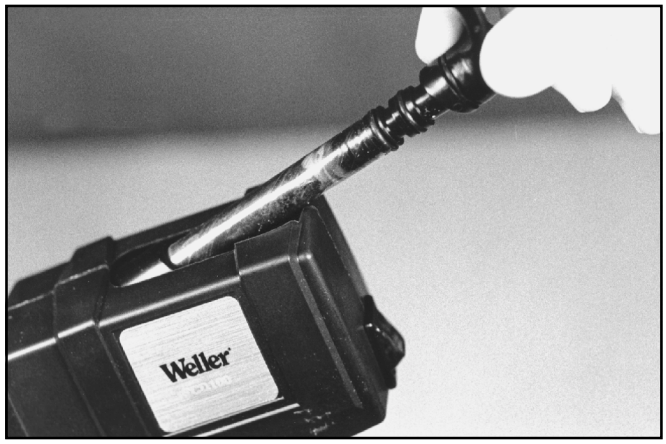


Figure 5— After desoldering 300 to 500 joints, the tube inside the Weller SCD100 must be replaced.

COURTESY COOPER TOOLS

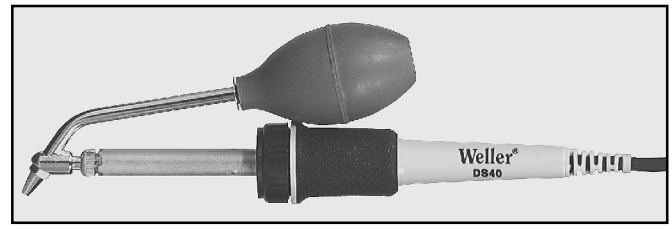


Figure 6—Rubber-bulb desoldering iron is adequate for single-sided boards only. Shown is Weller DS40.

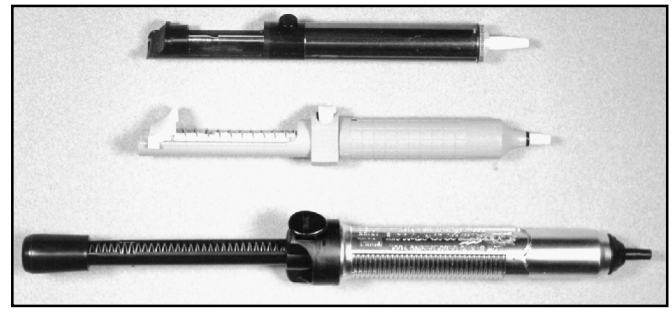


Figure 7—Spring-powered desoldering pumps are cheap and effective. Shown, top to bottom: RadioShack 64-2098, Edsyn Soldapullt SS750, Edsyn Soldapullt AS196 (anti-static). Bigger is better.

Desoldering Iron with Rubber Bulb

A cheaper desoldering iron has a rubber bulb instead of a vacuum pump (Figure 6). I've tried both the Weller DS40 (shown in the picture) and the cheaper, but similar, RadioShack 64-2060. Tools of this type are fine for single-sided boards, especially if you remember to wait the extra two seconds after the joint melts before you release the vacuum bulb. But they are rather frustrating to use on multilayer boards: They tend to remove *most* of the solder, but leave enough behind to keep you from removing the IC. This type of iron also has a tendency to overheat PC-board traces and lift them from the board. This may indicate that the iron is running too cool, so that it has to be held on the joint too long. In general, heat transfer is a problem; if the tip isn't clean and well tinned, quite often the joint simply doesn't melt.

There's one additional use for this tool: You can use it to supply a puff of hot air to shrink heat-shrink tubing.

Spring-Powered Desoldering Pump

This is a cylindrical gadget (Figure 7) that you cock by pressing down a plunger, then release the plunger while holding the tool tip near a melted solder joint . It works surprisingly well. The rapid rush of air carries all the solder into the tool, which, of course, must be emptied periodically. The Edsyn Soldapullt is the best-known brand, but there are also others, and in my experience, they all work. RadioShack sells a desoldering pump (RS64-2098).

Internal cleaning and lubrication of the spring-powered pump are very important, or performance will deteriorate. To test the pump, put your finger over the end of the tip and release the plunger. If it goes back up immediately, without being slowed down by vacuum, the tool needs maintenance. Clean out the inside of the pump, lubricate it with petroleum jelly or silicone grease, and, if necessary, replace the **O** ring (available at any hardware store).

For best results when desoldering with this tool, melt the solder joint completely, then keep it melted by applying the tip of the soldering iron to the edge of the joint while putting the tip of the pump over the middle (Figure 8). This means that your soldering iron will be touching the tip of the Soldapullt, but don't worry—it will hold up fairly well and new tips are cheap. A ceramic tip is available. For safety, though, you should use an anti-static Soldapullt with a black anti-static tip; conventional models can generate static electricity when the air rushes suddenly across through the nonconductive plastic.

In my experience, a big pump performs better than a small one, even when working on miniature circuitry. The advantage of the Soldapullt is that you can use it on a moment's notice; you don't have to heat up a special iron. The down side is that it takes time to recock the pump after every joint, and you'll quickly build some muscle doing so. Cocking it 40 or 80 times in rapid succession can be fairly tiring. Accordingly, I use the Weller SCD100 for repetitive desoldering jobs, and the Soldapullt for small or unexpected desoldering tasks.

Copper Braid with Flux

Years ago, someone discovered that you could remove solder using a piece of copper braid stripped from a length of coaxial cable; just hold the braid against a solder joint, apply heat and the solder is sucked into the braid by capillary action (Figure 9). This technique has been refined, and today you can buy special copper braid that incorporates flux to help the copper soak the solder up. Some brands work better than others; I've settled on Chemtronics Chem-Wik Lite.

Until you've seen it done, you might not expect much from this technique. In reality, though, copper braid has an almost magical ability to remove solder from holes. If you have enough time, you can remove ICs cleanly from multilayer boards.

That's the catch: time. Desoldering with copper braid is rather slow. It works best if you re-melt each joint and add a bit of fresh solder before applying the copper braid. Then put the braid between the soldering iron and the joint, press them together, and wait about five seconds. Often, nearly all the solder will come out. If not, add more solder and try again.

Clip off the used portion of the braid before moving on to another joint; that way, there will be less useless copper to absorb heat. Use a hot soldering iron (750° F) with a tip about the same size as the joint; excessively small tips don't work well. Don't spread out the braid; it works best when bunched together. Adding a bit of extra liquid flux can improve performance.

Because of its slowness, copper braid is not my main desoldering tool, but it's indispensable for cleaning up the solder left behind by others. Copper braid is one of the few techniques that work well on surface-mount boards. What's more, you can carry a roll of copper braid in your toolbox even if there isn't room for other desoldering tools.

A Special Heating Tip

Another way to desolder ICs is to use an iron equipped with a special tip that heats all the pins at once (Figure 10). I've never used a commercial iron of this type

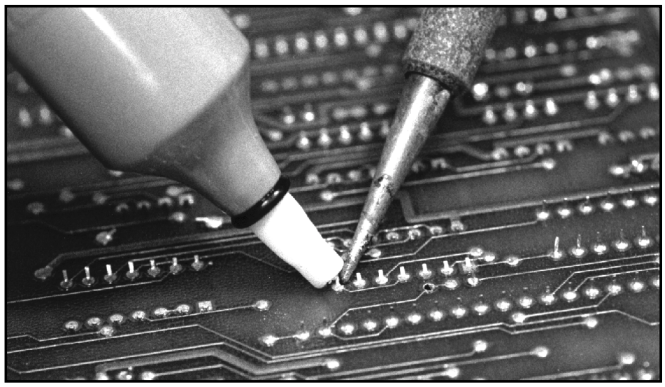


Figure 8—Put the tip of the spring-powered pump as close as possible to soldered joint while desoldering.

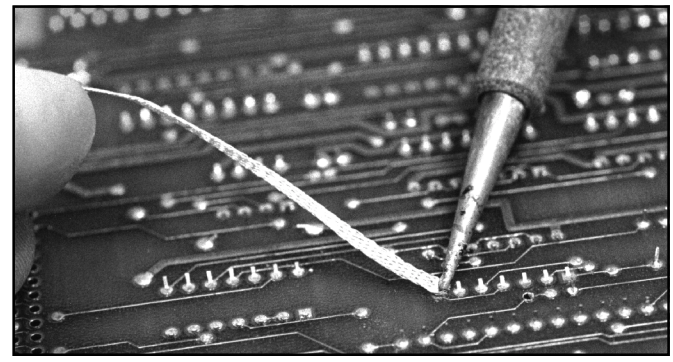


Figure 9—Copper braid soaks up solder and is useful for cleaning up after other techniques have been used. Add some flux for better performance.

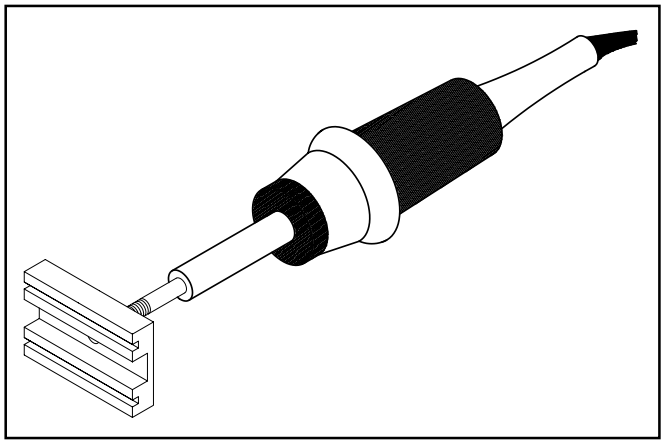


Figure 10—A soldering iron equipped with a special tip can heat all of the IC pins at once, but can't remove solder or straighten pins. (This tip is no longer made.)

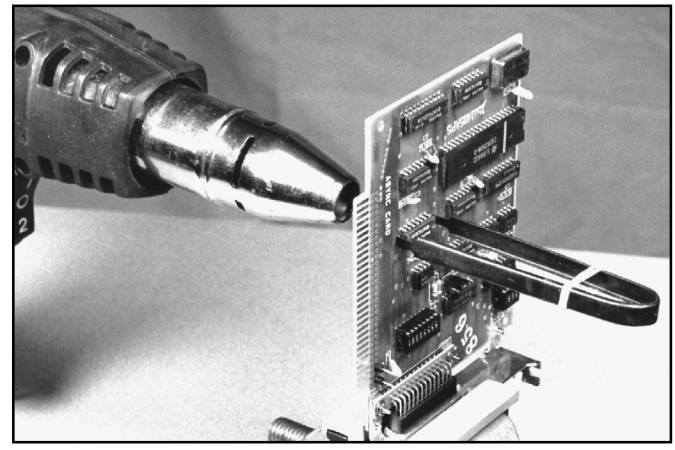


Figure 11—A heat gun and an IC puller can quickly remove ICs if its leads don't need to be unbent.

(they're no longer widely available), but I've made some homemade tips with which to experiment. They work well, but they don't remove solder, of course; they only melt it. Also, you must install a different tip for each IC size, and it takes a long time for the tip to get hot.

Hot-Air Gun

The fastest desoldering technique I'm aware of is one I stumbled on, not knowing whether it would work. It turned out to be a great way to salvage large numbers of ICs quickly. Place the circuit board vertically in a vise. Attach an IC puller (use a rubber band to keep it closed tightly) to the IC you're removing and heat the solder side with a heat gun (the kind used for stripping paint). Keep the heat gun in constant motion to heat all the pins evenly (Figure 10). In half a minute or so, the IC will come loose.

"But wait a minute," you say. "Aren't you overheating the board and the components?" Apparently not. ICs usually come out with some unmelted solder still on the upper part of their pins, which tells me that they probably didn't get as hot during desoldering as during original installation. Also, I've measured the temperature of the IC package, and it rarely exceeds 80° C. ICs are rated to *work*, not just survive, at 70° C or higher.

One drawback of this technique is that it can occasionally blow droplets of solder into unwanted places, so pay attention to where the solder is going. Also, if the board bends while it's warm, straighten it before it cools, unless you want a permanently bent board.

As you might imagine, a small tip on the heat gun is helpful; industrial surface-mount rework stations have very fine-tipped heat guns. But *don't put a smaller tip on any heat gun than the size recommended by the manufacturer* or the gun will overheat. Look carefully at the heat guns in a hardware store; you'll see that the only ones that take small tips are thermostatically controlled.

A Few More Desoldering Hints

Many ICs have their pins crimped (bent) as well as soldered. As you might guess, that makes desoldering much harder. Sometimes you can partially straighten a bent pin before desoldering; more often, you must remove most of the solder before you straighten the pin. If you use a desoldering iron with a hot, hollow tip, you can often straighten pins with the tip itself.

After removing the solder from an IC pin, you generally have to free the pin by moving it back and forth with needle-nose pliers, because the pin will adhere lightly to one side of the joint until you do.

If any desoldering technique fails, leaving some solder behind, you'll probably need to add more solder before trying again. It is almost impossible to remove the remaining solder from a half-desoldered joint. I found that all of these desoldering techniques work better if I wear 2× magnifying goggles—quality depends on being able to see whether, and how well, the solder has melted.

Michael Covington, N4TMI, is a research scientist in computational linguistics at the University of Georgia, where he is responsible for computer processing of human languages. A ham since 1988, Michael has written a number of articles for various electronics magazines, including the monthly Q&A column in Poptronics *(formerly* Electronics Now*). Michael's also well known in his other hobby, amateur astronomy, and is the author of* Astrophotography for the Amateur. *You can contact Michael at 285 Saint George Dr, Athens, GA 30606, and visit his Web site at* **http://www.covingtoninnovations.com**.

Photos by the author.

By George Eldridge, N6RVC

Decoding the Disneyland Telegraph

Hams love a good mystery—especially a radio mystery. So when the author uncovered a cipher in Mickey Mouse's backyard, he just had to uncover its hidden message. As it turned out, one mystery led to another…

The telegraph office at the New Orleans Train Station at Disneyland in Anaheim, California. The telegraph sounder is visible at the bottom of the partially open window.

Several years ago I was standing at the New Orleans Train Station at Disneyland Park in Anaheim, California. Echoing in my ears was the sound of a telegraph. I, like every other ham that has visited Disneyland, listened intently to the clicks and clacks and tried to decode the message that was coming from the telegraph sounder.

As a practiced CW operator on the ham bands, my first thought was that it wouldn't be too hard to decode the content. Rather than listening for tones, I'd have to think in terms of the electromagnetic sounder, which produced a "click" when energized and a "clack" when released. Thus a dit (dot) would be "click clack" and a dah (dash) would be "click (pause) clack."

This sounded good in theory, but in practice it was a little more difficult than I expected. My CW gray matter just hasn't been trained for listening to the clicks and clacks in place of tones! And another thing concerned me: The rhythm of the elements wasn't quite right. In particular, I could hear a "click (pause) clack" that was much longer than the rest. At that moment I decided to return with a tape recorder and investigate further. I wasn't going to stop until I had successfully decoded the message!

A Little Detective Work

When I got home I searched the Internet for any reference to the Disneyland telegraph message. I found one reference that claimed the message was Walt Disney's inaugural speech, given at the opening of Disneyland in 1955. The telegraph message repeated every 49 seconds, however, and even at 25 words per minute it would be about 20 words, so I didn't think it could be the whole speech.

As a Disneyland annual pass-holder who lives only 12 miles from the theme park, it wasn't long before I returned with a tape recorder. Actually, it was the evening of Friday, September 5, 1997. I taped about five minutes of the "code" while enduring strange looks from the other guests who were waiting for the train. I took my recorder and headed home to start the task of decoding the message.

The first thing I did was to play the tape at half speed. This made it much easier to hear the clicks and clacks. It also made it easier to hear code elements that didn't correspond to Morse code (at least the Morse code that we use as hams). I remem-

bered seeing a table in the *Callbook* that listed various telegraph codes. I opened up the *'book* and, sure enough, the Continental Code (used in ham radio) was listed next to the Morse Code (used on land lines in the United States and Canada).

I was surprised by the differences between the two!

The letters C, F, J, L, O, P, Q, R, X, Y and Z are different. The figures and punctuation marks are different. And the elements C, O, R, Y and Z are composed of dots and spaces. T is a short dash and L is a longer dash. No wonder I was having trouble decoding the message!

At this point I decided to enlist the aid of my computer. I played the tape into my computer's sound card and digitized the audio. I could then display the waveform and *see* the clicks and clacks. This was much closer to Samuel F. B. Morse's original telegraph.

Morse's original invention had a clockwork that moved a paper tape. The electromagnet pressed a pencil against the tape, making a sequence of dots and dashes on the moving tape. The paper tape was visually decoded to decipher the message. Telegraph operators soon found that they could decode the message just from the sounds, however, so the paper tape became an instant antique.

I soon had the message decoded: "WHO COME TO DISNEYLAND, WELCOME. HERE AGE RELIVES FOND MEMORIES OF THE PAST, AND HERE YOUTH MAY SAVOR THE CHALL."

The message repeated with what sounded like a splice between the "CHALL" and "WHO." Did the message start with "ALL WHO" and end with "CH," or did it start with "WHO" and end with "CHALL"? Obviously, there was a problem with the message.

A Call to the Magic Kingdom

I called Disneyland and asked to speak with someone about the damaged message. I was afraid that I might get a brush-off, but the Disney staffers were courteous and did their best to locate someone who could help me. When it became clear that no one at Disneyland could help me, they referred me to the WED studios in Burbank.

I called WED and was routed to the media department—the folks there handle the sound effects at the park. I left a message explaining the damaged telegraph message. A couple of days later I received a call from media engineer Glenn Barker.

Glenn explained that Disneyland is very serious about keeping things correct and was interested in getting the message fixed. He guessed that the message was accidentally truncated when it was moved from an endless loop tape player to the solid-state digital player used today. I surmised that the media engineer had listened for a repeat in the pattern and keyed in on the distinctive "LL" combination. Unfortunately, he failed to realize that the pattern "LL" occurred twice in the message.

Glenn said he'd try to dig up the original tape and call me back. A couple of weeks later I got a call from Glenn saying he had found the original tape—but there was a problem. On the original tape the message repeats several times, but because Glenn didn't understand telegraphy, he couldn't tell where the message started or ended.

I offered to decode the message and mark the beginning and end points. Glenn played the tape into my voice mail, which I downloaded onto my computer and decoded as before. I edited the sound clip so it contained just one copy of the message and played the clip into Glenn's voice mail. Glenn was able to update the digital player at the New Orleans Train Station so that it plays the correct message. He even added a pause at the end of the message to make the repeat more obvious.

It's interesting that we used modern technology to send and decode a telegraph message. I'm sure Samuel Morse never expected that someone would one day use a computer to decode a telegraph message. I had achieved my goal of decoding the message and had an interesting adventure in doing it. I hope my tale has entertained you enough that the next time you hear telegraphy you'll make an effort to decode the hidden message.

And the corrected message?

"TO ALL WHO COME TO DISNEYLAND, WELCOME. HERE AGE RELIVES FOND MEMORIES OF THE PAST, AND HERE YOUTH MAY SAVOR THE CHALLENGE AND PROMISE OF THE FUTURE."

You can contact the author at 2217 Tulane Ave, Long Beach, CA 90815-1945; **eldridge@cp10.es.xerox.com**.

NEW PRODUCTS

AUDIO ENHANCING PRODUCTS FROM K²RF

◊ K²RF offers two products intended to enhance the audio quality of repeaters, links and remote base radios.

The DSL-100 Dynamic Speech Limiter is designed to maintain the voice quality through a system by ensuring that the audio fed to the transmitter is at the proper level. Once calibrated, the DSL-100 will automatically apply up to 12 dB of gain or attenuation to the audio supplied to the transmitter, resulting in lower distortion and reducing the audio clipping that can result from overdeviation.

Ideal for HF, VHF and UHF link transmitter applications, the DSL-100 ensures that all the audio received from those who access the radio repeater system will be input into the system's transmitter at a consistent audio level. This is an important consideration for telemetry/mixed signal systems as well.

The DSL-100 meets Telephony B-302 specifications and operates from 10 to 18 V dc at 10 mA. The total harmonic distortion is specified at less than 1% and the 3 dB bandwidth is specified at 50 Hz to 15 kHz (with an input impedance of 10 kΩ and an output impedance of 600 Ω). The DSL-100 is constructed on a PC board and comes assembled and tested. It measures $1^3/_8 \times 2^3/_8 \times 1/_2$ inches.

The SAGE-300 is a 3-band speech audio gain equalizer that is designed to enhance and balance the tone quality of a communications system by enabling the user to cut or boost, by up to 10 dB, three audio ranges.

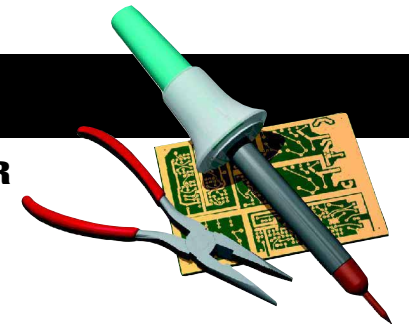
The low frequency cutoff is at 250 Hz, which prevents subaudible CTCSS tones from being passed on for equalization. Measured at the –3 dB points, the audio passband is from 275 to 4,400 Hz. Three trim potentiometers enable the user to control the amplitude of the low (275-1000 Hz), mid (1000-2600 Hz), and high (2000-4400 Hz) audio ranges. Total harmonic distortion is specified at under 0.01% at 1 kHz.

When used for telemetry purposes, the SAGE-300 allows the audio path to be bandwidth limited and can reduce DTMF twist problems associated with interconnected systems. The SAGE-300 also allows adjustment of narrow band FM radios to meet the new EIA deemphasis specification (6 dB per octave deemphasis curve).

The SAGE-300 operates from 10 to 18 V dc at 12 mA. The maximum input amplitude is specified at 8.0 V P-P (with an input impedance of 10 kΩ and an output impedance of 150 Ω). The SAGE-300 is constructed on a PC board and comes assembled and tested. It measures $1^1/_2 \times 2 \times 1/_2$ inches.

Price: DSL-100 Dynamic Speech Limiter, $95; SAGE-300 3-Band Speech Audio Gain Equalizer, $95. For additional information contact K²RF Communications Products, 11725 SW Timberline Ct, Beaverton, OR 97008; tel 800-268-1516; fax 503-642-5678; **KenS@k2rf.com**; **http://www.k2rf.com**.

Next New Product



The Doctor is IN

QRon, N9RC, asks, "I have a 1994 RCA 35-inch console TV fed by cable. Twice this year I have been transmitting at the full legal limit and my TV set has 'popped off.' According to my TV repairman, the horizontal circuit has 'shorted.' (Apparently the horizontal transformer failed.) He says he has seen this happen in another case when a ham was transmitting at the house.

"This costs $400 per incident! I never had the problem until this year, but we have added a few VCR cables that I have now belatedly removed. I'll be adding common mode chokes to these cables and elsewhere. I can't afford for this to keep happening! Is there a fix?"

AOuch! This sort of problem is rare, but it can happen. RF energy is usually picked up on any wiring connected to the TV (TV sets do not make good antennas, but wires do), then gets conducted onto the chassis of the TV, into its power supply and into its circuitry. In this case, it looks like the horizontal circuitry is particularly sensitive. There are a few things I'd suggest, although to find out if they work does entail some degree of risk.

First, the greater the separation between your transmit antenna and the TV *and* any wires connected to it (ie, ac, cable, antenna, speaker, etc.), the lower the RF energy will be. So, raising the height of your antenna or locating it farther away from the house could be helpful. In this case, do not use end-fed wires—only antennas fed with coaxial cable. If you have any problems with RF in the shack, correct the underlying transmit antenna problem.

Adding common-mode chokes to all of the wires connected to the TV may also help keep the RF energy from getting into the set. You can make a common-mode choke with an F-240-43 ferrite core, wrapping about 10 turns of wire (coax, speaker, etc.) onto the core, just where it enters the TV set. For smaller wires, you can use an F-140-43 size core. You will have to treat the cable or antenna lead, the ac wiring and anything else connected to the TV. You may also want to add an ac line filter to the TV.

Some companies have developed service bulletins to deal with RFI problems, although this is generally the exception. Contact RCA and see if they have any info for you.

QTom, KF6DRI, asks, "Direct TV has changed over from Primestar and left me the old 24-inch Primestar dish. Can these dishes be used on the amateur microwave bands?"

AYes, your Primestar 24-inch dish should work just fine on 1296 MHz and higher microwave bands up to at least 10 GHz. In chapter 1 of the *UHF/Microwave Projects Manual*, Paul Wade, W1GHZ, describes how to design a feed for these types of offset dishes. Paul also has a microwave Web site at **http://www.w1ghz.cx**.

QHow old does a radio have to be before it is considered "collectible?" Can an FM transceiver from the '70s be considered "vintage?"

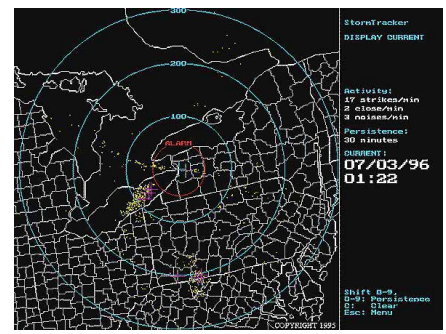
AThe answer depends on who you ask. Some radio collectors strictly adhere to the 50-year rule. That is, a radio must be at least 50 years old to be considered an antique. Others are more generous. For example, many collectors covet Ten-Tec Power Mite QRP transceivers from the early '70s. The Heathkit HW-series QRP transceivers from the same period are often in high demand. Among the FM rigs, Drake TR-22s are often considered collectible as are the early Clegg and Regency transceivers. As always, "collectible" is in the eye of the beholder.

The Clegg FM-27B was among the first synthesized 2-meter FM amateur transceivers and is now considered collectible by some hams. This advertisement appeared in the February 1974 *QST*.

QHow do lightning trackers work? Is this something that a ham could do at home?

AA single-site lightning tracker detects the low frequency radio signals produced by lightning's electrical discharge. These signals are the cracklings you hear on AM radios when thunderstorms are nearby. Lightning signals travel for hundreds of miles and can be detected by directional low-frequency antennas. Specialized software plots the approximate direction of each strike and analyzes the signal strength to calculate the distance. The results are typically plotted on a map display. More sophisticated systems combine strike data from several receiver sites to create more accurate position plots.

Yes, you can set up a lightning tracker at home. The Boltek Corporation, among others, makes a lightning tracking system based on a receiver board that plugs into your PC. The directional LF antenna can be installed outdoors or in your attic. The entire system costs about $500. Contact the Boltek Corporation, 2316 Delaware Ave, Buffalo, NY 14216; tel 905-734-8045; **http://www.boltek.com**.



The Boltek lightning tracker in action.

QI own a Packard Bell SVGA monitor that has been giving me fits. It generates interference that just happens to fall on several of my "favorite" frequencies. I've tried every RFI suppression technique known—short of installing the monitor in a copper cage. Do you have any other tips?

AI'd suggest that you try changing your display settings. Going to a higher or lower resolution display may at least shift the interference away from your favorite frequencies. Frankly, you may want to consider shopping for a new monitor. You may discover that other brands offer better shielding. If you can get your hands on a portable shortwave receiver, take it to the computer stores and use it to check the various monitors. Obviously you want to find the monitor that generates the least

amount of interference, if any at all, on the frequencies or bands you use most often.

Q Jean-Pierre, VE2GDA, asks, "I log all of my contact times using UTC, but the question of which *date* to use is not always clear. Suppose I log a contact that was made at a 2230 local time on June 4. The UTC time will be local time plus four hours, so I log it at 0230 UTC. But does the date become June 5, or does it remain June 4?"

A Many hams are often confused about this point. The simple answer is that the date must match the time. In your example, the "UTC date" would be June 5. It may have indeed been June 4 according to your *local time*, but for UTC it is after midnight and, henceforth, the next day (June 5).

Q When talking about computers, what does SCSI mean?

A SCSI is an abbreviation for Small Computer System Interface. Pronounced "scuzzy," it is a parallel interface standard used by Macs, PCs and many Unix systems for attaching peripheral devices to computers.

SCSI interfaces provide faster data transmission rates (up to 40 Mbytes per second) than standard serial or parallel ports. In addition, you can attach many devices to a single SCSI port, so that SCSI is really an I/O bus rather than simply an interface.

Although SCSI is an ANSI standard, there are many variations of it, so two SCSI interfaces may be incompatible. For example, SCSI supports several types of connectors.

While SCSI is the only standard interface for Macintoshes, PCs support a variety of interfaces in addition to SCSI. These include IDE, Enhanced IDE and ESDI for mass storage devices, and Centronics for printers. You can, however, attach SCSI devices to a PC by inserting a SCSI board in one of the expansion slots. Many high-end PCs come with SCSI built in. Note, however, that the lack of a single SCSI standard means that some devices may not work with some SCSI boards.

The following varieties of SCSI are currently implemented:

SCSI-1: Uses an 8-bit bus, and supports data rates of 4 MBps.

SCSI-2: Same as SCSI-1, but uses a 50-pin connector instead of a 25-pin connector for 16-bit transfers, and supports multiple devices. This is what most people mean when they refer to plain SCSI.

Wide SCSI: Uses a second cable (called a B-cable) to support 32-bit transfers.

Fast SCSI: Uses a 16-bit bus, but doubles the clock rate to support data rates of 10 MBps.

Fast Wide SCSI: Uses a 16-bit bus and supports data rates of 20 MBps.

Ultra SCSI: Uses an 8-bit bus, and supports data rates of 20 MBps.

SCSI-3: Uses a 16-bit bus and supports data rates of 40 MBps. Also called Ultra Wide SCSI.

Ultra2 SCSI: Uses an 8-bit bus and supports data rates of 40 MBps.

Wide Ultra2 SCSI: Uses a 16-bit bus and supports data rates of 80 MBps.

Q KT4SP asks, "I am using a Hustler 4-band trap antenna fed with coax. At the antenna the coax is attached not by a connector, but by the shield and center conductor to screws. I assume that this is proper, since the antenna does not have an SO-239 connector. The antenna is mounted about three inches above ground with no radials. I have been using this setup for a number of years, but my power output on phone is only about 45 W from a 100-W transceiver. Would the addition of a 1:1 balun to the system improve or degrade the output? Is this type of vertical considered a balanced or an unbalanced antenna?"

A While a vertically oriented half-wave dipole would be a balanced antenna, a quarter-wavelength vertical—with its "missing bottom half" made up using an image antenna reflected in the ground plane—is indeed an "unbalanced antenna."

However, just because this is an unbalanced antenna fed with an unbalanced (coax) feed line doesn't mean that everything is hunky-dory in the installation. The real clue to the nature of this problem is that your system doesn't have ground radials. Two concerns immediately arise: (1) power reduction in the radio due to common-mode currents and (2) poor radiation efficiency.

If the ground plane or radial system is inadequate under the vertical, then there's a really good chance that common-mode currents are being radiated onto the shield of the coax cable running on the ground under the vertical. Such common-mode currents can fool a transceiver's SWR sensor and cause it to reduce the output power. Putting a balun at the feed point may, or may not, reduce the level of common-mode currents, but this isn't really the proper approach—putting down radials is what is really required here!

Consider this: a quarter-wave vertical with a perfect ground system should show a feed-point impedance of about 36 Ω, and this is only a $^{50}/_{36}$ = 1.388:1 SWR—not enough to cause an SWR shutdown unless common-mode currents are involved. Indeed, because of the lack of radials, the feed-point impedance due to losses might be even closer to 50 Ω, even if the radiation efficiency is poor. So, unless common-mode currents are involved, the SWR alone wouldn't cause a power reduction to protect the radio.

Adding ground radials would improve the radiation efficiency and increase your output power (by eliminating common-mode currents that are falsely activating your radio's SWR sensor).

Q Many solid-state timers function by producing a logic "high" at the output within a specified time after the timer is triggered. For my application, however, I need a timer that "goes high" as soon as it is triggered and remains high for about 60 seconds before dropping back to zero. Can you steer me in the right direction?

A How about trying the one-shot multivibrator shown in Figure 1? This one uses a garden-variety 555 timer chip and a couple of components. The trigger pulse causes the output (Q) to go positive and capacitor C to charge through resistor R. When the voltage across capacitor C reaches $^{2}/_{3}$ of V_{cc}, the capacitor discharges to ground and the output returns to zero. You can calculate the values of R and C with the equation T = 1.1(RC) where T is the duration of the output pulse in seconds, R is resistance in ohms and C is capacitance in farads. For a 60-second pulse, you'll need a 56-kΩ resistor and a 1000 µF capacitor. This works out to be about 61.6 seconds. Of course, you could use a potentiometer (a 100-kΩ pot, for instance) in place of R to tweak the pulse length and compensate for the tolerance range of the capacitor.

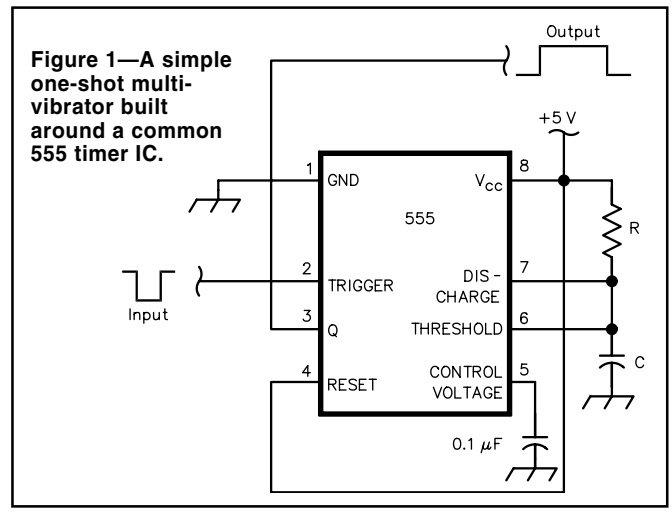
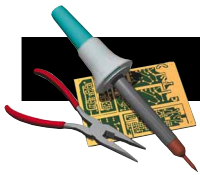


Figure 1—A simple one-shot multivibrator built around a common 555 timer IC.

Do you have a question or a problem? Ask the doctor! Send your questions (no telephone calls, please) to: "The Doctor," ARRL, 225 Main St, Newington, CT 06111; doctor@arrl.org; http://www.arrl.org/tis/.



By Charles Barkowski, N2IM

Microwave Bands: Use 'Em or Lose 'Em!

Amateur Radio's microwave bands are more accessible than ever. Gear is widely available, affordable and easy to build. Now is the perfect time to survey the wide-open spaces and stake your claim in Amateur Radio's new frontier.

If you're like most hams, when you got your license, whether recently or in decades past, you probably bought an HF rig and some sort of 2-meter FM radio. For an antenna you threw up a wire dipole (fed through an antenna tuner) or—if you were lucky—a tribander. On VHF, you assembled a **J**-pole, a mobile antenna or a beam. Such stations are common throughout the amateur community. They're easy to set up and the equipment is widely available. Users can work other ops across town and around the world.

While operating with such a setup—or even an elaborate HF setup—many hams forget that the US amateur spectrum goes from 1.8 MHz to *300 + GHz*. That leaves a lot of uncovered real estate. The least-used span of amateur frequencies today is from 902 MHz to 300 GHz. So, if you dream of wide open spaces and you're a *daring, ready-to-accept-any-challenge-to-keep-up-with-technology Amateur Radio operator*, read on!

There's also a threat backing up the challenge. Day by day, commercial interests are developing more and more high technology microwave equipment to satisfy the demands of millions of paying customers. As a result, these companies are hungry for frequencies in the SHF range—including any and all amateur microwave allocations. When the FCC receives bids for this spectrum, it compares the commercial interests' plans with Amateur Radio operators' plans and present activity. The difference is like night and day! We need to get busy on these bands to plant our flag and stake our claim.

I've heard many arguments about why hams aren't on the SHF bands. Let's debunk these myths one by one.

"You Can't Talk as far on the Microwave Bands as You Can on HF!"

First, it's generally true that you can't talk as far on the microwaves as you can on HF—*normally*. But at the depths of the solar cycle you can usually talk a lot farther on 1296 MHz than you can on 10 meters. And even at the peak of the cycle, the microwave bands can outperform some HF bands (via moonbounce). It's true that most microwave activity is line-of-sight, but unlike HF, VHF/UHF/SHF signals are subject to all sorts of interesting propagation enhancements. The list includes aurora (Au), tropospheric ducting, meteor scatter, sporadic E (E_s), transequatorial propagation (TE), EME (moonbounce), transoceanic ducting, and so on. The bands at 50 MHz through 300 GHz can do a lot more than you might think.

Additionally, a lot of people complain that the HF bands are getting crowded and polluted. Some casual ops are so put off by weekend contest operation that they say the bands are almost unusable. Well, if you're looking for space, elbowroom abounds in the bands above 30 MHz! Although there's less than 6 MHz of available HF bandwidth available to hams, the 10-GHz ham band alone is more than 500 MHz wide! That's a lot of room to maneuver.

There are *several thousand megahertz* available to hams who desire to venture higher in spectrum. With all that room, your imagination is the limit! All the modes you can't use on HF are fair game in the microwave region. Heck—some microwave modes would require all amateur HF allocations and then some! Microwave hams are experimenting with weather radar, radio astronomy and visible light communication. There is virtually no end to what you can do "up there."

The author enjoys working the microwaves with a portable 10-GHz Gunnplexer transceiver.

"There Aren't as Many People on Those Bands as There Are on HF."

That's certainly a self-fulfilling prophecy, isn't it? If everyone who says that became active on the microwave bands, there would be a whole lot more people to work. I believe we should be working toward populating the microwave bands so that on any night of the week, a ham might fire up on a small range of frequencies and make *random contacts* instead of *needing* schedules.

Everybody should start by building/buying equipment for one band and expanding from there. Start at the low end of the spectrum and work your way up the bands. Begin by speaking with the "microwave geniuses" in your local club (if there are any). Believe me, they will be happy to help you enter the world of microwaves. If possible, find a special interest club you can join and keep up with the group's projects. Here in Rochester, New York, we have the Rochester VHF Group. This year the club project is an inexpensive, easy-to-build, 10-GHz *transverter*. (A transverter is a device that converts a transmit signal on one frequency [2 meters, for example] to another frequency [say, 10 GHz]. It does the same conversion in reverse for reception.) That kind of project is perfect for the person who wants to get started in microwave building and operating. If you're a "microwave professional," consider working up a project like that. It's *definitely* one of the best ways to encourage more activity on the microwave bands.

Another way to boost the action on the highest bands is during contests. Amazingly, even the UHF bands are sometimes congested during contests. If you don't have a lot of equipment, *get on with what you have and fill the airwaves with your call sign*. The bands are never busier than they are during contest weekends.

During the 1999 January VHF Sweepstakes, I took my VX-1R hand-held, a home-brew eight-element 2-meter beam and a small 440-MHz commercial beam outdoors and made a few contacts over the weekend. I didn't do as well as many, but considering my equipment, I did okay. Actually, I scored more than 1000 points and finished in eighth place (I was AB2FW)!

During the September contest, I put my 10-GHz wideband FM gear to work (more on the rig later) and made a couple of contacts. Get some equipment and get busy. You'll be surprised by how much fun you'll have!

"The Equipment is Too Expensive."

Compared to what? I built a 10-GHz Gunnplexer rig from an old radar detector that cost me a whopping $11. The design can be found in *The ARRL Microwave Projects Manual, Volume 2*.[1] If you scrounge a bit you can find inexpensive parts. But if the thought of building a transverter causes you to break into a cold sweat, you can buy assembled kits and transverters instead. There are several companies[2] that sell assembled transverters for various microwave bands. Down East Microwave sells most of its microwave transverters for less than $400. That includes the power module, which puts out enough power for the basic operating activities.

Yes, for the price of two microwave transverters you could buy a brand new beginner's HF rig, but the economic law of supply and demand still applies. If more and more hams begin buying transverters, prices would drop accordingly. At today's prices, a new 1296-MHz station would cost about $500 (assuming you already have the necessary IF transceiver). That will put 3 W into a 25-element loop Yagi. That's a nice, compact station, but the $500 price tag is still too "big" for many ops.

The best alternative to spending your hard-earned cash is scrounging. I recently talked to a ham who works for a telephone company that uses 2.2-GHz sideband transceivers for its point-to-point links. He said he would get me as much of the stuff as he could, since his company is discarding the 2-GHz stuff and moving up to 6-GHz gear! He said if I brought a moving truck to his office he could give me six of those radios (they cost about $30,000 a piece), seven 20-foot dishes (they weigh two tons each), and hundreds of feet of 3-inch waveguide! Many companies are doing similar upgrades. All you have to do is ask around. You may be surprised at what you can find.

Table 1
Band Plan for 23-cm

1240 - 1246	ATV #1
1246 - 1248	Narrowband FM, point-to-point links and digital, duplex with 1258 - 1260
1248 - 1252	Digital communications
1252 - 1258	ATV #2
1258 - 1260	Narrowband FM, point-to-point links and digital, duplex with 1246 - 1252
1260—1270	Satellite uplinks
1260—1270	Wideband experimental, simplex ATV
1270—1276	Repeater inputs, FM and linear, paired with 1282—1288. There are 239 pairs every 25 kHz.
1271—1283	Uncoordinated test pair
1276—1282	ATV #3
1282—1288	Repeater outputs, paired with 1270 - 1276
1288—1294	Wideband experimental, simplex ATV
1294—1295	Narrowband FM simplex services, 25-kHz channels
1294.5	National FM simplex calling frequency
1295—1297	Narrowband weak-signal communications (no FM)
1295.0—1295.8	SSTV, FAX, ACSSB experimental
1295.8—1296.0	Reserved for EME, CW expansion
1296.0—1296.05	EME-exclusive
1296.07—1296.08	CW Beacons
1296.1	CW, SSB calling frequency
1296.4—1296.6	Cross-band linear translator input
1296.6—1296.8	Cross-band linear translator output
1296.8—1297.0	Experimental beacons (exclusive)
1297—1300	Digital Communications

"It's Too Technical and Difficult!"

Anything is difficult with that kind of attitude! It does help to have some technical background if you're scrounging parts, but just about any ham can build a modern kit. Find a fellow club member who can help you and you're well on your way to getting a microwave transverter built and operational.

The Internet is another excellent method of getting the help you need. There are many sites[3] relating to Amateur Radio microwave operation and assembly. There are also many e-mail reflectors[4] you can subscribe to and ask questions of people who have been involved in microwave experimentation for years.

Satellite DXing is "Full Quieting"

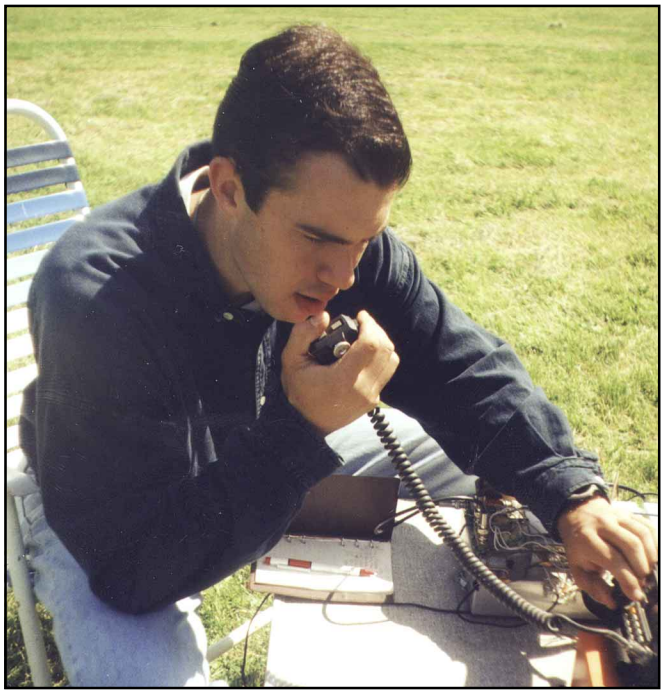
Amateur satellites are the likely future of amateur technology—and satellites and microwaves go hand in hand. Noise is almost nonexistent on the microwave bands (especially if you go there right after leaving 20 meters during a DX contest!) and the equipment is very compact. I know a ham who endures a lot of business travel. He can fit an entire satellite station in his suitcase! He used to get on the air frequently, and will again once Phase 3D makes it to orbit.

Think about what awaits you as a microwave satellite op. At the risk of raising the ire of die-hard HF ops, let's just say that satellite "propagation" is *very* dependable. You can *always* talk with your friends if they're within satellite range. There are no propagation worries whatsoever. Many commercial interests are realizing the potential of satellite-based communication services—and it's time we do, too!

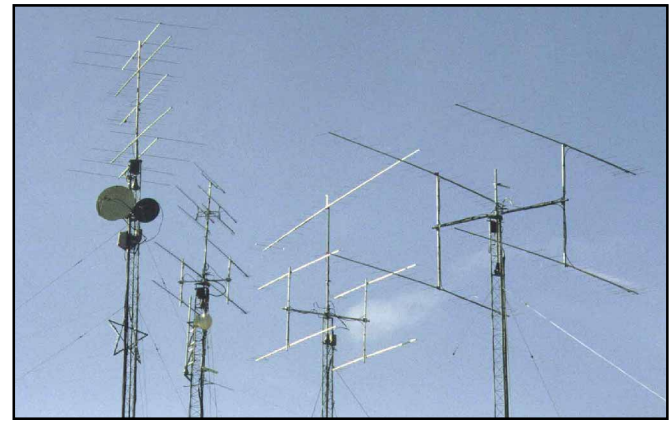
Setting up a Station

Gunnplexers, available commercially for 10 and 24 GHz,[5] aren't the only way to do weak-signal work on the microwave bands. Although these units can provide enjoyment, they are wideband FM devices that are "range challenged" when compared

[1]Notes appear on page 64.



You can set up a portable microwave station at any elevated location.



If the microwave bug *really* bites, you may eventually end up with an antenna farm like the one owned by Tom, WA8WZG.

to their SSB counterparts. Gunnplexer units are great for computer, video and hi-fi voice links, all of which can't effectively be done with weak-signal gear.

To set up a microwave station for, say, 1296 MHz, you would likely start with a transverter (home-brewed, kit-built or commercially assembled). There *are* commercially built transceivers, hand-helds and mobile rigs that offer FM on 1.2 GHz, and modules that can be added to Kenwood TS-790 or Yaesu FT-736 transceivers. These units are somewhat pricey, however, as are monoband units, which are also difficult to find. No-tune transverters are easy to build and get running, and there are many magazine articles that show you how to assemble them.

To use a no-tune transverter, you'll need an appropriate IF transceiver. Traditional practice is to use a 10-meter IF for 6 meters through 902 MHz, and a 2-meter IF from 902 MHz and up. You can use an HF transceiver and run transverter through transverter. Many hams use low-power 2-meter all-mode transceivers to drive a bank of transverters.

However you do it, you need to reduce your output power to an acceptable level. Make sure you read the specifications for your transverter *carefully* so you don't burn out the internal circuits. Specs vary from unit to unit, so make sure you're informed in advance.

Between the transverter and your antenna you'll want to use the *lowest loss cable* you can afford. You *absolutely* do not want to use RG-58 coax to feed your 1296-MHz antenna! Almost all of your precious RF power will be lost in the feed line!

A decent antenna is next on the list. Loop Yagis are good to 2.3 GHz. From there, dish antennas are more practical. I don't have space for a complete explanation of how to set up a microwave station. There are other articles that provide more comprehensive details.

Use it!

There are many uses for the amateur microwave spectrum. You can use the 10-GHz band for linking video, computers or repeaters. You can exchange data as fast as you can with a cable modem. With a couple of cheap Gunnplexers and modulator boards, you can set up a dependable voice/video/computer link with your friends around town.

The bands above 30 MHz are wide open for experimentation! I know of at least one ham who is assembling an EME *laser* station (I'm thinking about building one myself)! It's fascinating what you can do with light energy! If you're a budding light-wave experimenter, there is a good article[7] that describes how to build a basic station.

The microwave bands are great for contest activity. If you've *done it all* as an HF contester, try operating during VHF/UHF contests! You'll be thrilled the first time you make contact on a band above 50 MHz with a station you thought would never work! During my first September VHF QSO party I operated QRP-portable. I took my gear outdoors and ran my hand-helds from batteries. Activity began to die off after I worked "everyone around."

I got up from my chair and began to putter with some outdoor work. All of a sudden, I heard "K3-yellow-traffic-light, K3-yellow-traffic-light calling CQ!" I jumped up, picked up my palm-size radio and stared at it as I ran my fingers through the *QST* that listed last year's scores. I saw that K3YTL was from Pennsylvania —and I live in New York. I quickly worked him and switched to a different frequency to tell a couple of my pals that there was a good grid coming in loud and clear. I got to the frequency only to hear W2SZ/1! I worked through a little pileup and logged him as well. I worked both of those stations with $^1/_2$ W on FM with a home-brew six-element beam up about 12 feet! That got me hooked on VHF contesting!

Perhaps the best thing about microwave operating is that as a Technician, you have access to *every band and mode from 50 MHz to daylight!* You don't have to be an Extra-class ham to work the best DX. Take your written test and you are well on your way to enjoying microwave fun.

Conclusion

Don't neglect the bands above 50 MHz just because the solar cycle is booming. VHF/UHF/SHF *always* offers something new. And when the solar cycle is at its most dismal depths, microwave hamming can save the day. The world of microwaves awaits!

Notes:

[1] *The ARRL Microwave Projects Manual, Volume 2* is available through the ARRL or your favorite Amateur Radio bookseller.

[2] A few of the companies that offer transverters (assembled and in kit-form) include Down East Microwave, Ten-Tec, SSB Electronics and Kuhne Electronics. Contact information for these and other companies can be found on the ARRL's UHF/Microwave page at **http://www.arrl.org/tis/micro.html**.

[3] The sites include **http://www.wa1mba.com** and **http://www.qsl.net/n1bwt**.

[4] Point your browser to **http://www.qth.net** for information on joining the various VHF and above reflectors. Also visit **http://www.onelist.com**. Write to the author at **n2im@arrl.net** for information on joining that reflector.

[5] Advanced Receiver Research has Gunnplexers for 10 and 24 GHz.

[6] The no-tune designs have been developed by Jim Davey, WA8LNC, and Rick Campbell, KK7B.

[7] February 1997 *QST*, "The World Above 50 MHz".

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Arthur S. Gillespie, Jr, K4TP

An Easily Constructed 30- and 40-Meter Trap Dipole Antenna

Spend a little time with some PVC and wire, and you'll be able to cover two bands with your own homemade dipole!

Discussions of trap-antenna construction and use have appeared in ARRL and other Amateur Radio publications for years. Using readily available materials, you can simply and inexpensively construct a 30- and 40-meter dipole antenna by assembling a pair of 30-meter traps. Most of the trap material you need is in stock at hardware and building-supply stores. For my station, I erected the dipole as an inverted **V**.

Trap Construction

See Figures 1 and 2 for the antenna dimensions and trap details, respectively. The traps use 1.5-inch Schedule 40 PVC pipe and mating end caps. Standard PVC cement glues the end caps to the pipe ends. The capacitors I used are Centralab 850S-50Z.[1] Because the power limit for the 30-meter band is 200 W PEP, lower-voltage ceramic capacitors of the proper value could probably be used. The value of a disc-ceramic capacitor designed for bypassing applications may vary considerably from its marked value, so if you plan to substitute capacitors, try 1-kV (or greater) capacitors after verifying their capacitance value. Use eyebolts and hardware made of corrosion-resistant metal such as stainless steel. Avoid using plated fittings; they won't last long without rusting. To allow the traps to breathe, drill a small hole in one end of each trap. This helps prevent moisture buildup within the trap.

After assembly, tune the traps to 10.125 MHz, the center of the 30-meter band. I did this by placing each trap—without antenna attached—on top of an empty cardboard box and tuning the trap to resonance using a dip meter. (If you have an antenna analyzer, use it—*Ed.*) First, check the calibration of the dip meter using a receiver. Make minor adjustment of the trap resonance by moving the coil turns closer together or farther apart. Once the traps are tuned properly, fix the windings in place with a light coat of PVC cement. When the cement is dry, check the trap resonance again. To hold the windings in place and lengthen trap life, cover the windings with an ultraviolet resistant sealant such as 3M Strip-Caulk (08578) available at auto parts suppliers, or use RadioShack sealing tape for outdoor connections (RS 278-1675). The sealant does not noticeably change the trap resonance.

[1]Suitable capacitors are available from RF Parts, 435 South Pacific St, San Marcos, CA 92069; **rfp@rfparts.com**; **www.rfparts.com**: 5-kV, 50-pF units (P/N 580050-5, factory part # HT50T500) are $12.95 each; 7.5-kV capacitors are $14.95 each. Another source is Surplus Sales of Nebraska, 1502 Jones St, Omaha, NE 68102; tel 800-244-4567, 402-346-4750, fax 402-346-2939; **grinnell@surplussales.com**, **www.surplussales.com**. (See page 101 of their catalog #8.—*Ed.*) Often these "doorknob" capacitors can be purchased inexpensively at hamfests and flea markets. High-voltage disc-ceramic capacitors are available from Mouser Electronics, 958 N Main St, Mansfield, TX 76063-4827; tel 800-346-6873, 817-483-4422, fax 817-483-0931; **sales@mouser.com**; **http://www.mouser.com** and Digi-Key Corp, 701 Brooks Ave S, Thief River Falls, MN 56701-0677; tel 800-344-4539, 218-681-6674, fax 218-681-3380; **http://www.digikey.com**.

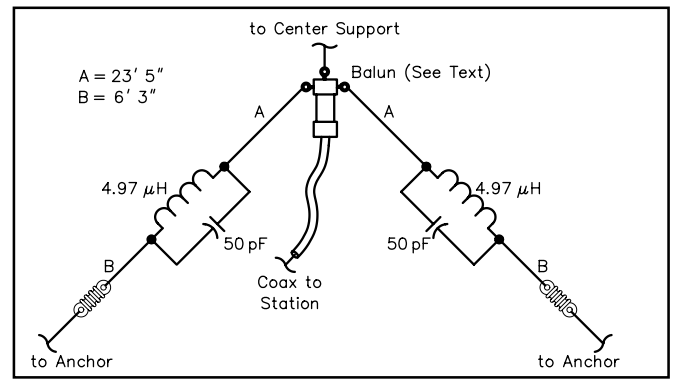

Figure 1—Inverted V 30- and 40-meter trap dipole antenna at K4TP.

Performance

I use a 1:1 balun at the center of the inverted **V**; the balun also serves as a center insulator. As shown, my antenna displays an SWR of 1.5 or less across the CW portion of the 40-meter band rising only to 2.8 at 7.3 MHz. On 30 meters, the SWR is 1.5 or less. My antenna has been in use for over two years and performs outstandingly on 30 and 40 meters. The traps should work equally as well in a standard dipole configuration; however, some minor changes in overall antenna length might be required to maximize the performance.

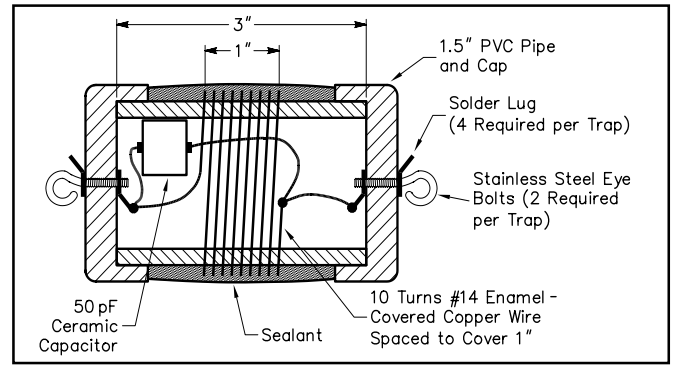

Figure 2—Trap construction details. Two traps are needed, one for each leg of the antenna. To ensure long life, use stainless-steel hardware and cover the winding with an ultraviolet-resistant sealer.

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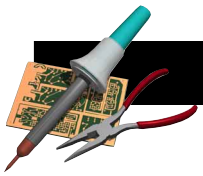
artnfaye@bellsouth.net



By H. Ward Silver, N0AX

Test Your Knowledge!

Take a “power-full” quiz…

Just about every project has a power supply. This pair of word problems gives the power supply builder a little design exercise with two types. Have fun and may your ripple be within spec!

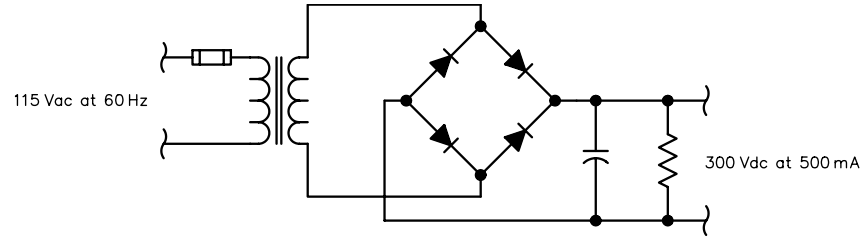


Figure 1—Linear power supply specifications:
115 V ac @ 60 Hz input
300 V dc @ 500 mA output
5% ripple at full load
Safe to touch in 30 seconds

See Figure 1.

1. What is the minimum rating of the transformer in V/A?
2. What should be the primary fuse size?
3. For a full-wave bridge, what is the required secondary RMS voltage? What is the PIV and current rating for the rectifiers?
4. Where should the secondary fuse be placed—between the rectifier and the capacitor, or between the capacitor and the output?
5. How big should the filter capacitor be?
6. What should be the value of the bleeder resistor? Its power rating?

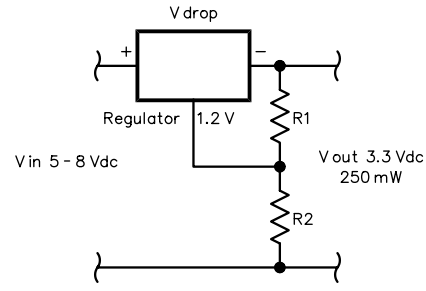


Figure 2—Linear regulator specifications:
5 to 8 V dc input
3.3 V dc out @ 250 mW

See Figure 2.

7. Pick R1 and R2 values to give a sensing voltage of 1.20 V while consuming less than 1% of total output power.
8. For a 0.5 V drop across the regulator, what is the power dissipation of the regulator at full load?
9. How low can the input voltage be and still meet the output spec at full power?

Bonus—What is a “chicken stick”?

22916 107th Ave SW
Vashon, WA 98070

Answers

1. The output power of the supply is 300 V @ 500 mA, so neglecting losses, 300 × 0.5 = 150 VA output power is required. Good design practice would add at least one-third for losses and design margin. So, at a minimum, a 200 V/A transformer is required.
2. The average primary current draw is 150 V/A ÷ 115 V ac = 1.3 A. To account for inrush surge and temporary overloads, the fuse should be twice that or 2.6 A. Use a 3 A fuse.
3. In a full-wave bridge, the output dc voltage is approximately 1.4 times the secondary RMS voltage. If 300 V dc is required at the output, the secondary voltage should be 300 ÷ 1.4 = 214 V ac. PIV for each rectifier is the output voltage of the supply or 300 V dc. Use a 500-V rectifier at a minimum. Each diode carries one-half of the supply’s average output current, or 250 mA. So, a 500-mA current rating is required to handle inrush surges at turn-on. A common 1N4007 (1000 PIV @ 1A) would do well in this design.
4. Between the rectifier and the capacitor. This protects the rectifiers and the transformer in case of a capacitor short.
5. The capacitor must be capable of keeping the output voltage within 5% (15 V) of rated output voltage at full current draw. In a full-wave bridge design, charge is input into the capacitor every 1/120 = 8.33 msec. Discharge due to the output current load is (8.33 msec × 500 mA) / C = 15 V. C = 277 µF minimum. A 300-µF unit will do the job.
6. The bleeder must be able to drop the capacitor voltage to a safe value (25 V or less) in 30 seconds. Twenty-five volts is 0.0833 of rated voltage. At least three time constants of an RC circuit are required to discharge the capacitor to less than 0.0833 of initial voltage, so set 30 sec = 3 time constants and the time constant = 10 seconds. A 33 kΩ resistor and a 300 µF capacitor have the proper time constant. The power dissipation of a 33 kΩ resistor across a 300 V supply is 2.7 W, so a 5 W unit is required.
7. The total value of the resistor string must draw less than 2.5 mW. At 3.3 V across the string, the total resistance must be at least $(3.3)^2 \div 0.0025 = 4.36\ k\Omega$. The ratio of R2 to R1+R2 must be 1.2 V / 3.3 V = 0.364. R2 must then be at least 4.36 kΩ × 0.364 = 1.58 kΩ. Use 1.6 kΩ. That means R1+R2 must be 1.6 kΩ ÷ 0.364 = 4.2 kΩ.Thus, R1 is 4.2kΩ – 1.6kΩ = 2.6kΩ.
8. The average current draw through the regulator is 250 mW ÷ 3.3 V = 76 mA. Power dissipation of the regulator is 0.5 V × 76 mA = 38 mW.
9. The minimum input voltage is 3.8 V = 3.3 V output voltage + 0.5 V drop through the regulator.

Bonus: A chicken stick is a ground wire attached to a non-conducting stick. Before working on a power supply of any significant voltage, the chicken stick is touched to each component that might have voltage on it. Better a live chicken than a dead fool!

Portable Power Station

Even though it weighs only 7 lbs, the model 752 Portable Power Station packs a substantial punch. A sealed 12-V 7-Ah lead-acid battery makes up most of the weight. Charge the Portable Power Station's battery from the supplied ac unit (about 8 hours), or charge it from your car (about 3 hours, while driving) and you're good to go. The Portable Power Station can potentially power a QRP transceiver or an H-T continuously for at least 24 hours, potentially even for weeks, depending on how often you transmit.

Front view of the Portable Power Station along with the mobile charging cable and home charger unit.

Rear view showing the 12-V terminals and 10-A fuse.

Appearances are Deceiving

The Portable Power Station is deceptively small at just $7^1/_4 \times 4^1/_2 \times 8$ inches. It looks like a black lunch bucket with a dc voltmeter attached. There are two slide switches: one to select 3, 6 or 9 V for the $^1/_8$-inch in-line jack on the side of the unit, the other a power on/off switch. Below the switches are two cigarette-lighter jacks: one acting as a port for charging the Portable Power Station from your car or other 12-V source (a charging cable is supplied), and another functioning as a 12-V *output*.

A red LED above the master switch simply indicates whether the Power Station is on or off. Another red LED labeled **CHARGER** blinks or dims as the ac charger cycles on or off (it extinguishes when the battery is completely charged). As the battery is discharged, you'll notice that the dc voltmeter indicates a gradual drop in voltage. The **CHARGER** LED begins blinking when the Power Station is in need of a recharge. In my tests the LED began blinking when the voltage dropped below 12 V.

On the rear panel you find a door covering a small compartment. In this compartment are two 12-V screw bolts that serve as 12-V terminals. It's worth noting that these terminals are always hot, even when the front-panel master switch is in the **OFF** position. You can tap into the terminals using alligator clips or whatever, but don't attempt to loosen the nuts at the bases. These are *not* attachment nuts. If you wish to use nuts to attach your power leads to these terminals, you'll have to find your own. (They must be metric.)

In the rear compartment is a 10-A fuse. Despite the fuse location, it does not protect these terminals. The fuse protects only the front panel cigarette lighter jack and the side panel low-voltage jack. An independent fuse in the power line is a good idea if you intend to use the rear terminals.

On the Air

I spent a long Independence Day 2000 weekend putting the Portable Power Station to the test. In fact, I used it as the only power source for my ICOM IC-706MkII transceiver during that time. (Of course, I had the 706's output cranked down substantially to stay within the Power Station's current limit when transmitting.)

The Portable Power Station was as solid as a proverbial rock. I enjoyed quite a few PSK31, RTTY and CW contacts while keeping an eye on the dc voltmeter, but it barely budged with each transmission. According to the reports I received, my battery-powered signal was perfectly clean.

I deliberately left my radio in the receive mode for 5 hours just to see how long it would take to deplete the Portable Power Station. An IC-706 draws about 1.5 A continuously while receiving, so in terms of your typical QRP rig, this would be roughly the equivalent of a continuous key-down transmission. After 5 hours the voltage finally slipped below 12 V and the **CHARGER** LED began blinking. This corresponded pretty closely to the 7 Ah rating of the Power Station.

A Reliable Companion

The Portable Power Station would make an ideal power source for emergency operations and public service events. The fact that you can charge the Power Station from a running automobile in only 3 hours means that the unit can theoretically be used for days in areas where primary ac power has been lost. It makes sense to simply keep a Portable Power Station fully charged and ready whenever the need arises.

Beyond its serious applications, the Portable Power Station is perfect for casual portable operating. You can take it on trips, camping, hiking expeditions or wherever you'd care to operate. And when you aren't using it on the air, the Portable Power Station can power a TV, CD player, computer…

Manufacturer: The Ham Contact, PO Box 4025, Westminster, CA 92684; 714-901-0573 (information); 800-933-4264 (orders only); **http://www.hamcontact.com/**. *$49.94 plus $10.50 shipping and handling.*

Steve Ford, WB8IMY ♦ *QST* Managing Editor

HINTS & KINKS

SIMPLE PVC CENTER INSULATORS

◊ I have recently discovered two accessories can be used with PVC plumbing pipe to simplify making dipole center insulators and balun enclosures.

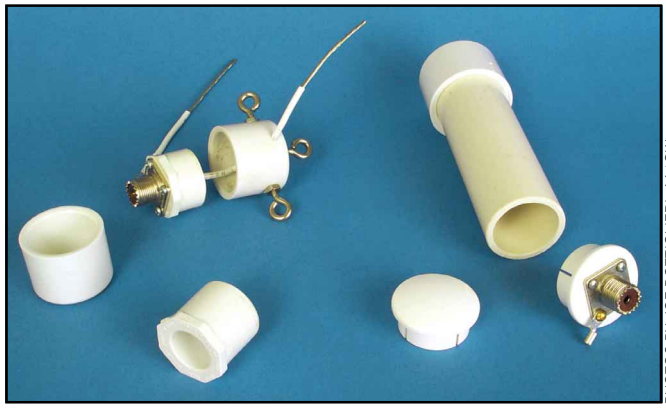
The first is a reducing bushing. It is designed to fit inside a pipe coupling or an end cap and accept a smaller size pipe than the cap does. A 1×1/2-inch bushing fits over 1/2-inch pipe and into a 1-inch cap. By a stroke of good luck, an SO-239 coax chassis connector will fit over the hole for 1/2-inch pipe and can be mounted there with #4 screws. Figure 1 shows one of these bushings and a 1-inch cap, as they may be purchased at Home Depot or plumbing-supply stores. A completed center insulator is also shown; the eyebolts are mounted by nuts both inside and outside the cap. The opposing eyebolts are for the dipole wires. The eyebolt at the top is for supporting an inverted-**V** antenna when the center insulator will be the highest point of the antenna. Separate wires connect the center terminal of the coax connector to one half of the dipole and one of the SO-239 mounting screws to the other half of the dipole. The bushing and cap are glued together with PVC cement.

If you want a larger center insulator, a second reducing bushing can be used between the one shown, which mounts a coax connector, and a 1 1/4- or 1 1/2-inch pipe cap.

The second "discovery" is of PVC plugs, or inner caps, that fit inside ordinary PVC pipe. These make a nice enclosure when used to seal off the ends of a pipe. For example, when combining a center insulator with a balun, the enclosure can be lengthened with a piece of pipe that fits into the cap, and the coax connector can be mounted to one of these inner caps. They are available from United States Plastics Corporation.[1] Figure 1 shows 1 1/4-inch pipe with a regular cap at one end and an inner cap with SO-239 ready to be inserted at the other end.

Notice that the reducing bushings fit into pipe connectors, not the pipe itself, but the inner caps do fit into the regular Schedule 40 pipe. They present some new options in making PVC enclosures.—*Robert Johns, W3JIP, Box 662, Bryn Athyn, PA 19009;* **ksjohns@mindspring.com**

[1]United States Plastics Corp, 1390 Neubrecht Rd, Lima, OH 45801-3196; tel 800-537-9724. They take telephone orders with Visa or MasterCard and usually ship the same day. You will also receive a catalog that every builder should have. The order numbers for the inner caps are: 1-inch #28207, 1 1/4-inch #28208 and 1 1/2-inch #28209.



PHOTOS BY JOE BOTTIGLIERI, AA1GW

Figure 1—PVC internal caps and reducing bushings can be very helpful when fabricating center insulators for dipole antennas.

USE PVC PIPE TO EASE INSTALLATION OF ATTIC ANTENNAS

◊ I have been working recently on installing a 40-meter dipole (using two end-loading wires) in a small attic space of my rented townhouse. The antenna must be trimmed to resonance at four points, all of which are right along the edge of the attic under the eaves. Access is tight and normally requires a belly crawl along the narrow edges of ceiling joists through loose fiberglass insulation with roofing-nail points just inches overhead.

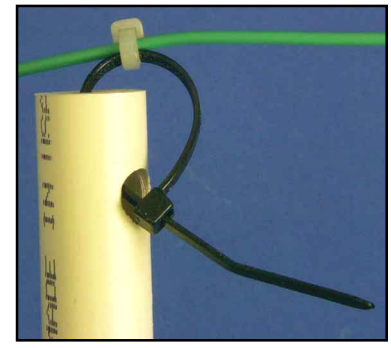


Figure 2—KB8WEV suggests PVC pipes as permanent handles to place antennas in cramped attic spaces.

While contemplating the prospect of several trips out to the four end-points of the antenna to trim it, I came up with a better way. I purchased four 10-ft sections of 1/2-inch Schedule 40 PVC pipe and attached one end of each pipe to each end of the loading wires with cable ties.

I first drilled a small hole through one side of the PVC pipe about 3/8 inch from one end. I slipped a cable tie through this hole and out the end of the pipe and created a loose loop. I fed a second cable tie through this loose loop and then tightened the second cable tie securely around the antenna wire several inches from its end. This holds the wire firmly enough to manipulate it, but allows the wire to slide enough to pull more wire through for trimming to resonance. (See Figure 2.)

Now I can work on the antenna from the more spacious interior of the attic by simply picking up the PVC pipes and bringing the wire ends back to my position, then extending them back into their tight working quarters when I'm done. The pipes are heavy enough to hold the wire stretched into working configuration. You could also use thicker-walled Schedule 80 PVC or 3/4-inch diameter pipe if you need a heavier or stiffer pipe. If you need additional tension on the wire, use pipe straps or **J** hooks to secure the pipes, and therefore the antenna ends more firmly in place. You might also be able to use the PVC pipe and straps to hold the antenna off the attic floor if your design requires this.

If you have a longer wire that is difficult to reach but needs more careful placement, fashion an open hook or a **Y** that attaches to one end of a PVC pipe. Hold the wire a few inches above the ceiling joists with the hook or push it away from you with the **Y** as you lay it in the desired position.

Of course, a wooden dowel, closet rod or small rectangular stock could also serve these functions if you have them on hand. The PVC has good reach and is cheaper than wood if you're buying for the purpose. The PVC also has no sharp corners or grain and will not snag, tear or move attic insulation around as much as wood.

I find this method more appealing than a steady diet of fiberglass and dust or finding bits of my scalp hanging from the business end of a roofing nail.—*Lee W. Lumpkin, KB8WEV, 51 Glenhurst Dr, Oberlin, OH 44074;* **kb8wev@arrl.net**

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor

MODIFICATION TO KENWOOD MC-53 MICROPHONE

◊ Figure 3 is a drawing I made in order to explain a modification needed to most Kenwood MC-53 microphones commonly used with Kenwood TM-742 transceivers. If any of you proud TM-742 owners have found your backlit-microphone PTT going away or becoming intermittent, the solution is at hand! Simply remove three screws holding the microphone's back cover, then remove the PTT lever. Remove and discard the foam-rubber cylinder from the lever. Now remove the small foam piece within the return spring. Next,

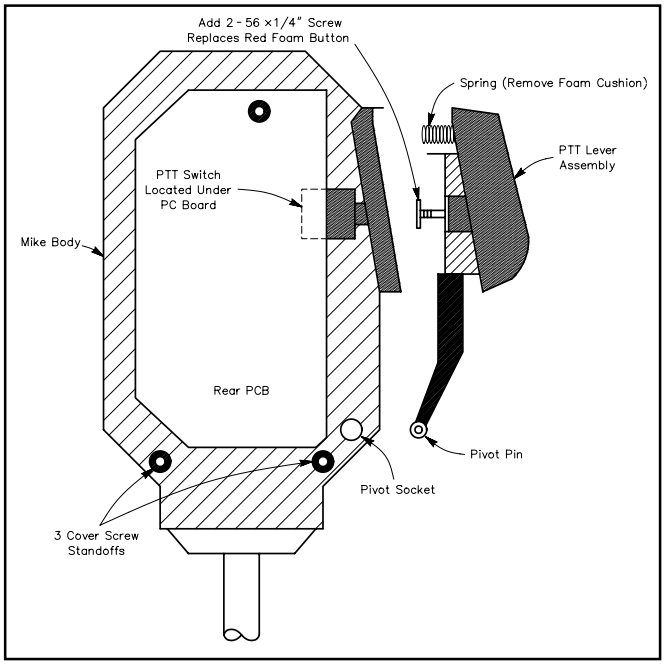


Figure 3—KC6NXZ's remedy for PTT problems in Kenwood MC-53 microphones.

install a #2-56×1/4-inch screw where the first foam-rubber piece was glued into the hole in the plastic lever. Adjust for proper action on the PTT switch. Finally, close the microphone and perform a final check attached to the transceiver. This mod should give you a positive feel when the PTT switch transfers. I am told it did wonders for Carl, KE6JQL, who had lost some of his finger strength due to a stroke.—*Tom Caudle, KC6NXZ, PO Box 711825, Santee, CA 92072-1825;* **kc6nxz@tns.net**

MORE ON REPAIRING OLD HEADSETS

◊ Regarding those wonderfully flexible (but impossible to solder) metal-on-nylon cords which are found in headsets and some telephone cables, here's a hint that I've used for years. As N7OJ mentioned,[2] reconnecting them is a pain. A close examination of a typical connection on one of these will usually show that the original connectors have tiny teeth which went through the insulation.

Go to your local RadioShack and pick up their part number 64-3070, insulation-piercing telephone spade lugs (see Figure 4). A pack of 24 is about $1.49. These are perfect for this task.

Leave the outer insulation intact on your disconnected wires, trimming off any exposed metal conductor. Then carefully crimp one of those lugs onto the stub. The teeth poke through and make contact with the conductor, while the insulation keeps the foil/metal conductor in place and provides a bit of strain relief. Now you've moved from tinsel wire to real metal (tada!) and can trim/solder the spade lug as needed.

[2]B. McCaffrey, N7OJ, "Don't Throw Away Those Old Headsets," *QST*, Feb 2000, p 61.

I've fixed headsets and other flimsy things for quite some time with this method, and I'm amazed that RadioShack still carries the lugs. They're vital when you need them, but can't be a big seller.

Here's another, newer solution: I told a friend about this headset-cord tip. He has a pile of antique headsets with cloth cords that are either missing or rotted. Therefore, he asked me to surf the Web and see what I could find. I found Phoneco Inc, 19813 E Mill Rd, PO Box 70, Galesville, WI 54630; tel 608-582-4124, fax 608-582-4593; URL **http://www.phonecoinc.com/**. They sell old telephones, reproduction and novelty telephones, miscellaneous parts and memorabilia. The cords shown on their Web pages might not be original-equipment headset cords, but they look awfully close.—*Jim Tolson, KF9CI, 4934 Dobson St, Skokie, IL 60077;* **jtolson777@aol.com**

Figure 4—Insulation-piercing spade lugs, as sold by RadioShack.

TS-850 VCO INSTABILITY

◊ I have a Kenwood TS-850SAT transceiver that has served me well, except for a problem it developed a while ago. Both the receive and transmit audio developed a raspy sound. It was very noticeable on SSB and CW, but nonexistent on AM. After much probing, I found it was due to instability of one of the voltage controlled oscillators (VCO).

There are three VCOs in the 850: a band-switched tuning VCO, the second-mixer VCO and a lower-frequency "carrier" VCO. The second-mixer VCO (64.22 MHz) in my radio was FMing. VCO2 is located on the PLL board (X50-3130-00).

Tapping the body of trim capacitor TC-1 caused it to worsen. The VCO controlling voltage on test point TP-2 was 3.1 V dc. The service manual calls for it to be 5.0 V dc. Adjusting the TC-1 trim cap would not raise this, only lower it until PLL lock was lost, at about 2 V dc.

With some finesse, it was possible to remove VCO2 with its shield can, along with the daughter-board. Touching up the TC-1 solder joint(s) did not improve the situation. I believe the sliding joint within the trim cap was intermittent.

I went looking at the local electronics shop to search for a decent 10 pF air-dielectric trimmer to replace the intermittent TC-1. They had to order it, so for the time being, I purchased a fixed value 8.2 pF monolithic capacitor to pop in there and try it. This was a stab at a ballpark, workable value. With 8.2 pF, the controlling voltage is now 5.9 V dc. Not perfect, but closer than could be achieved with that faulty trimmer. The raspiness (FMing) is gone and the rig is running well until the replacement trimmer comes in.

I have heard some other signals on the air that have the same raspy sounding signal. Perhaps they have the same condition and this repair might cure the problem.—*David Steels, VE3UZ, 444 Jellicoe Crescent, London, ON, Canada, N6K 2M5;* **dsteels@odyssey.on.ca**

Hints and Kinks items have not been tested by *QST* or the ARRL unless otherwise stated. Although we can't guarantee that a given hint will work for your situation, we make every effort to screen out harmful information. Send technical questions directly to the hint's author.

QST invites you to share your hints with fellow hams. Send them to "Attn: Hints and Kinks" at ARRL Headquarters (see page 10), or via e-mail to **rschetgen@arrl.org**. Please include your name, call sign, complete mailing address, daytime telephone number and e-mail address on all correspondence. Whether praising or criticizing an item, please send the author(s) a copy of your comments.

Amateur Radio Titan Lew "Mac" McCoy, W1ICP, SK

Amateur Radio giant and former ARRL Headquarters staff member Lew "Mac" McCoy, W1ICP, of Mesa, Arizona, died July 31. He was 84. His daughter, Marsha Ashurst, W1HAQ, said McCoy had not been feeling well for about seven weeks and was diagnosed as being seriously ill only three weeks before he died.

As a member of the ARRL Headquarters staff from 1949 until 1978, McCoy gained a national and international reputation primarily for his early work to combat TV interference and for his articles in *QST*. "He became a hero of all the Novices and beginners because his stuff was so down to earth and easy to read," said retired ARRL Communications Manager George Hart, W1NJM, a good friend.

ARRL Executive Vice President David Sumner, K1ZZ, described McCoy as "one of a kind" and "versatile." Sumner said McCoy "left his mark on future generations of amateurs as *QST*'s 'Beginner and Novice' editor." When FM repeaters came along, Sumner said, McCoy made it his mission to educate his ARRL colleagues about their potential.

An ARRL Life Member, McCoy was first licensed as W9FHZ and later as W0ICP, before moving to New England. He arrived at ARRL Headquarters in 1949, first working at W1AW and eventually landing in the Technical Department. There, he was able to take advantage of his ability to explain technical concepts in simple terms.

McCoy earned a reputation as a tireless traveler and goodwill ambassador for Amateur Radio. He first started hitting the road in the early 1950s after TVI had become troublesome for amateurs. Lew soon became the League's TVI expert.

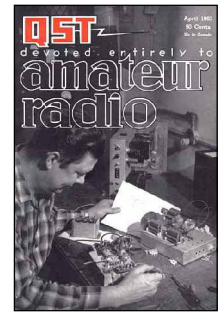
At that time, Amateur Radio faced a major threat in the form of television interference. "TV sets were poorly made, TV signals were weak, and most amateur transmitters were unshielded; it wasn't unusual for a ham to wipe out TV reception for blocks around," Sumner said. "Some predicted that this meant the death of Amateur Radio. Not to Mac McCoy and the ARRL, though." Sumner said that one of McCoy's first assignments was a "road show" to demonstrate how to beat TVI using filtering and shielding.

Ashurst recalls how she and her sister Sharon, then WN1GQR, toured with McCoy as he demonstrated TVI cures for hams and TV service personnel alike. "As children we also sat through many of his presentations and knew more about TVI than any other kids in the country," she said. "We were the first in town to have a TV set so that Dad could monitor interference. Having a TV also made us very popular with the other kids, especially when Ed Sullivan had Elvis Presley [on]."

ARRL Lab Supervisor Ed Hare, W1RFI, credits McCoy with providing the foundation for the ARRL's current RFI expertise in helping hams to deal with interference to consumer equipment and interference to hams from other sources. "His tutorial articles helped many hams of that era learn about radio electronics, antennas, propagation and a host of other subjects of interest to the newcomer and old timer alike," Hare added. McCoy also was well-known for one of his projects, "The Ultimate Transmatch," an antenna tuner he described in a July 1970 *QST* article.

After leaving the ARRL Headquarters staff, McCoy continued as a *QST* contributing editor. He subsequently was a major contributor to other Amateur Radio publications, including *CQ*.

During his active years on the air, McCoy was an avid DXer. More recently, he was active in the Quarter Century Wireless Association, had served as QCWA president and a board member and had just been elected again to the QCWA's Board of Directors, something his daughters never got to tell him before he died. QCWA President Emeritus Leland Smith, W5KL, remembered McCoy as a proponent of a no-code license for beginners who also advocated the 5 WPM maximum code requirement subsequently adopted by the FCC.



After authoring some 200 columns and articles, McCoy finally got a cover shot on *QST* for April 1963.

McCoy's first wife (of 60 years), Martha, died in 1998. Survivors include his wife, Clara Gibbs McCoy, whom he married in 1999, and his daughters, Marsha Ashurst, W1HAQ—licensed at age 8 and said at the time to be the youngest ham in the world—and Sharon Armann, ex-WN1GQR, as well as grandchildren and great-grandchildren.

In accordance with McCoy's wishes, there was no funeral. The family is planning a memorial service for McCoy in early December. The family invited memorial donations in McCoy's name to Hospice of the Valley, 1510 E Flower St, Phoenix, AZ 85014-5656. Condolences may be sent to the family care of Marsha Ashurst, PO Box 2260, Lakeside, AZ 85929.

NCVEC ADVANCES REVISED MORSE TESTING STANDARDS

The National Conference of Volunteer Examiner Coordinators has voted to set up revised standards for the administration of Morse code examinations in the US. The move at the NCVEC's July 21 meeting in Gettysburg, Pennsylvania, came in the wake of the FCC's December 30, 1999, action to establish 5 WPM as the sole Amateur Radio Morse code requirement.

Under the revised standards, examinees would have to show 25 character-count solid copy on their test sheets or successfully answer seven out of 10 questions of a fill-in-the-blank quiz on the sent text. The plan would bar the use of multiple choice tests for Morse code testing.

Morse examinations would specify use of the Farnsworth method, where characters are sent faster than the overall speed and additional spaces added between characters, words and sentences. Farnsworth "character speed" would be in the range of 13 to 15 WPM at an audio pitch of between 700 and 1000 Hz. Standard 5 WPM tests with 5 WPM character speed could be administered only as a special accommodation.

The new Morse testing standards are set to be in use by next July 1, but VECs may implement them sooner.

Representatives of 11 of the nation's 14 Volunteer Examiner Coordinators attended the Gettysburg session. FCC staff members on hand indicated that any decision on petitions for reconsideration of the FCC's

Rick Lindquist, N1RL ♦ Senior News Editor

Amateur Radio restructuring *Order* would not come until this fall or winter. The FCC also said that an FCC *Order* appointing amateur club station call sign administrators is pending, but gave no indication of when it would be released. The ARRL-VEC, the W5YI-VEC and W4VEC have applied to be call sign administrators.

The FCC's Bill Cross, W3TN, also advised the conference that an overlooked amendment to the Communications Act has eliminated the basis for setting a maximum test fee reimbursement. The ARRL initially had requested a change in the test fee basis several years ago. The FCC plans to issue a *Public Notice* by year's end clarifying how this will affect 2001 test fees. In the meantime, the current test fee schedule remains in place.

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth, K4ZDH, discussed recent enforcement actions and emphasized the VEC's obligations to uphold the integrity of the volunteer examiner system.

The NCVEC Question Pool Committee was re-elected, with Ray Adams, W4CPA, to continue as chairman. Adams announced his resignation August 24, however.

FCC statistics presented during the session show that Technician and Tech Plus licensees still make up nearly one half of the US amateur population. As of July 18, there were 209,550 Techs and 121,175 Tech Pluses. Reflecting the shift in license class because of restructuring, Extras now number 92,165, and Generals 134,015—both up by more than 20% over year-earlier figures. There are 93,834 Advanced ops, and the Novice population remains at just under 60,000.

ARRL VOLUNTEERS FIND, FIX "THE DITTER"

ARRL staffers were greeted the morning of July 24 with reports of a continuous string of CW dits near 14.008 MHz—heard throughout North America over the preceding weekend. Initial reports gave conflicting beam headings of the offending signal, dubbed "the ditter." But when FCC staffer John Reiser, WQ4L, called ARRL to report his observations, things started to happen.

Reiser traced "the ditter" to the San Diego area. ARRL San Diego section Official Observer Coordinator Bill Sallee, K6TWO, took several field readings. At one point, when he'd narrowed the location to within two miles, the signal abruptly disappeared. The ARRL Monitoring System also was alerted.

Dialing around the bottom edge of 20 meters early on July 26, IARU Region 2 Monitoring System Coordinator Martin Potter, VE3OAT, heard the ditter once

In Brief

ARRL PHOTO

• **van Tuijl family returns home:** The van Tuijl family has left the US and returned to the Netherlands. Their departure in late June came just a month after 13-year-old Willem van Tuijl—wounded by gunfire during an attack by pirates off the coast of Honduras last March—was released from a Dallas hospital and cleared for travel. Willem, the son of Jacco and Jannie van Tuijl, KH2TD and KH2TE, was seriously injured in late March after he was shot by pirates that attacked the family while they were sailing off the coast of Honduras. He was left paralyzed from the waist down as a result of his injuries. After the pirate attack, the family was aided by Amateur Radio operators who called the Coast Guard and provided medical advice during the family's trip to shore with the gravely injured youngster. Other hams later provided communication assistance and additional help. ARRL President Jim Haynie, W5JBP, was instrumental in getting the boy and his family from Honduras to the US for medical attention. The family's sailboat, *Hayat*, now is in South Florida and will remain docked there through the generosity of friends. The van Tuijls plan to return to the US within one year, possibly on a permanent basis, so that Willem can complete his education here.

• **Outgoing QSL Service marks a million:** On July 28, the ARRL Outgoing QSL Bureau topped one million cards sent so far this year. QSL Service Assistant Tammy Krauss, K1TLK, says the year-to-date total is 1,103,535. That number is ahead of the same date last year by 22,215 cards.

• **Vote on *QST* Cover Plaque Award:** Recent winners of the *QST* Cover Plaque Award were: April, Frank King, KM4IE, for "A $20 HF Mobile Antenna"; May, James Kates, N9GBB, for "Confessions of a DXing Dad"; June, Howard Teller, KH6TY, and Dave Benson, NN1G, for "A Panoramic Transceiving System for PSK31"; July, Thomas Schiller, N6BT, for his article "Everything Works"; and August, Ray Soifer, W2RS, for "UO-14: A User-Friendly 'FM Repeater in The Sky'." Congratulations to all! ARRL members are reminded that the winner of the *QST* Cover Plaque award—given to the author(s) of the best article in each issue—now is determined by a vote of ARRL members. Voting takes place each month on the ARRL Members Only Web site at **http://www.arrl.org/members-only/qstvote.html**. As soon as your copy arrives, cast a ballot for your favorite article. Voting ends on the 15th of each month.

• **KT4XA is 2000 *Newsline* Young Ham of the Year:** Christopher Arthur, KT4XA, a 17-year-old from Russellville, Alabama, has been named *Newsline* Young Ham of the Year for 2000. The award is jointly sponsored by the Los Angeles-based *Amateur Radio Newsline*, Yaesu USA, and *CQ* magazine. As Young Ham of the Year, he received—courtesy of Yaesu—an expense-paid trip to the 2000 Huntsville Hamfest and a gift of Yaesu equipment. *CQ* treated him to a week in Spacecamp Huntsville. A high school senior, Christopher's numerous Amateur Radio achievements include founding the League of Young Radio Amateurs and the International Youth Communications Council, both dedicated to the advancement of youth in Amateur Radio. He's a member of the ARRL and was an Assistant Section Manager in 1998 and 1999. He's a member of the Franklin County Amateur Radio Emergency Service and has served as a net control station during training exercises and in actual emergencies. He's also involved in ARES and SKYWARN. The 2000 *Newsline* Young Ham of the Year Award was presented August 19 at the Huntsville Hamfest. For more information, visit **http://www.arnewsline.org/**.—*Amateur Radio Newsline*

• **Canadian lowfers report first 136 kHz QSO:** Larry Kayser, VA3LK, and Mitch Powell, VE3OT, report that, despite poor to medium conditions, they successfully completed the first two-way QSO in Canada on 136 kHz at 1400 UTC on July 22. The distance was 431 km (268 miles). The pair used very slow-speed CW—QRSS—where dits are 3 seconds long and dahs are 9 seconds long! VA3LK and VE3OT have received special letters of authorization for LF testing and evaluation. Frequency range is 135.7 to 137.8 kHz, emissions permitted include CW, FSK and BPSK at a bandwidth of up to 3 kHz. Powell says VA3LK is operating on 137.710 kHz and he is on 137.780 kHz. More information on LF Amateur Radio is available on the Radio Amateurs of Canada Web site, **http://www.rac.ca/infodx.htm**.—*Mitch Powell, VE3OT/RAC*

again, this time near 14.026 MHz. Potter notified League Headquarters, and the San Diego hams again picked up the scent.

Sallee ultimately zeroed in on the source in the oceanfront community of La Jolla. He says the woman who answered the door said her husband was a ham and allowed Sallee to take a look at the station. Sure enough, a stuck dit paddle was keying a powered, unattended rig, which Sallee disabled.

Sallee theorizes that heating and cooling within the ham's uninsulated shack and a combination of corrosion and close dit contact spacing caused the paddle to close on its own. He said the ham later told him that he'd been operating on 14.007.5 MHz on July 21 but did not return to the shack until the following Monday, when he listened in on a CW contact on 14.026 MHz, but didn't transmit. Sallee says the ham left his rig on, unaware of what would happen

FCC News

FCC TURNS DOWN KENWOOD "SKY COMMAND" PETITION

The FCC has declared that use of Kenwood's "Sky Command" remote station control system does not comply with Amateur Service rules. In an *Order* released July 28, the FCC also declined to grant a waiver of the rules to make Sky Command legal.

"We conclude that Sky Command does not comply with Section 97.201(b), and that a waiver of the rules is not warranted," the FCC said.

Sky Command, which lets the user control a fixed HF station via a pair of dualband transceivers, has been on the market for almost three years. The ARRL has declined to permit Sky Command advertisements in *QST*, however, maintaining that the system was not legal to use as configured. Sky Command operates in full duplex, using a 70-cm frequency to transmit audio and control commands to a dualband transceiver at the remote station and a 2-meter frequency to transmit received audio via the remote station's Sky Command transceiver to the operator's transceiver. The VHF channel also contains a Morse code ID.

The League has contended that Kenwood's use of a 2-meter frequency would cause amateurs using the system to violate Section 97.201(b), which limits auxiliary operation to certain frequencies above 222.15 MHz.

The FCC agreed, saying the VHF link was integral to Sky Command and tha Ken-wood's view represented "at best a tortured interpretation" of the rules. The Commission also declined to issue Kenwood a requested blanket waiver of the applicable rules because it said the manufacturer failed to meet the standards required to grant a waiver.

The League has called Kenwood's Sky Command System "a fine product" that would be of interest to many hams if designed for frequencies on which auxiliary operation is legally permitted.

Paul Middleton, KD6NUH, Kenwood's national sales manager for amateur and marine products, said the company has suspended shipment of the Sky Command PG-4R interface cable, but says that it "can't change product software, manuals and literature." Middleton said the company has not yet made a decision on the future of Sky Command or on future entreaties to the FCC. He said a rulemaking petition was "a real strong option."

FEWER THAN ONE-FIFTH OF HAMS ARE ULS-REGISTERED

The FCC has confirmed that fewer than one-fifth of US Amateur Radio licensees—including club stations—are registered on the Universal Licensing System. The FCC deployed the ULS for the Amateur Service just under a year ago, although registration has been available far longer.

The question of how many hams now were ULS-registered arose during the July 21 meeting of the National Conference of Volunteer Examiner Coordinators, held in Gettysburg, Pennsylvania. Not even the FCC officials on hand had an answer. After the meeting, RC Smith, W6RZA, of the Greater Los Angeles VEC crunched some numbers to see if he could supply one for his colleagues.

Starting with the 717,629 licensees in the FCC database at that point, Smith subtracted the 31,449 determined to be expired but within the two-year grace period. Sorting on the Licensee ID Number field, Smith came up with 129,947 ULS registrants, or 18.9% of the remaining 686,180 licensees on record.

The FCC's Steve Linn, N4CAK, says the Commission subsequently ran its own numbers and came up with a similar figure—although without subtracting for those within the two-year grace period. "The quick run done here looked at all active records—717,314—and how many had Licensee ID numbers, giving 18.1%," Linn said . "Take out the grace records and we're in the same ballpark."

For more information, to access the ULS or to register, visit the FCC's ULS site, **http://www.fcc.gov/wtb/uls**.

FCC GRANTS EXPERIMENTAL LICENSE FOR 2300-2305 MHz

The FCC has issued an experimental license to a California company to test market a wireless Internet system in the San Diego area on 2300 to 2305 MHz. Amateur Radio has a secondary allocation on 2300-2310, the lower segment of the 13 cm band. The 2300-2305 MHz segment supports a variety of amateur activities, including weak-signal CW, SSB, digital modes and moonbounce as well as beacons and translator inputs and outputs. The ARRL continues efforts to get 2300-2305 MHz elevated to primary status for amateurs.

The FCC issued the call sign WB2XIK to ArrayComm Inc of San Jose to deploy its "i-BURST" wireless Internet technology using up to 3000 "market trial" participants with portable units and up to 50 base station nodes, each with 50 W EIRP. The license, granted in April, is good for two years. Typically, the FCC gives no notice of experimental applications until they are granted.

The experiment would be conducted within a 35-mile radius of San Diego. Market trial users will be equipped with laptops and i-Burst wireless modems that operate at a maximum EIRP of 1.3 W. The company says it will make clear to participants that the system is experimental and temporary.

ArrayComm acknowledged Amateur Radio's secondary occupation of the segment but downplayed the likelihood of interference between its experiment and amateur weak signal work in the vicinity.

The ARRL has no immediate plans to protest the ArrayComm grant but urged amateurs operating in the 2300-2305 MHz band to be alert for interference. Experimental licenses are granted on a non-interference basis.

Amateur Enforcement News

FLORIDA MAN ARRESTED FOR INTERFERENCE TO HAMS

Federal authorities have arrested a Florida man and charged him with interfering with Amateur Radio operations and transmitting without a license. William Flippo of Jupiter was taken into custody July 20. The arrest is the latest chapter in a lengthening saga involving complaints of flagrant and repeated malicious interference attributed to Flippo.

Flippo already faces a $20,000 fine for unlicensed operation, willful and malicious interference to Amateur Radio communications, and failure to let the FCC inspect his radio equipment. The matter was re-

when moisture and temperature conditions began to change.

Sallee says the ham, whom he did not identify, "was most embarrassed."

"I really felt sorry for him and assured him that public hangings were no longer in vogue," Sallee said. "He said he had learned a valuable lesson about disabling a rig that will be unattended."

Potter congratulated the ARRL Monitoring System and the San Diego field organization for what he called "a fine example of quick reaction and good, solid work." —*Brennan Price, N4QX*

ferred to the US Attorney in January after Flippo failed to pay the fine, and the interference complaints continued.

Armed with a search warrant, federal marshals and FCC and FBI agents, accompanied by local authorities, took Flippo into custody. FCC agents seized items related to the alleged offenses, including radio equipment.

Flippo was released on $100,000 bond. One condition of his release is that he not make any radio transmissions.

Flippo was charged with four counts of transmitting without a license and four counts of interfering with the operations of licensed stations. Each count carries a maximum penalty of one year in prison and a $10,000 fine.

FCC Enforcement Bureau Deputy Chief Jane Mago commended the members of the amateur community, who provided information leading to Flippo's arrest.

CALIFORNIA MAN ARRESTED FOR UNLICENSED OPERATION

A California man with a long history of alleged unlicensed operation was arrested August 5. The FCC reports that Richard Allen Burton was taken into custody August 5. The action follows Burton's indictment in May by a grand jury for the US District Court for the Central District of California. Burton, a former amateur licensee, has been charged with six felony counts of violating the Communications Act of 1934.

The FCC says Burton was operating without a license on Amateur Radio repeaters in Southern California after his license was revoked. Formerly WB6JAC, Burton's General ticket was lifted in 1981. He was convicted in 1982 on four counts of transmitting without a license and two counts of transmitting "obscene, indecent or profane words, language or meaning." Burton initially was sentenced to serve six months of an eight year prison term, with the remainder suspended. Upon appeal, the US Ninth District Court of Appeals upheld the unlicensed operation conviction but threw out his obscenity conviction. The FCC says that Burton transmitted without a license while on probation in 1984 and again in 1990 and in 1992. After the second incident, he was fined $2000 and received a year's probation; after the third, he was sentenced to seven months in jail and a year's probabtion.

In 1992, Burton attempted to get his Amateur Radio license back, but the FCC refused to reinstate him. He was briefly successful in getting a ham ticket in 1996, when he passed a Technician exam at a VE session. The FCC granted Burton a new license and the call sign KF6GKS, which was promptly set aside as soon as the Commission realized its error.

The FCC said that bail for Burton was set at $20,000. He's out on bond. Burton pleaded not guilty at his arraignment, and a trial has been set for October 3.

KV4FZ LOOKS TO SUPREME COURT TO SAVE LICENSE

In a final effort to renew his Amateur Radio license, Herbert L. Schoenbohm, KV4FZ, has petitioned the US Supreme Court. Schoenbohm told the ARRL that his request to the high court to grant a *writ of certiorari* was accepted for filing on August 1. It calls on the justices to request the record of his case from the US Court of Appeals for review.

"Until I hear from the Supremes, I can stay on the air," he said. If the Supreme Court declines to hear his case, however, Schoenbohm's interim operating authority immediately disappears without further notice from the FCC.

Schoenbohm concedes his chances of getting the Supreme Court to review his case are small.

The FCC cited Schoenbohm's 1992 felony fraud conviction and character issues in refusing to renew his ticket. Subsequently, the FCC said that Schoenbohm had improperly solicited *ex parte* contacts with the FCC on his behalf. A federal Appeals Court turned down Schoenbohm's request for a rehearing by the full bench after rejecting his appeal of the FCC's decision to not renew his Amateur Radio license in February.

Schoenbohm claims to be the first ham to ever lose his license for reasons of "character." If he is successful in getting the high court to review his case, it would be heard during court's next term, which begins the first Monday in October.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Arizona, Arkansas, Iowa, Kentucky, Mississippi, Montana, North Texas, Orange, and Wyoming. You are hereby solicited for nominating petitions pursuant to an election for Section Manager (SM). Incumbents are listed on page 12 of this issue.

To be valid, a petition must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are *not* acceptable. No petition is valid without at least five signatures, and it is advisable to have a few more than five signatures on each petition. Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. We suggest the following format:

(Place and Date)

Field & Educational Services Manager, ARRL
225 Main St
Newington, CT 06111

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

(Signature ___ Call Sign ___ City __ ZIP__)

Any candidate for the office of Section Manager must be a resident of the section, a licensed amateur of Technician class or higher and a full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters by 4 PM Eastern Time on December 8, 2000. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before January 2, 2001, to full members of record as of December 8, 2000, which is the closing date for nominations. Returns will be counted February 20, 2001. Section Managers elected as a result of the above procedure will take office April 1, 2001.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 2001. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the April 2001 *QST*. A Section Manager elected through the resolicitation will serve a term of 18 months. Vacancies in any Section Manager's office between elections are filled by the Field & Educational Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Rosalie White, K1STO, Field & Educational Services Manager*

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Minnesota and North Dakota Section Manager elections by the deadline of June 9, 2000, nominating petitions are herewith resolicited. See the above details on how to nominate. QST

The Grundig Satellit 800 Millennium Receiver

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

The Grundig Satellit 800 Millennium receiver is the product of a combined engineering effort between Lextronix Corporation and the Drake Company, a name familiar to many amateurs. The radio itself is assembled in China.

If you've seen the advertisements for the Satellit 800 in the pages of *QST*, you might think that this is a portable receiver. Well, unless your idea of "portable" is toting a 15-pound box, the Satellit 800 is better described as a tabletop radio, despite the portable appearance.

Its substantial size—about $9^1/_2 \times 8^1/_2 \times 21$ inches—allows the Satellit 800 to accommodate quite a large speaker, which provides some of the best audio that I've heard from a radio in some time. Separate bass and treble controls allow you to tailor the sound to match your tastes. In addition, the 800's girth incorporates large, widely spaced pushbutton controls and a large LCD display that you won't need a magnifying glass to read. One nit to pick about the display: USB is displayed by adding an "I" immediately following the "L" in LSB. The result looks like "LISB" and it annoyed me every time I saw it.

You won't find an S meter incorporated into the LCD display. Instead, the Satellit 800 opts for a traditional analog S meter separate from the main display. As with the LCD display, you can backlight the S meter for easy viewing.

Although the Satellit 800 comes with a long telescoping antenna, you'll find several handy antenna connectors on the rear panel to accommodate just about any feed line you're likely to use. There are traditional longwire connectors, an SO-239 coaxial connector and even an F connector for 75-Ω coax (this is for FM broadcast and airband reception only).

Grundig also supplies a set of quality headphones (no, not the spindly Walkman-style headsets—these are large, full-ear-coverage cans), a hefty 120/230 V ac power supply module (the Satellit 800 will also operate on six D cells or another external dc source) and a convenient copy of *Passport to World Band Radio*, the Bible of shortwave listening.

Navigating the Radio

The Satellit 800 spans a wide frequency range: 100 kHz to 30 MHz, 87 to 108 MHz (FM broadcast) and 118 to 137 MHz (aviation). Modes include AM (including synchronous AM tuning), LSB, USB and FM (including FM stereo). FM reception is only available in the FM broadcast range.

When it comes to tuning, you have your choice of direct frequency entry via the keypad or manual tuning with the front panel knob or ^/v buttons. Both methods work very well, but I wish the knob had variable-rate tuning—where the tuning step rate increases the faster you rotate the knob. As it is, the Satellit 800 steps through the frequencies at the same maximum rate regardless of how rapidly you spin the control.

You can easily program your favorite frequencies into any of the 70 memory slots provided, and then step through them using the ^/v buttons or punch them up with the keypad. It's worth noting that the frequency display includes two independent clocks and two timer functions. For our tests I set one clock to local time and another to UTC, a configuration common with most users. The timers are convenient but, unfortunately, the Satellit 800 does not provide a switching output that would allow the timers to turn on an external recorder.

Audio outputs include a $^1/_8$-inch stereo headphone jack on the front panel, and line-level audio left and right channel phono jacks on the rear. The rear panel also includes a $^1/_4$-inch stereo jack for connecting an external speaker (or speakers).

Reception features of note are an adjustable squelch for use on the aviation band and pushbuttons to select the 20-dB RF attenuator, automatic gain control (fast or slow), IF bandwidth (2.3, 4 and 6 kHz), AM sync, SSB (LSB and USB) and band (AIR, FM, SW and AM). Conspicuously absent are a noise blanker and passband tuning.

Bottom Line

Impressive audio fidelity and admirable performance—along with a very nice selection of features—makes the Grundig Satellit 800 tabletop receiver a great choice for shortwave and domestic broadcast listening.

Memories and Scanning

As I've already mentioned, the Satellit 800 offers 70 memory channels. These are extremely convenient when you have a long list of favorite stations and frequencies that you wish to revisit in the future. The memories are divided into seven blocks of ten channels (00-09, 10-19, 20-29, etc). Each memory channel will retain frequency, mode, bandwidth, AGC and sync detector settings.

The scanning function allows you to scan the 10 channels within a specific block of memories very quickly. You can not scan through all 70 memories or select more than one block to be covered in a single scan operation. It is possible to "mask" any of

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

Table 1
Grundig Satellit 800, serial number 58005002965

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: 0.1-30 MHz (SSB/AM), 87-108 MHz (FM), 118-137 MHz (AM).	As specified.
Power requirement: 7-10 V dc, 1.0 A[1].	0.53 A. tested at 9.0 V dc.
Modes of operation: SSB, AM, WFM.	As specified.
SSB sensitivity, bandwidth not specified, 10 dB S/N: 0.1-30 MHz, <0.5 μV.	Noise floor (MDS), 2.3 kHz filter: 1.0 MHz –126 dBm 3.5 MHz –124 dBm 14 MHz –125 dBm
AM sensitivity, 10 dB S/N: 0.1-30 MHz, <2.0 μV; 118-137 MHz, <4.0 μV.	10 dB (S+N)/N, 1-kHz tone, 30% modulation: 1.0 MHz 1.3 μV 3.8 MHz 3.2 μV 120 MHz 3.4 μV
FM sensitivity, 20 dB S/N: 87-108 MHz, <4.0 μV.	For 12 dB SINAD (15 kHz bandwidth): 100 MHz 1.2 μV
Blocking dynamic range: Not specified.	Blocking dynamic range, 2.3 kHz filter: 3.5 MHz 103 dB* 14 MHz 110 dB*
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range, 2.3 kHz filter: 3.5 MHz 84 dB* 14 MHz 89 dB*
Third-order intercept: 5-kHz spacing, –20 dBm; 100-kHz spacing, +10 dBm.	3.5 MHz +2.0 dBm 14 MHz +8.4 dBm
Second-order intercept: Not specified.	+90.7 dBm.
S-meter sensitivity: Not specified.	S9 signal at 1.0 MHz: 81.2 μV; 14.2 MHz, 108 μV.
Squelch sensitivity: Not specified.	At threshold: AM, 120 MHz, 0.84 μV.
Receiver audio output: 1.0 W into 4 Ω (THD not specified).	1.4 W at 10% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): USB-W: 442-2307 Hz (1865 Hz); LSB-W: 436-2235 Hz (1799 Hz); AM: 360-2442 Hz (2082 Hz).
IF rejection: 80 dB; image rejection, 0.1-30 MHz, 118-137 MHz, 60 dB; 87-108 MHz, 50 dB.	First IF rejection, HF, 67 dB; AM aircraft, 69 dB; FM broadcast, 89 dB; image rejection, HF, 48 dB; AM aircraft, 97 dB; FM broadcast, 62 dB.

Size (hwd): 9.3×20.9×8.5 inches; weight, 14.6 pounds.

Note: Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.

*Measurement was noise-limited at the value indicated.

Third-order intercept points were determined using noise-floor reference.

[1]A 120/230 V ac 60/50 Hz power supply is included.

Figure 1—The Grundig Satellit 800 comes complete with a very nice set of headphones, a dual voltage (120/230 V ac) power supply, a multi-language *Use and Care Guide* and the 2000 Edition of *Passport to World Band Radio*.

the memories to effectively lock them out of the scan, however.

Too bad Grundig didn't add the ability to tag each memory slot with an alphanumeric label ("BBC-1," for instance).

On the Air

The Satellit 800's audio is a wonder to the ears—either in headphones or with the forward-firing speaker. No complaints whatsoever in that department. There is plenty of audio power as well. The Satellit 800 was loud with the audio gain control at only the 9 o'clock position. Anything beyond that constituted various definitions of "earsplitting."

AM listening on the domestic broadcast or shortwave bands was a pleasure. Even with the whip antenna, the Satellit 800 is more than sensitive enough to provide a broad variety of signals. The AM synchronous detector makes a substantial difference in signal quality. Once you properly tune a signal and activate the AM sync, the distortion caused by selective fading is kept to a minimum, if not absent altogether. The effect is especially pronounced when listening to music on the shortwave bands. (I could finally listen to music without cringing each time the signal faded.) If SSB is your pleasure, the Satellit 800 is sufficiently sensitive in the SSB modes to allow reception of both amateur and commercial phone traffic. Overall, the Satellit 800 seemed to be better than or equal to Drake's own SW-8 receiver and it approaches the quality of the R8A.

From an audio standpoint, the radio really shines on the FM broadcast band. You're treated to excellent FM audio fidelity and, when wearing headphones or when connecting the receiver to the line-in connectors on your home entertainment equipment, outstanding stereo separation.

Two Flies in the Ointment

There are only two significant performance blemishes on an otherwise fine receiver. While testing the Satellit 800 on various WWV frequencies, I uncovered a very strong (about S5) pulsating signal on 20 MHz. It was so strong, in fact, that it almost obliterated WWV. Testing the radio at various locations in my home and office produced no difference in the strength of the interfering signal. Further investigation revealed that the signal appeared every 2 MHz from 20 to 30 MHz. It was also audible on 124 and 130 MHz. Switching in the attenuator reduced the signal substantially, suggesting that the pulse was being radiated by the Satellit 800 itself and picked up on the whip antenna. Using my ICOM IC-706 as a test receiver with a short piece of wire, I discovered that it received the signal from the Satellit 800 at a distance of about 6 feet. When I switched off the Satellit 800, the signal vanished.

The other problem is most likely related. I found that the Satellit 800 would produce an audible "click" in the speaker while rotating the tuning control. This noise was only heard above about 20 MHz and was mildly annoying. In the aircraft band, however, it was noticeable to the point of being objectionable at times. The clicking was particularly strong when tuning through elevated noise levels.

I did discover, however, that connecting an external antenna to the SO-239 jack and selecting the **50-Ω** position on the antenna

selector switch virtually eliminated the noises in the shortwave frequency range. Connecting an external airband antenna to the provided F connector also substantially reduced the tuning racket on the airband frequencies. You will need to locate these antennas far enough away from the set to keep them from picking up the radiated interference.

While external antennas obviously are not as convenient as the built-in whip antenna for portable applications, serious shortwave (and airband) listeners are already familiar with the significant improvements in reception that result from their use. Most aficionados consider external antennas a necessity.

Grundig reports that these problems do not exist on all units.

Conclusion

The unusual noise problems notwithstanding, the Grundig Satellit 800 Millennium is an excellent consumer-grade receiver. If you don't mind the massive size, you'll love the audio and the overall signal performance. With its fidelity, sensitivity and convenient features, the Satellit 800 brings back the *pleasure* of shortwave and domestic broadcast listening.

Manufacturer: Grundig/Lextronix, PO Box 2307, Menlo Park, CA 94026; 650-361-1611; fax 650-361-1724; **grundig@ix.netcom.com**; **http://www.grundigradio.com**.

Manufacturer's suggested price, $699.95. Typical current street price, $500.

RadioShack HTX-245 Dual-Band FM Handheld Transceiver

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

RadioShack's Amateur Radio Products department has been busy lately.

A cruise through the company's Web site—**http://www.radioshack.com**—reveals that, in addition to their popular house-brand transceivers, they now offer an expanded selection of ham radio equipment. This includes gear by Alinco, Vectronics, Cushcraft, Rohn, Glen Martin and Alpha Delta.

Information on the site indicates that most of these products are only available on line or through telephone catalog sales. Individual outlets stock just a small portion of these listings—their RadioShack-labeled amateur transceivers.

I've got to admit that the appearance of their latest offering, the HTX-245 dual-band FM handheld, caught me completely off guard. While most Amateur Radio manufacturers seem more than anxious to share information on soon-to-be-released equipment, lately RadioShack has been playing their cards very close to their chest. I first sighted this transceiver in the pages of a RadioShack flyer that recently showed up in my mailbox—the '245 was available in area stores just a few days later.

The 'Shack's Latest Surprise

The HTX-245 is a compact "one-band-at-a-time" 2-meter/70-cm dual bander. Highlights include 50 regular memory channels; two call channel memories; NOAA Weather Broadcast receive; independent CTCSS encode and decode tones; six DTMF autodial memories; and scan capabilities. Full duplex, dual receive and cross band operation are not supported.

As delivered, the HTX-245 transmits and receives from 144 to 148 MHz on VHF and from 438 to 450 MHz on UHF. The call channel frequencies are preprogrammed with the National FM simplex calling frequencies—146.52 and 440 MHz—but can be reprogrammed to another simplex or repeater frequency if desired.

The frequency range is slightly expandable. A special reset procedure, described in an included *Addendum* sheet, extends the coverage for MARS/CAPS or FM satellite operation to 142 to 149.88 MHz on VHF and 420 to 450 MHz on UHF. Scanner listeners may be disappointed though—this radio will not receive communications in the commercial or public service bands. Weather band receive is limited to seven preprogrammed channels.

The enclosure is dark gray with an easy-to-grip matte finish. The front panel controls include a 16-button keypad, a **PWR** button and a **DTMF**/**M**onitor button. **PTT** and **F**unction keys are located on the left side. All of the keys are rubberized. The size, spacing and position of the controls and the compact dimensions of the transceiver make for comfortable left or right hand operation.

The buttons on the keypad are used to directly enter frequency digits while in the VFO mode or for sending DTMF tones

Bottom Line

With compact dimensions, simple operation and a good selection of features, the HTX-245 dual-band handheld transceiver should be a popular choice among newcomers and experienced operators alike.

while transmitting. Labels on the surface of the keys identify their primary assignment. The right-most column of keys provides one-touch access to the VFO, memory, scan function and call channels.

Legends above the keys—**SET**, **+/–**, **STEP** and **BAND** for example—identify each key's secondary function. These are accessed by pressing the corresponding key while holding the **F**unction button.

A single menu (entered by holding the **F**unction button and pressing the **SET/2** key) offers just five selections—the squelch setting, the CTCSS transmit tone, the CTCSS receive tone, the UHF offset frequency and the VHF offset frequency. Checking the menu settings for the VFO or for a specific memory channel is easy, just press and hold the **DTMF/M** button. The squelch will open and each of the settings will appear sequentially.

The LCD display is reasonably large, and the frequency digits and the icons that show the settings of the various operating parameters are of adequate size to make them very legible. A 5-segment S/RF meter is located in the lower right portion of the window. Display backlighting is automatically activated when the encoder is turned or when any key, with the exception of the **F**unction or **PTT** buttons, is pressed. Backlighting will remain on for about 5 seconds. The keypad is not backlit and it is not possible to lock the display illumination on.

The top panel supports a concentric pair of knobs for the frequency encoder and the volume control. A pair of jacks for connecting an earphone or speaker/microphone and a female SMA antenna connector are also top-mounted. The provided antenna is slightly more than 5 inches long. A coaxial-style jack for charging or connecting external power is located on the right side.

A large, thick, plastic belt clip does an excellent job of securely holding the radio on a belt or in a pocket.

Power Particulars

As is the case with the recently reviewed HTX-200 2-meter H-T, power for handheld

operation is supplied by AA batteries. A 4-stage battery level indicator in the display window and a digital readout of the voltage that comes up briefly when you turn the unit on makes it easy to keep track of their charge state.

RF output power with three 1.5 V AA batteries is specified at 700 mW. When connected to an external 6 V dc, 600 mA power source, the power output increases to around 1.5 W. There are no provisions for varying the RF output manually—it's determined by the supplied voltage.

The HTX-245 offers a couple of features that can help maximize battery life. There's a "Power Save" system that will shut off power to the receive circuitry and then switch it on briefly every 8 seconds to check for activity. This works particularly well if you tend to monitor relatively inactive frequencies for extended periods of time.

The second feature is an "Automatic Power Off" system. When enabled, this will automatically shut off the radio after a 30-, 60-, 90- or 120-minute period of inactivity. Set this up and you won't be cursing yourself for accidentally leaving the transceiver on and needlessly depleting your batteries. Note, however, that the settings for these features—and a few of the others—can only be changed while the unit is in the VFO mode.

Field tests revealed very good battery life with disposable alkaline batteries—especially when using the features just described—but there are also several alternative methods for powering the '245. The transceiver does not come with a wall-transformer charging unit, but—unlike the HTX-200—there is built-in circuitry that will allow recharging of NiCd or NiMH AA-sized batteries in the unit. You will need to purchase the rechargable batteries and a wall transformer charger (273-1662) or a vehicle charger (273-1810).

Additional accessories are available for using external power for transceive operation. For fixed station use, RadioShack offers an ac-to-dc supply (273-1680). For vehicle operation there's a dc-to-dc power adapter (273-1815) that plugs into a vehicle cigarette lighter outlet.

Table 2—RadioShack HTX-245, serial number 0002509

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency Coverage: Receive and transmit, 144-148, 438-450 MHz[1].	Receive and transmit, as specified.
Power requirements: 4.5-6.0 V dc; receive, not specified; transmit, 0.6 A (maximum, high power).	Receive, 0.27 A (maximum volume, no signal); transmit, 0.62 A, tested at 6 V.
Receiver	*Receiver Dynamic Testing*
Sensitivity: 12 dB SINAD, 0.2 μV.	12 dB SINAD, VHF, 0.14 μV; UHF, 0.22 μV.
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 146 MHz, 61 dB*, 10 MHz offset from 146 MHz, 79 dB. 20 kHz offset from 440 MHz, 55 dB*, 10 MHz offset from 440 MHz, 71 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset from 146 MHz, 61 dB. 20 kHz offset from 440 MHz, 55 dB.
Spurious response: 50 dB.	IF rejection, VHF, 76 dB, UHF, 103 dB; image rejection, VHF, 69 dB; UHF, 31 dB.
Squelch sensitivity: Not specified.	At threshold, VHF, 0.08 μV; UHF, 0.16 μV.
Audio output: 300 mW at 10% THD into 8 Ω.	525 mW at 2% THD into 8 Ω[2].
Transmitter	*Transmitter Dynamic Testing*
Power output: w/ alkaline batteries, 0.7 W; with external dc (6 V), 1.5 W.	Batteries: 146 MHz, 1.1 W, 440 MHz, 0.62 W; external dc, 146 MHz, 1.4 W, 440 MHz, 0.89 W.
Spurious signal and harmonic suppression: Not specified.	VHF, 53 dB; UHF, 60 dB. Meets FCC requirements for spectral purity.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, VHF and UHF, 150 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	VHF, 128 ms; UHF, 70 ms.
Size (hwd): 4.0×2.4×1.2 inches; weight, 5.1 ounces.	

*Measurement was noise limited at the value indicated.
[1]See text.
[2]Maximum volume.

Advanced Features

Although the HTX-245 isn't exactly bristling with cutting edge features, it does provide a good selection of the more desirable ones.

A "Time-Out-Timer" will limit the transmit duration to a preset time interval. The timer can be set to 5, 10, 15 or 20 minutes (or off). Unfortunately, the shortest time-out interval—5 minutes—is about 2 minutes longer than the period commonly programmed into most repeater controllers.

The HTX-245 also includes some basic memory and VFO scanning capabilities. The transceiver can scan the memory channels, the entire frequency range of the selected band or the preprogrammed frequencies in the weather broadcast band. There are no provisions for scanning between an upper and lower frequency limit in the VFO mode.

While there is no specific setting for locking a particular channel out of a memory scan, you could temporarily assign a bogus CTCSS tone squelch frequency to the memory channel you wish to avoid. The scan will still pause on the channel if there is activity there though—you just won't hear it. The scan will remain on any busy frequency—tone squelched or not—for 8 seconds before resuming.

The DTMF autodial memory system is set up very nicely, but it works a little differently than most I've encountered. I spent several minutes unsuccessfully trying to transmit the DTMF number string while it appeared in the display. The key is to select the DTMF memory that you wish to transmit first and then touch the **PPT** to return to the normal frequency display *before* you press the **PPT** and **DTMF/M** buttons to send the sequence. This setup is actually very convenient. If you exit the autodial memory menu with a often-used audiodial string showing—your home phone number for example—transmitting the sequence at a later time is a two-button operation—press and hold the **PPT** and then punch the **DTMF/M** button. There is no need to reenter the autodial memory menu first.

Documentation

The 48-page 7 × 5-inch *Owner's Manual* is well organized and generally easy to follow. In several places in the manual the */▲ and the #/▼ key are mysteriously referred to as the "***s***" and "***t***" keys—once I broke that code though, it was smooth sailing.

The manual includes clearly worded warnings concerning unlicensed operation and even provides ARRL contact information for further information. There's a brief, but reasonably complete, section on basic repeater operation titled "Understanding Repeaters" that should prove very valuable to first-timers.

You'll also find a handy 4-page *Quick Look at the Controls* table. This would be nice to have had on a separate card for easy reference in the field. (A few minutes spent with a

copy machine could satisfy that desire).

A schematic diagram is not included.

Operational Observations

The HTX-245 is simply a pleasure to operate. If you're not particularly fond of trying to grope your way through a maze of seldom-used high-tech features found in some of the "more sophisticated" transceivers, blindly searching for a basic setting like the duplex direction, perhaps RadioShack's got your dual bander.

Even greenhorns shouldn't run into too much difficulty getting up and running with nary a peek at the *Owner's Manual*. With most common operations accessed directly from the keypad and the logically titled legends that are provided on and above the keys, a few minutes spent poking the buttons and snooping around in the 5-item menu should suffice. Those needing a little more help can refer to the *Quick Look* table. Rank amateurs might even consider actually reading the manual!

Requests for critiques of unit's transmit audio quality consistently resulted in very favorable reports. Receive audio is good for a handheld radio this size and is even adequate for mobile operation.

The transceiver's 700 mW of RF power output and stock antenna does the trick for short-range simplex and nearby repeater applications, but if you are looking to increase your coverage area for handheld operations, a good place to start would be a longer antenna. Though the compact size of the included antenna may be conducive to carry convenience, performance-wise it leaves a lot to be desired—especially for 2-meter operation. (Weather broadcast reception also suffers.) Temporarily substituting a longer aftermarket antenna made a world of difference.

ARRL Lab test data—presented in Table 2—shows an overall level of receiver performance that's on par with what we've seen in similar transceivers from the other manufacturers. The two-tone third-order IMD dynamic range numbers at 10 MHz offset are above the running average. This measurement is generally a good indicator of a receiver's ability to reject interference from strong nearby commercial and paging radio operations. Receive sensitivity in the VHF band, at 0.14 µV, is right up there with the best of them. The UHF sensitivity, at 0.22 µV, is a bit below average.

The RadioShack HTX-245 is a very compact, simple to use dual-band handheld with a good variety of the most important features. Try one on for size at a 'Shack near you.

Manufacturer: RadioShack Corp, Fort Worth, TX 76102; 800-842-7422; fax 718-415-2303; **http://www.radioshack.com**.

Manufacturer's suggested retail price, $229.95. Typical current street price $200.

Vehicle Charging Adapter (273-1810), $12.99; Ac Charging Adapter (273-1662), $12.99; High-Current Vehicle Power Adapter (273-1815), $16.99; Ac Power Supply (273-1680), $39.95.

West Mountain Radio RIGblaster Rig-to-Sound-Card Interface

Reviewed By Rick Lindquist, N1RL
Senior News Editor

The back side of your transceiver can be a very scary place. Typically, it's filled with jacks of various types. Not all of these connectors will necessarily be immediately recognizable without reference to the owner's manual—and just where *did* you put that sucker anyway?

Okay, here's the thing. You have heard all about PSK31 or your buddy across town just introduced you to the wonders of slow-scan TV or you're just dying to try your hand …uh, fingers… at RTTY because you've found out that's where there's often the least competition to work the major DXpeditions. Or maybe you'd like to try out a software-based voice keyer program to save your golden throat during the next SSB contest.

So, all you need is your sound-card-equipped PC, a few quick connections for audio between your radio and the computer, and *voilá!*

Then you encountered the DIN connector on the rear apron of your rig!

To the rescue comes RIGblaster by West Mountain Radio. This is a sort of enhanced break-out box that lets you quickly and easily access the audio and push-to-talk lines of your transceiver so that you can interface your radio and PC sound card and take advantage of all those sound card-based aps without ever having to even *look* at an odd connector with nonsensical pin numbering—much less try to solder wires to it.

The RIGblaster goes between your radio's front-panel microphone connector and your mike, so there's no need to go over to the "dark side," Luke Skywalker—except, perhaps, to pick off transceiver audio from the external speaker jack, although on some radios, even that is right there on the front. The whole point is to simplify the interconnection process and let you get on with the business of enjoying Amateur Radio digital modes.

Another big advantage of the RIGblaster concept is that you can, in essence, move the connections from one radio to another—although this might require some reconfiguration if the transceivers are by different manufacturers.

What You Get

The RIGblaster itself is a little dark-gray box with a mike connector, a couple of switches and two LED indicators on the front panel and five connectors and a **LEVEL ADJ** control on the rear apron.

Allow me to interject here that the RIGblaster is a solid, well-made station accessory. The sturdy little shell is aluminum with a rugged finish and silk-screened labels. Inside, the PC board, connectors and components appear to be top quality. I considered this a good sign.

There are versions for different radios. The M8 is compatible with most Yaesu, ICOM, Kenwood, Kachina and Alinco transceivers. In addition, there's a RJ45 version that works with the popular ICOM IC-706, the Yaesu FT-900 and several of the FM mobile radios, and an M4 version for Ten-Tec and older Kenwood rigs.

The RIGblaster arrives with the top cover unsecured and the self-tapping screws still in their plastic bag. This is because you have to install the internal jump-

ers before you operate. More on that in a bit.

Also in the box is a 36-inch long microphone cable that goes between the RIGblaster and your transceiver. Depending on the model you ordered, the cable will have the appropriate front-panel mike plug on the end that attaches to your rig. The package also includes four adhesive pads or stick-on rubber feet—your call—for the bottom of the box. The adhesive pads come in handy if you plan to stick the box onto your radio or, perhaps, under an operating desk shelf, in which case they could go on the top of the box instead.

The RIGblaster comes with a little nine-page (counting the warranty) *Owner's Manual*. While mostly concise and to-the-point, the manual provided all of the necessary "get started" info as well as a fine troubleshooting page and great diagrams.

Finally, there's a 12-V wall cube power supply rated at 300 mA (the box does contain some active devices and a couple of relays). Personally, I can't stand "wall wart" power supplies, although they seem to be ubiquitous these days with amateur accessories. There's no reason why you shouldn't be able to power this unit from your station's power supply to keep down the clutter at the ac outlet.

Finally, West Mountain Radio supplies a CD-ROM software sampler. Most of the software on the disk appears to be of the demonstration variety, and, once installed, not all of it wanted to function on the laptop I was using. Thoughtfully, the manufacturer supplies discount coupons for $8 off *JVComm32* by DK8JV and 20% off *VoiceKey Express* to RIGblaster purchasers.

What You Need to Supply

The RIGblaster package is not complete—you'll need a few things to get started. Most important are audio cables to and from the box and your rig to the PC's sound card connectors. West Mountain Radio recommends high-quality, shielded stereo (ie, three-wire, tip, ring and sleeve) connecting cables (these are available from West Mountain as optional accessories). To go between the box and the PC, you'll need one with 3.5 mm mini phone plugs on each end. For the audio connection from your rig to the PC's sound card input—which does not pass through the RIGblaster—the connector requirements will vary. In my case, I was able to make use of the recorder output connection from the external Yaesu speaker that's connected to my Kenwood TS-850S/AT (yeah, I know, but the speaker was a gift, and it works great). It had a mono 3.5 mm plug on the other end, and the sound card on the older Dell laptop I was using seemed to have no problems with it. As the *Owner's Manual* points out, in some situations you might need a Y connector to keep your external speaker connected when using your transceiver's speaker jack to supply audio to the PC sound card. Some transceivers have line-level outputs, but this might require digging into your owner's manual and—horror of horrors—soldering to a DIN plug or some other connector. Best to play it safe and simple.

The other thing you'll need is a serial cable (also available from West Mountain Radio). The RIGblaster has a DB25 RS232 connector on the rear apron. To take advantage of serial port PTT control, you'll need a cable with a male DB25 on one end and the appropriate connector to mate with your computer's serial port on the other.

Setting It Up

Probably the most difficult part of making the RIGblaster work is setting the *&%$# jumpers. Since this is a family publication, we have to say "*&%$#" instead of the real thing, just as Sarge does in the *Beetle Bailey* comic strip, when we're speaking about tiny jumpers and, of course, DIN connectors.

Really, though, I'm exaggerating—a little. If your eyes are young and bright, these jumpers won't present an obstacle to getting your RIGblaster up and running quickly. If you're on the "dark side" of middle age like me, you might want to borrow some of those binocular magnifiers that fit on your head like a card dealer's visor. The jumper wires aren't so bad, but the connecting pins on the RIGblaster's PC board are teeny tiny and closely spaced. Then there are the jumper plugs. These are so small, I missed them altogether initially. Each one is about the size of a fat grain of rice. If you're at all ham-fisted (no pun intended here, friends), you might want to let your wife or one of the kids install these. Better yet, use a pair of tweezers from the wife's manicure or makeup kit. By the way, for maximum effect, leave the borrowed tweezers somewhere in the shack—preferably where they're not easily found—after you're done using them.

The manual has individual diagrams and a list of pin connections for each radio, so it was pretty easy to determine which jumper wire or plug went on what set of teeny tiny pins. Thanks to West Mountain Radio for the clear directions in this regard. The only possible improvement might be to render the diagrams in color so it would be easier to trace the wires, making things less error-prone. On the other hand, I managed to do it (eventually), and a color manual probably would mean West Mountain Radio would have to jack up the price of the RIGblaster accordingly.

Making the other necessary connections is a breeze. You hook up your stereo audio output cable from your sound card's output jack to the **AUDIO IN** jack on the back of the RIGblaster. (There's an **AUDIO OUT** jack in parallel with the input jack, so you can listen to this audio with a pair of earphones if you wish.) You connect the RJ45 end of the mike cable to the box and the other end to your mike jack and, if needed, plug your microphone into the jack on the front panel of the RIGblaster. Finally, you plug in the power connector from the wall wart or other 12 V dc power source and you're almost ready to rock 'n' roll.

By the way, West Mountain Radio urges you to unplug the ac power to your computer and to your radio and the RIGblaster when you're setting things up. This is wise advice to avoid damaging your serial port by connecting units while they're powered up.

RIGblasting!

Once all the jumpers are in place, connections made and everything's checked over carefully, you can power things up and check it out with some real software. But first, you'll want to take all the connections back off the RIGblaster and install the cover with the four supplied self-threading screws, because we've been watching you and we know you left that cover in the box! Seriously, before actually using the RIGblaster, you should install the cover once you've determined all the jumpers are in place. This will help provide any necessary shielding to keep RF out of where it doesn't belong. Running the unit with the cover off also can lead to some ac hum pickup on the audio lines. I know, because I tried leaving the cover off too while testing the unit.

While the manufacturer has provided some sample software, we'd advise using a program you've already got installed and configured on your PC, if possible. In this case, we had *DigiPan* on the machine for PSK31, and we knew beforehand that it was working fine. (This PSK31 program, and several others, is included on the CD.) Knowing this helps to narrow down the search for solutions if problems arise.

One front-panel switch on the RIGblaster lets you select right or left-channel audio or both from your sound card. I left the unit in the "both" setting, but some applications let you process receive signals on one channel while transmitting. The **AUTO/VOX** switch determines how the RIGblaster will control your transceiver. In the **VOX** position, the computer's audio should trip the transceiver's VOX circuit—assuming it's properly set up. In the **AUTO** position, the software controls the PTT. Pushing the microphone's PTT button in either mode will put your transceiver into transmit mode, overriding the box setting.

The **DIGITAL** LED indicator tells when sound card audio is connected in either the VOX or auto mode, and it shows PTT con-

trol in the auto mode. This LED goes out when you press the PTT button on the mike. The **PWR** LED simply indicates the unit has 12 V dc applied to the **POWER** jack. There's no on/off switch.

Before getting down to serious operating, you have to get levels adjusted so that everything is hunky dory. The manual spends a full page on the subject of setting audio levels—from your computer's sound card to your rig and vice versa. The bottom line is to adjust the audio to the transceiver so that it does not overdrive the rig. We were able to check this out by running the software in transmit mode while the transceiver was connected to a dummy load (and at relatively low power). Likewise, especially if you're coming off a speaker jack and going into a mike-level sound card input, you need to take care to keep the level down on that side of things.

The RIGblaster has a screwdriver-type **LEVEL ADJ** control on the rear apron. Adjusting this control in combination with software level controls on your computer and your transceiver's mike gain control should yield an acceptable gain level with most PC sound cards. A good idea is to listen to the transceiver's audio monitor—if it has one—to determine that the audio from your PC is clean and distortion and hum-free. This is how I determined there was hum in the audio with the cover removed. It's also how I resolved a pesky feedback problem I was seeing. Using the software-based sound card controls, I was able to mute the sound card input while in the transmit mode. It had been set to feed through to the output.

The RIGblaster opens up a world of digital operating pleasure for you without having to heat up the soldering iron—or even try to find it. While I used it primarily to work PSK31 and watch some SSTV transmissions, with the appropriate software installed on your PC, you can dive into RTTY, computerized Morse, PACTOR, AMTOR, packet and much more. Since I own two Kenwood transceivers (one in the house, one in the car), I could use the RIGblaster in either "shack" by simply switching connectors from one site to the other.

I was especially pleased that RIGblaster let me enjoy my first PSK31 QSO ever. While I realize that I'm one of only three or four hams in the US who has not jumped onto this mode with both feet, because of RIGblaster I intend to no longer be a stranger on the PSK31 frequencies.

Price: $89.95.

Manufacturer: West Mountain Radio, 18 Sheehan Ave, Norwalk, CT 06854; 203-853-8080; fax 203-299-0232; **k1uhf@westmountainradio.com**; **http://www.westmountainradio.com**. QST

GOING ONCE, GOING TWICE...

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

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

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

Alinco DJ-195T VHF FM handheld transceiver, serial number T000799 (see "Product Review," August 2000 *QST*). Minimum bid: $125.

Alinco DJ-V5TH dual-band FM handheld transceiver, serial number T000670 (see "Product Review," March 2000 *QST*). Minimum bid: $180.

HAL Communications DXP38 multimode communication processor (see "Product Review," April 2000 *QST*). Minimum bid: $260.

ICOM IC-T81A quad-band FM handheld transceiver, serial number 01271 (see "Product Review," April 2000 *QST*). Minimum bid: $265.

ICOM IC-718 HF transceiver, (500 Hz CW filter and DSP options not included) serial number 001069 (see "Product Review," July 2000 *QST*). Minimum bid: $570.

ICOM IC-756PRO HF/6-meter transceiver, serial number 01313 (see "Product Review," June 2000 *QST*). Minimum bid: $1920.

Kantronics KAM 98 multimode communication processor (see "Product Review," April 2000 *QST*). Minimum bid: $275.

Kenwood TM-D700A dual-band FM mobile transceiver, serial number 10800015 (see "Product Review," May 2000 *QST*). Minimum bid: $470.

Kenwood VC-H1 Interactive Visual Communicator, serial number 00100076 (see "Product Review," December 1998 *QST*). Minimum bid: $220.

Patcomm PC-9000 HF/6-meter transceiver with FM option, serial number 04069C0026 (see "Product Review," November 1999 *QST*). Minimum bid: $575.

RadioShack HTX-10 10-meter multimode transceiver, serial number 901811 (see "Product Review," April 2000 *QST*). Minimum bid: $95.

RadioShack HTX-200 VHF FM handheld transceiver, serial number 99080659 (see "Product Review," August 2000 *QST*). Minimum bid: $100.

Ten-Tec Pegasus HF transceiver, serial number 09A10199, with model 302 remote tuning control (see "Product Review," February 2000 *QST*). Minimum bid: $700.

Timewave PK232DSP multimode communication processor (see "Product Review," April 2000 *QST*). Minimum bid: $295.

Yaesu FT-1500M 2-Meter FM mobile transceiver, serial number 0E030077 (see "Product Review," July *QST*). Minimum bid: $152.

Yaesu/Vertex VX-150 VHF FM handheld transceiver, serial number 99080659 (see "Product Review," August 2000 *QST*). Minimum bid: $115.

Sealed bids must be submitted by mail and must be postmarked on or before November 1, 2000. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

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

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

TECHNICAL CORRESPONDENCE

PSK31 ON FM

By Butch Mason, W6KAG, Box 1557, Kaunakakai, HI 96748;
bmason@aloha.net

◊ I believe that there is a very important aspect of PSK31 that is being overlooked. The typical reaction to the idea of using PSK31 on FM is, "Forget it! SSB is much better for PSK31." But is this true in all circumstances?

Sure, SSB uses less bandwidth than NBFM, but that does not mean that NBFM cannot compete with SSB in the realm of signal-to-noise ratio (S/N). As a matter of fact, FM holds its own against SSB in the S/N department right down to the wire. When the Land Mobile Services wanted some frequencies for SSB rather than FM (one of the candidate bands was part of a ham band), a big argument ensued with all kinds of tests and high-power math. It turned out that FM held its own under many conditions. That's when amplitude-compandered SSB (ACSSB) was invented to finally win the argument by a whisker.

PSK31 can be used very effectively on VHF/UHF FM, believe it or not. I challenge other amateurs to try it themselves. I did—and it *works!* A sked with a similarly equipped station a couple of hundred miles away on a simplex frequency will produce a contact even though mag-mount whips are all that are used for antennas.

Recently, Sahoni (Sahoniredbird English), WH6QD, and I successfully tested PSK31 on FM as a possible solution to the emergency communications problems here on the Hawaiian Islands. The test path was from 20 Mile Beach here on Molokai to my home two miles east of Kaunakakai. From the 20 Mile Beach spot (it is just past the 20 miles from Kaunakakai road sign) one can see part of the east side of Maui and also the northwest part of Maui (Lahania, Kaanapauli, and Kapalua). Also, the Island of Lanai is well within view. The view toward my home is completely blocked by a big, husky ridge (and several more along the route). The only possible path is reflections off Maui and Lanai and tropo.

I have tried for years to communicate over that path using FM voice. The only success came by using a 13-element Cushcraft 13B2 beam at 20 Mile Beach aimed at the highest mountains on Lanai and running 40 W on 2 meters.

For the PSK31 test, we used 147.440 MHz and started at the 40-W power level. The rig at 20 Mile Beach was an Alinco DR-570 dual-band FM mobile with a dual-band mag-mount. At my home we used another Alinco DR-570 dual-band FM mobile rig and a dual-band 23-foot whip antenna, which gives about 6 dB gain on both bands. We used *DigiPan* at both locations.

The waterfall display on each end of the circuit was easily seen and the copy was excellent (using QPSK mode). We then switched to low power (5 W) on each end; there was no readily detectable change in the waterfall display and the copy remained good. We then switched to 446.200 MHz and still copied well.

Of course, both rigs were operated unsquelched. The *DigiPan* waterfall display spreads the random noise over the width of the computer screen, so when there is a PSK31 signal present, there is a pair of lines spaced only 31 Hz. The human ear often cannot detect the sound of the signal, but the digital-signal processing pulls out the intelligence nicely. If the passband of the FM signal is zero to 3100 Hz, then a 31-Hz-wide channel improves the S/N by 100 fold (20 dB).

It is possible that FM PSK31 can rival near vertical incidence skywave (NVIS) as a means of local and regional communication. Best of all, it can be used on any FM transceiver—and there are plenty of them out there. Factor in the widespread availability of sound cards in both laptop and desktop computers and you have a digital emergency and public service communication system that is ready to go!

A 1.9-MHZ INVERTED-L ANTENNA

By John (Jack) S. Belrose, VE2CV, ARRL TA, 17 rue de Tadoussac, Aylmer, QC J9J 1G1; **john.belrose@crc.ca**

◊ As a part of the annual review process of ARRL publications, Technical Advisors are asked to review our *Handbook* copies. (This year, I was asked to review *The 1997 Antenna Handbook* as well.) This item concerns the 160-meter inverted-**L** antenna that has appeared in both books for many years. This wire antenna is shown supported by a yardarm or a length of line attached to a tower, and the tower typically supports a Yagi antenna as well. A comment advises one to "Keep the inverted-**L** as far from the tower as possible, as certain combinations of tower height and Yagi top loading can

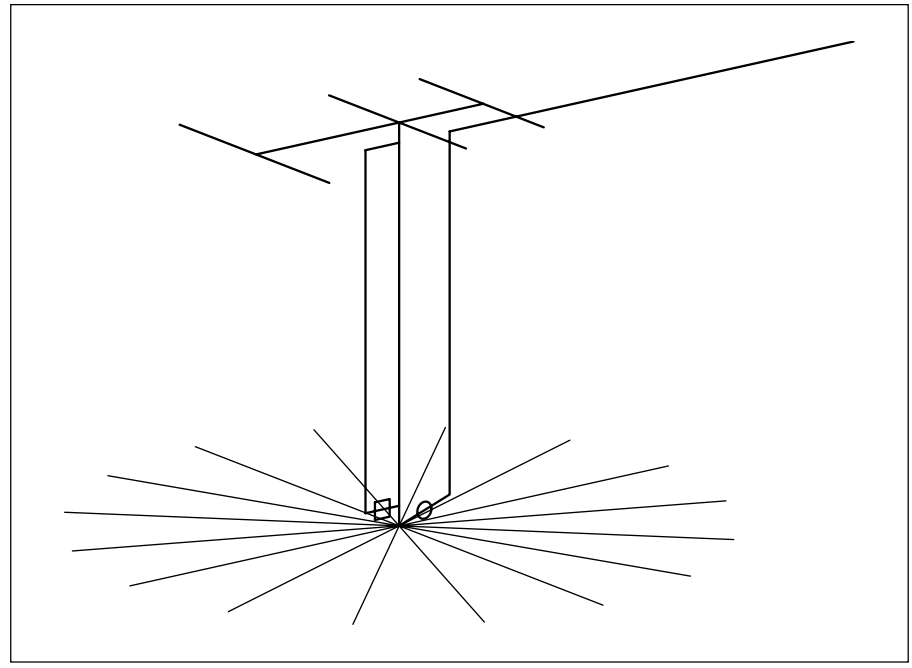


Figure 1—A 160-meter inverted L supported by a 50-foot tower that also supports a 20-meter Yagi. The decoupling stub is spaced 39 inches from one leg of the tower. The stub is tuned to minimize interaction between the tower system and the inverted L; basically, it is tuned for minimum tower-base current.

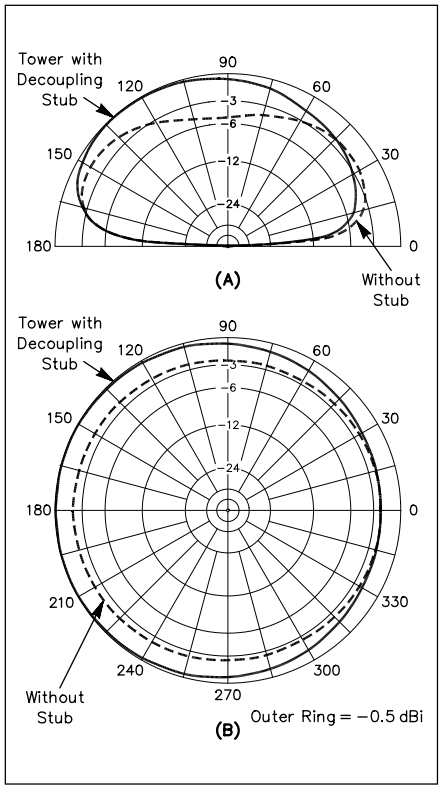


Figure 2—Radiation patterns for a tower with and without the decoupling stub arrangement: (A) elevation pattern; and (B) azimuthal pattern at an elevation angle of 45°.

interfere severely with the inverted-**L** antenna." This interaction can be particularly severe if the top-loaded tower happens to be resonant in the 160-meter band. But, whatever the degree of interaction, no practical spacing between the vertical section of the inverted **L** and tower can solve this problem. The problem is that the induced current flowing in the tower results from a "transmission-line" effect, so this current has a phase that is nearly 180° different from the current on the vertical part of the inverted **L**.

But there are methods to minimize—even eliminate—this interaction, and although the very practical method I describe here can, for all practical purposes, eliminate the interaction, the method is very frequency sensitive. The base of the tower can in effect be "disconnected" or isolated from its radial-wire ground system at specific frequencies by installing a 1/4-λ decoupling stub, shorted to the top of the tower and open at the bottom end. This wire stub comprises a wire spaced a short distance, say one yard, running down the tower—for a lattice tower, install the stub at the corners of the tower. If all three or four corners of the tower are treated, the tower can be effectively electrically disconnected from its ground system, and the bandwidth of this "disconnection" will be greater compared with treating but a single leg.

Because the length of the decoupling stub will generally be shorter than 1/4 λ, it has to be tuned by a capacitor connected to the lower end of the stub wire and to the tower leg (see Figure 1). For the example that follows (a 50-foot tower with a 3-element 20-meter Yagi on top and a resonant frequency of 2.24 MHz), a capacitive reactance (according to *NEC-4D*) equal to $-j418\ \Omega$ is required. This capacitance is tuned for minimum tower base current. In this example, the tower base current was reduced from 3 A (1 kW transmitter power) to 0.2 A, and while zero current was not achieved for our numerical model, this minimum current is practically low enough. The base impedance of the inverted **L** is (according to *NEC-4D*) almost identical to the impedance that would be found using a wooden pole to support the antenna: $61 + j352\ \Omega$ (compared with $61+j366\ \Omega$ for the wooden pole); and the radiation patterns are identical within fractions of a decibel.

The impedance of the inverted **L** for the case of the untreated top-loaded tower is $194 + j375\ \Omega$, and the radiation patterns are very different (see Figure 2). For modeling, I assumed a ground system comprised of sixteen 50-foot-long radials buried six inches in average ground (3 mS/m). The inverted **L** is dimensioned as shown in *The Handbook*, with a length of 170 feet and with the horizontal arm pointing toward the 0° azimuth.

The tower with decoupling stub clearly has the more desirable pattern, since it has more low- and high-angle gain in the favored direction (the direction opposite to that which the end of inverted **L** points).

MAKING SCHEMATICS FROM PC BOARDS

By Steve Farkas, WA2NFR, 175 Belle Ave, Highland Park, IL 60035;
wa2nfr@nineland.com

◊ Over the years I've frequently—and unwillingly—had to draw schematics from PC boards for which I had no schematic or documentation. It's always been a time-consuming task—flipping the board back and forth, following traces and identifying holes that matched components on the other side. With the aid of modern technology, I've found another way to do it.

The process can be made easier using a digital camera (or a scanner) and picture-manipulation software. First, take a picture of the solder side of the board, using the highest resolution available. Use a static light source as a flash can cause reflections from the solder bumps. Then, using your graphics software, adjust the contrast to taste and mirror the image. Print the picture as large as you can, cropping off any unneeded portions. Draw in the components and label them with the reference designators if they exist; if not, make up your own. Depending on the background shade of the solder mask, experimenting with different pen colors may be appropriate.

When you're finished, you have a top-down view of the PC board with all the components and traces. It's much easier to make a schematic from this, and you'll likely make fewer errors. I haven't tried overlaying a top and bottom picture, but that may be a worthwhile experiment.

DEFECTIVE DISKS?

By Terry Lyman, WA4BSD, 7712 Yolanda Rd, Richmond, VA 23229-4245;
wa4bsd@firstva.com

[Editor's note: Terry is responding to an item that appeared in "The Doctor is IN," *QST*, April 2000, pages 59 and 60.]

Dear Doctor: I read with interest about the problem concerning "defective disk" messages. Several years ago I was writing for a gun-test magazine and had a similar problem. I would compose an article and mail it only to get a call several days later that the disk was unreadable!

After several months of this, Bill, the editor, was convinced I was crazy—I was just as convinced that Bill was being difficult! Some months later, we switched to the Internet to transfer the articles and the problem was forgotten.

Then, about two years ago, I got a laptop PC. I was ready to go portable when I found that the disks containing my programs could not be read by the laptop! I popped the disks into my desktop and they worked like a charm! What did I have here? Was the problem a bad disk drive, bad disks or a bad laptop?

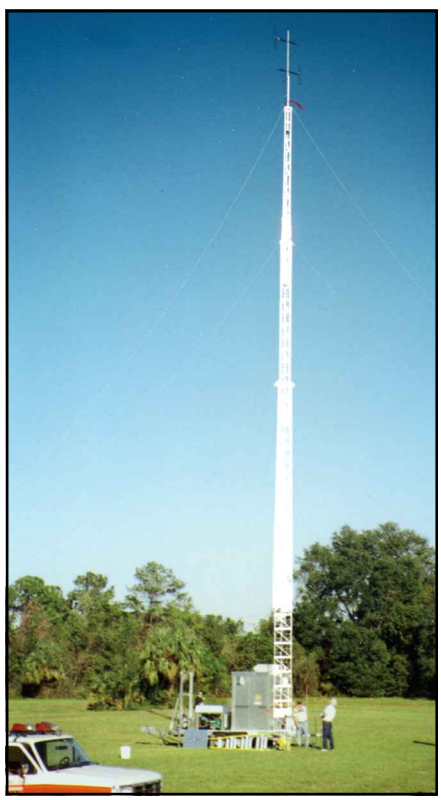
Always believing that the more difficult the problem the simpler the solution, I inspected the disks. I could see nothing obvious. Then it dawned on me that perhaps the problem wasn't obvious. My many years of working with telephone-company central office electronics taught me many things—especially to expect the unexpected, such as this. On a whim, I dampened a cloth with water and gently wiped the plastic case of each disk (*not* the disk material within the case!). Each previously "defective" disk I inserted into the laptop worked fine! Mystery solved. I suspect that over time, the disks build up a small surface charge that affects some of the newer 3.5-inch drives. I expect that these drives have sensitive circuitry within that is affected by the charge. The older 3.5-inch drive in my desktop is physically larger and evidently not as sensitive. Instead of a water-dampened cloth, perhaps some of the antistatic cloths used in clothes dryers would do the same trick, but I haven't tried that. QST

ARES Mutual Aid Considerations

By Jerry Boyd, K6BZ, SM, Sacramento Valley

Most times when missions are assigned to an Amateur Radio Emergency Service (ARES) group, they can be handled by area hams. In other disasters, assistance is needed from outside the area. Such requests for help are often referred to as mutual aid requests, and present unique challenges. How to initiate mutual aid, and whom the mutual aid team works for upon arrival, are important, as are liability and workers compensation insurance issues.

A most important consideration when hams assist in emergency or disaster response is protecting the volunteer to the extent possible, from physical harm. Thus the importance for the requesting entity to provide workers compensation insurance. Volunteers can become targets of lawsuits—the served agency should also have legal resources. The surest way of covering injury and liability bases is through a memorandum of understanding (MOU) with the served agency, and a formal process for the agency to register emergency volunteers. What happens, though, when amateurs are needed from out of the area? They are ARES members and may be registered with some agency in their home jurisdiction. But the corresponding protections don't necessarily extend to duties they may be assigned to away from home, unless possibly they're working for the same agency—for example, the state forestry department. SEC Dave Thorne, K6SOJ, suggested a system for protecting volunteers away from home—registering all disaster service workers in a state by one state agency, such as the motor vehicle department. Volunteers would have protection and official status statewide. Unfortunately, cities and counties aren't willing to give up control of such matters to a state agency.



Seminole County, Florida, ARES/RACES members trained as a deployment team under the Department of Forestry with this transportable Mutual Aid Communications Unit with 100-foot crank-up tower, generator, and shelter for VHF and UHF base radios and hand-helds.

Another approach might be to include language in the MOU with served agencies that clearly says volunteers registered with that agency enjoy workers compensation and liability coverage, *and* that additional volunteers summoned by the agency are entitled to the same protection, insurance and indemnification. Absent the served agencies including such language, there is a fallback. Have the responders assemble in one spot for briefing prior to deployment (which you would do anyway), and the served agency would enroll the volunteers on the spot as workers. The point is to not send ARES personnel into harm's way without protection to the extent the law allows.

There are other aspects of mutual aid to address. First is the practical issue of how to summon assistance from outside the area of the emergency. The beauty of ARRL's Field Organization structure, of which ARES is a major part, is that the chain of command for making such requests is rather clearly spelled out. Take a typical ARRL Section—if the Emergency Coordinator (EC) of county X needs more help than mustered from within his/her ARES, he/she can ask the District Emergency Coordinator (DEC) for assistance. The DEC needs critical information: What is the ARES mission? How many operators are needed, and for how long? What special expertise/equipment is required? To whom do volunteers report, where? The DEC, generally being responsible for multiple counties, sets in motion an appropriate response. If the district level is insufficient in terms of resources, then the Section Emergency Coordinator (SEC) can draw personnel from an even wider area. So, each coordinator should keep pertinent information on how to contact people up the chain if mutual aid becomes necessary.

Another situation may occur—when resources cross ARRL Section or Division lines. Each Section is mostly autonomous and while each has an almost identical organizational structure, it works best within its own boundaries. But there have been instances of amateurs requested to respond out of the Section and Division in major calamities. Ongoing relations between ARRL SMs and Directors best facilitate such broad-area response. SECs of bordering Sections (even if in different Divisions) are also encouraged to network. For the California/Oregon border—frequently a mutual aid crossover area—dual registration of amateurs makes good sense. As an example, ARES members in Klamath County, Oregon, and Siskiyou County, California, are registered with client agencies in both states.

Liability Protection and the Volunteer

By Chris Imlay, ARRL General Counsel

Worker's Compensation law is rather complex and a matter regulated by the states. It may not be possible for volunteers who are not employees of a served agency to be covered by Worker's Compensation; state law on this subject should be investigated by ECs prior to any insistence on Worker's Compensation coverage from the served agency.

However, volunteers providing service to government agencies or Section 501(c)(3) tax-exempt private organizations are provided immunity from liability by Federal law through the Volunteer Protection Act of 1997, 42 U.S.C. Section 14501. This generally limits liability if the volunteer was acting at the time within the scope of official duties under a volunteer program. Exceptions are: the law does not cover volunteers who cause harm while operating motor vehicles, for example; or if the volunteer is grossly negligent, or engages in criminal acts. The statute, however, provides broad liability protection for amateurs in most contexts, and especially where amateurs volunteer under ARES to provide emergency communications to served agencies.

Rosalie White, K1STO ♦ Field & Educational Services Manager

HAMS AID OLYMPIC COMPETITORS

By Ron Brown, AB5WF, and Kenneth Bankston, W5KWB

◊ Jackson Amateur Radio Club (JARC) members played an important communications role for races in Mississippi for the upcoming US Olympic cycling events in Australia. JARC supported the first race May 18 along the Natchez Trace Parkway—the Tour LeFleur National Time Trial Championship for women and men. The national media had TV cameras mounted on motorcycles driven among the cyclers, and video relayed by repeaters in helicopters to production vans. The plan to provide communications from the start point to the end called for cell phones, park service radios, and ham radio as a backup. The cell phones didn't work at the mid point. The park service multichannel radios worked fine between motorcycle officials, but not between the start-finish points. If it weren't for hams, there would have been no contact between the start and finish lines.

The next events were on May 20—the Ridgeland Natchez Trace Century Ride, US Olympic Team Trials. JARC set up portable ham stations with beams at all major turns, and used the Madison 2-meter repeater. Hams were the only source of race information to event headquarters. During the last two laps of the final race, weather moved in—helicopters were grounded. Ham radio was quickly called on to keep track of race leaders. Once again, hams saved the day, allowing the event to be completed.

Get ready, get set... With the support of Jackson Amateur Radio Club members in Mississippi.

The final issue to discuss is who is in charge. Does the amateur responding under mutual aid work for his/her EC or the EC in the affected area? Growing use nationwide, of the Incident Command System (ICS) provides an answer. Under ICS, a ham is assigned to a team with a specific mission, for a specific leader. Because of its clarity and effectiveness, the ICS approach is becoming the standard in some states. Thus, it's important for every ARES group to become well-versed in ICS operations. A primer is at the Federal Emergency Management Agency Web site at **http://www.fema.gov/EMI/crslist.htm**. Click on IS Home and find IS-195 "Basic Incident Command System." All course materials can be downloaded without cost.

Mutual aid requests are, unfortunately, becoming more common as the number of major disasters increases. The discussion in this article should assist in preparing and protecting those called upon to respond in such times QST

Field Organization Reports

Public Service Honor Roll
July 2000

This listing is to recognize amateurs whose public service performance during the month indicated qualifies for 70 or more total points in the following 8 categories (as reported to their Section Managers). Please note the maximum points for each category: 1) Checking into a public service net, using any mode, 1 point each; maximum 60. 2) Performing as Net Control Station (NCS) for a public service net, using any mode, 3 points each; maximum 24. 3) Performing assigned liaison between public service nets, 3 points each; maximum 24. 4) Delivering a formal message to a third party, 1 point each; no limit. 5) Originating a formal message from a third party, 1 point each; no limit. 6) Serving as an ARRL field appointee or Section Manager, 10 points each appointment; maximum 30. 7) Participating in a communications network for a public service event, 10 points each event; no limit. 8) Providing and maintaining an automated digital system that handles ARRL radiogram-formatted messages; 30 points. Stations that qualify for PSHR 12 consecutive months, or 18 out of a 24-month period, will be awarded a certificate from HQ on written notification of qualifying months to the Public Service Branch at HQ

924
NM1K
509
W9RCW
470
K9JPS
462
K5NHJ
418
N5JZ
277
KJ3E
266
KF4NFP
240
KB5WEE
232
W7TVA
219
K7BDU
212
WB5ZED
KK3UB
KB2RTZ
206
KK3F

202
KA2ZNZ
N2LTC
201
WA4QXT
200
WB4GM
198
N5IKN
195
WA9VND
193
NN7H
188
W4ZJY
182
KA4FZI
180
K2UL
179
NZ1D
178
W6DOB
KA2GJV
175
N2YJZ

173
N2RPI
171
W4EAT
170
W6IVV
169
K9FHI
168
KB2VRO
K6YR
AD4DO
166
W4CAC
165
N2OPJ
163
KC4TLG
160
KC2EOT
158
KB2VVB
W6QZ
157
WO0A
N3WKE
WA1JVV

156
WN0Y
154
WB2UVB
153
W5ZX
N2KPR
152
WA1TBY
WD9FLJ
151
N5XGI
KC5OZT
150
KB2KLH
NR2F
149
W0OYH
148
W3YVQ
N8IO
WB5NKC
WA5OUV
147
KC2AHS
146
K4IWW

AA3SB
N5NAV
KC4ZHF
145
N1LKJ
W5GKH
N5OUJ
K2GTS
144
KB5W
AF4GF
143
N8BV
K4SCL
142
WA1FNM
WB0ZNY
W2MTA
WA5I
KF6OIF
141
W0LAW
N2CCN
AB4XK
140
WA4DOX
KT4PM
K4RBR

139
W2RJL
138
N0SU
W7GB
N9BDL
W7NWP
W7ZIW
KD4GR
KT6A
136
N2AKZ
KK1A
135
KE4JHJ
W2AKT
W9YCV
WX4H
134
W4NTI
W3BBQ
K1JPG
W0WWR
133
N7AIK
KC2DAA
AF4PU
132
KA1GWE
W1PEX
WA2UKX
131
WB4TVY
W3VK
W2EAG
130
KC7SRL
NN2H
K9LGU
W9CBE
WB5NKD
129
WA0TFC
KJ9J
K5VV
KC7ZZB
W7LG
WU4C
WB2FGL
128
AF4QZ

WB2GTG
WB2QIX
WA2YBM
AF4QZ
KB5TCH
AF4NS
127
KI4YV
126
KC4PZA
W4CKS
W2JHO
K4FQU
125
N2WDS
124
K4AKC
W1ALE
W9ZY
N2JBA
123
K5IQZ
W1JX
AD6LW
AD4IH
122
N3WK
WA8EYQ
N1JBD
N5GG
121
AA3GV
KE1AI
W1QU
K4YVX
KG2D
NY2V
AA2SV
W6JPH
KJ4N
119
K7GXZ
K5DPG
KB2ETO
118
K0PIZ
K9GBR
AD6HR
N7DRP
K0IBS
N9TVT
K7MQF

W4AUN
KE4IFD
116
KA2CQX
115
WD9HII
KB0DTI
114
WD0GUF
113
W7VSE
112
W4DGH
K2PB
AG9G
WA4EIC
N9MN
111
N8DD
WB2IIV
KF4KSN
110
N2GJ
KC6SKK
109
KA0DBK
K2DN
W7BO
108
NC4ML
KT4SJ
N9KNJ
K5MC
KB1DSB
KT4SJ
W2MTO
K4WKT
107
AA2ED
WI2G
106
W3OKN
KE4GYR
W2PII
W5AYX
KC5VLW
W2JG
WB2LEZ
105
KG5GE

104
WA8SSI
N5JUU
KJ7SI
103
N3ZKP
W5XX
KA5KLU
102
W3IPX
AA4AT
KC6NBI
100
KO4OL
N3WAV
WB7VYH
KA7TTY
99
KR4MU
W5MEN
98
KA4LRM
K4MTX
K2VX
KA4HHE
W8SZU
97
WA2CUW
AA4HT
KE4VBA
96
KB2WII
KE6MIW
WB4PAM
KE4DNO
95
KF5A
94
N1LAH
KA2DBD
W2LC
KG4CHW
93
K8LEN
KT4TD
91
KA1VEC
90
KC3Y
K1SEC

89
W7QM
88
KB3AMO
WB4UHC
87
W2CC
86
WA4GLS
85
N3KB
KA2BCE
KB4DXN
84
W4CC
WA1QAA
N1SGB
W1JTH
KC7SGL
KD4HGU
82
WA3HJC
WB9GIU
80
W3CB
79
K8SH
KC8HTP
78
AF4CD
WB4ZNB
WA4EYU
77
WA2YOW
KC7SGM
76
AA4YW
75
KE3FL
N2VQA
74
KJ5YY
WA4JFK
73
K3CSX
N1IST
KB4WBY
KM5VA
70
KA9FVX

The following stations qualified for PSHR in previous months, but their call signs and scores were not listed in this column: (June) N0KJ 171, W0OYH 163, N3WKE 157, N2KRP 148, WB0ZNY 135, W0WWR 130, KB0DTI 124, W2FR 109, W0FCL 87, KB2WII 85. (May) KA5KLU 144.

Section Traffic Manager Reports
July 2000

The following ARRL Section Traffic Managers reported: AK, AL, AR, AZ, CO, CT, ENY, EPA, EWA, GA, IA, ID, IL, IN, KS, KY, LA, LAX, MDC, ME, MN, MS, NC, NFL, NH, NLI, NNJ, NTX, NV, OH, OK, OR, ORG, SBAR, SC, SDG, SFL, SNJ, STX, TN, VA, VT, WCF, WI, WMA, WNY, WPA, WWA, WY.

Section Emergency Coordinator Reports
July 2000

The following ARRL Section Emergency Coordinators reported: AL, AZ, CT, EWA, IN, KS, KY, LA, MI, MN, MO, NLI, OH, SD, SFL, STX, SV (North), VA, WCF, WMA.

Brass Pounders League
July 2000

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
NM1K	800	413	1001	8	2222
KK3F	26	869	818	42	1755
W1PEX	0	114	1104	18	1236
WX4H	12	565	579	6	1162
WB5ZED	22	405	519	22	968
N5IKN	0	473	120	353	946
W9RCW	0	439	31	437	907
K9JPS	1	407	25	383	816
N2LTC	0	376	384	14	774
KT6A	0	383	314	0	697
W9IHW	0	384	36	332	672
N5JZ	269	84	277	11	641
W6DOB	0	157	424	40	621
W5SEG	10	270	280	20	570
W9YPY	0	259	298	0	549
K7BDU	39	272	223	12	546
KA2ZNZ	10	265	203	64	542
K5NHJ	190	70	211	44	515
K9GU	0	248	32	234	514
WA9VND	11	309	183	6	509

BPL for 100 or more originations plus deliveries: KJ3E 149, KB5WEE 121. The following station qualified for BPL during June, but was not listed in this column: N0KJ 600. QST

HOW'S DX?

This month we're taking a look at the top position of the DXCC list. No, not the most wanted country, but the top of the standings of the DXCC Mixed award. As of October 1, 2000 there are 334 entities on the current list and 58 entities on the deleted list for a total of 392. Three DX men are all sitting in the number one position with 389 confirmed. "How's DX?" salutes old-timers W2BXA, W2AGW and K6ZO.

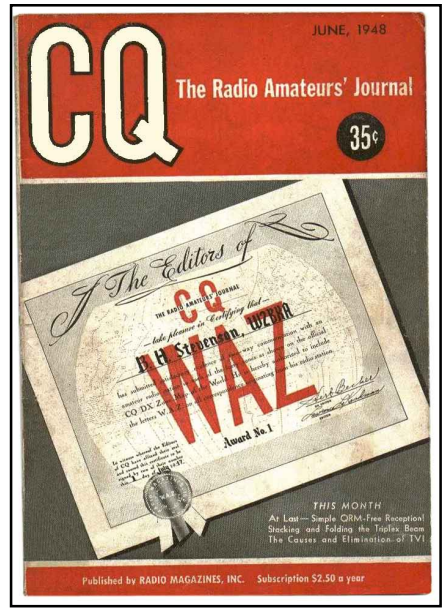
Benjamin H. Stevenson, W2BXA
Colonia, New Jersey

Ben was a DXer before becoming an Amateur Radio operator. As a youth he enjoyed tuning the broadcast bands finding KPO, KNX, KFI and many other California stations. November 19, 1929 he was licensed as W2BXA at the age of 15. Over the last 70-plus years, many DX QSOs have gone in the log, but one particular contact stands out as Ben's most memorable. It was 1930 and he had just worked an ON4 station in Belgium. He was so excited to have worked this "rare one" at age 16 that he was unable to eat his dinner afterwards. Over the years, Ben remembers the great DXpeditioners such as Danny Weil, VP2VB; Don Miller, W9WNV; and Gus Browning, W4BPD. When asked who was his favorite, Ben nominated Martti Laine, OH2BH, without hesitation.

The station lineup at W2BXA currently consists of a Ten-Tec Omni 6 Plus transceiver, an old Henry 2K and a Kenwood TL922A. Ben is active on 10 through 20 meters and is mostly on SSB with some CW on the side (he has never been on RTTY). He was very active on OSCARs 6, 7, 8 and 10 and completed the first Satellite DXCC in 1978.

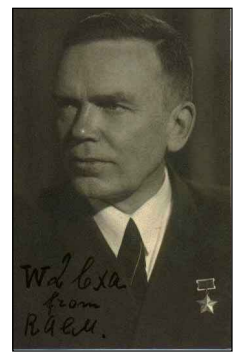
Back in the old days, Ben had big monoband antennas. Now he gets by with a TA53M beam up 55 feet. It doesn't seem to be hampering his abilities to get through the pileups because he has worked all countries on the DXCC list except P5 (North Korea) and all countries on the Deleted list except FI8 (French Indochina) and CR8 (Damao Diu). He worked FI8AC from French Indochina, but that was prior to WWII and the DXCC start date of November 15, 1945. Ben remembers working three or four other FI8 stations after the beginning of DXCC, but he was never able to confirm any of those contacts.

Ben, W2BXA, is at the top of both the SSB and Mixed DXCC lists.



***CQ's* prestigious Worked All Zones award # 1 went to Ben, W2BXA, in July 1947.**

Another of Ben's accomplishments was obtaining the first *CQ* WAZ Award on July 1, 1947. He had no idea how close he was to actually making it until he discovered a QSL card from C8YR China. When he examined the QSL it had "Zone 23th" (no typo!) printed on the card. It was then that he realized that he was just one card away from having all 40 zones, lacking only Zone 19. Ben had worked the Polar Radio Club, UA0KQA, in Tiksi Bay, but getting a QSL could take years via Box 88. His good friend Ernst Krenkel, RAEM, a Russian hero and Amateur Radio operator, sent a telegram to the Radio Club requesting them to QSL direct, which was almost unheard of in those days.



Russian Hero Ernst Krenkel, RAEM

In 1957 Ben started the North Jersey DX Association (NJDXA) and was its first president. The purpose of the club was to bring together hams with a mutual interest in DXing. As a charter member, Ben is still active in the NJDXA.

In recent times, Ben has opted for more ragchewing on the air and socializing in person with other DXers. At 86 years of age Ben is not like Hugh Cassidy's, WA6AUD, character "The Old-Timer," atop a hill constantly tuning the bands for that last one. On the contrary, Ben can be found most days on 14.188 MHz talking to his friends, but if a DX station does show up, he and his friends are ready!

Howard W. Wolfe, W2AGW
Harrington Park, New Jersey

If you've ever been to the Dayton Hamvention DX Dinner, you've seen Howard W. Wolfe, W2AGW. He is always the last man standing in the DXCC count up!

Howie was first licensed in Brooklyn, New York as 2AGW in 1926. His first DX QSO was with a station from Britain in the early 1930s.

Howie, W2AGW, has worked all countries except CR8, FI8 and P5.

Howie's most thrilling DX contact was with R.W. Ford, AC4RF, on December 19, 1949. Ford was a British operator who had been showing up on the air for many days and Howie never thought he would work him. When he finally made the QSO, it was all he could do to not fall out of his chair! Needless to say, this was also his favorite DXpedition of all time.

CW is his favorite mode, although he does get on SSB occasionally. Howie can be found on 10 through 80 meters with his IC-756 transceiver and ICOM 2KL linear, which puts out 500 W. Howie is also using one of the DJ2UT all-band 11-element antennas up 60 feet.

Just like his friend Ben, Howie has worked and confirmed all countries on the

Bernie McClenney, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

Ed, K6ZO, has a modest setup including a Kenwood TS-930S, homebrew 4-1000 amplifier and a 4-element 20-meter monobander up 60 feet.

DXCC list except North Korea and all countries on the Deleted list except French Indochina and Damao Diu. After working his latest new DXCC entity, TX0DX in the Chesterfield Islands, Howie said, "It only proves that if you live long enough many great things happen!"

Time has taught Howie one key fact about working DX: "Shut your mouth and open your ears."

Edward R. Hawkins, K6ZO
La Mirada, California

His uncle, who owned a radio store in Los Angeles, introduced Ed to Amateur Radio. On the front door was a ham logo that showed a parrot wearing headphones. Ed's journey into the hobby began when he asked his uncle what the logo meant.

Later, Ed would visit his neighbor who was an Amateur Radio operator and the two would stay up late at night listening to DX stations from Guam and the Philippines. It was probably then that Ed became infected with the DX bug.

He was licensed as W6CUQ at age 16 in 1931. His most exciting DX QSO was with Chavna, AC5PN, who was the first ham on the air from Bhutan. A friend of Ed's, W6SYG, had worked him and told him how it was done. AC5PN was exotic DX and was not very active on the air. So, Ed wrote a letter to Chavna asking for a schedule, just as W6SYG had. It actually took five letters before Ed received a reply with a date and time. With the delay in mail delivery, schedules had to be set up months in advance. Ed made the schedule and quickly sent a QSL. Horst Freer, W6TI, received a QSL card for W6C*V*Q at the W6 QSL bureau for the contact. Wrong call sign! Ed wrote Chavna again and arranged another schedule. The second time was the charm. They completed the QSO and Ed received his QSL with W6C*U*Q written on it.

One contact that stands out in Ed's mind was on August 17, 1948 with FI8ZZ in French Indochina. Ed was never able to confirm this QSO and he even went so far as to write French President Charles de Gaulle about the matter! The President replied that he was unable to help trace the operator.

Ed's current station includes a Kenwood TS-930S transceiver, a home-brew 4-1000 amplifier and a 4-element 20-meter monoband Yagi up 60 feet, a dual-band beam for 10 and 15 meters and wires for 30, 40 and 80 meters. He operates almost exclusively CW unless chasing SSB DX or talking to locals about DX.

Ed has been somewhat of a loner in DXing, although he once was a member of the Southern California DX Club. His one source of DX information is *QRZ DX*. Beyond scanning *QRZ DX*, Ed listens on the air every day for his last country on the current list, P5—North Korea. During his years of chasing DX he has only missed working two countries on the deleted list, French Indochina and Minerva Reef.

Ed started chasing DX long before packet and the Internet, and still has never been active on packet. But what he has done is to try to hone his skills of tuning and listening. He recommends this to all hams chasing the rare, elusive and exotic DX!

Observations by W3UR

It was a real thrill to talk to these three top-notch DXers. One common thread of advice was to listen, listen, listen. That's just what I did when I spoke to these DX old timers. I asked a few questions, then stood back and listened intently as they told their stories.

I was astonished to learn that all three had worked French Indochina, but were unable to confirm it. And I discovered that Damao Diu was perhaps the rarest DXCC country there ever was (supposedly only a handful of amateurs had ever worked it). It became obvious that chasing DX has kept these three old timers young at heart. Hats off to Ben, Howie and Ed!

AGALEGA DXPEDITION 2000

The team that brought you 3B7RF from St. Brandon in May of 1998 has joined together and plans to operate as 3B6RF from Agalega Island in early October. The islands of Agalega and St. Brandon ranked # 24 on the ARRL Most Wanted list last year.

The multinational team will arrive on Mauritius Island (3B8) on October 1. After making preparations on Mauritius, the team will take an expected 36-hour boat ride to remote Agalega Island on October 5. The team expects to take just over a day to get all the tents, antennas and stations set up, so expect 3B6RF to be on the air around October 8.

The group includes Hans-Peter, HB9BXE; Karl, HB9JAI; Joe, HB9AJW; Rene, HB9BQI; Christina (YL), HB9BQW; Kurt, HB9AFI; Adolf, HB9JAX; Friedhelm, HB9JBI; Hermann, HB9CRV; Philipp, HB9FMU; Ami, 4X4DK; Derek, G3KHZ; Matthias, DL3KUD; Jack, F6HMJ; Jacky, 3B8CF; Vince, K5VT; and one Japanese operator.

3B6RF plans to operate on 6 through 160 meters on CW, SSB and RTTY. The team may also be active on the satellites. Expected transmit frequencies are as follows:

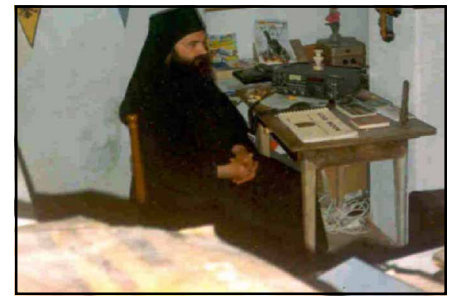
CW (kHz)—1827-1829, 3500-3505, 7005-7007, 10103-10105, 14023-14025, 18072-18074, 21023-21025, 24893-24895, 28003-28005, 28023-28025, 50102.

SSB (kHz)—3620-3625, 3800, 7060-7065, 7100, 14190-14195, 18140-18145, 21290-21295, 24940-24945, 28465-28470, 50145

RTTY (kHz)—14080, 21080, 28080

The operators plan to be active until October 24. This should give everyone plenty of time to work them. This won't be an inexpensive operation because the crew must charter a boat. Donations will be most welcome.

The 3B6RF Web page can be found at **http://www.agalega2000.ch/**. It includes general information, operator profiles, sponsors, latest news, a log search, QSL information, suggested frequencies, propagation forecasts and a guest book. QSL cards go via the bureau or direct to HB9AGH, Ambrosi Fluetsch, Lerchenberg 29, CH 8046 Zürich, Switzerland.



Monk Apollo, SV2ASP/A, from Mount Athos, expects to be using special call sign SY2A through the end of the year.

MORE DX IN OCTOBER

• Starting October 1 Monk Apollo, SV2ASP/A, will be using special call SY2A from Mount Athos through the end of the year.

• A group of YLs will be operating from Norfolk Island (VK9N) as AX9YL.

• K7BV, N6FF and YB9BV expect to be active from East Timor, with a low-band emphasis.

• Australians VK6KZ and VK6HK expect to be active from Cocos Keeling as VK9CZ and VK9CK at the end of the month.

• Don't forget the W5 DX Bash on October 7 and the RSGB's HF and IOTA Convention October 13 to 15. And, of course, the CQ World Wide SSB DX Contest on October 28 and 29.

WRAP UP

Special thanks go out to HB9AJW, HB9BXE, K6ZO, K7BV, N3OSH, NA2M, SV2ASP/A, W2AGW and W2BXA for helping to make this all possible. Please continue to send your DX news, pictures, letters, newsletters and whatnots to **w3ur@arrl.org** or to Bernie McClenny, W3UR, 3025 Hobbs Rd, Glenwood, MD 21738, USA. Until next month, see you in the pileups!

—Bernie, W3UR

Finding M. H. Dodd's 1912 Wireless Station

Imagine for a moment that you just received a telephone call from your friend Steve, who buys household antiques. He tells you that he just purchased a whole bunch of old radio parts and one old Radiola radio for you from the 1920s for $275, and says to come over tomorrow and pick them up at this yard sale in Reno. Steve adds, "You get all of the radio equipment and all of the parts in this deal." This actually happened to Henry Rogers, WA7YBS, last November.

Arriving early the next morning, Steve said, "All of your radio stuff is in that corner of the yard covered with an olive-drab tarp." Pulling away the tarp, Henry saw a nice Radiola 26 and matching battery box, a decent Atwater-Kent 40, three 1920s crystal sets and many boxes of radio parts from the 1920s.

Henry then struck up a conversation with Pat Doherty, who was running the yard sale.

"Oh, you have a radio museum," Pat said. "Well, you know, my stepfather had a radio station before World War I. He was a balloonist and in the Signal Corps during WWI." Pat continued, "He was interested in radio up into the twenties, but then dropped it. He was always trying new things." Pat paused for a second and then added, "You know, I think he had some old tubes in a trunk in that shed over there," pointing to an old metal backyard storage shed that had been "off limits" to the yard sale.

Discovering a 1912 Wireless Station

They followed Pat into the shed. On the floor amidst old furniture and junk car parts were three large steamer trunks, all with several layers of sheet metal and debris piled on top. Rogers gave this account, "After moving the obstacles from the top of the first trunk, we found it contained personal papers, letters and envelopes. The second trunk was found to be empty. After moving the miscellaneous junk from the top of the third trunk, I opened its lid. Wow! The first thing I saw was an enormous spark era helix! Then spark coils and a large antenna switch! It was extremely difficult to remain composed! The trunk was literally full to the top with the parts comprising a very early wireless station. I asked Pat if this equipment went with all of the parts we had already purchased and loaded in the van?"

"Sure," Pat replied. "If you don't take it, it's going to the dump."

The following Monday, Henry received another call from Steve. "I found you another part that goes with that station and some photographs too!" He was excited.

Dodd's station as it looks today.

Another call from Steve came the next day. "You have to get with Ted Moore. He bought a photo album at that yard sale that has pictures of the station. He says there's even one of Dodd with headphones on!"

Putting the Station Back Together

Having actual 1912 photographs of Dodd's Wireless Station will provide Henry with the opportunity to recreate the station, set up as accurately as possible, for display in the Virginia City Radio Museum in Nevada, which he runs. It is set up temporarily now.

"It is difficult to express the eerie feelings that one has when first viewing the 1912 photographs," Henry said."And then looking at exactly the same items in person." His attention to detail will give visitors the unique opportunity of seeing Dodd's wireless station almost exactly as it was in 1912!

Seeing it Yourself

The Virginia City Radio Museum, privately owned by Henry and Sharon Rogers, is the result of over 36 years of collecting. They display wireless and radio apparatus from 1910 through the 1950s. It is located at 109 South "F" St, Virginia City, Nevada. The mailing address is PO Box 511, Virginia City, NV 89440; tel 775-847-9047; **hands@radioblvd.com**.

Profile: Marion Henry Dodd

By Henry Rogers, WA7YBS

Marion Henry "Hank" Dodd was born in 1890 in Cortland, New York. His family moved to southern California in 1907, settling around San Bernardino.

Hank Dodd became interested in wireless about 1910, probably when going to Baptist College in Westlake, California. One of his first jobs was with the San Bernardino Fire Department. His wireless interest was just one of many hobbies. Others included photography and taking trips on his Indian motorcycle. When the US became involved in WWI, Hank Dodd joined the Army and became a lieutenant in the 316th Field Signal Battalion, 91st Division.

After WWI, radio was still his primary interest and Dodd became involved in a radio business in Los Angeles. Dodd's interest in the fast-evolving radio technology business was soon replaced when he became involved in an automobile dealership for the "Wood's Mobilette." Only seven Mobilette automobiles were built and the business went under. Again, moving on to other interests, Dodd went into real estate.

After many years of taking trips into the Sierras, the Dodd family moved to Lake Tahoe, Nevada in 1945. Dodd Reality Company was quite successful in the Tahoe area for many years. Entering his senior years, Hank found that the harsh Tahoe winters were too much for him. He moved to Reno sometime in the 1960s, bringing along a lifetime collection of material and equipment that he had saved and stored in trunks since before WW I. Dodd died in 1985, well into his 90s, leaving the bulk of his well-documented lifetime of hobbies and interests stored in his Reno house and the backyard shed.

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Cycle 23 Continues Upward

Solar Cycle 23 continued its upward progress through the summer. Solar flux exceeded 200 on many days and rarely went below 150. This is good news for the possibilities of worldwide 6-meter propagation this fall, especially if the solar activity remains at least this high through early 2001.

Mid-latitude F-layer propagation, such as along the North America to Europe path, is more likely during the fall and winter season when the daily solar flux exceeds 175. It is not difficult to understand why the 1999 fall-winter season was disappointing. The solar flux was rarely that high, as the generally low monthly averages attest.

Cycle 23 Peak

Cycle 23 has been rather lackluster so far (see Figure 1). It had a rather sluggish start and suffered a major glitch during a seven-month period from late 1998 to early 1999. Consequently, Cycle 23 has fallen well behind the NASA prediction and has barely kept within the 90%-confidence level. All this bodes poorly for the possibilities of 6-meter propagation over the next year or two.

This trend is especially discouraging in the context of NASA's predicted mid-2000 peak. We may be on the downward slope already, despite the short-term upward trend during the first half of the year and the impressive jump during July. The summer surge does not necessarily mean the peak will be later or higher than predicted, but this is at least a hopeful sign for the next few months. The actual peak cannot be determined for at least another year, as it is based on a13-month smoothed average.

Predicting solar activity several months, weeks or even days in advance remains quite uncertain, despite all the progress in solar science and instrumentation. Predictions are based largely on the behavior of previous solar cycles, yet each cycle has had its own peculiarities. This one has surprised us already and can again. We just have to wait, watch and be prepared.

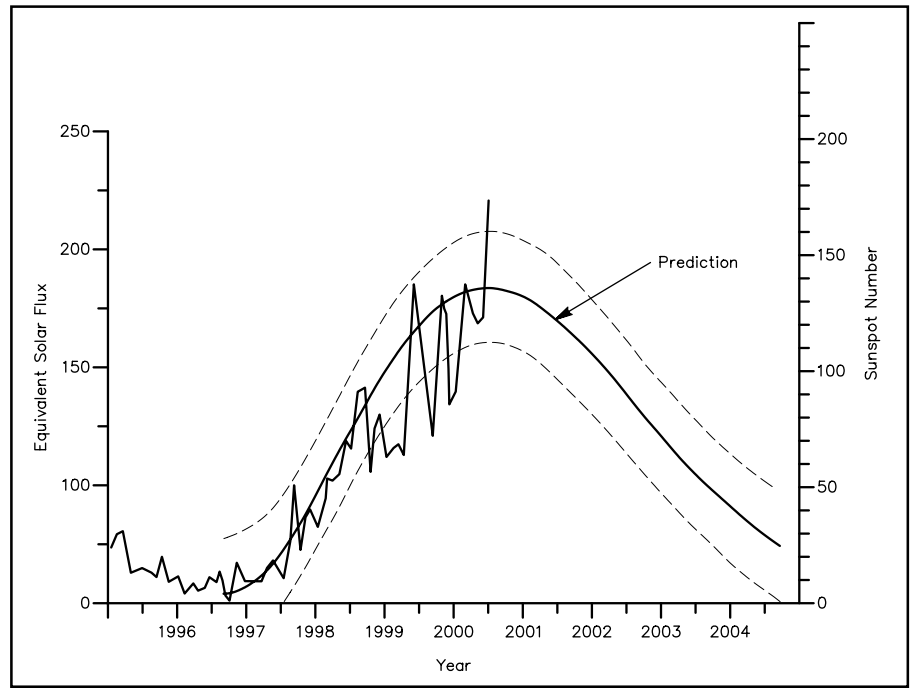

Figure 1—Cycle 23 plotted as one-month smoothed solar flux and sunspot numbers, as of August 1. Bell curve is the NASA prediction based on the smoothed 13-month running average. The dotted curves mark the 90%-confidence interval for the prediction. Based on http://science.msfc.nasa.gov/ssl/pad/solar/images/ssn_predict_l.gif.

ON THE BANDS

My goodness! Few summer months in recent years can match the astonishing variety and intensity of activity across the US and Canada as this past July. In addition to the expected sporadic-E openings, there were at least 15 days with transatlantic propagation on 6 meters, nine days with 2-meter E-skip, and several aurora sessions, one of which reached spectacular levels. Several evenings with auroral-E in northern latitudes and several mornings with tropospheric ducting further south round out the month's highlights.

The unusually good propagation jolted activity on all bands, including the microwaves, resulting in a flood of reports. More than 100 of you sent e-mail, letters and faxes directly to me or left telephone messages in July. Many thanks and keep them coming, even if it is not possible to mention everyone individually each month. All of your reports are essential to the column's success. This month, supporting information came from various journals, newsletters, WWW pages and VHF-oriented e-mail reflectors. Dates and times are in UTC unless otherwise noted.

Sporadic E

Six meters came alive with single-hop E-skip openings on at least half the days of the month, and double-hop openings became nearly routine. Excellent conditions allowed modest stations, running as little as 10 W or using simple antennas (such as dipoles and verticals), to make cross-country contacts with strong signals. Quite a number of mobile and vacation operations from out-of-the way places, especially in Canada and the western US, provided additional opportunities to work rare grids.

Among newcomers is Steve Toupin, VE2TKH, of St-Louis-de-France, Quebec. Steve just got on 6 meters a few months ago with a TS-690S and a rotatable dipole from the relatively rare grid of FN36. Steve has been popular whenever he was on the air, providing his rare locator to eager grid collectors and accumulating a growing total of his own. Fourteen-year old Stephen Turner, KC2FVY, demonstrated what is possible with a quite modest station. Using a 2 W FM handheld with a built-in shortened whip antenna, Stephen exchanged 55 reports with KF4UPA in Tennessee from his New Jersey home during an E-skip opening. What fun!

Steve Ford, WB8IMY, and others were delighted by the increase in PSK-31 activity around 50.290 MHz, which has become the *de facto* center for such activity. This relatively new digital transmission mode is ideally suited for conditions on the VHF bands. Steve observed that deep fading, which is common

This Month

October 4	432 MHz Fall Sprint
October 14	Microwave Fall Sprint
October 21-22	ARRL EME Contest
October 21	Orionids meteor shower peaks
October 21	50 MHz Fall Sprint
October 22	Excellent EME conditions

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with sporadic-E and other propagation modes above 50 MHz, hardly affected the ability of PSK-31 to get through.

Six Meter DX

There was plenty of DX to work on all continents in July. Several expeditions enlivened the usual assortment of North American countries within reach of much of the US via one or two sporadic-E hops. Much of the country was able to work VY0RR (FO03 in Nunavut Territory), FP/N1JEZ (St Pierre), C6A/N9JIM (Bahamas), HI3/OE3EBO (Dominican Republic) and VP2V/W6JKV (British Virgin Islands). YV1DIG was one of the few South Americans to appear in North American logs during the month.

K2OVS (FN30) and others found ZD7MY and ZD7VC (St Helena) in the South Atlantic on July 26 around 2055. VE7SL hooked up with VK4PU on July 15 at 0029. Both of these paths are so unusual for July that it is difficult to describe with any assurance just what sort of propagation modes may have been involved.

Japan and the Pacific

Hawaii is a rare catch on 6-meter sporadic E from the mainland, but stations widely scattered from California to New Hampshire had a chance to work KH6/K6MIO, KH7R and others on the afternoons of July 1, 2 and 3. One of the longest contacts was between KH7R (BL11) and K1SIX (FN43), about 8050 km via at least four hops. This is longer than any of the many contacts K1SIX made with Europe this season.

It may be no coincidence that spectacular sporadic-E openings to Japan took place on the consecutive evenings of June 30, July 1 and 2. On June 30, between 2315 and 2335, JAs worked as far east as KA9CFD (EN40) in Illinois, as reported last month. Japanese came through again a few hours later at 0215 until 0400 (July 1) with even stronger signals and over a wider area of the country. US stations as far east as Colorado, Kansas and Oklahoma reported logging 10 to 30 JA QSOs each, some with signals as strong as 59 over paths that exceeded 10,000 km.

Larry Lambert, N0LL (EM09), made 12 such contacts, his first ever with Japan via E-skip. Connie Marshall, K5CM (EM25), ran off 19 QSOs and thought it was the best ever Japanese opening. Brian Allen, N0VSB (DM79), who made 36 SSB contacts in several Japanese call districts, made a notable 10,927 km QSO with JS6CDB (PL36) in the Ryukyu Islands. This is probably the longest 6-meter sporadic-E contact ever reported.

The opening on July 2 came late (0500 to 0800), but yielded the strongest signals yet. Jack Henry, N6XQ (DM12), worked through the pileups to make 95 QSOs, about half on SSB with visiting operator JE6JYT at the microphone. Erik Dean, NI6G (DM06), ran 70 QSOs using 100 W and a seven-element Yagi. Hatsuo Yoshida, JA1VOK, reported many W6 and W7 stations, some as loud as 40 dB over S9. Charlie Ho, VR2XMT, heard WA6PEV (perhaps the first time Hong Kong has heard North America on 50 MHz via sporadic E), but could not break through the Japanese QRM to get the attention of any US stations.

Europe and Africa

Transatlantic 6-meter openings have appeared with almost routine regularity the past few summers, but this July has exceeded even ordinary expectations. US stations worked Europeans on more than a dozen days, as summarized in Table 1. Note that not all the countries listed for each day were necessarily worked in all the indicated US and Canadian call areas. Rather this summary is meant to suggest the widest extent of the openings. Indeed, some country prefixes appear because of a single fortunate contact. Even so, the scope and duration of openings is still amazing.

The single most amazing day was surely July 10. Stations primarily in the Northeast began running Europeans as early as 1810, and for some the opening lasted until past 0100, although the 1940-2200 time frame was more typical. Stations in Ireland (EI) and the United Kingdom (G, GI, GM and GW) were most prominent with loud signals, but the most interesting feature of the opening was the number of Central European contacts, especially with Germany (DL), Poland (SP), Czech Republic (OK) and Slovakia (OM).

The band was filled with CW and SSB stations to 50.200 MHz and higher. Many contacts were on CW, but signals were often strong enough (even to Central Europe) to make SSB contacts easy. W3EP (FN31) worked 81 Europeans, half of them DL, SP, OK and OM stations and mostly on CW. Others in the Northeast typically worked several dozen stations each. Among notable catches were AF1T (FN43) and W1JJM (FN41) to Z32ZM (FYR Macedonia) and K2SPO (FN13) to 9A1CAI (Croatia) and LZ2CC (Bulgaria). Needless to mention, most US stations picked up at least one new country.

The opening made a distinct shift west after 2200 until at least 0040, when stations centered in Wisconsin, Minnesota and adjacent states found workable signals from Ireland and the United Kingdom. Typical of the dozen or so Midwesterners who reported contacts was John Feltz, W9JN (EN54) Wisconsin, who logged eight EI, GM, GW and G stations. Several made their first ever European contacts on 6 meters, including N0UR (EN35) Minnesota and KM0T (EN13) Iowa, both of whom ran just 100 W and small Yagis.

Several stations scattered from Louisiana to New Mexico, an additional hop away from Europe, made isolated contacts. W5VAS (EM40) logged two G stations; W5OZI (EM00) hooked up with MM0AMW and G4CBW; and K5AM (DM62) made it to EI3IO and G4IFX after 2330, for the longest reported contacts of the day at about 8200 km.

The opening was just as exciting from the European side. G0RUZ ended up with 126 North American contacts as far west as K0RAK (EN43) in Wisconsin. G4CBW made 104 QSOs, the longest to EN13 and EM00. SP6GWB was happy to make 25 contacts with North Americans, adding 15 new grids to his list. SP3RNZ struggled through the western European QRM to eke out seven QSOs, all with stations having FN grid locators, but heard many others who could not copy him.

A Spectacular Morning

Mike Smith, VE9AA, has been one of the most active and persistent 6-meter DXers in recent years. He has gradually accumulated 91 entities toward a coveted 6-meter DXCC since getting on the band in 1991. Mike runs 100 W to a pair of stacked eight-element Yagis. Although he has participated in most of the transatlantic openings that have occurred over these years, Mike can still be surprised.

"July 23 will go down in my logbook as the most exciting day on 6-meter E_s to date," he wrote. He was awakened at 0622 (3:22 AM local time) by loud 48.250 MHz video from his receiver. By 0630, he had worked GW4VEQ, followed by GW3JXN, S59A, and G0JHC. The Europeans were just getting up and signals were building.

Table 1
Transatlantic 6-Meter Sporadic E in July

Date	*Time*	*North America—Europe and Africa*
1	2250—2330	W9—EH; W1—EH8
3	2145—0000	W1, 2, 3—EH8, EH, EH9, I
4	2130—2135	W1, 4—EH8
5	1025—1720	VE1, 3, W1, 2, 3, 5, 8—CU3, EH8, CN, CT, EH
	1945—2340	W5, 8, 9, 0—CU3, EH8, CN, CT, EH, EI, F
6	1145—2110	VE1, 9, W1, 2, 4—(CU3), CN, EH9, CT, EH, PA, F, HB
	1515—	W5—CT
7	1515—1530	W4—EH
	2035—2345	W1, 4—CN, CT, EH, EH9
8	1215—1430	VE1, W2—EH8, CT, F
9	2040—2225	VE1, W1, 2—EI, G, GW, F, 4X
10	1625—1630	W9—EI, F
10-11	1810—0100	VE1, 2, 3, 9, W1, 2, 3, 4, 8—EI, GM, GI, G, GW, GD, PA, ON, OZ, F, DL, OE, 9A, OK, OM, SP, Z3, LZ
	2200—0110	W5, 8, 9, 0—EI, GM, GI, G, GW
12	2115—2145	W1—EH8
22	0805—1650	VE1, W1, 2—CT, EH, F, I, 1A0, 9H
	2105—2145	W9—EH, 9H
23	0625—1435	VE1, 9, W1—CN, EH, CT, EI, G, GW, GU, PA, ON, F, HB9, LX, DL, OE, I, 9H, 1A0, S5, 9A, ZA, SV, OD, 4X
24	1230—1440	VE1, W1—CU3, EH, F
25	2125—2305	VE1, 9, W1, 2, 4, 9—TF, EH, G, I,
29	1800—2210	VE1, 9, W1—PA, ON, OZ, HB9, LX, SM, DL, I, OM, 9A, S5, YU, SP, YO, 4X, (OD), (UX)
	2000—	W5, 8—EH, EI, G, GD, GI, GW, ON, F, I, DL, S5, 9A

Prefixes in parentheses are heard only

Over the next seven hours, Mike made 108 QSOs in 16 European countries, including OE (Austria), S5 (Slovenia) and SV (Greece). He had the impression he was the only North American station on the band for the first several hours. Between 0730 and 0900 or so, when signals were the strongest, Mike snagged some most extraordinary contacts with 1A0KM (Sov. Military Order of Malta), OD5PN (Lebanon) and 4X1RF (Israel). The Israeli boomed in with a 59 signal for nearly an hour.

Mike's morning run was certainly one of the most remarkable 6-meter transatlantic sporadic-E runs ever reported. Even during the best days of the 1995 season, few individual accomplishments can compare in terms of duration of the opening (at least eight hours), number of contacts (over 100), countries worked (16) and longest distances (up to 8300 km). It also suggests, as the past few summers of transatlantic work have generally, that 6 meters is open longer and more often than had been commonly assumed.

A Spectacular Week

Bob Mobile, K1SIX (ex-WA1OUB), has been chasing 6-meter DX from his perch overlooking southern New Hampshire for more than 30 years. Bob leads all US stations in DXCC countries (currently 136), but he can still get excited by 6 meters. Bob worked 4X1RF on July 9 for a new country—and for the last continent he needed for his 6-meter WAC award.

That would have been accomplishment enough, but then Bob realized that he had worked all continents within a single week—and all via sporadic E to boot! His complete list is in Table 2. Congratulations for a fine bit of operating and a long-awaited award.

Table 2
K1SIX 6-Meter WAC Contacts

Date	*Time*	*Station*	*Continent*
July 3	0127	KH7R	Oceania
July 7	2100	CN8KD	Africa
July 8	0205	K6FV	North America
July 8	1303	F8BU	Europe
July 9	1824	YV1DIG	South America
July 9	2124	4X1RF	Asia

Two-Meter Sporadic E

The run of 2-meter E-skip openings that began in June continued through July. Although most areas of the country had a chance to work some 2-meter DX via sporadic E, the western half of the country seemed to be favored with the most opportunities this July. Nearly all contacts fell within the expected one-hop range of 1500 to 2300 km, although some notable contacts were a good deal longer than this.

The widespread outbreak of sporadic E on July 11 yielded many of these long contacts, including N7DB (CN85) to AA5MT (EM53) at 3135 km, W7FHI (CN96) to KU4WW (EM54) at 2960 km, and W7FHI to WA4HFN (EM55) at 2800 km. An analysis of several dozen QSOs indicates especially active sporadic E centers over eastern Kansas and central Wyoming. This suggests that some of the longer contacts from Washington to Arkansas, Mississippi, Alabama and Tennessee were likely made by two relatively short hops.

July 15 Aurora

The aurora of July 15-16 was an extraordinary event, but not totally unexpected. Solar astronomers had observed a coronal mass ejection nearly two days earlier and forecast a major impact on Earth. The resulting solar shock wave was duly reported via satellite on the morning of July 15, as many VHF operators waited for something unusual to happen.

The geomagnetic K index was five at 0600 and again at 0900, high enough for aurora, but too early in the day for North America. The HF bands began to close down. By 1200, the K index had risen to six and then it happened! The K index jumped to nine (the high end of the scale) at 1500, indicating a rare severe geomagnetic storm. It held at nine for three consecutive three-hour reporting periods during the peak of auroral conditions.

Table 3
Unusually Long 2-Meter Contacts, July 15-16

Stations	*Distance (km)*
K5CM (EM25)—WA1VTA (FN42)	2145
K5CM (EM25)—W3EP (FN31)	2105
W5UWB (EL17)—K4QI (FM06)	1978
K5YT (EM22)—K2SMN (FN20)	1975

What an aurora it was—certainly the most intense and widespread since the great aurora of March 1989. Radio auroral conditions got off to a relatively late start, considering the severity of the storm. A few northerly stations were making contacts prior to 1930. W3ZZ (FM18) and others as far south as Maryland began making contacts during the following half hour. For most stations, the first phase of the aurora began suddenly around 2000.

Auroral conditions spread very rapidly south during the following 20 minutes. By 2025, K5IUA (EL29, along the Texas coast) was running stations on 144 MHz. Indeed, 2-meter stations from Maine to Minnesota and south to central Florida, southern Texas and southern New Mexico experienced very intense auroral conditions simultaneously by 2030. In addition to K5IUA, southerly stations making contacts on 2 meters included AC4TO (EM70), W5UWB (EL17) and K5AM (DN62)

Activity and coverage was phenomenal on 144 MHz, as some samples from the Midwest suggest. K9AKS (FN41) in Illinois made 40 contacts from Utah to New Hampshire. N0LL (EM09) logged 55 QSOs and extended his reach from Southern California to North Carolina. W0VD (EM27) in Missouri ran off 72 QSOs in 52 grids, while K0GU (DN70) in Colorado reported 70 stations worked in 47 grids.

The activity was also wild from New York to Florida, with stations spread out from 144.100 to 144.275 MHz. AC3A (FN03) in New York logged 40 contacts in 26 grids, plus an additional 10 QSOs using an IC-202 running 2 W to its built-in whip antenna. W4MYA (FM07) racked up 109 QSOs in 68 grids from Virginia. WA4MVI (EM84) managed 36 contacts from South Carolina. W5HUQ (EM35) in Arkansas was delighted with his 29 QSOs. AC4TO (EM70) in Florida made six contacts, while W5UWB (EL17), perhaps the most southerly station reporting contacts, logged four QSOs in four different grids.

Indeed, auroral activity in the South was unusual for other reasons. Signals from southern stations were as strong as 20 or 30 dB above S9 in New England. Some of the longest contacts of the day cut right across the South and approached the calculated 2200-km limit for auroral propagation. The Table 4 shows some unusually long contacts with approximate distances.

As with other intense aurora, several operators noticed interesting effects. Beam headings peaked well off North, with some more northerly operators reporting the strongest signals were often close to due West or due East. Stations along the Canadian border complained that they could hear few stations at the peak of the aurora. This was undoubtedly because the aurora was overhead or even south of some stations, thus preventing them from making aurora-scatter contacts.

There was also widespread auroral activity on 222 and 432 MHz, where contacts are nearly as easy to make as on 144 MHz. Stations as far south as South Carolina and Texas made 222-MHz contacts. Activity on 432 MHz was more restricted to northerly areas, not because conditions prevented wider geographical coverage, but probably because many fewer stations were willing to try 70 cm. This would have been one of the best opportunities to make UHF contacts. There were no reports of any attempts at 903 or 1296 MHz.

The aurora weakened around 0130, stations across the northern half of the country reporting that auroral conditions returned for two hours or so after 0300, but not with the same intensity. Unlike some other great aurora, auroral-E propagation did not follow the aurora on 144 MHz, and it was scarce on 50 MHz, even after midnight local time, when it commonly appears. This was a once in-a-decade event, yet another severe storm and resulting great aurora could happen again as we ride the crest of Solar Cycle 23.

Auroral E

More savvy 6-meter operators are turning their beams north late in the evening and early morning to search for Arctic stations via auroral E. It does not take an actual aurora for this uniquely northerly propagation to appear, as many have found out this past July. Lefty Clement, K1TOL (FN44) in Maine, found VE8BY/b (FP53) coming through on several evenings after 0300 and on a few nights heard OX3VHF/b (GP60), VE8WD/b (DP22) and even VE8SIX/b (CP38), as well. July 14 was the highlight of the month for him. Just after 0600, Lefty worked KL7Y, KL7NO and heard additional weak signals. WA2AEY (FN23) and others also hooked up with KL7NO.

Arliss Thompson, W7XU/0 (EN13) in South Dakota, heard or worked Alaskans on July 12, 20 and 30, at least. "This has become somewhat commonplace," Arliss remarked, "but it is still kind of exciting." Arliss has made most of his contacts between 0500 and 0830. N7DB (CN85) also worked or heard KL7NO, KL7FH, KL7FZ, KL7IKV, NL7Z and KL7HFQ after 0400 on July 12. Apparently, stations across the upper Midwest and as far south as California and Arizona were also working the Alaskans that evening.

Microwaves

Tropospheric ducting conditions across the Gulf of Mexico were excellent on the mornings of July 16 and 20, supporting another flurry of 2304 MHz contacts between Texas and Florida. Rolf Marx, K1YV (EL89), hooked up with K5VH (EM00), K5YC (EM00) and K5IUA (EL29), briefly causing some QRM to a QSO already in progress in Texas! WB4OMG

2000 432-MHz Standings

Band standings for 432 MHz are compiled each July for publication in the October issue of *QST*. You must work at least five states for inclusion, except for stations west of the Mississippi. To ensure that the standings reflect recent activity, you must submit reports at least every two years. Stations dropped for lack of reports will be reinstated with a current update. You don't need to work new stations to remain in the published standings, but please indicate your continued interest by submitting a report. Reporting forms are available with an SASE to: Standings, ARRL, 225 Main St, Newington, CT 06111. You can also submit your reports by e-mail to: **standings@arrl.org**.

Call	QTH	States	DXCC	Grids	Best DX† (km)
W1JR*	NH	50	41	195	1397
AF1T*	NH	24	7	—	1375
K1TEO	CT	22	3	101	1900
K1LPS	VT	22	3	33	1357
K1UHF	CT	20	2	64	1604
W3EP/1	CT	19	2	50	1760
W1AIM	VT	16	2	39	1323
K1MAP	MA	13	1	23	970
KU2A	NH	12	2	28	998
N1PM	MA	11	2	12	—
WA1HOG	NH	9	2	21	745
K1WVX	CT	9	1	12	—
N1RWY	ME	7	2	15	574
WA1OFR	MA	7	1	9	338
W2CNS	NY	25	3	91	1582
N2WK	NY	23	3	83	1180
N2HLT	NY	23	2	80	1486
K2LGJ*	NY	23	2	—	720
K2AN	NY	21	2	60	1401
WB2VVV*	NJ	18	11	49	960
K2OVS	NY	16	3	21	420
WA2ZFH	NY	16	1	30	1463
W2FCA	NY	13	2	31	640
WA2BAH	NY	13	2	28	825
W3HHN	NY	13	2	27	1180
K1JT	NJ	13	1	23	621
KA2MCU	NY	9	2	23	755
W2MPK	NY	9	2	—	—
KB3PD*	DE	50	27	138	—
AE3T	PA	23	2	—	—
NO3I	PA	19	1	54	1268
K3KEL	PA	14	2	21	1025
WA3DMF	MD	10	1	13	603
N3JNX	PA	9	1	20	825
N3XJX	PA	7	2	23	—
W3SZ	PA	7	1	12	—
WA4MVI*	SC	50	12	—	1771
KD9KP	TN	34	1	101	1680
WA4OFS*	FL	33	25	135	—
K4MRW	AL	30	2	134	—
K4RF	GA	28	2	96	1742
N4CH	VA	24	1	73	1400
K4ZOO	VA	23	2	71	1444
AA4H	TN	21	1	62	1737
N4MM	VA	20	3	58	—
K4KAE	SC	19	3	69	1200
K4RTS	VA	19	2	63	986
NB2T	FL	19	1	30	1294
W4WTA		18	1	54	1319
W4WTA	GA	18	1	54	1319
WB4JEM	FL	17	3	76	1647
W4EUH	VA	16	2	51	1180
AD4DG	VA	16	1	39	1085
W4KXY	GA	12	1	33	—
AB4OO	GA	8	1	18	—
W5LUA*	TX	50	—	—	—
W5FF*	NM	50	—	—	—
WD5AGO*	OK	38	23	100	1740
K5SW	OK	30	2	143	1979
WA5TKU	TX	22	—	69	—
W5ZN	AR	21	1	82	1715
WB5YWI	OK	19	1	71	—
AA5C	TX	18	1	100	1721
N5QGH	TX	17	—	48	—
W5UWB	TX	11	1	27	2167
N5HYV	LA	10	—	44	—
WA5VKS	TX	7	1	24	—
K5RHR	NM	6	1	29	574
N5XU	TX	4	1	19	1459
N5NJ	TX	4	1	19	826
NL7CO	OK	4	1	13	577
KK5OV	NM	4	1	5	1448
W5HUQ*	AR	—	23	—	—
K6JYO	CA	9	—	—	—
K6TSK	CA	5	2	50	4125
N6RMJ	CA	4	3	46	4017
K6QXY	CA	4	3	36	3794
KC6ZWT	CA	4	2	48	3934
AJ6T	CA	4	2	32	3672
K7RR	CA	3	3	21	830
N6IFW	CA	3	1	21	715
K6FV	CA	2	2	8	3768
KR7O	CA	2	1	33	—
N6ZE	CA	1	1	12	—
W7HAH*	MT	47	40	178	—
W7ID*	ID	26	13	85	—
K7XD*	WA	22	13	70	—
K7XC*	NV	8	5	52	743
N7LQ*	NV	7	10	56	770
W7RV	AZ	7	4	56	712
NJ7A	UT	6	1	28	1122
W7PUA	OR	5	2	28	680
KE7SW	WA	3	2	19	409
WA7GSK	ID	3	1	12	—
WA8WZG*	OH	41	20	158	1844
KE8FD	OH	34	2	133	1731
K8MD	MI	31	2	113	2166
KU8Y	MI	29	2	98	1406
W8PAT	OH	28	2	67	1631
N8KOL	OH	22	2	71	1235
WB8XX	OH	20	2	62	1570
KB8RJS	MI	18	2	35	—
KB8O	MI	15	1	50	—
K2YAZ	MI	14	2	37	2167
WA8NPX	OH	11	2	30	—
WA8EOJ	OH	11	1	40	869
N8GHZ	OH	7	2	17	480
N8VEA	OH	6	2	11	378
WB9SNR	IL	35	2	106	1420
W9ZIH	IL	34	2	69	1520
K3SIW/9	IL	31	2	126	1450
W0UC	WI	21	2	100	1471
W9UD	IL	28	2	116	1312
KA9CFD	IL	25	2	97	1537
N9NJY	IL	18	2	62	1020
WA1MKE	IN	15	2	47	1200
W9JN	WI	14	2	74	1402
N0AKC	WI	10	1	25	
W9EME	WI	10	—	—	—
W9FZ	WI	8	1	27	504
N9HF	WI	7	1	7	608
K0RZ*	CO	42	45	243	1116
W0FY	MO	28	—	95	—
W0DFK	MO	25	2	75	1656
W0OHU	MN	23	2	102	1842
KD0PY	IA	22	1	71	1380
WA0BWE	MN	21	2	92	1430
N0LL	KS	21	1	113	1690
KA0PQW	MN	20	2	—	1629
K0FF	MO	20	1	74	1189
N0NZ	NE	20	1	39	1224
W7XU/0	SD	18	1	94	2040
K0SQ	MN	17	2	68	1295
N0KQY	KS	17	1	58	1554
K0CJ	MN	16	2	2	1375
W0ZQ	MN	15	2	89	1148
KM0T	IA	14	2	77	1151
KB0VUK	MN	13	2	63	1124
K0VSV	IA	13	2	47	1100
K0AWU	MN	12	2	30	1555
N0UK	MN	11	2	55	992
W0PHD	MN	11	2	29	
NE0P	IA	11	1	17	1200
WA2HFI/0	MN	10	2	34	932
N0KE	CO	10	1	38	500
KA0ZYD	MN	9	1	33	1250
WB0LJC	MN	9	1	25	750
N0SWV	CO	9	1	24	575
KR0I	MO	8	1	19	694
W0LD	CO	8	—	20	1032
KF0Q	MN	7	1	31	830
K6LS	CO	4	—	9	300
VE3KH	ON	18	—	54	1174
VE6TA	AB	14	10	51	660
VE2PIJ	PQ	8	2	28	694

—Information not supplied
*Includes some EME (moonbounce) contacts
†Terrestrial

(EL87) was also able to hook up with K5IUA, but not with the other Texans.

These contacts were in the 1200- to 1500-km range, but as Buddy Morgan, WB4OMG, remarked, "talking across the Gulf is easier and is happening more often than we thought." Rolf Marx, K1YV, observed that 2304-MHz signals were sometimes stronger than those at 432 or 144 MHz.

Tom Haddon, K5VH, is president of the Texas-based Roadrunners Microwave Group, currently with 37 members, and he invites anyone interested in microwaves to join the fun. The group is planning to put its next effort into 10-GHz gear. Contact Tom at **k5vh@texas.net** or visit the Web page at **http://www.k5rmg.org**.

Erik Dean, NI6G, provided news of 2304-MHz activity in the San Joaquin valley of California. Erik, N6AJ and K6MI now have nearly identical stations, consisting of German-made transverters with 1.4 W output and 21-element loop Yagis. To make up for the lack of activity in the immediate area, Erik went roving in the June contest and worked the other two from five different grids. Is anyone out there willing to provide them some company?

VHF/UHF/MICROWAVE NEWS

New 24-GHz Distance Record

Silvano Ricci, I0LVA, announced that he and Costante Carrer, IW3EHQ, set a new 24-GHz world distance mark of 462 km on June 18. The mixed SSB-CW contact took place between mountaintops in the northern and central parts of Italy. I0LVA ran 250 mW to a 90-cm dish and used a receiver with a 1.5-dB noise figure. The IW3EHQ station was similar, but it had 750 mW available. The previous record of 406 km was held by a Japanese pair. The US record has stood at 267 km for the past three years.

10-GHz Rain-Scatter Record

In response to an appeal in a previous column, Russ Pillsbury, K2TXB, has filed a claim for a 10-GHz rain-scatter distance record. Russ was operating W2DRZ (FN02la) during the ARRL 10-GHz contest on August 16, 1997, when he made a 733-km contact with WB9SNR (EN62ac). The home station of W2DRZ was running 10 W at the feed of a 1-meter dish at 90 feet. The pair exchanged 55A reports, indicative of the Doppler broadening evident on rain-scattered signals. The longest European 10-GHz rain-scatter contacts are in the 650 to 685 km range. Belated congratulations on a fine contact.

Fall Sprints

The Southeastern VHF Society is sponsoring the fall season of sprints, which take place between 7 and 11 PM local time (except for 50-MHz and microwave sprints) on designated dates for each band. This news may come too late to participate in the sprints for 144 MHz (September 18) and 222 MHz (September 26), but the dates for the remaining events are in the calendar on the first page. The 50 MHz sprint scheduled for October 21 runs from 1200 to 1900 UTC in order to take advantage of the Orionids meteor shower. Participants have some choice of operating times for the microwave sprint. For complete rules, e-mail Bob Lear, K4SZ, at **k4sz@arrl.net**.

Power is No Substitute for Skill

October starts the DX contest season. Since this column will appear in mid-September, I decided to concentrate on several things that will improve your chances when contesting or DXing using QRP power levels.

First of all, let me express my gratitude to John Dorr, K1AR, contesting columnist for *CQ* magazine. John's June Contesting Tip says: "Here's a great tip to help hone your operating skills. The next time you enter a DX pileup, try calling the station with just 100 watts, instead of instinctively turning on the amplifier. The idea is to try to let operating skill prevail over brute force. It's amazing how differently you will operate (and how you can improve your skills) when you know you're not the loudest guy in the pack!" Well said, John!

About the only thing I'd change in John's statement is to substitute 5 W for the 100 W! Gang, the message is getting out. If you want to improve your operating skills start using QRP. I wonder if we will have any "QRP converts" as a result of John's contesting tips?

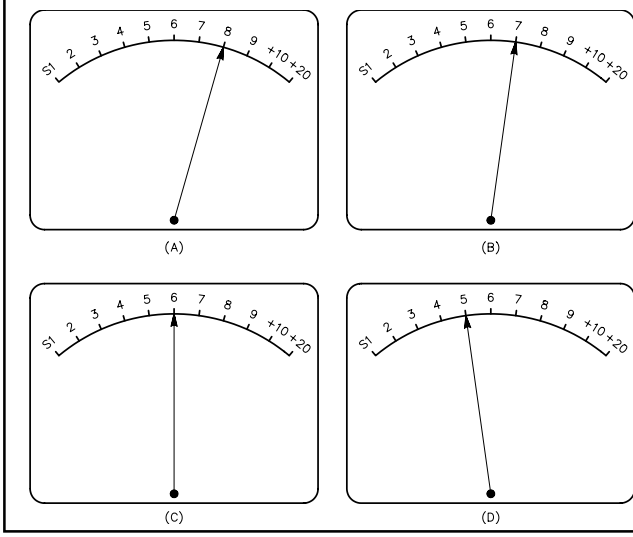


Figure 1—If a 1-kW signal pushes the S meter to S9, dropping to 250 W will only lower the meter to S8 (A). Drop to 62.5 W and you're down to S7 (B). Take the big downward leap to 15.6 W and the meter reads S6 (C). Finally, dip to only 3.9 W and the meter is S5 (D). So, going from 1 kW to 3.9 W only "cost" us four S units!

To dB or Not to dB

Let's take a look at what happens when someone decides to drop the output power down from 1000 W to 5 W. The most obvious result is your signal is no longer *really* loud. Is your QRP signal readable? Let's find out (see Figure 1).

We are going to work in decibels, which is the way RF power output and S meters are calibrated. Each S unit on the meter is theoretically equal to a 6-dB change in signal level. Since every 3 dB is equal to a doubling or halving of the power output, 6 dB equals a power increase or decrease of 4 times. Taking a 1-kW signal and arbitrarily assigning it an S9 reading on the S meter, if we decrease the output 6 dB, down to 250 W, the S meter should read S8. By dividing this power again by four (an additional 6 dB) the S meter should read S7 for a 62.5-W signal. Continuing downward, by attenuating this 62.5-W signal by a factor of four (to 15.6 W) the S meter should read S6. One final 6-dB drop from 15.6 W to 3.9 W (well within QRP power levels) should equal an S5 signal on the S meter. In all actuality, to go from 15.6 to 5 W would equal a drop of only 4.9 dB, which is less than one S unit, so the resulting indication on the meter would be somewhere between S5 and S6. Not tough copy at all, under most band conditions.

QRP Contesting & DXing Tips

Tip #1: ***Never doubt that you will prevail when hunting DX.*** It may take several nights of intense effort, but you will end up in the other guy's log. Doubting that QRP works is one of the biggest obstacles QRPers have to overcome. QRP works: we prove that every time we get on the air.

Tip #2: ***Spend some time using a good CW program on your computer to increase your CW speed and learn to copy in your head.*** Without a doubt, this is a very important tip. The more proficient you are at CW (the preferred mode in QRP) the more DX contacts you'll make. There are several good CW learning/training programs available for the PC. Learning to put away the paper and copy in your head is something that every good CW operator can do. It takes time and effort but it's doable.

Tip #3: ***Check your antennas and replace broken wires, beam elements and weathered coax while the weather is still good.*** In the middle of an ice storm during a major contest is *not* the time to find out that your antennas aren't up to par. Take advantage of the good weather in the late summer and early fall to inspect, repair and replace the various elements of your antenna farm. Now is the time to erect that "killer death-ray" antenna. Antenna experimentation is at the heart of QRP. *Safety first!* Be sure to observe all safety precautions when erecting or working with antennas.

Tip #4: ***Get on the air often, get to know the bands, and work everything you hear!*** This will dramatically improve your operating skills and build confidence. Learning how the bands propagate will also help during contests and DXing by allowing you to "read" the propagation and move around accordingly.

Tip #5: ***QRP works better at higher frequencies.*** It's true. The higher you go in frequency, the more efficient your 5-W signal tends to be. This is why on 10 and 6 meters you can really work the world with only 5 W. Use this information to plan the time to QSY to higher bands as the propagation improves. When 10 meters seems dead, dropping to 15 meters will yield many QSOs. Don't forget to check 10 intermittently because it can "prop" in and provide more contacts, especially those all-important "multipliers."

Tip #6: ***Learn what the propagation information furnished by WWV/WWVH really means.*** It does no good to chase DX when the A Index is in the 20s and the Geomagnetic Field is at major storm strength. *The ARRL Antenna Book*, along with the ARRL's *Low Power Communications, The Art and Science of QRP*, have chapters dedicated to deciphering these propagation forecasts. Learn about it; you won't be sorry.

I hope these tips will encourage many of you to give contesting and DXing a try. Major HF contests are 24-48 hours of intense DXing and offer a great way to increase your DXCC totals. Remember there are some really *big* contests starting in October: the QRP ARCI Fall QSO Party and the CQ WW DX Contest just to name two. Jump in and try them. QST

Rich Arland, K7SZ ♦ 25 Amherst Ave, Wilkes Barre, PA 18702 ♦ k7sz@arrl.org

A Front-Row Seat for WRTC 2000

In a small outside cafe overlooking Lake Bled, Slovenia last July, I happened to sit next to Niki, VE7NKI. A coincidence? Not exactly. Along with about 400 other radio amateurs from all over the world, we were there to watch the opening ceremonies of the 2000 World Radiosport Team Championship. This Olympic-style event was first held in 1990 in Seattle, Washington, and in San Francisco, California, in 1996. (See the article by David Sumner, K1ZZ, elsewhere in this issue.)

Niki and I were there to accompany our OMs—Gary, VA7RR, a competitor on one of the Canadian teams and George, N2GA, a referee for the "wild card" Asiatic Russian team, respectively. WRTC 2000 consisted of 53 two-man teams (with one referee each) representing 35 countries. These teams were dispatched to locations all over Slovenia, from the Croatian border to the east to the Austrian border to the north. At each site, Amateur Radio hosts and clubs had set up identical antennas, consisting of a 3-element Italian-made Yagi 12 meters high and a Windom-style antenna for 40/80 meters.

The competitors had to bring their own equipment—radios, computers, accessories—except for an antenna switch provided by the organization. They didn't even know what call sign they would be using until five minutes before the contest began! There were many unique rules for this 24-hour multimode contest, held in conjunction with the IARU HF World Championship contest. They also had a CW and SSB "pile-up tape" competition where they had to copy call signs as quickly and accurately as possible. The pile-up results were factored in with the on-the-air results to give the final score. Like Niki, I was there to enjoy the event and do some sightseeing. Thanks to some of the local hams, I was able to visit many of the contest teams while they were operating. It was certainly a learning experience!

Since Niki and I are both active contesters, it was a big disappointment not to see any YL participants. At WRTC 2000, most licensed YLs took a backseat. The only three listed in the official program were Jelka, S57NW, and Maca, S56MM, who were hosts, and Romina, S56RXT, on the WRTC committee. Was the lack of YL participants an intentional oversight? I'm sure it was not. Perhaps no qualified women hams applied or expressed interest in being part of the event.

DIANE ORTIZ, K2DO

At the opening ceremonies of WRTC 2000 in Lake Bled, Slovenia, I met Niki, VE7NKI, and her OM Gary, VA7RR.

I hope there will be YLs on the list of competitors and referees for the next WRTC. For this level of competition, a participant must be an accomplished contester, preferably in both CW and SSB. For WRTC 2000, the large contest clubs picked most of the team leaders. Others won a wild card spot by applying to the organizing committee with a list of their accomplishments.

Join the Contest Crowd

There are many different types of contests from the big CQ WW (SSB-October 27-29; CW-November 24-26) with thousands of entrants to the smaller sprints and local contests that may only encompass one state or province. There are many YLs who are active in major contests. Ann Santos, WA1S, is an avid CW contester and has been on many DXpeditions including Willis Island. You can usually find her call in the top ten of most major contest results. Ann enjoys working single-op, low power from her home in New Hampshire. Another egular is Jody Millspaugh, VP5JM, of Providenciales in the Turks and Caicos Islands. Jody is a world-class RTTY contester. These YLs, and many others, enjoy the competition and thrill of contesting.

Many successful contesters will tell you they got their start at Field Day. Others prefer events that are more specialized. A good place to start is the YLRL contests. They are always fun and one of the most popular is the YL Anniversary Party, held this month. This year, for the first time, you can compete for an award in this contest even if you don't have HF privileges. New this year is the SWL Contest that is open to licensed YLs who don't have a license class that enables them to transmit on the contact frequencies. The dates for the YL Anniversary Party (YL-AP) are:

CW: 1400 UTC, October 7 to 0200 UTC, October 9, 2000

SSB: 1400 UTC, October 21 to 0200 UTC, October 23, 2000

Suggested frequencies are: CW—3555, 7055, 14055, 21135, 28195; SSB-3955, 7255, 14265, 21395, 28395 (plus or minus 15 kHz.) Look in the DX portions of the band on 40 and 80 meters. For the SWL Contest, log the date, time, frequency, both contact calls and signal reports exchanged and send it to YLRL Vice President, Phyllis Shanks, W2GLB at 1345 W Escarpa St, Mesa, AZ 85201.

Many YLs said it was difficult to find the time to contest on busy weekends, so starting next year the YLRL will move many of the contests to weekdays in an effort to boost participation. The full rules for the YL-AP and other YLRL contests are available at **http://www.qsl.net/ylrl**. They also have a link to a new page listing YL certificates and awards from around the world including New Zealand, Korea, Japan, Belgium, Italy, France, Brazil, Canada, Great Britain and the US. There is even a special certificate called the Grandmother Certificate. It is available for working 10 YLs who already hold the certificate. A gold seal is available for working 5 great-grandmothers!

Other popular sites for contest information are: **http://www.contesting.com**; **http://www.qth.com/KA9FOX/**; **http://www.dxbands.com/contesthome.htm** and **http://www.arrl.org/contests/**.

NEW CLARA WEB SITE

A new YL Web site from the western CLARA members (Canadian Ladies Amateur Radio Association) is very well organized and informative. It's at **http://www.qsl.net/ylradio**. You'll find interesting YL stories, links, nets, conferences, DX operations, antenna hints (with diagrams and examples) and even video clips of YLs in QSO! A recent story was about the experiences of Bonnie Nagel, VE7BNN. After a training session on Disaster Childcare, she volunteered to help in a daycare center at the Canadian Forces Base in Kingston, Ontario, caring for young refugee children from Kosovo. Bonnie is a teacher and worked at the center during her summer vacation.

Congratulations to Web site manager Elizabeth Baggoo, VE7TLK, designer Linda Vanderzande, VE7LJV, and the committee who put this site together. QST

Diane P. Ortiz, K2DO ♦ PO Box 296, Bellport, NY 11713 ♦ k2do@arrl.org

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

KA1ASD, Malcolm W. Wilcox, Northford, CT
WB1CIW, Douglas G. McGraves, Topsham, ME
WA1DPB, Robert M. Collins, Fall River, MA
W1EQG, Thomas Maier, Lexington, MA
K1FWK, George L. Egerton, Enfield, CT
K1GDE, Stephen R. Gorski, Lynn, MA
N1HUX, George W. Rooney, W Hartford, CT
K1LHS, J. B. Waterman, Greenfield, MA
W1ICP, Lew McCoy, Mesa, AZ
W1LRR, Eugene F. O'Hare, Weston, CT
KA1MCH, Edwin E. Alexander, Gardiner, ME
W1NDL, Gerald W. Benedict, White River Junction, VT
N1OGO, Robert K. Hall, Lisbon Falls, ME
W1SGT, Robert M. Whittemore, Chestnut Hill, MA
KA1SYO, Walter H. Uhle, Wallingford, CT
K1TSV, James R. Santos, Pawtucket, RI
K1VJI, Walter M. Fife, Stockton Springs, ME
N1WBJ, George Tarbox, Auburn, ME
N2FX, Wayne W. Clifford, Franklinville, NJ
WA2HJH, F. H. Hoppe, Waverly, NY
WA2HYY, Paul Smolarz, Rego Park, NY
AA2IG, Thomas L. Wimett, Sanborn, NY
W2KFI, Sam N. Barbara, Conway, SC
WB2MZL, Robert B. Goody, Demarest, NJ
W2ODK, Willard F. Mason, Capon Bridge, WV
N2OLP, Patricia T. Pastore, Horseheads, NY
WA2PEK, Nona F. Pearson, Bridgeport, NY
W2QXB, Edward J. Reittinger, Whitesboro, NY
W2SAW, Addison N. Ringler, Webster, NY
N2XJ, Carl A. Felt, Chatham, NJ
KB3AHW, John T. Wenninger, Ellicott City, MD
K3BWZ, William J. Ludes, Havertown, PA
WA3DRK, Morton A. Friedman, Harrisburg, PA
N3EBI, Bruce A. Meadowcroft, Murrysville, PA
K3HV, Joseph P. Schlagenhaft, Silver Spring, MD
W3JEI, Henry S. Hatton, Catonsville, MD
N3NJB, Richard N. Bordner, Steelton, PA
W3SOO, Thomas J. Doak, Norristown, PA
K3SYC, Charles E. Bickelman, Lansdale, PA
WA3ZMY, E. H. Irwin, Hyattsville, MD
KJ4AL, Arthur L. Tuttle, Ft Lauderdale, FL
K4BGN, Clark L. Rogers, North Charleston, SC
WB4BPH, James E. Ditto, Memphis, TN
K4BWY, Arthur L. Ridgeway, Lynchburg, VA
KP4CKY, Agustin Santana, Carolina, PR
K4DKC, James M. Cubbage, Hampton, VA
W4DLL, Harry A. Cole, Clearwater, FL
W4DQT, W. R. Plage, Atlanta, GA
KD4FLT, George P. Peed, Fort Pierce, FL
W4GC, Eugene W. Klein, Naples, FL
K4GEL, Edward H. Lockhart, Sterling, VA
K4IDU, R. D. Smith, Maitland, FL
KP4IX, Hermenegil A. Irizarry, Utuado, PR
W4LEN, Lewis C. Garrett, Durham, NC
WB4OCV, Allen Bubley, Sunrise, FL
*W4ORH, Lawrence G. Wilker, Citrus Springs, FL
*K4RHD, William R. Hite, Steinhatchee, FL
K4SQI, William M. Reigner, Riverview, FL
KF4TMF, H. D. Rayburn, Walterboro, SC
WA4TVX, Hope Hale, Cedar Bluff, AL
W4VNS, Ed Bixler, Melvindale, MI
W5ACZ, Wilburn Bruce, Richmond, TX
KA5AND, James D. Carter, Belton, TX
WJ5D, Herbert Viegas, Arlington, TX
KD5EFE, John W. Black, San Rafael, NM
W5GMT, Wyley J. Barr, Corpus Christi, TX
W5HJM, Harry J. Marx, Rio Rancho, NM
W5IB, S. R. Horn, San Antonio, TX
WB5KHO, Joseph R. Bravot, Siletz, OR
KB5QGV, John R. Key, Oglesby, TX
WA5RIX, Allison C. Tucker, Dallas, TX
KC5TKA, Patrick M. Collinsworth, Duncan, OK
W5TTN, Francis N. Kasal, Dallas, TX
WB5UBK, Hardy T. Keller, Eudora, AR
W5YSJ, Jennie P. Lathrop, Albuquerque, NM
K6AJN, Joseph P. Reilly, Lancaster, CA
K6BIX, Earl B. Ludwick, Newport Beach, CA
K6CWN, Nick R. Bruno, Novato, CA
WB6EKI, Clinton A. Pamatat, North Hollywood, CA
WB6JNB, George H. Griffin, San Diego, CA
WB6KYM, Otho E. Jarman, Barstow, CA
KA6MLD, Donald M. MacQueen, Barstow, CA
KB6MOL, Arthur D. Schaper, Yermo, CA
*KH6NFN, Leonard H. Young, Kailua, HI
K6OSY, Bernard W. Muecke, Pomona, CA
KC6WLT, Sandra A. Eason, Barstow, CA
KC7ADY, Archie S. Hayes, Sun City West, AZ
N7CPA, Thomas A. Rickert, Newberg, OR
N7CQ, Robert E. Dillon, Phoenix, AZ
W7CWN, Donald J. Lotz, Seattle, WA
W7FRJ, William E. Wright, Salt Lake City, UT
WT7G, Gilbert W. Brown, Mesa, AZ
WA7JID, Leonard E. Graf, Kent, WA
W7KOX, Charles R. Cook, Grants Pass, OR
WA7RXW, Phil Veek, Astoria, OR
KV7X, Jay L. Sturdivant, Bellingham, WA
KC8AGO, Kathleen C. Sempert, Allegan, MI
W8DWT, Carl J. Yeager, Dayton, OH
N8DXX, Thomas E. Lewis, Curtice, OH
W8IEU, Richard C. Grant, Columbus, OH
N8KMP, Robert W. Bates, Brunswick, OH
KE8LL, Willard E. Dougal, Van Wert, OH
W8NMY, Roland E. Herbert, North Olmsted, OH
WA8PFW, James H. Schuder, Trotwood, OH
W8QEF, Verna L. Pierce, Delaware, OH
WA8RYQ, Ralph E. Laughlin, Gnadenhutten, OH
W8VOI, Vaughn W. Rice, Bridgeport, WV
W8WZK, Donald C. Foreman, Columbus, OH
KK8Y, Louis S. Horvath, South Euclid, OH
N9BAB, John S. Mills, Port Richey, FL
W9CUZ, Walter L. Reid, Oshkosh, WI
W9ESU, Robert C. Eddy, Rolling Prairie, IN
KB9HFK, Harold T. Johnson, Mitchell, IN
*W9JOO, Terry A. Long, Roann, IN
*W9JR, Ralph G. Alley, Pine Level, NC
W9PWM, Richard V. Shrader, Moline, IL
N9SOK, Allan H. Utter, River Grove, IL
K9UFK, Robert C. Anderson, Berwyn, IL
KC9VN, Louis W. Horvath, Mishawaka, IN
**W9WKC, Edward F. Trego, Hoopeston, IL
W9ZNX, Frederick L. Johnson, Oshkosh, WI
K0AAA, Cornie C. Miller, Leawood, KS
*WA0CGS, Irving W. Cook, El Dorado, KS
N0CHT, Paul H. Brotherton, Edgerton, KS
KB0DOL, Sam Zito, Chesterfield, MO
W0FEE, Russell W. Taylor, Goodland, KS
KC0GFN, James W. Wilson, Olathe, KS
W0HRN, Lewis W. Morris, Linn Grove, IA
K0HWY, Gordon L. "Tex" Beneke, Costa Mesa, CA
KA0LGN, John B. Beck, Oneill, NE
K0UBP, Dale R. Westgate, Albert Lea, MN
PY3EM, Erico M. Filho, Porto Alegre, Brazil
VE3HAR, Thomas Toth, Windsor, ON, Canada
VE3HCA, Edward C. Waddington, Oxford Mills, ON, Canada
VK6RU, J. E. Rumble, City Beach, Australia

*Life Member, ARRL
**Charter Life Member
‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

Kathy Capodicasa, N1GZO ♦ Silent Key Administrator

NEW PRODUCTS

K1 TWO BAND QRP TRANSCEIVER FROM ELECRAFT

◊ Elecraft has followed its popular K2 with a companion QRP transceiver kit, the K1. The new radio runs up to 5 W of CW on two user-specified bands.

The K1 is as small as most traditional QRP monobanders—the enclosure measures only 2.2×5.2×5.6 inches—but still includes some of the more advanced features provided on the K2.

The transceiver's front panel has an LCD window that displays the frequency, output power, signal strength, supply voltage, keyer speed and other information. Operating features include pushbutton band selection, RIT

and XIT, 8-50 WPM internal keying with message memories and auto-repeat, and three crystal filter bandwidths.

The unit can be ordered with your choice of any two of the following bands: 40, 30, 20 and 15 meters. Elecraft expects the combination of 40 and 20 meters to be the most popular, as these bands offer the opportunity for day or nighttime operation and worldwide DX and are also well suited for Field Day and general QRP use.

The K1 uses only traditional through-hole parts, making it a good project for first time kit builders. Point-to-point wiring has been kept to an absolute minimum. The only test equipment needed for final testing and setup is a digital voltmeter.

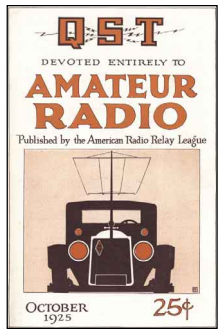
Price, $269. Options include a noise blanker ($29) and a three-point universal mounting bracket ($35) which permits angling the unit upward for either desktop or field use. A low-cost, internal automatic antenna tuner option is also planned.

For more information contact Elecraft LLC, PO Box 69, Aptos, CA 95001; tel 831-662-8345; **sales@elecraft.com**; **http://www.elecraft.com**. QST

Next New Product

75, 50 AND 25 YEARS AGO

October 1925



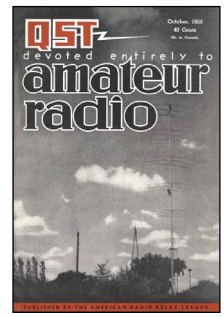
◊ The cover shows a stylized drawing of a car with an early mobile radio setup—and an ARRL diamond on the grillwork. The editorial discusses the changing face of Amateur Radio, and how the League is working hard to keep up with the changing aspects of the service. K. B. Warner closes with the sentence, "All of our difficulties will straighten out some day and then we will be doubly proud of our old League."

L. M. Hull describes "A True Cascade R. F. Amplifier," telling of the latest research in superheterodyne receiver design. In the continuing investigation of how radio waves are propagated over long distances, A. Hoyt Taylor and E. O. Hulburt of the Naval Research Laboratory discuss "Wave Propagation at High Frequencies." A new A.R.R.L. plan to provide the services of an Amateur Radio station to every unit of the National Guard and Army Reserves is presented in "The Army Links up with the Amateur." "Our Third National Convention" reports on the latest "red-letter event…in amateur radio," and the wonderful social and technical aspects of the meeting. R. R. Batcher discusses the design of "Short Wave Receivers," with solid information of how to wind coils that will put the receiver on the desired frequency.

"A Novel Condenser" describes a new variable capacitor design that will result in an approximation of a straight-line frequency tuning curve!

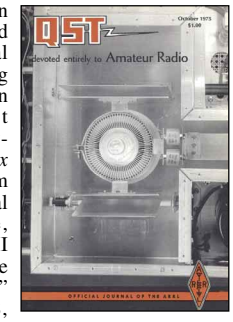
October 1950

◊ The cover photo shows W9EH's 36-element 10-meter beam—six bays of six elements each, with a tower height of 125 feet, and with the entire structure rotatable! The editorial discusses the many ways in which the ARRL is ready to help local hams and ham clubs with information packages on many subjects. The editorial also notes that the wheels on bureaucracy turn slowly—the new 21-Mc. Band will not be available in time for next year's DX contest.



"T-Day in Sandwich" tells of the erection of the gigantic 36-element 10-meter array of Leon Faber, W9EH, that is shown on the cover, and details some of its design features. On the other end of the spectrum of antenna design, Fred Walter, W8TWQ, tells of "Building a Rotatable End-Fire Array for 10 and 20." Don Mix, W1TS, describes "Shielded Construction for the Medium-Power Transmitter." J. P. Shanklin, ex-W3CJIJ and now with Collins Radio, presents the results of his investigations on "Bandwidth of Two- and Three-Element Yagi Antennas." In the continuing ARRL series of articles on amateur operating, L. A. Morrow, W1VG, discusses "QSL Cards." Gert Mosler, LU7CW, tells how to get "More Selectivity at Low Cost." Ed Tilton, W1HDQ, describes his use of "All-Metal Construction in 2-Meter Arrays" to provide lower weight and wind resistance in large antenna systems.

October 1975



◊ The cover photo shows the final-amplifier compartment of K1AGB's 6-meter kilowatt amplifier, which was featured in articles last month and this month. The editorial discusses "Licensing Delays," noting that "In recent months it hasn't been unusual for a Novice application to take *six months* to progress from the code test to the actual license." Ed Meade, K1AGB, presents Part II of "A High-Performance 50 MHz Amplifier." Robert Edlund, W5DS, tells about "The W5DS Hula-Hoop Loop," a receiving loop for 160, 80 and 40 meters. Jarda Dvoracel, OK1ATP, tells about working "160-Meter DX…with a Two-Element Beam." Also on the subject of the lower HF bands, Earl Cunningham, W5RTQ, describes "Shunt Feeding Towers for Operation on the Lower Amateur Frequencies," and Doug DeMaw, W1CER, adds his two cents' worth in "Another Method of Shunt Feeding Your Tower." Thomas Riley, WA1BYM, provides details on "A Morse Code to Alphanumeric Converter and Display," the first of a three-part article. "CMOS and the Ham," by Ron Todd, VE2AXW/WA2JAM, dispels some of the common misconceptions about CMOS devices. George Griffis, K7EIS/AFA7EIS, reports on the 50th anniversary of the partnership between the military and Amateur Radio in "MARS Milestone." An update of the FCC's restructuring proposals is given in "Happenings of the Month." Also reported in "Happenings" is the retirement of A. Prose Walker, W4BW, from his position as chief of the FCC's Amateur and Citizens Division. In addition to his good work for Amateur Radio while at the FCC, Prose continues to work for Amateur Radio, preparing for the 1979 WARC. QST

Al Brogdon, W1AB ♦ Contributing Editor

W1AW SCHEDULE

Pacific	Mtn	Cent	East	Mon	Tue	Wed	Thu	Fri
6 AM	7 AM	8 AM	9 AM		Fast Code	Slow Code	Fast Code	Slow Code
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	Visiting Operator Time (12 PM - 1 PM closed for lunch)				
1 PM	2 PM	3 PM	4 PM	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code
2 PM	3 PM	4 PM	5 PM	Code Bulletin				
3 PM	4 PM	5 PM	6 PM	Teleprinter Bulletin				
4 PM	5 PM	6 PM	7 PM	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code
5 PM	6 PM	7 PM	8 PM	Code Bulletin				
6 PM	7 PM	8 PM	9 PM	Teleprinter Bulletin				
6^{45} PM	7^{45} PM	8^{45} PM	9^{45} PM	Voice Bulletin				
7 PM	8 PM	9 PM	10 PM	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code
8 PM	9 PM	10 PM	11 PM	Code Bulletin				

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

♦ Morse code transmissions:

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 1992 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by K6YR. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

♦ Teleprinter transmissions:

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Fridays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

♦ Voice transmissions:

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

♦ Miscellanea:

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors from 10 AM until noon and from 1 PM until 3:45 PM on Monday through Friday. FCC licensed amateurs may operate the station during that time. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.

COMING CONVENTIONS

NORTH TEXAS SECTION CONVENTION

October 14, Denton

The North Texas Section Convention, sponsored by the Denton County ARA, will be held at the Denton Civic Center, 321 E McKinney St; E of center of town, corner of McKinney St and Bell Ave. Doors are open for setup at 5 AM; public 7 AM to 3 PM. Features include flea market, vendors, displays, electronics, computers, VE sessions (9-11 AM), forums and seminars (ARRL with President Jim Haynie, W5JBP; APRS; Amsat; ATV; NTS; antennas), NTX section meeting, refreshments. Talk-in on 146.92 (110.9 Hz). Admission is $5, under 13 free when accompanied by parent. Tables are $10 per first individual table, $5 for each additional. Contact William Spradling, WA5I, Box 5, Fort Worth, TX 76101-0005, 817-441-1170 or 817-613-1344; **wa5i@aol.com**; **http://lsic.net/dhf**.

PACIFIC DIVISION CONVENTION

October 20-22, Concord, CA

The Pacific Division Convention (Pacificon 2000), sponsored by the Mt Diablo ARC, will be held at the Sheraton Concord Hotel, 45 John Glenn Dr, next to Buchanan Airport. Doors are open Friday and Saturday 8 AM to 9 PM, Sunday 8 AM to 3 PM. Features include the 1st Annual Symposium on the "Future of Amateur Radio," swapmeet (Saturday, 6 AM), vendors, exhibitors, forums and seminars (ARRL, antenna, RACES, and more), QRP workshop, keynote address (Saturday, 9 AM; by special guest speaker David Sumner, K1ZZ, ARRL Executive Vice President and Secretary), banquet (Saturday, 7 PM, $33; special guest speaker Riley Hollingsworth, K4ZDH), Wouff-Hong ceremony, VE sessions. Talk-in on 147.06. Admission is $5 in advance, $10 at the door. Contact Dick Brown, KT6X, 4125 Sacramento St, Concord, CA 94521, 925-676-9048 or 925-932-6125; **paccon2000@pacbell.net**; **http://www.pacificon.org**.

September 23-24
Digital Communications Conference, Orlando, FL*
Roanoke Division, Virginia Beach, VA*

September 29-30
Microwave Update, Trevose, PA*

October 6-8
Southwestern Division, Scottsdale, AZ*

October 8
Connecticut State, Wallingford*

November 18-19
Indiana State, Fort Wayne

December 2-3
West Central Florida Section, Palmetto

***See September *QST* for details.**

AMSAT-NA SPACE SYMPOSIUM AND ANNUAL MEETING

October 27-29, Portland, ME

The AMSAT-NA Space Symposium and Annual Meeting will be held at the Holiday Inn Portland West in Portland, ME. Doors open Friday at 8:30 AM. The agenda includes Phase 5 satellite planning, satellite APRS, Phase 3D and much more. Symposium registration is $30 ($25 additional for the Saturday night banquet). To make hotel reservations, call the Portland West Holiday Inn at 207-774-5601 or 1-800-HOLIDAY. The rooms are reserved under "AMSAT" at a rate of $78 per night. Please be sure to use AMSAT's name when making reservations. For more information on the Web, go to **http://www.amsat.org/amsat/sympos00.html**, or call AMSAT at 301-589-6062.

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

Gail Iannone ♦ Convention Program Manager

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **October 1** to be listed in the **December** issue. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes or any kind of games of chance such as raffles or bingo.

(Abbreviations: *Spr* = Sponsor, *TI* = Talk-in frequency, *Adm* = Admission.)

California (Concord)—Oct 20-22, Pacific Division Convention. See "Coming Conventions."

†Connecticut (Waterford)—Oct 21; set up 9 AM; Auction starts 10 AM. *Spr:* Tri-City ARC. Senior Citizens Center, Waterford Municipal Complex, Rte 85; S of Exit 77 off I-395 or N of Exit 82 off I-95. Auction (bring your items to be auctioned), handicapped accessible, refreshments. *TI:* 146.97. *Adm:* Free. Austin Wolfe, AA1SV, 860-443-2459; **aa1sv@downcity.net**.

†Florida (Jacksonville)—Oct 28; set up Friday 3-9 PM; public Saturday 9 AM to 6 PM. *Spr:* Greater Jacksonville Hamfest Assn. Morocco Shrine Auditorium, 3800 St John's Bluff Rd, S of Beach Blvd (US 90), just N of The University of North Florida Campus; I-95 S to JTB (John T Butler), turn left, go approximately 3 miles to St John's Bluff Exit, turn left, go 4 miles to Auditorium on left. Major commercial exhibitors (Richard Smythe, KF4PBL, 904-739-9713; **rsmythe2@bellsouth.net**); dealers; swap tables (Bill Lenoir, KE4HQG, 904-268-9925; **ke4hqg@aol.com**); computer hardware, software, and accessories; tailgating ($10 per space, Gordon Mason, WB4JQZ, 904-269-8714; **gdmascop@aol.com**); forums; DX award checking; VHF/UHF award checking; VE sessions; free parking; refreshments. *TI:* 146.76, 146.88. *Adm:* advance $5, door $6. Tables: $25, booth $100. Deborah Lusk, KG4ADZ, 4473 Hudnall Rd, Jacksonville, FL 32207, 904-739-9713, **rsmythe2@bellsouth.net**; **http://www.se.mediaone.net/~lrich/JAXHAMFEST.html**.

†Florida (Palm Beach Gardens)—Oct 21, 8 AM to 4 PM. *Spr:* Palm Beach Repeater Assn. Amara Shrine Temple, 3650 RCA Blvd; take FL Turnpike to Exit 109 or I-95 to Exit 57, go E on PGA Blvd to Alt A1A, turn right onto Alt A1A to RCA Blvd, turn left onto RCA Blvd, hamfest is on right 2/10 mile. Tailgating ($10 per space). *TI:* 147.165. *Adm:* advance $5, door $6. Tables: $20. Ken Summerell, KD4CTG, 5136 El Claro Cir, West Palm Beach, FL 33415-2768, 561-640-9447; **kd4ctg@freewwweb.com**.

†Florida (Sorrento)—Nov 4, 8 AM to 4 PM. *Spr:* Lake ARA. East Lake Chamber of Commerce Building, 31336 Hwy 437; from Hwy 441 in Mt Dora, go E on Hwy 46 to Sorrento, at stop light (Hwy 437) turn right and go S about 1 city block to Bldg. Inside vendors, outside tailgating ($7), VE sessions. *TI:* 147.255. *Adm:* $5. Tables: $10. John Gable, W8KCE, 11146 Springdale Ave, Leesburg, FL 34788, 352-394-2723; **w8kce@aol.com**.

†Florida (Tampa)—Oct 14, 9 AM to 4 PM. *Spr:* Egypt Shrine Temple Radio Assn. Egypt Shrine Temple Complex, 4050 Dana Shores Dr, W side of Tampa International Airport; FL 60 to Eisenhower Blvd to George Rd, turn left and go to 1st stop sign, turn right to Dana Shores Dr to Complex. Inside air-conditioned flea market, tailgating ($5 plus admission), forums, DXCC card checking, VE sessions. *TI:* 146.94. *Adm:* advance $5, door $6. Tables: $15. Jay Strom, K9BSL, 233 34th Ave N, St Petersburg, FL 33704-2241, 727-822-9107; **k9bsl@juno.com**.

†Florida (Umatilla)—Oct 28-29; Saturday 8 AM

†ARRL Hamfest

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to 5 PM, Sunday 10 AM to 4 PM. *Spr:* Lake ARA. Olde Mill Stream RV Resort, 1000 N Central Ave, on Hwy 19, on N end of town across from Miller Supermarket. Hamfest/Computer Show, inside vendors, outside tailgating ($7), VE sessions (10 AM, walk-ins only), RV lots (40' x 60', $18 per night, with utilities). *TI:* 147.255. *Adm:* $5. Tables: $10 (includes 1 admission). Chuck Crittenden, KE4XM, Box 615, Altoona, FL 32702, 352-669-2075; **capias@gate.net**.

Florida (Waldo)—Oct 13-14. John Bradley, KU4AY, 904-782-1185.

†Georgia (Augusta)—Oct 14; set up Friday 6-8 PM, Saturday 6-9 AM; public 9 AM to 3 PM. *Spr:* ARC of Augusta. Westside High School, 1002 Patriots Way; just 1 city block off I-20 (Exit 199). Hamfest/Computer Show, new and used equipment dealers, tailgating, ARRL forum, VE sessions (registration 9:30 AM). *TI:* 145.49. *Adm:* $5. Tables: $10 (plus admission). Terry Brown, KE4MHN, 4749 Tinley Rd, Hephzibah, GA 30815, 706-796-7635; **ke4mhn@bellsouth.net**.

†Georgia (Lawrenceville)—Nov 4-5; Saturday 9 AM to 5 PM, Sunday 9 AM to 3 PM. *Spr:* Alford Memorial RC. Gwinnett County Fairgrounds, 2405 Sugarloaf Parkway; I-85 to Hwy 316 E to Sugarloaf Parkway SE. Flea market, major manufacturers, exhibitors, forums, VE sessions. *TI:* 145.45, 146.76. *Adm:* advance $6, door $8. Tables: $20 (flea market), $105 (exhibitors). Randy Bassett, KR4NQ, Box 1282, Stone Mountain, GA 30086, 770-410-3989, **kr4nq@bigfoot.com**; **http://totr.radio.org**.

†Illinois (Chicago/Oakbrook Terr)—Oct 8; set up 7 AM; public 8 AM to 1 PM. *Spr:* Chicago ARC. Entrance at Park View Dr, N of Cermak Rd (22nd St), 1 block W of Rte 83. Vendors, free parking. *Adm:* advance $4, door $5. Tables: free space (bring your own tables). George Sopocko, WA9JEZ, c/o CARC, Box 410535, Chicago, IL 60641-0535, 773-545-3622 (10 AM to 1:30 PM); or Dean, 708-331-7764 (morning or evening).

†Illinois (Decatur)—Oct 1, 7 AM to noon. *Spr:* Cenois ARC. Rock Springs Conservation Area, 3939 Nearing Ln; SW corner of Decatur, off Wyckles & Rock Springs Rd. Indoor/outdoor flea market, VE sessions. *TI:* 146.73, 442.25 (103.5 Hz). *Adm:* $5, under 16 free. Tables: indoors $1 per foot (free setup outdoors). Spencer Carter, N9LVW, Box 245, Blue Mound, IL 62513, 217-692-2460, **n9lvw@msn.com**; **http://members.tripod.com/btdad/hamfest_y2k.html**.

†Illinois (Godfrey)—Oct 21, 8 AM. *Spr:* Lewis and Clark RC. Lewis and Clark Community College, River Bend Arena, 5800 Godfrey Rd; on US Rte 67, 25 miles N of downtown St Louis, MO and 4 miles N of Alton, IL. Indoor flea market, commercial vendors, VE sessions, handicapped accessible, free paved parking, refreshments. *TI:* 145.23. *Adm:* advance $5 (for 3 tickets), door $3 each. Tables: $10 (6-ft, electricity available if requested). Chris Holland, N9WHH, 618-254-9465, **n9whh@ezl.com**; or Larry Roberts, W9MXC, 618-466-0041, **lhrob@home.com**.

†Iowa (Davenport)—Nov 5, 8 AM to 2 PM. *Spr:* Davenport RAC. Mt Joy Airport National Guard Hanger; 1/2 mile N of I-80 and 1/2 mile W of Hwy 61. *TI:* 146.88, 146.64. *Adm:* advance $5 (double stub), door $6. Tables: $12 (bring your own chairs). Dave Mayfield, W9WRL, 1819 7th St, Moline, IL 61265, 309-762-6010, **hamfest@gwltd.com**; **http://www.gwltd.com/hamfest**.

Iowa (Des Moines)—Oct 29. Rod Ivers, KI0BW, 515-278-9945.

†Louisiana (Lake Charles)—Oct 21, 7 AM to 4 PM. *Spr:* Lake Charles Southwest Louisiana Amateur Repeater Club. Habibi Shrine Temple, 2928 Pack Rd; N on Hwy 171, 3 miles from I-10, Exit 33. VE sessions, camping sites with hookups ($15 per night). *TI:* 146.73. *Adm:* Free. Tables: $15 ($5 additional for electricity). Joe Czejkowski, WE5V, 1616 Cherry St, Lake Charles, LA 70611, 337-855-9202; **joeczejk@juno.com**.

Maine (Ellsworth)—Oct 14. Phil Duggan, N1EP, 207-546-7028. (Symposium)

†Maryland (Westminster)—Oct 22; set up 6 AM; public 8 AM to 2 PM. *Spr:* Carroll County ARC. Carroll County Agricultural Center; take MD 32 to Smith Rd, turn onto Smith Rd, Center is at the end of Smith Rd. Tailgating, vendors, VE sessions, refreshments. *TI:* 145.41. *Adm:* $5. Tables: $12. John Hoge, W3JJH, Box 2211, Westminster, MD 21158, 410-857-2893, **w3jjh@arrl.net**; **http://www.qis.net/~k3pzn**.

Massachusetts (Cambridge)—Oct 15. Nick Altenbernd, KA1MQX, 617-253-3776.

†Massachusetts (Framingham)—Nov 5; set up 7:30 AM; public 9 AM to 1 PM. *Spr:* Framingham ARA. Framingham High School; Mass Pike to Exit 13, Rte 30 W to Rte 126 N, 1.3 miles to "A" St, school on left. Flea market, dealers, radio equipment, computers, commercial vendors, ARRL info, VE sessions (Ed Weiss, W1NXC, 508-881-2301), refreshments. *TI:* 147.15. *Adm:* $3. Tables: advance $10, door $14. Beverly Lees, N1LOO, c/o FARA, Box 3005, Framingham, MA 01705; 508-626-2012.

†Michigan (Kalamazoo)—Oct 15; set up 6 AM; public 8 AM to 3 PM. *Sprs:* Kalamazoo ARC and SW Michigan AR Team. Hazel Grey Bldg at Kalamazoo County Fairgrounds, 2900 Lake St; I-94 to Sprinkle Rd, N to Lake St, W to Fairgrounds. Hamfest/Computer Show, trunk sales ($5 per space), VE sessions (George, **k8gar@voyager.net**), campsites with electricity and water, free parking, refreshments. *TI:* 147.04. *Adm:* advance $3, door $4. Tables: $1.50 per foot (4 ft minimum); electrical hookup $5. Charlie Burgstahler, K8BLO, 6658 Carlisle, Kalamazoo, MI 49001, 616-349-4041; **charlieb@net-link.net**; **http://www.qsl.net/k8blo/hamfest.htm**.

†Michigan (St Joseph/Benton Harbor)—Nov 5, 8 AM to noon. *Spr:* Blossomland ARA. Playland Hall, 1050 E Nickerson Ave; take I-94 to Exit 28, then N 1/2 mile on US31/M139 to Nickerson, E on Nickerson, 1/4 mile to Playland Hall on right. Vintage Radio exhibit. *TI:* 146.82. *Adm:* advance $3, door $4. Tables: advance $4, door $5. Duane Durflinger, KX8D, 1051 Main St, St Joseph, MI 49085, 616-982-0404, **comdac@comdac.com**; **http://www.comdac.com/bara**.

†Michigan (Warren)—Oct 22. *Spr:* Utica Shelby Emergency Communications Assn. Italian Cultural Center, 28111 Imperial Dr; I-696 to Exit 24 (Hoover), N on Hoover to 12 Mile Rd, E on Hoover past hospital to Imperial Dr, S 1 block on Imperial Dr. Seminars (antennas, packet radio, APRS, GPS), left foot CW contest, VE sessions (9 AM to noon), refreshments. *TI:* 147.18 (100 Hz). *Adm:* $5. Tables: $15. Dave Cunningham, KC8IAQ, 35618 Rutherford St, Clinton Twp, MI 48035, 810-263-0227, **kc8iaq@att.net**; **http://members.home.net/dougk/useca.htm**.

†Minnesota (St Paul)—Oct 28, 8 AM to 3 PM. *Spr:* Twin City FM Club. St Paul River Center, Kellogg and W 7th St; Marion St/Kellogg Blvd Exit off I-94. Hamfest/Computer Expo, flea market, vendors, seminars, VE sessions. *TI:* 146.76. *Adm:* advance $6, door $8. Tables: $20. Amanda Roberts, KG0AY, 3153 263rd St W, Northfield, MN 55057, 651-460-6050 or 612-535-0637, **kg0ay@pclink.com**; **http://www.hamfestmn.org**.

Missouri (Grandview)—Oct 21. Donna Quick, KB0YJN, 816-537-7464.

†Missouri (St Louis)—Oct 28, 8 AM to 2 PM. *Sprs:* St Louis ARC and Gateway to Ham Radio Club. Kirkwood Community Center, 111 N Geyer Rd; I-270, N from I-44 or S from I-70 to Dougherty Ferry Rd, E to Geyer Rd, S to hamfest. Halloween Hamfest, swap tables, dealers, forums, VE sessions, refreshments. *TI:* 146.91. *Adm:* Free. Tables: commercial $15 (with electricity), noncommercial $8. Steve Welton, WB0IUN, 9847 Arv-Ellen Dr, Affton, MO 63123, 314-638-4959; **slw@surface.com**.

†Montana (Bozeman)—Oct 14, 9:30 AM to 3 PM. *Spr:* Gallatin Ham RC. Sacajewea Middle School; I-90 to Exit 205, S on 19th, left on Goldenstein Ln, left S 3rd, school 1/2 mile N on 3rd. Swap tables, seminars (noon to 2 PM), VE sessions (1:30 PM, all levels). *TI:* 146.88, 447.7, 146.52. *Adm:* $2. Tables: $10. Don Wilson, KC7EWZ, 418 S Black, Bozeman, MT 59715, 406-586-6659; **nandon@mcn.net**.

†New Jersey (Leonardo)—Oct 14; set up 6 AM; public 8 AM. *Sprs:* Garden State ARA and Middletown Township OEM. Croydon Hall; from N take Garden State Parkway S to Exit 117, follow Rte 36 E approximately 8.3 miles, just past Academy Bus, make right at Leonard Ave/Leonardo State Marina Jug Handle, right onto Leonard Ave, follow signs into Park. Indoor flea market, tailgating, VE sessions (registration 10 AM). *TI:* 145.485. *Adm:* advance $5, door $6 (nonham spouses and under 12 free). Tables: $10 (plus admission), additional spaces $8. Mario Sellitti, N2PVP, Box 286, Keansburg, NJ 07734, 732-787-7184, **n2pvp@arrl.net**; **http://www.monmouth.com/~gsara**.

†New Mexico (Deming)—Sep 23, 8 AM to noon. *Spr:* Deming ARC. Old K-Mart Parking Lot, 2320 W Pine; Exit 85 off I-10, Pine St W for 2 miles, follow signs. Tailgate only ($2.50 per space), free Friday night camping, free parking, free coffee and donuts. *TI:* 146.82. *Adm:* Free. Carol Brown, N5CMB, 713 Spruce, No 161, Deming, NM 88030, 505-544-4766, **n5cmb@arrl.net**; **http://www.zianet.com/darc**.

†New Mexico (Socorro)—Nov 4, 8 AM to 4 PM. *Sprs:* Socorro ARA, Tech ARA, and the City of Socorro. NM Tech Gymnasium, 801 Leroy St; I-25, Exit 150. Swapfest, dealers, forums (at the Workman Center; HF operations, satellite, DXing, Morse code, ARRL, and more), demos, T-hunts, VE sessions (Kalman, AJ5B, 505-835-5225; **oravecz@nmt.edu**), refreshments. *TI:* 146.68 (100 Hz). *Adm:* Free. Tables: $5. Al Braun, AC5BX, 720 California St, Socorro, NM 87801, 505-835-3370 or 505-835-3456, **ac5bx@juno.com**; **http://www.ees.nmt.edu/sara/**.

†New York (Farmingdale)—Oct 22. *Spr:* Radio Central ARC. Polytechnic University Gym, 901 Rte 110; Long Island Expressway, Exit 49 S, go 3 miles S on Rte 110, on E side. Indoor/outdoor flea market, major manufacturers, vendors. *TI:* 145.15 (136.5 Hz). *Adm:* $8. Tables: $20 (6-ft, indoor); outdoor space $10. Neil Heft, KC2KY, 27 Midday Dr, Centereach, NY 11720, 631-737-0019, **nheft@attglobal.net**; **http://www.rcarc.org/expo.htm**.

†New York (Horseheads)—Sep 30, 6 AM to 3 PM. *Spr:* ARA of the Southern Tier. Chemung County Fairgrounds; on Rte 17, at the 2nd light turn S on Grand Central Ave, proceed approximately 1/2 mile to Fairgrounds. Hamfest/Computerfest, flea market, dealer displays of new equipment, VE sessions (9 AM, walk-ins; John, 607-565-4020), camping, free parking, refreshments. *TI:* 146.7, 147.36. *Adm:* advance $4, door $5. Tables: $10 to $15 (8-ft). Randy Viele, N2SYT, Box 44, Elmira, NY 14902-0044, 607-625-5893 (days) or 607-738-6857 (eves), **n2syt@arast.org**; **http://www.arast.org**.

†New York (Lindenhurst)—Oct 29; set up 7 AM; public 9 AM to 2 PM. *Spr:* Great South Bay ARC. Knights of Columbus Hall, 400 S Broadway. Flea market, vendors, computers and accessories, software, radio equipment, electronic components, books and technical manuals, VE sessions (noon, Babylon Town Hall), free tune-up clinic, ARRL information, refreshments. *TI:* 146.685 (136.5 Hz). *Adm:* $6. Tables: advance $15, door $20 (6-ft). Phil Lewis, N2MUN, c/o GSBARC, Box 1356, W Babylon, NY 11704, 631-226-0698, **info@gsbarc.org**; **http://www.gsbarc.org**.

†New York (Queens)—Oct 15; set up 7:30 AM; public 9 AM to 3 PM. *Spr:* Hall of Science ARC, NY Hall of Science Museum Parking Lot (Flushing Meadow Corona Park), 47-01 111th St. Electronics and computer equipment, tailgating ($10 per space), VHF tune-up clinic, VE sessions (10 AM, all classes; Lenny Menna, W2LJM, 718-323-3464), free parking, refreshments. *TI:* 444.2 (136.5 Hz), 146.52. *Adm:* $5. Stephen Greenbaum, WB2KDG, 85-10 34th Ave, Jackson Heights, NY 11372, 718-898-5599 (eves only), **wb2kdg@bigfoot.com**; **http://www.qsl.net/hosarc**.

North Dakota (Grand Forks)—Oct 14. Steve DuFault, KB0QQE, 218-281-7875.

†Ohio (Ashland)—Oct 15, 8 AM to 2 PM. *Spr:*

Ashland Area ARC. Ashland County Fairgrounds, 2042 Claremont Ave; I-71, Exit 186. *TI:* 147.105. *Adm:* advance $4, door $5. Tables: advance $9, door $12. David Fike, N8UCA, 979 Twp Rd 1654, RFD 6, Ashland, OH 44805, 419-289-1082; **aaarc@neo.rr.com**.

†Ohio (Canton)—Oct 29; set up 6 AM; public 8 AM to 2:30 PM. *Spr:* Massillon ARC. Stark County Fairgrounds, Wertz Ave NW; I-77 to downtown Canton, follow W Tusc or 4th St, W to Fairgrounds. All indoors, auction (10 AM, 15% commission charged on all items sold), handicapped accessible, free parking. *TI:* 147.18. *Adm:* advance $4, door $5 (under 12 free). Tables: $10 (8-ft, with free electricity). Terry Russ, N8ATZ, 3420 Briardale Circle NW, Massillon, OH 44646, 330-837-3091, **marc.hamclub@juno.com**; **http://www.qsl.net/w8np**.

†Ohio (Lima)—Oct 15; set up 6-8 AM; public 8 AM to 2 PM. *Spr:* Northwest Ohio ARC. Allen County Fairgrounds, 2750 Harding Hwy; 1/2 mile E of I-75, Exit 125-126, on State Rte 309. Hamfest/Computer and Radio Control Show. *TI:* 146.67. *Adm:* advance $4, door $5. Tables: $10 (8-ft). Greg Schwark, N8WBD, 600 Sunset Dr, Spencerville, OH 45887-1259, 419-647-6321 or 419-647-5127; **gas1950@aol.com**.

†Ohio (Marion)—Oct 29, 8 AM to 3 PM. *Spr:* Marion ARC. Marion County Fairgrounds Evers Arena. *TI:* 147.3. *Adm:* advance $4, door $5. Tables: $10. Karen Eckard, N8KE, 6583 South St Meeker, Marion, OH 43302, 740-499-3565; **meeker@gte.net**.

†Oklahoma (Altus)—Nov 4, 8 AM to 5 PM. *Spr:* Altus Area ARA. Altus Community Center, Falcon Rd; 2 blocks E of the intersection of N Main St and Falcon Rd. *TI:* 146.79. *Adm:* $5. Tables: $5. M.K. Schenkel, W5VXU, Rte 1, Box 140B, Lone Wolf, OK 73655-9756, 580-846-5578; **w5vxu@juno.com**.

Oklahoma (Enid)—Nov 4. Tom Worth, N5LWT, 580-233-8473.

†Oklahoma (Kingston)—Oct 27-28; Friday noon to 5 PM, Saturday 6 AM to 3 PM. *Spr:* Texoma Hamarama Assn. Lake Texoma Resort, Hwy 70, 5 miles E of Kingston. Flea market, commercial exhibits, dealers, tailgating ($5), technical sessions, forums (ARRL with President Jim Haynie, packet radio, MARS), screwdriver antenna assembly, VE sessions (11 AM), RV parking (800-528-0593). *TI:* 147.39 (118.4 Hz). *Adm:* advance $5, door $7. Tables: $15. Buddy Harris, K5JDU, 580-298-3105, Bud Johnson, WI5G, 972-231-4250; or Herb Sleeper, WB5PHM, 940-855-5820, **retmarine@cst.net**; **http://www.wf.net/~ka5crl/hamarama.htm**.

Oregon (Rickreall)—Oct 21. Bud Smith, WA7FJF, 503-838-0266.

†Pennsylvania (Carlisle)—Oct 29, set up Saturday 6 PM; public Sunday 8 AM to 3 PM. *Spr:* South Mountain Repeater Assn. Carlisle Fairgrounds, Gate No 3; Rte 34 and "K" St; from Rte 81, PA Exit 14, go N on Hanover St (Rte 34) through Carlisle; from PA Turnpike, Exit 16, go S on Rte 11, follow signs to Fairgrounds. Vendors, tailgating ($5 per space plus admission). *TI:* 145.43. *Adm:* $3. Tables: $10 (plus admission). Robert Carpenter, N3LKL, Box 45, Mt Holly Springs, PA 17065, 717-486-8476, **smraham@aol.com**; **http://www.qsl.net/kb3cvo**.

Pennsylvania (Lancaster County)—Oct 7. Pat Bouder, KA3FGH, 717-626-7539.

†Pennsylvania (Sellersville)—Oct 22; set up 5 AM; public 7 AM to 2 PM. *Spr:* RF Hill ARC. Sellersville Firehouse, Main St; from Montgomeryville go N on Rte 309 to Exit 152 (Telford), right at bottom of ramp, left at stop light, 1 1/2 miles to Firehouse. Vendors, VE sessions (10 AM to noon). *TI:* 145.31. *Adm:* $5. Tables: $12 each (indoor, 5 or more $10 each); $6 (outdoor 9-ft frontage space, bring your own table). Linda Erdman, KA3TJZ, 2220 Hill Rd, Perkiomenville, PA 18074, 215-679-5764; **http://www.rfhill.ampr.org**.

†Pennsylvania (Sunbury)—Oct 21; set up 7 AM; public 8 AM to 3 PM. *Spr:* Susquehanna Valley ARC. Sunbury Armory (PA National Guard), Catawissa Ave; from I-80 exit Rte 15 S or 147 S to Sunbury, follow Front St (along river wall) to Reagan St (light at Turkey Hill Minit Market), follow Reagan (.7 mile to stop sign top of hill) to Catawissa Ave, turn left on Catawissa Ave, Armory is .4 mile on left. Computer/Electronics/AR Show, new and used equipment, vendors (first-come, first-served), tailgating ($5 per space), handicapped accessible, refreshments. *TI:* 147.27, 146.52. *Adm:* $4, under 12 free. Tables: $15. David Welker, K3SI, 229 Ridge Ave, Sunbury, PA 17801, 570-286-0787, **k3si@hotmail.com**; **http://avs.epix.net/svarc/**.

Quebec (Montreal/Longueuil)—Oct 28. Micheline Simard, VE2XW, 450-446-0477.

†South Carolina (Rock Hill)—Oct 7, 9 AM to 3 PM. *Spr:* York County ARS. Charlotte Knights Stadium; I-77, Exit 88, E on Gold Hill Rd, follow signs to Knights Stadium. Flea market, VE sessions (10 AM), free parking. *TI:* 147.03. *Adm:* advance $5, door $6. Tables: Bring your own. Bob Good, K4BG, 4485 Harbor Inn Rd, Rock Hill, SC 29732, 803-327-9855; **k4bg@cetlink.net**.

†South Carolina (Sumter)—Oct 28, 8 AM. *Spr:* Sumter ARA. Sumter Exhibition Center, 700 W Liberty; I-95 to Rte 378 to Alice Dr to Liberty. Outdoor flea market, forums, VE sessions (8:30 AM, no preregistration). *TI:* 147.015 (156.7 Hz). *Adm:* advance $5, door $6. Tables: advance $5, door $6. Tom D'Anella, KC4ZTC, 5515 Oakcrest Rd, Sumter, SC 29154, 803-499-4806, **dstoy@sumter.net**; **http://www.geocities.com/capecanaveral/2695/sara.htm**.

†Tennessee (Chattanooga/East Ridge)—Oct 28, 8 AM to 4 PM. *Spr:* Chattanooga ARC. Camp Jordan Arena, Fred Pruitt Parkway; I-75, Exit 1, go 1 block E on Ringgold Rd, left on Fred Pruitt Parkway, stay left for 1/4 mile, arena on right. Indoor and outdoor flea market (Randy Walker, KE4AQH, 423-875-5417; **ke4aqh@aol.com**), dealers (Shelia Cannon, KE4GXN, 423-877-9837, **ke4gxn@aol.com**), overnight camping with security, VE sessions, handicapped parking, free parking. *TI:* 146.79, 444.1. *Adm:* $5. Tables: $20 (flea market), $50 (dealers). Barbara Gregory, WA4RMC, 423-629-7911 (work) or 423-892-8889 (home); **wa4rmc@aol.com**; **http://www.qsl.net/w4am/carc_index.html**.

†Tennessee (Gray)—Oct 21, 8 AM to 4 PM. *Sprs:* Kingsport, Bristol, and Johnson City RCs. Appalachian Fairgrounds, Exit 57 off I-81 to I-181 S, take Exit 42 off I-181 to Fairgrounds. Large drive-in indoor and outdoor flea market, RV hookups. *TI:* 146.97, 146.79. *Adm:* $5. Wendell Messimer, K4ZHK, Box 3682 CRS, Johnson City, TN 37601, 423-928-4407; **messimerw@ten-nash.ten.k12.tn.us**.

Tennessee (Jackson)—Sep 23. Lee Towater, KF4NZV, 901-427-2808.

†Tennessee (Sevierville)—Oct 7, 9 AM to 4 PM. *Spr:* Ten-Tec. Ten-Tec Factory, 1185 Dolly Parton Parkway; take Hwy 411 N from downtown Sevierville, 2 miles E of Sevierville on Rte 411 N, across the street from Sevier County High School. New and used equipment, free tailgating. *Adm:* Free. Scott Robbins, W4PA, 1185 Dolly Parton Parkway, Sevierville, TN 37862, 865-453-7172, **sales@tentec.com**; **http://www.tentec.com/hamfest.htm**.

Texas (Belton)—Oct 7. Mike LeFan, WA5EQQ, 254-773-3590.

Texas (Denton)—Oct 14, North Texas Section Convention. See "Coming Conventions."

†Texas (El Paso)—Oct 28-29; Saturday 8 AM to 5 PM, Sunday 8 AM to 2 PM. *Spr:* International Hamfiesta Committee. YISD Cultural Arts Center; exit IH-10 at Exit 28A, go N on McRae 1 block to Sims, turn left, 1/2 block to YISD on left. Forums (ARRL, packet, RACES, antennas, 80 meter shootout), VE sessions. *TI:* 146.88. *Adm:* Free. Clay Emert, K5TRW, 109 Pasodale Rd, El Paso, TX 79907; 915-859-5502.

†Texas (Odessa)—Nov 4-5; 8 AM to 5 PM. *Spr:* West Texas ARC. Ector County Coliseum in building "D", 42nd and Andrew's Hwy (US 385). Flea market, vendors, new and used ham and computer equipment, VE sessions (Saturday, 1 PM), free parking. *TI:* 145.47, 444.425. *Adm:* $3, under 13 free. Tables: $10 (8-ft, includes 1 admission per vendor; Mike Glenn, K5EG, 915-362-1428; **k5eg@caprok.net**). Craig Martindale, W5BU, 915-366-4521, **w5bu@hotmail.com**; **http://radioranch@qth.com**.

†Virginia (Stafford)—Oct 14, 8 AM to 3 PM. *Spr:* Stafford ARA. Mt Ararat Baptist Church Parking Lot, 65 Toluca Rd; I-95 to State Rte 610 (Exit 143B, Garrisonville Rd), head W to State Rte 657, go approximately 4 miles, turn N on Toluca Rd. Swap and Shop ($5 per space, $4 if reserved prior to Oct 1), free demo of Stafford County's Emergency Communications Bus, free radio equipment testing, VE sessions, refreshments. *TI:* 145.27. *Adm:* Free. Richard Diddams, KF6UTH, c/o SARA, Box 1568, Stafford, VA 22554-1568, 540-657-8322, **rldiddams@earthlink.net**; **http://www.n4nw.org**.

†Washington (Bremerton)—Oct 14, 9 AM to 3 PM. *Spr:* North Kitsap ARC. Kitsap County Fairgrounds President's Hall, NW corner of Fairgrounds Rd at Nels Nelson Rd. New and used equipment, ARRL forum, Kitsap County Emergency Communications Van, antique radio stations in operation, VE sessions. *TI:* 146.62 (103.5 Hz), 146.52. *Adm:* $5, under 12 free. Tables: advance $15 (by Sep 30), door $20; commercial spaces $30; electrical connection $2 per table. Marcie Stilwell, KC7DAT, Box 2268, Silverdale, WA 98383-2268, 360-697-2797, **nkarc@yahoo.com**; **http://www.silverlink.net/nkarc**.

†Washington (Chehalis)—Oct 1. *Spr:* Chehalis Valley ARS. Lewis County Fairgrounds, 2555 N National; I-5, Exit 79, from the N turn left or from the S turn right onto Chamber Way, left onto National Ave, National becomes Kresky, proceed on Kresky to Chamber Way, turn left on Chamber Way. VE sessions. *TI:* 147.06. *Adm:* $3. Bill Harwell, KC7QHJ, 362 SW Chehalis Ave, Chehalis, WA 98532, 360-748-8086, **kc7qhj@arrl.net**; **http://www.cvars.org/**.

†Wisconsin (Appleton/Kaukauna)—Nov 5; set up 6 AM; public 8 AM. *Spr:* Fox Cities ARC. Starlite Club, W 2091 Cty JJ; Hwy 41 to Hwy 55 N to Cty JJ (SW corner of Cty Rd JJ and Hwy 55). Swapmeet, electronics, computers, scientific and test equipment, commercial vendors, ARRL info, VE sessions (registration 8-9 AM, no walk-ins after 9 AM), free parking, refreshments. *TI:* 146.52. *Adm:* advance $4, door $6. Tables: $8 (8-ft). John Ensley, N9RJZ, 335 W Prospect Ave, Appleton, WI 54911, 920-830-3194, **n9rjz@arrl.net**; **http://www.w9zl.ampr.org**.

Attention All Hamfest Committees!

Get official ARRL sanction for your event and receive special benefits such as free prizes, handouts, and other support.

It's easy to become sanctioned. Contact the Convention and Hamfest Branch at ARRL Headquarters, 225 Main St, Newington, CT 06111. Or send e-mail to **giannone@arrl.org**. QST

STRAYS

LOOKING FOR MOUNTAIN MOGULS

◊ From 1970-1975, a Field Day group called the Arizona Mountain Moguls met on the Mogollon Rim near Payson, Arizona. We had a reunion at our original site for Field Day 2000, but many of the original Moguls could not be located. If more can be found, we would consider doing another reunion in 2001. If you were a member of that group, please contact Brian Wood, W0DZ, at **brianmwood@msn.com**, or write to: 710 Grove Ct, Loveland, CO 80537.

SPECIAL EVENTS

Canon City, CO: Royal Gorge Amateur Radio Club, KB0TUC, 1300 to 1800Z **Oct 1**, during Coloradofest at the Royal Gorge Bridge, Colorado. 14.320 7.220 14.045. Certificate. Walton Wells, Secretary, PO Box 2044, Canon City, CO 81212.

Suffield, OH: Great Trail Council BSA, K8S, 0000Z **Oct 6** to 2400Z **Oct 8**, during the Great Trail Council BSA Camporall at Wingfoot Lake. 28.475 21.300 14.275. QSL. Ted Sarah, W8TTS, 239 Bermont Ave, Munroe Falls, OH, 44262.

East Greenwich, RI: Fidelity Amateur Radio Club, W1Y, 1400-2400Z **Oct 7**, celebrating the Yankee "Steam Up" at the New England Museum of Wireless and Steam. 7.250 14.250 28.450. Certificate. Ronald E. Drake, W1TEM, 51 Kennedy Dr, Warwick, RI 02889-2503.

Brasstown, NC: Triode Amateur Radio Club, AD4FJ, 1500 to 1700Z **Oct 7**, during the Autumn Color Celebration in Appalachia. 10.110. Certificate. Triode ARC, PO Box 1721, Andrews, NC 28901.

Brasstown, NC: Triode Amateur Radio Club, KB4YSX, 1700 to 1900Z **Oct 7**, during the Autumn Color Celebration in Appalachia. 14.280. Certificate. Triode ARC, PO Box 1721, Andrews, NC 28901.

Kingman, AZ: Hualapai Amateur Radio Club, WB6RER, 1500Z **Oct 7** to 1900Z **Oct 8**, for Andy Devine Days. 3.900 7.250 14.250 21.350. Certificates. Hualapai ARC, PO Box 4364, Kingman, AZ 86402.

Atlanta, GA: Georgia Tech Amateur Radio Club, W4AQL, 1800Z **Oct 7** to 2400Z **Oct 8**, for the 90th anniversary of the Georgia Tech Radio Club. 7.250 14.250 21.350 28.400. QSL. Georgia Tech ARC, 332705 GT Station, Atlanta, GA 30332.

Richfield, PA: Susquehanna Valley ARC, W3VPJ, 1400Z **Oct 7** to 2300Z **Oct 8**, during Bison Foliage Fest. 7.250 14.265. Certificate. Chris Snyder, NG3F, RR1 Box 92, Richfield, PA 17086.

Atlantic City, NJ: Southern Counties Amateur Radio Association, K2BR, 1400Z **Oct 9** to 0400Z **Oct 15**, operating from the Miss America Pageant. 7.250 14.250 21.325 28.325. QSL. SCARA, PO Box 121, Linwood, NJ 08221.

Rochester, NY: Harris RF Communications Amateur Radio Club, W2R & N2R, 1600Z **Oct 13** to 2000Z **Oct 15**, for the 30th anniversary of RFCARC and the 40th Anniversary of Harris RF Communications. 7.050 7.240 14.040 14.240. QSL. Harris RF Communications Amateur Radio Club (RFCARC), Attn: J. Bremer, 1680 University Ave, Rochester, NY 14610-1839.

Madison, CT: Connecticut Rivers Council, Boy Scouts of America, K2BSA/1, 1600Z **Oct 13** to 1600Z **Oct 15**, during ScoutShow 2000 at Hammonasset Beach State Park. 7.290 14.290 21.360 28.350. SASE for QSL. Larry Wolfgang, WR1B, 30 Cottage Rd, Bozrah, CT 06334.

Robbinsville, NC: Smoky Mountains Amateur Radio Team, KD4TPO, 1400 to 2000Z **Oct 14**, to commemorate the opening of the Cherohala Skyway on October 12, 1996. 7.247 14.247. QSL. SMART, PO Box 517, Robbinsville, NC 28771.

Houston, TX: Northwest Amateur Radio Society, W5NC, 1400 to 1800Z **Oct 14**, to call attention to the Saddle Up For S.I.R.E. Rideathon. 7.260 14.260 21.350. Certificate. W5NC, 9342 Golden Wood Ln, Houston, TX 77086-2414.

Stafford, VA: Stafford Amateur Radio Association, N4NW, 1200 to 2100Z **Oct 14**, operating from the SARA Hamfest. 147.270. QSL. Rich Diddams, PO Box 1568, Stafford, VA 22554-1568.

Maplewood, LA: Southwest LA Amateur Repeater Club, W5M, 1300 to 2100Z **Oct 14**, to celebrate Maplewood, one of the first planned communities in the US. 7.245 14.245 21.335. Certificate. SWLARC, PO Box 7244, Lake Charles, LA 70606.

Norwich, NY: Chenango Valley Amateur Radio Association, N2GVB, 1200Z **Oct 14** to 2359Z **Oct 15**, for the Worked Chenango County New York Award. 10-80 meters. Certificate. Tony Masi, N2GVB, 3289 State Highway 206, Bainbridge, NY 13733-3114.

Middletown, RI: Newport County Radio Club, W1SYE, 1400Z **Oct 14** to 2000Z **Oct 15**, during the 26th annual Norman Bird Sanctuary Harvest Fair. 7.240 14.260 21.350 28.360. QSL. W1SYE, PO Box 3103, Newport, RI 02840.

Hermann, MO: Zero Beaters Amateur Radio Club, K0F, 1400Z **Oct 14** to 2200Z **Oct 15**, celebrating the 30th anniversary of the Hermann Octoberfest. 7.237 14.240 21.350 28.335. Certificate. Richard L. Lionberger, 1440 S. Hwy 19, Hermann, MO 65041.

Poughkeepsie, NY: Poughkeepsie Amateur Radio Club, W2CVT, 1400-2000Z **Oct 14 and Oct 15**, celebrating the grand opening of the new visitors' center at the S.F.B. Morse Home. 7.120 14.035 21.310 28.350. Certificate. W2PTF, 3 Little Rd, Wappingers Falls, NY 12590.

Carlisle, PA: Cumberland Amateur Radio Club, K3IEC, 0000 to 2400Z **Oct 15**, commemorating the 250th anniversary of Cumberland County. 7.250 21.125 14.250. Certificate. CARC, c/o JG Binkley, N3SEC, 264 Blacksmith Rd, Camp Hill, PA 17011.

Nowhere, IL: Iowa Radiosport Society, W0FUN, 1500 to 2000Z **Oct 21**, for the "Fram-A-Stam" special event. 14.243 7.234. Certificate. Iowa Radiosport Society, PO Box 73, Denmark, IA 52624.

Alexander City, AL: Lake Martin Amateur Radio Club, K4YWE, 1300 to 2200Z **Oct 21**, celebrating Oktoberfest in Alexander City. 28.420 7.163 14.180. QSL. Steve Waters, 2034 Reeves Rd, Alexander City, AL 35010.

Nowhere, KS: Douglas County Amateur Radio Club, W0UK, 1400 to 2100Z **Oct 21**, during the Baldwin City Maple Leaf Festival. 7.244 14.244 21.365 28.365. Certificate. Kenneth Blair, KC0GL, 1711 West 19th Terrace, Lawrence, KS 66046.

Bowling Green, OH: Wood County Amateur Radio Club, W8G, 0001Z **Oct 21** to 1200Z **Oct 22**, for Senior Girl Scout Troop 818 JOTA. 147.180 General bands. Certificate. Senior Troop 818, 8656 E Kramer Rd, Bowling Green, OH 43402.

Philadelphia, PA: Marple Newtown ARC, K3G, 1400Z **Oct 21** to 0000Z **Oct 22**, to celebrate the 61st anniversary of the US Coast Guard Auxiliary. 7.232 14.332 21.332 28.332 QSL. Dan Amoroso, NM3S, 196 Dam View Dr, Media, PA 19063

Osceola, WI: Stillwater Amateur Radio Assn & Courage Center, KB0SCE, 1400Z **Oct 21** to 2300Z **Oct 22**, operating railroad mobile along St. Croix Valley in Minnesota and Wisconsin. 7.231 14.041 14.241 21.311. Certificate. Shel Mann, Club Station: KB0SCE, 1618 West Pine St, Stillwater, MN 55082.

Ringwood, NJ: N2GBJ and Coalition for Brain Injury Research, N2GBJ, 1700 to 1830Z **Oct 22**, honoring the start of Brain Injury Cure Research. 28.400. QSL. Eamon Doherty, 3 Main Dr, Boonton, NJ 07005.

Fort Wayne, IN: Franke Park Elementary School ARC, KB8TYU, 1400Z **Oct 28** to 0200Z **Oct 29**, celebrating 40 years of quality education at Franke Park. 7.263 14.270 28.455. Certificate. Franke Park School ARC, 828 Mildred Ave, Fort Wayne, IN 46808.

Lexington, MO: Wentworth Military Academy RATS, W0W, 1900 to 2300Z **Oct 28**, during WMA Homecoming 2000 In 2000 and "The Little Army-Navy Game." 7.250 14.250. Certificate. Bill Heltzel, K4WMA, 5231 Willane Rd, Glen Allen, VA 23059.

Brevard, NC: Transylvania County ARC, K4HXZ, 1800 to 2359Z **Oct. 31**, for Halloween in Transylvania County—operating from The Devil's Courthouse on the Blue Ridge Parkway. 7.195 14.295 21.365 28.335. Certificate. TCARC, PO Box 643, Brevard, NC 28712.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope with two units of First Class postage to the address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), or for a SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111) and write "Special Requests Form" in the lower left-hand corner. You can also submit your special event information on-line at **http://www.arrl.org/contests/spevform.html**. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; ie, a special event listing for **Jan** *QST* would have to be received by **Nov 1**. Submissions may be mailed to George Fremin III, K5TR, at the address shown on this page; faxed to ARRL HQ at 860-594-0259; or e-mailed to **events@arrl.org**. QST

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

VHF/UHF CENTURY CLUB AWARDS

Bill Moore, NC1L
Century Club Manager

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators (indicated in *italics*) for each band listing. The numbers preceding the call signs indicate total grid squares claimed. The numbers following the call signs indicate the claimed endorsement levels. The totals shown are for credits given from June 21 to August 2, 2000.

The VUCC application form, field sheets and complete list of VHF Awards Managers can be found on the Web at **http://www.arrl.org/awards/vucc/**. Please send an SASE if you cannot download the forms online. If you have questions relating to VUCC, send an e-mail to **vucc@arrl.org**.

50 MHz
100

1066	NQ2O
1067	9A2YC
1068	KD5BRF
1069	N3AO
1070	N3JPU
1071	WB5ZAM
1072	KC2TR
1073	WM9M
1074	K7UV
1075	N6KD
9A2YC	150
HB9RUZ	200
K1TOL	900
WA2HFI/0	275
WT3P	150
K3AX	400
W3EP	850
N3JPU	200
W5WP	200
WD5K	850
WA5KBH	150
W5TFW	125
AA5XE	350
WA7VHF	200
K7ND	250
K8TGC	350

144 MHz
100

580	WV2C
582	9A2YC
583	CT1FAK
584	CT1DNF
W0VD	275

432 MHz
50

K3AX	90

1296 MHz
25

K3AX	95

10 GHz
5

104	W5VSI

Satellite
100

K5OE	325

QST

CONTEST CORRAL

Feedback

In the **1999 ARRL 10-Meter Contest**, a file corruption error was discovered in the **K0SR** log in the Single Op, CW Only, Low Power category. Upon rescoring the entry, his totals become 809,360 points on 1509 QSOs and 134 multipliers. The change moves him from second place to **overall First Place** in the category for W/VE stations.

Also in the 1999 ARRL 10-Meter Contest, **K0PC** should be listed as Single Op, Mixed Mode instead of CW only. This moves him to **Seventh Place** in the category and now moves **WO2N** into the Single Op, CW Only, QRP category at **Tenth Place**. The operators at **PY3MHZ** included: **HC1NG, PU3AGP, PY3ACC, PY3AFS, PY3ADY, PY3BZA, PY3FOX, PY3MM, PY3PAZ,** and **PY3TMR**.

In the **2000 January VHF Sweepstakes**, the **KB5MY** multiop station should have been listed in the **SDG** section instead of LAX. The call sign of **WN9GUC** in the IL section was reported as WN9GWC.

In the **1999 ARRL 160-Meter Contest**, **K0UK** should be shown as Low Power instead of High Power in the CO section. **W1OP** should be listed as a multiop entry with an operator list of **W1IUX, W1GS, K1DT, K1JNJ** and **N1JDA**.

W1AW Qualifying Runs are 10 PM EDT Wednesday, October 4, and 4 PM EDT Thursday, October 19. The K6YR West Coast Qualifying Run will be at 9 PM PDT on Wednesday, October 11 (10-40 WPM). Check the W1AW schedule for details.

September 30-October 1

Louisiana QSO Party, sponsored by the Twin City Ham Club, 0000-2400Z Sept 30. 80 40 20 15 10 6 2 meters. Phone and CW. Single op QRP (5 W or less); low power (150 W or less); high power; mixed mode; phone only; CW only. Multi-op single transmitter, QRP, low power and high power, mixed mode only. Non-LA stations send consecutive serial number and ARRL section or "DX." LA stations send consecutive serial number and parish. Count 2 points / phone QSO and 3 points for CW QSO. Multipliers for Non-LA stations are Louisiana parishes (64 possible per band); LA stations—ARRL sections (80 possible per band). Final score is total QSO points × total multipliers. Awards. Send entry by Oct 31 to TCHC Contest Committee, PO Box 1871, West Monroe, LA 71294; **laqp@tchams.org**; **http://www.tchams.org/users/contest/laqp/**.

Texas QSO Party, sponsored by the Northwest Amateur Radio Society, 1400Z Sept 30 to 0500z Oct 1, and 1400-2000Z Oct 1. All modes and all bands except 30 17 12 meters. Categories: Single transmitter QRP; multitransmitter QRP, single op; single op assisted; multi-single; multi-multi; Texas mobile single op (includes assisted); Texas mobile; multiop; Novice/Tech; CW only and club aggregate. Stations may be worked once per band/mode. Texas mobiles may be worked once per band/mode from each county. Exchange RST and state/province/country/maritime region (Texas stations send RST and county). Multipliers: TX Stations—states, TX counties, Canadian provinces and DXCC countries (excluding USA, Canada, Alaska and Hawaii); Non-TX stations—TX stations worked (max 245). Count 2 pts/phone QSO and 3 pts/CW or digital QSO. Bonus points: Add 100 points for every ten Texas mobiles worked per band/mode. Texas mobiles add 5000 points for every five counties covered with at least five contacts per county, and add one 100 points for every ten Texas mobiles worked per band/mode. Final score is QSO points × multipliers + bonus points. Send logs (and dupe sheets if over 200 QSOs) by Oct 31, to NARS, PO Box 690342, Houston, TX 77269-0342; **K5VUU@arrl.net**; **http://www.flash.net/~nars/**.

October 7-9

California QSO Party, sponsored by the North California Contest Club, 1600Z Oct 7 until 2200Z Oct 8. Single op, multi-single, multi-multi, CA county expedition, mobile, and Novice/Tech. 160 80 40 20 15 10 6 2 meters. Send QSO number and CA county. If you're outside of California, send the QSO number and your state/province/DXCC country. Single ops are limited to 24 hours. Multi-singles have a 10-minute rule. Single ops and multi-single are limited to one transmitted signal at a time. CW QSOs must be made in CW subbands, except on 160 meters. Work stations once per band/mode, work CA stations again as they change counties. A CA station on a county line counts for 1 QSO but multiple counties. CW—1.805 and 40 kHz up; phone—1.850 3.850 7.230 14.250 21.300 28.450; Novice—10 kHz up and 28.450. Score 2 pts/QSO on phone and 3 pts/QSO on CW. Final score is QSO points × CA counties (max 58). CA stations multiply by states and VE sections (max 58). Awards. Send logs to Alan Maenchen, AD6E, 3330 Farthing Way, San Jose, CA 95132 or e-mail to **cqp@contesting.com**; **http://www.cqp.org**.

VK/ZL/Oceania Contest, phone, sponsored by the Wireless Institute of Australia, 1000Z Oct 7 until 1000Z Oct 8 (CW is 1000Z Oct 14 until 1000Z Oct 15). Single operator all band/single band, multi-operator. Send RS(T) and serial no. Work VK/ZL/Oceania stations only. Score 10 pts/QSO on 80; 5 pts/QSO on 40; 1 pt/QSO on 20; 2 pts/QSO on 15; and 3 pts/QSO on 10. Multipliers are prefixes worked per band; final score is QSO points × multipliers. Awards. **http://www.wia.org.au/federal/contests.html.** Send logs postmarked by Dec 5 to VK/ZL/OC Contest Manager, 2 Moss Court, Kingsley, West Australia, 6206 Australia; **vk6ne@upnaway.com.au**.

RSGB 21/28 MHz Contest, phone, sponsored by the RSGB, 0700Z until 1900Z Oct 8 (CW is Oct 22). Exchange RS(T) and serial number (UK stations also send three-letter county code). Work UK stations only. Count 3 pts/QSO. Final score is QSO points × county codes worked per band. Send logs to Steve Knowles, G3UFY, 77 Bensham Manor Rd, Thornton Heath, Surrey CR7 7AF, England.

YLRL YL Anniversary Contest, CW, sponsored by YLRL, 1400Z, Oct 7 to 0200Z Oct 9 (phone Oct 21-Oct 23). All licensed women operators throughout the world are invited to participate. Exchange QSO number, RS(T), and ARRL section/VE province/country. All YLs within one of the U.S. ARRL sections or within a Canadian province score one point for each QSO with another station located within a section or province. Score two points for each contact with a station not located within an ARRL section or province. Multiply the number of contact points by the total number of different sections, provinces and countries worked. Logs must also state the power output used. If you have 200 or more QSOs, submit a separate log for each band and submit a "dupe" sheet. Logs must show claimed score. Logs must be sent within 30 days after the end of the contest to: Cleo Bracket, K0JFO, 810 Towne Square Dr, Fremont NE 68025. For more information see **http://home.earthlink.net/~tenmtryl/ylrl/**.

The TARA PSK31 Rumble The Fall Classic, sponsored by Troy ARA, 0000-2400z Oct 7, PSK31 only. 80, 40, 20, 15, 10, 6 meters. Work stations once per band. Exchange name, state/province/DX send DXCC prefix. Operate 1 of 6 categories: The Club Challenge; Normal, 100 W max; Great, 20 W max; Super, 5 W max; Novice or SWL. Final score is QSOs × (W + VE + JA + VK) call areas + 1 point per DX. Multipliers count once per band. To be valid, scores must be received via our online score submission form found at **http://www.qsl.net/wm2u/score.html**. Logs must be available for review if requested. Last entry date is Oct 22. **wm2u@n2ty.org**; **http://www.qsl.net/wm2u/rumble.html**.

10

Ten-Ten Day Sprint, sponsored by Ten-Ten International, from 0000-2400Z Oct 10. Single op; multiple station, single operator (club station); single station, multiple operator (OM/XYL, family stations). AM, FM, SSB, CW and RTTY, 10 meters only. Work stations once, regardless of mode. Exchange call, name, state and 10-10 number (if member). Score 1 pt/QSO w/nonmembers and 2 pts/QSO w/members. Final score is QSO pts. Awards. Send logs by Oct 24 to Don Ward, W0RTV, 4514 Ferrer Dr, St Louis, MO 63129-3741; **donw0rtv@juno.com**; **http://listserv.lehigh.edu/lists/tenten-l/rules.html**.

14-15

Pennsylvania QSO Party, sponsored by the Nittany ARC, 1600Z Oct 14 until 0500Z Oct 15 and 1300Z until 2200Z Oct 15. Send serial number and ARRL/RAC section (PA stations send serial number and county). Single op QRP, medium (150W), QRO, or CW only (150W); multi-single, multi-multi, portable (single op or multi-single), Novice/Tech/Tech Plus, mobile, rover. Work stations once per band per mode. Work mobiles as they change counties. Stations on county lines are good for one QSO but multiple counties. Score 2 pts/CW QSO on 160 and 80; 1.5 pts/CW QSO on other bands; and 1 pt/QSO on phone. Multipliers are PA counties (67 max); PA stations add PA counties, ARRL/RAC sections and 1 for DX (150 max). CW 1.810 and 40 kHz up; phone 1.850 3.980 7.280 14.280 21.380 28.310; Novice/Tech 10 kHz up; mobiles 5 kHz below the above listed frequencies. Final score is QSO points × multipliers × 2 if QRP; × 3 if Novice/Tech. Add 200 points to final score for each QSO with W3HA. PA mobiles add 500 points for each county operated from where 10 or more QSOs were made. Awards. Send logs by Nov 15 to K3YV, Nittany ARC, PO Box 614, State College, PA 16804; **na2x@arrl.net**; **http://members.aol.com/doughdh/paqsoparty/paqso.htm**.

FISTS CW Fall Sprint, sponsored by FISTS International CW Club, 1700Z until 2100Z Oct 14. CW only, QRP and QRO. 80 40 20 15 10 meters. Work stations once per band. Exchange name, state/province/DXCC country, and FISTS number if you are a member (nonmembers send power output). Score 5 pts/QSO w/FISTS member and 2 pts/QSO w/nonmember. 10 points with FISTS Novice or Tech plus. Final score is QSO points × states/provinces/DXCC countries. 3.558 7.058 14.058 21.058 28.058. See **http://www.FISTS.org**. Send paper logs only within 30 days to Alan M. Tanner W8FAX, 3787 Trebein Rd, Fairborn, OH 45324.

ARRL International EME Competition. See September *QST*, p. 103.

21-22

Arkansas QSO Party, sponsored by the Ozark Wireless Society. 0000-2359Z Oct 21. Stations may operate 18 hours of the 24 hour period. On/off times must be clearly noted on log. CW, phone, and PSK 31. 80, 40, 20, 15, 10 meters. Single op, multiop, mobile. Only one transmitted signal at a time. Frequencies: CW—3.550, 7.050, 14.050, 21.050, 28.050. Phone—3.850, 7.225, 14.250, 21.300, 28.450. PSK 31—3580.15, 7070.15,

George Fremin III, K5TR ♦ 624 Lost Oak Trail, Johnson City, TX 78636 ♦ k5tr@arrl.org

14070.15, 21080.15, 28120.15. Work stations once per band and mode. AR-to-AR contacts permitted. Work mobiles again as they change county/province/DXCC country. Exchange signal report and state/province/DXCC country. Arkansas stations send county. Three power classes for all categories: QRP (<5W), low power (<100W), and high power (>100W). Count 1 point per phone QSO, 2 points per CW and PSK 31 QSO, 5 points per each QSO with bonus club stations K5OWS (Ozark Wireless Society) and W5YM (University of Arkansas). Count multipliers only once. Multipliers for Arkansas stations: 50 states, Canadian provinces, and 1 DXCC multiplier. For non-Arkansas stations: Arkansas counties (75). Final score: Multiply QSO points × total multipliers × the power multiplier (<5W × 3, <100W × 2, >100W ×1). Awards. Send logs by Nov 30 to Ozark Wireless Society, c/o Don Banta, W5RL, 2005-A Sycamore Pl, Springdale, AR 72762.

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, 1800Z Oct 22 until 0200Z Oct 23. Phone and CW. No repeater QSOs. 160 80 40 20 15 10 6 2 meters. CW 50 kHz up from the bottom; phone 3.890 7.290 14.290 21.390 28.390; Novice 30 kHz up from bottom for CW. IL stations exchange RS(T) and county; others exchange RS(T) and state/province/DXCC country. Count 1 pt/QSO on phone, 2 pts/QSO on CW. Work stations once per band and mode, and once per band/mode/county for IL mobile stations. If you operate mobile you must use the mobile's call exclusively for the duration of the contest. Contacts with/by mobile stations on border of two counties count as two counties and two QSOs. IL stations multiply QSO total by sum of states, IL counties, VE provinces plus a maximum of five DXCC countries. Count additional DX for points, but not multipliers. Others multiply QSO points by the number of IL counties worked. All stations may take one bonus multiplier for each eight QSOs with the same IL county. Awards. Send entries by Nov 15 to RAMS, c/o John Matz, KB9II, 7079 West Ave, Hanover Park, IL 60103; **http://www.megsinet.com/~jematz/rams.html**.

VK/ZL/Oceania Contest, CW. See October 7-9 listing.

RSGB 21/28 MHz Contest CW, See Oct 7-9 listing.

21-23

YLRL YL Anniversary Contest, phone, 1400Z Oct 21 to 0200Z Oct 23. See Oct 7-9 listing.

QRP ARCI Fall QSO Party, CW, sponsored by QRP ARCI, 1200Z Oct 21 to 2400Z Oct 22. Single band, all band, high (20 15 10 6) or low (160 80 40) band. Operate no more than 24 hours. Work stations once per band. Exchange RST, state/province/DXCC country, and ARCI number (if nonmember, send power output). 1.830 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.128. Score 5 pts/QSO w/members, 2 pts/QSO w/nonmembers on same continent and 4 pts/QSO w/nonmembers on different continents. Final score is QSO points × states/provinces/DXCC countries × power multiplier (> 5W, ×1; <5 W, ×7; <1 W, ×10; <250 mW, ×15). Send entry to Joe Gervais, AB7TT, PO Box 322, Peoria, AZ 85380-0322; **vole@primenet.com**; **http://www.qrparci.org/**.

Asia-Pacific Sprint, CW, sponsored by Asia-Pacific Sprint Contest Committee (APCC) 0000Z-0200Z Oct. 21. The object is for stations in the Asia-Pacific region to work as many stations world-wide as possible within two hours, on 15 and 20-meter CW. Suggested frequencies are 21030-21050 and 14030-14050 kHz. Output power is limited to 150 W. Exchange RST + serial number, and count one point per valid QSO. The called station (usually the CQer) must QSY at least 1 kHz after a CW QSO, or 6 kHz after an SSB QSO. The multiplier is the total number of prefixes, per WPX rules (ie, each prefix once only, not once per band). Final score equals valid QSOs × multiplier. Send your log within 7 days after the end of the contest to: James Brooks, 26 Jalan Asas, Singapore 678787, or e-mail **jamesb@pacific.net.sg** within 72 hours. For more information, see **http://www01.u-page.so-net.ne.jp/ja2/je1jkl/apsprint.html**.

Worked All Germany Contest, sponsored by The Deutscher Amateur Radio Club, 1500Z Oct 21 to 1459Z Oct 22. 80 40 20 15 10 meters; SSB and CW. Single op, all band, single band, QRP, multiop single transmitter and SWL. Packet spotting allowed for all classes. Work German stations; Non-German stations send RST and QSO number; German stations send RST and DOK (local area code). Work stations once per band and mode. Three points per QSO. Multipliers: non-German stations count number of German districts on each band regardless of mode (max 26 per band). Germans count DXCC/WAE countries per band. Final score is QSO points × total multipliers. Awards. Send logs by Nov 20, Klaus Voigt, DL1DTL, PO Box 12 09 37, D-01010 Dresden, Germany; **wag@darc.de**; **http://www.darc.de/referate/dx**.

JARTS WW RTTY Contest, sponsored by JARTS, 0000Z Oct 21 to 2400Z Oct 22. RTTY only, 80, 40, 20, 15, 10 meters. Single op, multiop, SWL. Work stations once per band, exchange RST and age, multiop must send 99 as the age. Count 2 pts for QSOs within your continent, 3 pts per QSO outside your continent. Multipliers are DXCC countries excluding JA, W, VE and VK. JA, W, VE and VK call areas are multipliers. Count multipliers once per band. Do not count your own call area or country as a multiplier. Score is QSO points × total multipliers. Awards. Use separate logs sheets for each band. Send logs by Dec 31 to JARTS Contest Manager, Hiroshi Aihara, JH1BIH, 1-29 honcho, 4 Shiki Saitama 353, Japan.

28-29

CQ WW DX Contest, phone, sponsored by *CQ Magazine*, 0000Z Oct 28 to 2400Z Oct 29 (CW is 0000Z Nov 25 to 2400Z Nov 26). Exchange RS(T) and CQ zone. Classes: Single operator all band/single band/assisted, high power/low power (<100 W)/QRP (<5 W); multi single, multi multi. Multi-singles have a 10 minute rule. All classes may only have one transmitted signal per band. Work stations once per band. Team and club competition. North American stations score 2 pts/QSO w/ stations in different countries on the same continent and 3 pts/QSO w/stations on different continents; stations in the same country may be worked for zone credit, but no points. Multipliers are CQ Zones and countries (DXCC +WAE). Final score is QSO points × multipliers. Awards. Send logs by Dec 1 (Jan 15 for CW) to: *CQ Magazine*, 25 Newbridge Rd, Hicksville, NY 11801; **ssb@cqww.com**; **cw@cqww.com**. For more information see **http://cqww.com/cqww/**.

Ten-Ten International Net Fall CW QSO Party, sponsored by Ten-Ten International, from 0000Z Oct 28 to 2400Z Oct 29. Single op only, CW on 10 meters only. Categories: Individual, QRP, Club. Contacts must be in CW subband. Exchange call, name, state/country and 10-10 number (if member). Score 1 pt/QSO w/nonmembers and 2 pts/QSO w/members. Final score is QSO pts × prefixes. Awards. Send logs by Nov 15 to: Gateway Chapter, Don Ward, W0RTV, 4514 Ferrer Dr, St Louis, MO 63129-3741; **http://listserv.lehigh.edu/lists/tenten-l/rules.html**. QST

NEW PRODUCTS

ANTENNAS, TALES AND TECHNICALS ON CD-ROM

◊ L. B. Cebik, W4RNL, in cooperation with Antennex online magazine, has recently released a CD-ROM titled *Antennas, Tales and Technicals*.

The CD publication includes a brief section covering Amateur Radio history and other semi-technical oddities, but primarily features a collection of nearly 300 of L.B.'s articles and notes. It's loaded with useful information for amateurs and professionals interested in antennas, antenna modeling and related subjects (such as antenna tuners and impedance matching).

The collection is subdivided into several sections including *Antenna Modeling Notes*, *Practical Antenna Notes* (separate subheadings cover the upper HF, lower HF and VHF/UHF spectrum) and *Transmission Lines and Impedance Coupling*. An extensive list of antenna-related Web links is also provided.

Price: $29.95. For additional information contact Antennex, c/o Texas Capitol Management, PO Box 72022, Corpus Christi, TX 78472; tel 361-855-0250/888-855-9098; fax 888-855-9128; **info@antennex.com**; **http://www.antennex.com**.

2001 *POLICE CALL* EDITIONS NOW AVAILABLE

◊ The 2001 editions of these popular scanner listener frequency guides are now available. Seven different regional volumes (condensed from the nine volumes offered in the past) contain a total of over 500,000 listings. These list frequencies for police and fire agencies and 18 addition categories of mobile radio users and include many trucked system talk group ID codes. Also covered are radio codes, maps, frequency allocation tables, a glossary of radio "slang" and more.

The suggested retail price is $14.99 each. The 2001 editions of *Police Call* are published by Hollins Radio Data, PO Box 35002, Los Angeles, CA 90035 and are available through selected retail electronics dealers and mail order firms.

ROTATABLE TOWER SIDE MOUNT

◊ Side mounting directional antennas on towers—an arrangement commonly used in multiple antenna stacks—without severely limiting their rotational range can be difficult. Array Solutions offers a mounting system specifically designed to handle this challenge.

The WX0B Swinging Side Mount securely clamps to all three legs of Rohn 25G, 45G and 55G towers. (Use on other towers may require drilling.) Saddle clamps on the attachment U-bolts help prevent crushing of the tower legs.

The rotator mounting location is set up for a Hy-Gain Tailtwister 6-hole bolt pattern. The rotator is mounted alongside the tower and the antenna is fastened to a mast at the far end of the swinging assembly. Typical resulting rotational range is approximately 330 degrees.

The mount construction is heavy duty and includes a 2 × 1/4-inch angle iron frame, 3/8-inch thick steel rotator and bearing plates, a 1/2-inch thick black Delrin bearing, aluminum saddle clamps and stainless steel and Grade 5 bolts. Additional hardware can be purchased for extending the system for mounting multiple antennas.

Price: $399. For more information contact Array Solutions, 350 Gloria Rd, Sunnyvale, TX 75182; tel 972-203-2008; fax 972-203-8811; **wx0b@arraysolutions.com**; **http://www.arraysolutions.com**. QST

2000 ARRL November Sweepstakes Rules

1. Object: For stations in the United States and Canada (including territories and possessions) to exchange QSO information with as many other US and Canadian stations as possible on the 160, 80, 40, 20, 15 and 10 meter bands.

2. Date and Contest Period:

2.1. CW: First full weekend in November (**November 4-6, 2000**).

2.2. Phone: Third full weekend in November (**November 18-20, 2000**).

2.3. Contest Period: Begins 2100 UTC Saturday, ends 0300 UTC Monday.

2.4. Operate no more than 24 of the 30 hours.

2.4.1. Off periods may not be less than 30 minutes in length.

2.4.2. Times off and on must be clearly noted in paper logs. **They should be listed separately in the "Soapbox/Comments" section of an electronic Cabrillo file submission.**

2.4.3 Listening time counts as operating time.

3. Entry Categories:

3.1. Single Operator:

3.1.1. QRP.

3.1.2. Low Power.

3.1.3. High Power.

3.1.4. Unlimited—Packet assisted

3.2. Multioperator

3.2.1. Multi Single only

3.2.1.1. Only 1 transmitted signal is permitted at any time.

3.2.1.2. There is no limitation on the number of band changes.

3.2.1.3 Packet use is permissible.

3.3 School Club

3.3.1. There are three divisions to this category.

3.3.1.1. College and University

3.3.1.2. Technical School

3.3.1.3. Secondary and other School

3.3.2. School clubs compete as their own category.

3.3.3. Only currently enrolled regular students and faculty/staff of the institution are eligible to operate a school club entry. Alumni may "Elmer" but may not operate the station during the competition.

3.3.4. There is no distinction between Single and Multi operator stations or power levels in this category.

3.3.5. School clubs must operate from established stations located on the campus. No portable operation from a nearby contest station is allowed. A club may operate from a member's station only if no on-campus station exists.

3.3.6. Certificates will be awarded to the top scoring entry in each division of this category in each ARRL/RAC section and division.

4. Exchange: The required exchange consists of:

4.1. A consecutive serial number;

4.2. Precedence;

4.2.1. "Q" for Single Op QRP (5 W output or less);

4.2.2. "A" for Single Op Low Power (up to 150 W output);

4.2.3. "B" for Single Op High Power (greater than 150 W output);

4.2.4. "U" for Single Op Unlimited;

4.2.5. "M" for Multi-Op;

4.2.6. "S" for School Club;

4.3. Your Call sign;

4.4. Check (the last two digits of the year you were first licensed);

4.5. ARRL/RAC Section

Example: WA4QQN would respond to W1AW's call by sending: W1AW 123 U WA4QQN 71 CT which indicates QSO number 123, U for Single Op Unlimited, WA4QQN, first licensed in 1971, and in the Connecticut section.

4.6 With the exception of the serial number, which changes from QSO to QSO, the exchange sent must remain consistent during the entire contest.

5. Scoring: QSO points: Count two points for each complete two-way QSO.

5.1. Multiplier: Each ARRL Section and RAC Section plus VE8/VY1, with a maximum number of 80 **(Note—there is a new US Section: West Central Florida—WCF)**.

5.2.1. KP3 and KP4 are in the Puerto Rico Section.

5.2.2. KV4/KP2 and KG4 stations are in the Virgin Islands Section.

5.2.3. KH6 and other US possessions in the Pacific count as the Pacific Section.

5.2. Final score: Multiply QSO points (two per QSO) by the number of ARRL/RAC sections (plus VE8/VY1/VY0).

6. Miscellaneous:

6.1. Work each station only once, regardless of the frequency band.

6.2. Only one transmitted signal at any time is permitted.

7. Awards: Certificates will be awarded to the top operator CW and Phone scores in each category ("A", "B", "Q", "U", "S" and "M") in each ARRL/RAC section and division. Division winners in each category are also eligible for a Sweepstakes Plaque. If the plaque is not sponsored, the winner may purchase it from the ARRL.

8. Submission:

8.1 Deadline for submission of CW entries is Wednesday December 6, 2000. Deadline for submission of Phone entries is Wednesday December 20, 2000. Entries emailed or mailed via the postal service or other carrier after the deadline will be designated checklogs.

8.1.1. The CW and Phone mode are considered separate contests and must be submitted in separate envelopes or e-mails sent to the appropriate address.

8.1.2. Handwritten entries must be made on current ARRL entry forms or on a reasonable facsimile.

8.1.2.1. Current forms may be downloaded in PDF or ASCII format from **http://www.arrl.org/contest/forms**, or may be requested via e-mail from the ARRL Info Server by sending a message to **info@arrl.org** with the text of the message reading:

Send SSCW.frm
Send SSPhone.frm

8.2. E-mail entries for CW should be sent to **SSCW@arrl.org** and Phone to **SSPhone@arrl.org**.

8.3. Any entry that has been created using a computer for logging is required to submit an ARRL standard format (Cabrillo) log file.

8.3.1. The file must be in ASCII text format. Files from word processing, spreadsheet programs or "bin" type logging program files are not acceptable substitutes.

8.3.2. Any electronic file that is not submitted in required format will not be acceptable for competition and awards.

8.3.3. Failure to submit a required ASCII file may result in the entry being designated a checklog and ineligible for competition.

8.3.4. A paper printout for a log that has been generated by a computer in lieu of the actual data file is not an acceptable substitute.

8.3.5. Paper logs that are entered into a logging program or computer after the contest are considered electronic logs and must include the required electronic file in the submission.

8.4. Handwritten paper logs are acceptable entries. Any handwritten paper log over 500 QSOs in length must include the required dupe sheet.

8.5. Logs sent via the regular mail or courier service should be addressed to: **November SS CW or November SS Phone, ARRL, 225 Main St, Newington, CT 06111.**

9. Other information.

9.1. See "General Rules for All ARRL Contests" and "General Rules for ARRL Contests on Bands Below 30 MHz (HF)" available in the November issue of *QST* or from the contest Web page below.

9.2. All contest queries should be directed to **N1ND@arrl.org**, or by telephone to 860-594-0232. All contest rules and entry forms may be downloaded from the Contest Branch Web Page at: **http://www.arrl.org/contests**.

New Participation Pins for the 2000 Sweepstakes

The ARRL is again pleased to announce its Sweepstakes pins program for 2000. Anyone who completes 100 contacts on CW or Phone during Sweepstakes is eligible to purchase one of these attractive participation pins. Pins cost $5, including postage and handling. They will be shipped after all entries have been processed and logs verified.

To order your pins, attach a note to the front of your summary sheet indicating the number of pins ordered along with your check. If you enter electronically, send a copy of your summary sheet with a note and your check attached to: **Sweepstakes PINS, ARRL Contest Branch, 225 Main St, Newington, CT 06111.**

Clean Sweep Mugs—Y2K Style

To celebrate the Year 2000, the ARRL is proud to offer a newly designed Clean Sweep mug.

To earn your mug, work all 80 ARRL/RAC sections during the CW or Phone November Sweepstakes. The price for the colorful mug is $15 each, including postage and handling. To order, attach to the top of your summary sheet a note indicating how many mugs you are ordering and your check. If you submit electronically, send a photocopy of your summary sheet indicating how many mugs you are ordering along with your check and send to: **Clean Sweep Mugs, ARRL Contest Branch, 225 Main St, Newington, CT 06111**. Your mug will be shipped after all entries have been processed. QST

By Dan Henderson, N1ND
Contest Branch Manager

2000 ARRL International DX Contest Results

"It doesn't get any better than this…."

No, I am not referring to the beer that helped popularize that line a few years back. Rather, I am referring to the outstanding competition seen this past February in the ARRL's 2000 International DX CW Contest.

During a good contest weekend, you will see one or two overall scoring records challenged. On an excellent weekend, maybe a couple of those records may fall. But for the Y2K running of the League's premier DX event, it is hard to find an adjective to describe the results. *Every W/VE Single Operator All Band and Multioperator category record was broken.* And in every case but one, at least two entrants broke the previous record. One single band W/VE record was also established. Though only two Single Band records fell on the DX side, participation and competition outside the US and Canada was also remarkable.

A total of 2290 competitive logs—1000 W/VE and 1290 DX—were received for this contest. They represent the hard work and contesting skill of over 2,760 participants and 5.1% increase of logs for this contest. An additional 152 logs—33 US and 119 DX—were received but were classified as checklogs (incomplete data, submitted after deadlines, not all required log or summary files were submitted).

The Y2K running of the contest may have been a good DX coming out party for the QRP community. There was a 7% increase in the number of Single Operator QRP entries received. While still representing a small percentage of the total logs received (6%) of all entries, their operating talent continues to shine. Doug, KR2Q, led the pack as he and George, K2DM, and Alan, N3BJ, all shattered the old Single Operator All Band QRP mark. Doug's winning effort of 1,201,335 shattered the old mark by over 360,000 points!

The old Single Operator Assisted of 4.6 million was left standing in the dust, again by a talented trio of top operators. Rick, KI1G, edged out Chas, K3WW, as both became the first in this category to break through the five million-point barrier. Rick's 5,747,469 effort also topped the old mark by over 1 million points. Perennial contender Jeff, K1ZM, also broke the old mark, but fell just shy of crossing the five meg threshold.

Perhaps there is truth to the adage "good things come in threes" as yet another trifecta broke the Single Operator, All Band, Low Power record. Dan, K1TO, proves, yet again, that he is a talented CW man. Dan not only topped the old mark, but destroyed it, as he became the first ever in the category to cross the three million-point barrier with a score of 3,159,723. His runaway performance shouldn't diminish the accomplishments of Mark, K1RO, or WE1USA, the call sign used by WA1LNP, both of whom surpassed the old record.

The scramble at the top of the Single Operator, All Band, High Power category was even more crowded as the quartet of KQ2M, K1ZZ, W2SC (operating at K5ZD) and K1DG all broke the old category record. When the log checking was finished, Bob, KQ2M, beat Dave, K1ZZ, 5,403,114 to 5,001,150. In the process, both became the first two entrants to crash through the five million point score ceiling. Tom, W2SC, edged out Doug, K1DG, for third place in the standings.

The five million point score seemed to be a magic number this year. The W3BGN Multi-Single entry repeated in the category and in the process became the first in the category to surpass the five meg score, racking up 5,550,636 points to beat the WX0B crew by over 1.5 million points.

After threatening the big "ONE OH"—ten million—point barrier in 1999, the Multi-Two entry at K1AR broke through. The only problem was so did the outstanding group at N2RM. In the tightest finish among any of the all-band categories, congratulations to the N2RM station for edging out K1AR 10,693,221 to 10,629,135.

The final all-band record-breaking effort from the W/VE side occurred in the annual "battle of the heavyweights" as W3LPL and K3LR slugged it out. In the end the W3LPL station became the first to break 14 million points with 14,083,200 when the K3LR effort came up a mere 2,660 points short—just two QSOs short. Lurking just off the pace was the effort at KC1XX, whose third place finish also broke the old record of 12.1 megapoints.

With 10 meters being wide-open, it is no surprise that the W/VE single band record for the category fell. And boy, was the battle intense! The final results show that Vinnie K1RM edges out Bill W4ZV

Dave, NT1N, experiencing his first New England winter, made good use of his modest roof tower to place second on the Single Op, 15-Meter, Single-Band category. Watch out for him when he gets his antenna farm in place!

W/VE Top 10

W/VE Single Operator All Band QRP

KR2Q	1,201,335
K2DM	1,094,331
N3BJ	927,360
N7IR	732,513
N0UR	688,884
W6JTI	605,640
VE3KZ	602,112
N1TM	564,480
WA8RCN	418,500
W8QZA	380,160

W/VE Single Operator Assisted

KI1G	5,747,469
K3WW	5,526,648
K1ZM	4,989,738
K2NG	4,473,585
W2UP	3,880,602
K1IR	3,819,060
W2GD	3,709,476
K2XA	3,653,184
N3RR	3,468,330
AA3B	3,293,784

DX Single Operator QRP Top 10

HA2A	553,146
9A7P (9A6NHH, op)	441,540
LY2TA	353,580
LY3BA	346,338
JH1HRJ	291,549
UA0KCL	286,209
DL3KVR	258,768
LY2FE	255,060
DL6RDR	247,269
JR4DAH	221,940

DX Single Operator Assisted

YL4U (YL2KL, op)	1,961,154
DK3GI	1,538,310
JG1ILF	1,264,242
JA1YNE	963,630
OK1DG	686,760
JQ1BVI	642,546
DL1ASA	623,040
DJ9RR	575,073
LY5W (LY1DR, op)	549,792
OK1AU	510,786

571,560 to 570,723. Bill won the QSO battle—1847 to 1732. Vinnie won the Multiplier battle—110 to 103—and hence the war. Congratulations also go to the other Single Band champions: John, K1VW (160); Robye, W1MK (80); Steve, K7EM (40); Bill, K4XS (20); and Joel,VE6WQ (15).

W/VE Single Band Top Ten

W/VE Single Band 160

K1VW	7,182
K3RR	7,134
K4TEA	6,960
W4GD	4,224
W2VO	2,574
VE3DO	2,139
K1KY	2,139
NX5M	1,782
N4DU	1,188
VE7SL	741

W/VE Single Band 80

W1MK	196,830
W2YX (N4PL, ops)	38,211
N2FY	11,610
W2FR	9,576
VE6JY	1,827
AG4W	1,458
AA9IV	1,404

W/VE Single Band 40

K7EM	337,974
KV0Q	317,772
NS0Z (K9BGL, op)	271,620
K8PO	260,580
VE1ZJ	195,324
K5NZ	178,755
WA6IQM	123,984
WB4OSN	123,084
K7WP	118,125
KN5G	114,660

W/VE Single Band 20

K4XS	563,274
VE6BF (at VE6JY)	391,872
W4NZ	296,088
K2BA	279,090
VE6EX	111,714
K9CAN	92,004
KA7T	54,450
W8UMR	50,370
WA9S	46,800
K4RDU	32,391

W/VE Single Band 15

VE6WQ (at VE6JY)	674,325
NT1N	672,816
K8DX	592,686
K2VV (at K4VX)	539,514
N2PP	529,776
N2MF	508,800
K0IR	501,408
N5DX	485,130
K6LL	454,803
K5GN	435,900

W/VE Single Band 10

K1RM	571,560
W4ZV	570,723
K4VX (W9WI, op)	534,189
K5RX	477,855
W8WA	451,881
W9XG	437,472
N0NR	407,187
N7KU (NJ6D, op)	405,720
W0TM	394,308
WO4O (at K4JNY)	392,268

DX Single Band Top 10

DX Single Band 160

KV4FZ	52,128
CO8JY	28,080
IK4MHB	6,270
S57M	5,415
S50U	4,674
OMOWR	3,024
I3VHO	2,295
UU4JMG	1,575
LZ3AB	864
JR7VHZ	750

DX Single Band 80

C6AKQ (N4BP, op)	157,950
CO8ZZ	96,264
OT0T (ON4UN, op)	84,882
CO8DM	79,527
HG3M (HA3MY, op)	48,240
DK8LV	35,340
OM2DX	23,661
JI2ZJS (JG2TSL, op)	16,926
OK1TO	16,380
YU1KR	15,921

DX Single Band 40

OK1RF	213,510
PY0FF	205,425
IR4T (IK4UPB, op)	185,130
HA8FM	165,000
OM5M (OM2RA, op)	159,720
YT1BB	152,880
YU1AU	144,990
S57DX	141,912
YT7A	135,918
PY2NY	123,543

DX Single Band 20

OG8L (OH8LQ, op)	251,664
SM0JHF	249,480
RZ9UA	228,030
TG9/IK2NCJ	226,380
YU1AAX (YU1ZZ, op)	193,026
G0IVZ	190,005
S59UFB (S53CC, op)	166,632
YT1AD	147,582
F6HKA	137,748
PY7IQ	136,800

DX Single Band 15

VP5TT (K2KW, op)	360,903
GM3POI	263,424
5N0W	259,875
TI7/N4MO	220,719
PY3PAZ	218,862
OG6AC (OH6CS, op)	210,870
G5G (G0LII, op)	188,160
S57AW	184,140
JG3KIV	180,144
DK5QN	163,944

DX Single Band 10

ZF1A (W5ASP, op)	329,175
HC2SL	263,010
G3WVG	202,176
PY1KN	201,465
S5OK	192,294
AL7IF	191,730
DL3TD	186,615
S51AY	184,518
S53O	179,760
G5M (G3WGN, op)	167,268

Top Ten Band Breakdowns (QSOs/Multipliers)

W/VE Single Operator, Low Power

Call	*Score*	*160*	*80*	*40*	*20*	*15*	*10*
K1TO	3,073,590	21/16	86/41	398/72	740/91	577/85	805/85
K1RO	2,362,491	0/0	66/35	354/70	587/81	656/80	660/73
WE1USA (WA1LNP, op)	2,329,065	22/17	88/45	261/70	572/74	651/82	533/77
W2TZ	2,064,804	9/7	88/41	234/60	485/74	562/78	714/69
N8AA	1,998,723	18/15	58/36	203/62	363/76	496/76	771/84
K1VUT	1,983,786	10/7	84/39	502/63	399/72	477/71	613/65
K0EJ	1,924,272	23/17	52/33	191/56	441/77	542/72	683/77
NA2U	1,672,272	3/2	38/25	200/57	366/77	455/72	702/83
K4OGG	1,627,164	14/12	47/33	145/53	477/70	465/73	613/67
K6LA	1,543,605	0/0	48/19	362/67	282/70	483/76	512/73

W/VE Single Operator, High Power

Call	*Score*	*160*	*80*	*40*	*20*	*15*	*10*
KQ2M	5,403,114	29/22	169/56	725/80	1074/89	886/87	1395/87
K1ZZ	5,001,150	40/29	224/56	529/74	971/93	993/89	1093/92
K5ZD (W2SC, op)	4,860,504	50/32	238/54	913/78	914/90	867/82	894/82
K1DG	4,761,477	27/22	182/56	745/80	719/91	963/88	1081/90
K3ZO	4,543,200	31/23	191/51	639/77	977/82	918/86	1030/81
N2IC/0	4,455,429	23/16	120/42	782/77	552/84	924/92	1248/96
W6EEN (N6RT, op)	3,750,858	16/13	99/30	703/76	519/81	961/91	975/91
N2LT	3,614,940	34/22	111/45	409/71	758/88	762/86	946/87
N6MJ (at W6KP)	3,607,713	19/14	52/22	789/78	556/83	866/84	977/88
W9RE	3,593,322	21/16	80/39	491/70	603/81	834/82	1217/81

W/VE Multioperator Single Transmitter

Call	*Score*	*160*	*80*	*40*	*20*	*15*	*10*
W3BGN	5,550,636	44/32	266/64	675/89	1122/100	827/91	953/100
WX0B	4,095,198	22/21	67/52	499/88	725/99	803/95	858/104
AA2FB	4,078,656	12/10	130/56	71089	755/98	689/89	808/96
W2AA (at N2TX)	4,005,450	34/26	117/53	568/82	754/96	519/89	975/104
K4OJ	3,912,480	27/23	100/51	451/82	776/90	826/94	784/100

W/VE Multioperator Two Transmitters

Call	*Score*	*160*	*80*	*40*	*20*	*15*	*10*
N2RM	10,693,221	60/40	310/69	1243/98	1602/116	1644/109	1754/107
K1AR	10,629,135	44/32	372/74	1474/103	1448/116	1648/109	1515/111
K8AZ	8,586,756	34/25	111/62	892/98	1430/115	1473/109	1607/107
N3RS	7,861,641	29/24	238/64	868/85	1310/111	1627/105	1309/98
W8AV	6,400,044	29/22	129/54	735/85	1124/105	1260/98	1301/102

W/VE Multioperator Unlimited Transmitters

Call	*Score*	*160*	*80*	*40*	*20*	*15*	*10*
W3LPL	14,083,200	96/48	573/85	1458/106	1876/123	1900/121	1921/117
K3LR	13,997,340	49/35	330/77	1570/111	2004/123	2015/122	1967/120
KC1XX	13,281,246	86/46	710/90	1585/109	2050/124	1650/114	1372/111
K1XM	12,093,975	92/48	637/81	1246/100	1729/122	1676/113	1631/111
K9NS	10,837,260	44/30	316/76	1051/99	1548/118	1822/111	1799/115

DX Single Operator, Low Power

	Score	*160*	*80*	*40*	*20*	*15*	*10*
VP5EA (WD5N, op)	3,534,876	247/38	438/46	534/52	914/54	759/55	1062/53
V26G (N2ED, op)	3,075,732	116/38	339/47	612/53	691/51	722/52	972/56
V47X (WT9U, op)	2,546,613	0/0	257/43	485/52	919/54	848/54	794/54
J38A	2,292,255	150/38	371/44	649/53	594/52	528/51	389/47
KH6/W6PH	2,161,008	0/0	228/45	577/52	533/54	541/52	913/55
VP6BR (OH2BR, op)	2,070,207	0/0	5/4	489/52	567/50	920/57	1170/56
NP3G	1,839,474	225/38	221/39	296/50	520/51	368/46	616/49
V7G (AC4G, op)	1,642,572	0/0	28/19	614/52	378/50	495/51	897/55
EA7GTF	1,623,213	11/8	107/28	344/46	602/51	500/51	719/53
KP4Y	1,318,014	0/0	59/24	399/48	495/50	501/51	525/49

DX Single Operator, High Power

	Score	*160*	*80*	*40*	*20*	*15*	*10*
ZF2NT (N6NT, op)	4,961,367	299/45	495/55	854/53	1199/55	1203/55	1167/54
HC8L (W6NL, op)	4,952,475	348/50	406/51	784/54	879/54	996/55	1762/55
TI5N (K9NW, op)	4,485,459	218/47	482/54	848/53	844/55	1189/55	1106/55
WP3R (KE3Q, op)	4,360,320	252/46	333/50	692/56	1077/54	1029/57	1159/57
KH7R (KH6ND, op)	3,921,690	182/40	344/50	640/54	748/53	823/54	1549/54
ZD8Z (N6TJ, op)	3,791,304	10/5	192/43	767/53	1155/54	1231/55	1432/54
V31JP (K8JP, op)	3,551,742	157/40	426/51	625/53	813/54	995/53	853/55
6V6U (K3IPK, op)	3,300,387	0/0	265/46	743/53	987/54	1071/55	1117/55
NH7A (KH6TO, op)	3,012.126	164/39	279/45	623/53	536/55	694/52	1062/55
J37ZA (K2KQ, op)	2,780.928	152/35	327/42	450/50	898/53	669/52	768/52

DX Multioperator, Single Transmitter

	Score	*160*	*80*	*40*	*20*	*15*	*10*
P49V	5,305,272	415/49	530/52	796/54	1045/56	1198/55	1508/56
3E1CW	5,096,400	243/46	549/54	1024/55	1146/54	1196/54	1201/54
8P9JA	4,914,936	176/42	446/52	774/54	1218/55	1196/55	1441/54
V31TP	4,567,185	269/47	556/52	715/54	836/53	1143/55	1314/54
KP2F	4,315,185	199/44	540/49	677/53	801/53	1082/55	1356/55

DX Multioperator, Two Operator

	Score	*160*	*80*	*40*	*20*	*15*	*10*
KL7Y	6,036,255	134/33	459/52	1140/55	1492/55	1737/55	1635/55
MD/DL3OI	4,387,761	59/15	398/40	1019/53	968/53	1458/55	1495/55
G4BUO	3,999.030	38/17	343/39	958/53	1035/55	1231/56	1260/54
OT0A	3,408,804	1/1	267/35	990/53	891/54	1175/55	1185/54
RU1A	3,120,264	4/1	112/25	907/54	1256/55	934/56	1015/55

DX Multioperator Unlimited Transmitter

	Score	*160*	*80*	*40*	*20*	*15*	*10*
6D2X	8,518,797	764/53	1098/55	1627/55	1795/55	1648/55	1699/56
9AY2K	4,551,480	110/22	453/42	1084/53	1239/55	1176/55	1318/55
RW2F	3,852,618	36/14	269/34	1064/55	1104/55	1090/56	1211/55
LY7A	2,177,070	3/2	148/30	63/53	713/54	893/55	566/51
OL7W	1,562,895	0/0	110/20	614/53	432/51	599/51	540/52

On the DX side, Peter, HA2A, led the way in the Single Operator, All Band, QRP category, beating 9A7P with Hrvoje, 9A6NHH, operating 553,146 to 441,540. In the Single Operator Assisted category, Girts, YL2KL, as operator of YL4U, took top honors with 1,961,154 points—a hefty 400K victory over second place Roland, DK3GI. VP5EA, with Dave, WD5N, as operator, scored a decisive win over V26G, piloted by Ed, N2ED, by a score of 3,534,876 to 3,075,732 in the Single Operator, All Band, Low Power category. Bruce, ZF2NT (aka N6NT when operating with his US call sign), copped the Single Operator, All Band, High Power crown. Finishing a very close second in the category was HC8L with Dave, W6NL, "moonlighting" with his HC8 call.

DX Multioperator stations are sometimes the workhorses of this contest, and the efforts of many great contesters shine through again in this year's results. Two stations in the Multi-Single category broke the 5 Meg barrier, with P49V's 5,305,272 leading the way and 3E1CW in close pursuit. In the Multi-Two category, this year there was KL7Y, and then there were the rest of the entrants. The ops at KL7Y, with their score of 6,036,255, posted an outstanding 1.36 meg victory over the crew at MD/DL3OI in the category. In the Multi-Multi category the hard work and planning by the operators at 6D2X allowed them to coast to victory over the 9AY2K station (sporting a Y2K call sign) 8,518,797 to 4,551,480.

Also of interest was the close European Single Operator High Power finish won by SP2FAX who edged out SP7GIQ: 2,578,452 to 2,528,358.

One Single Band entry established a new DX records for the event. VP5TT, with Ken K2KW, posted a new 15-Meter Single Band score of 360,903 points. Also taking top honors in DX Single Band categories (though not setting new records) were KV4FZ (160); C6AKQ (N4BP, op) (80); OK1RF (40); and OG8L (OH8LQ, op) (20) and ZF1A, with W5ASP, op (10). Sincere congratulations to all W/VE and DX category winners.

Thanks to the log checkers and their helpers for helping prepare and adjudicate this contest. And thanks to Trey, N5KO, for putting together the "Soap Box" for this contest.

The last ARRL International DX CW Contest of the second millennium proved to be one for the record books. Start thinking now about your chance to set a new record—the first record for your category in the new millennium. The dates for the 2001 contest are February 19-20. Remember that the Cabrillo file format will be the ARRL file standard starting November 2000, so make your preparations now to make certain your station—from antennas to radios to software—are ready for contesting in the next millennium.

Plaque Winners

Category	*Winner*	*Sponsor*
W/VE All Band CW	KQ2M	Frankford Radio Club
W/VE 1.8 MHz CW	K1VW	Butch Greve, W9EWC Memorial
W/VE 3.5 MHz CW	W1MK	Thomas Rylander
W/VE 7 MHz CW	K7EM	Northern Arizona DX Association
W/VE 14 MHz CW	K4XS	QSLs by W4MPY
W/VE 21 MHz CW	VE6WQ (at VE6JY)	Carl Luetzelschwab, K9LA
W/VE 28 MHz CW	K1RM	Green River Valley, IL ARS
W/VE Low Power CW	K1TO	Dauberville DX Association
W/VE QRP CW	KR2Q	Tod Olson, K0TO
W/VE Single Operator Assisted CW	KI1G	Pete Carter, K3VW Memorial
W/VE Multi-Operator Single Transmitter CW	W3BGN	Northern Illinois DX Association
W/VE Multi-Operator Two Transmitter CW	N2RM	Order of Boiled Owls of NY, W2AO Memorial
World Single Operator CW	ZF2NT (N6NT, op)	North Jersey DX Association
Single Operator Africa CW	ZD8Z (N6TJ, op)	Byron Peebles, NZ3O
Single Operator Asia CW	JH5FXP	Alamo DX Amigos
Single Operator Europe CW	SP2FAX	Jerry Griffin, K6MD
Single Operator North American CW	TI5N (K9NW, op)*	Potomac Valley Radio Club
World 1.8 MHz CW	KV4FZ	In Memory of DL1FF
World 3.5 MHz CW	C6AKQ (N4BP, op)	Jim Knutson, KD0AV
World 14 MHz CW	OG8L (OH8LQ, op)	Tom Frenaye K1KI
World 28 MHz CW	ZF1A (W5ASP, op)	Ft. Wayne DX Association
World Low Power CW	VP5EA (WD5N, op)	Jim Stevens, K4MA
World QRP CW	HA2A	Jerry Griffin, K6MD
World Single Operator Assisted CW	YL4U (YL2KL, op)	Willamette Valley DX Club
World Multi-Operator Single Transmitter CW	P49V	John Brosnahan, W0UN
Asian Multi-Operator Single Transmitter CW	JA7YAA	Yankee Clipper Contest Club
Europe Multi-Operator Single Transmitter CW	IR2W	The Radio Place
North America Multi- Operator Single Transmitter CW	3E1CW	Gary Stilwell KI6T and Glenn Stilwell WR6O
World Multi-Operator Two Transmitter CW	KL7Y	Tom De Meiss K2TD Memorial
Europe Multi-Operator Two Transmitter CW	MD/DL3OI	Jim George N3BB
Asia Multi-Operator Two Transmitter CW	UA9LM	Oklahoma Com. Center and AH9B
World Multi-Multi CW	6D2X	H Stephen Miller N00SM
Europe Multi-Multi CW	9AY2K	Texas DX Society
Asia Multi-Multi CW	JN3PYQ/1	David Brandenburg, K5RQ
South America Multi-Multi CW	LU6UO	David Brandenburg, K5RQ
Great Lakes Division Single Operator CW	K8GL	Livonia (MI) Amateur Radio Club
Japan All Band CW	JH5FXP	Akita DX Association
Japan Low Power All Band CW	JL1ARF	Western Washington DX Club
Seventh Call Area All Band CW	W2VJN/7	Willamette Valley DX Club
Ninth Call Area All Band CW	W9RE	Northern Illinois DX Association
Caribbean Multi-Single CW	8P9JA	The YASME Foundation

*Asterisk indicates plaque is award to runner-up when winner has been awarded an overall plaque.

W/VE Region Leaders—CW

Boxes list call sign, score, and power (A = QRP, B = Low Power, C = High Power).

Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)

KR2Q	1,201,335	A
K2DM	1,094,331	A
N1TM	564,480	A
AA1CA	340,929	A
W3BBO	337,212	A
K1RO	2,362,491	B
WE1USA	2,329,065	B
W2TZ	2,064,804	B
K1VUT	1,983,786	B
NA2U	1,672,272	B
KQ2M	5,403,114	C
K1ZZ	5,001,150	C
K5ZD (W2SC, op)	4,860,504	C
K1DG	4,761,477	C
K3ZO	4,543,200	C

Southeast Region (Delta, Roanoke and Southeastern Divisions)

N3BJ	927,360	A
N1CWR	366,513	A
WA3NKO	347,616	A
WA9FWO	46,002	A
N4UY	41,652	A
K1TO	3,159,723	B
K0EJ	1,924,272	B
K4OGG	1,627,164	B
K5KLA	1,215,228	B
WD4AHZ	1,089,972	B
N4AF	3,466,683	C
K4MA	2,813,940	C
K4AB	2,553,480	C
W5WMU	2,429,040	C
K1PT	2,427,075	C

Central Region (Central and Great Lakes Divisions; Ontario Section)

VE3KZ	602,112	A
WA8RCN	418,500	A
W8GOC	242,874	A
VA3SB	229,614	A
W8ILC	198,996	A
N8AA	1,998,723	B
N4TZ	1,518,804	B
W8JGU	1,229,352	B
W9OP	968,724	B
N9UA	948,441	B
W9RE	3,593,322	C
K8GL	3,058,776	C
VA3UZ	2,584,401	C
K9MA	2,307,102	C
N9CK	2,140,068	C

Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)

N0UR	688,884	A
K5AAR	72,750	A
NU0V	12,792	A
K1EQA	11,880	A
K5OI	9,450	A
W0UO	1,305,630	B
N5AW	1,022,292	B
VE5SF	794,592	B
W0ETT	750,360	B
K0RI	646,878	B
N2IC	4,455,429	C
N8SM	1,910,088	C
NR0X	1,622,484	C
K0CAT	1,420,389	C
K0GQ	1,385,202	C

West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)

N7IR	732,513	A
W6JTI	605,640	A
W8QZA	380,160	A
N6WS	174,195	A
W6JVA	127,734	A
K6LA	1,543,605	B
W7YAQ	1,413,828	B
N7OU	1,164,060	B
K7ZA	1,086,012	B
KN7Y	969,408	B
W6EEN (N6RT, op)	3,750,858	C
N6MJ (atW6KP)	3,607,713	C
W2VJN/7	2,238,966	C
K7MI	1,803,942	C
KC7V	1,664,832	C

SOAPBOX

I really enjoyed this year's contest! I even worked a few new ones! (AA9RR)… This is my second year of contesting, first time for ARRL DX CW and my best effort yet. A lot of fun, propagation was great to Europe. (AD6G)… This contest is an excellent occasion for QRPers to make many transatlantic QSOs. I've been working the contest in my spare time and though the results aren't excellent, I've had lots of fun QRPing with 3 W on 10, 15 and 20 meters. The antenna was a simple inverted-**V** dipole. See you next year! (IK0ZSN)… Good conditions! I enjoyed. (JH0IXE)… I had a great time in this contest breaking pile-ups with my QRP signal! The Elecraft K2 and the new call (K2CY) worked great together! (K2CY)… My best ever DX test with QRP and simple wire antennas in only 23.5 hours! (K3WWP)… Wow, what great conditions! Biggest thrill was pulling VP6BR out of a huge 40-meter pileup with 100 W and a dipole. He was a really great op, though.(K4IE)… The contest changes every year. What great conditions! Started late, just goofing around, and ended up with a mostly single-band effort. Couldn't stay away! (K5GN)… We had a severe ice storm, which resulted in detuning problems on my Force 12 beams. In addition, my ring rotor froze up, which prevented me from being able to rotate the 6-element 10-meter antenna. I foolishly climbed the ice-coated tower on Saturday afternoon and actually turned the antenna toward Europe for the Sunday morning 10-meter run. Fortunately, I did not have a mishap on the climb. (K5KG)… Well 10 meters was just awesome. I even got to run stations with just 100 W and a vertical! (KC9TV)… Giving out the DC multiplier is almost like being on a rare DX island! (KE3VV)… What conditions! There is no band like 10 meters! (N1DG)… Biggest thrill when VR2BG called me on 15 meters. Thanks to all who worked me. (N5RG)… Thanks for another great contest. This year I added a small tribander (TA-33JR) and I have more than doubled the number of Qs from last year. Had a wonderful time. Managed to work most all stations that I heard even while using 4.5 W. What a blast! Even had a run of JAs on 10 meters. Will certainly plan on being back next year. (VA3SB)… Surprised by the excellent conditions as we expected a solar storm. The VE6JY super station is certainly a pleasure to operate. Lots of aluminum in the air. (VE6WQ)… First contest I've really gotten into. Accidentally got caught up in the excitement and actually managed to work DXCC in the contest. Now all I have to do is get the QSLs sent and received to confirm it. (W0EB)… These were by far the best conditions we have ever seen in a DX contest. The high bands were absolutely outstanding! (W8AV)…After 20 hours my arm cramped, had a hard time sending. (WA2CPP)…

Scores

Scores are listed by DXCC Countries and ARRL\RAC Sections. Within each Country or Section, scores are listed in descending order, Single Op by power categories, then Single Band entries. All Single Assisted and Multioperator entries then follow. Line scores list call sign, score, QSOs, multipliers, power (A = QRP, B = Low Power, C = High Power, D = Multioperator), and band.

CW

W/VE

Single Operator

1

Connecticut

N1TM	564,480	784	240	A	
N1MT	16,371	107	51	A	
K1RO	2,362,491	2323	339	B	
W1EQ	1,118,040	1331	280	B	
W1RM	621,090	670	309	B	
K1NO (K5FUV,op)					
	357,480	993	120	B	
K1RT	327,015	507	215	B	
KA1JVR	113,742	267	142	B	
KA1VMG	4,050	50	27	B	
KQ2M	5,403,114	4278	421	C	
K1ZZ	5,001,150	3850	433	C	
W1NG	1,947,462	1553	418	C	
W1WEF	1,894,752	2064	306	C	
W1UK	1,086,981	1337	271	C	
N1RL	243,930	470	173	C	
K1OE	33,696	144	78	C	
K1VW	7,182	63	38	C	160
NT1N	672,816	2096	107	C	15
WA1FCN	115,560	535	72	B	15
K1RM	571,560	1732	110	C	10

Eastern Massachusetts

K1VUT	1,983,786	2086	317	B	
W1VIV	360,294	583	206	B	
N1EDM	302,064	464	217	B	
N3KCJ	257,277	449	191	B	
N1DS	174,960	360	162	B	
K1EP	140,535	347	135	B	
KQ1F	129,630	298	145	B	
W1EZ	122,181	293	139	B	
WU1F	90,906	218	139	B	
WA1OLV	86,652	249	116	B	
WA1WFH	54,036	158	114	B	
WT1O	37,350	150	83	B	
KC1WD	2,850	38	25	B	
K5MA	2,444,805	2245	363	C	
K1HT	1,203,168	1328	302	C	
K1GU	758,175	917	275	C	
W1TE	694,827	807	287	C	
W1FM	181,764	374	162	C	
KR1B	155,694	337	154	C	
WR1P	75,492	233	108	C	
W1OHM	37,800	140	90	C	
W1MK	196,830	810	81	C	80
K1DC	119,658	518	77	B	15
WS1M	120,120	616	65	C	10

Maine

W4ZGR	294,975	575	171	A	
NY1S	863,148	1006	286	B	
K1JB	336,141	663	169	B	
N1AO	205,578	423	162	B	
K1POS	529,815	715	247	C	
K1TGS	20,016	139	48	B	15
NY1E	56,256	293	64	B	10

New Hampshire

AA1CA	340,929	549	207	A	
WE1USA (WA1LNP,op)					
	2,329,065	2127	365	B	
NM1W	366,996	514	238	B	
K1NH	153,027	347	147	B	
WB1GEX	21,939	103	71	B	
W1END	9,216	64	4	B	
K1DG	4,761,477	3717	427	C	
KC1F	3,043,716	2834	358	C	
KR1G	2,822,040	2680	351	C	
WC1M	2,712,252	2852	317	C	
NR1DX	1,826,253	1573	387	C	
K1BV	504,972	1014	166	C	
WQ1H	70,896	211	112	C	

Rhode Island

K1VSJ	964,512	1182	272	B	
AB1BX	161,406	366	147	B	
KS1J	2,535,588	2508	337	C	

Vermont

W3SOH	553,212	726	254	B	
AA1SU	481,140	729	220	B	
WA1LIR	1,634,880	1703	320	C	
W1ZS	565,386	782	241	C	
AB1T	179,400	520	115	C	
W1ZK	88,917	277	107	C	
KK1L	6,660	60	37	C	

Western Massachusetts

WB9JBM	115,101	261	147	A	
W1CSM	1,359,906	1501	302	B	
N1PGA	98,280	280	117	B	
N1MGO	15,933	113	47	B	
K5ZD (W2SC,op)					
	4,860,504	3876	418	C	
W1RZF	795,615	899	295	C	
AE1B	168,264	684	82	C	15
W1KT	71,325	317	75	B	10

2

Eastern New York

K2DW	323,208	536	201	A	
W2QYA	20,661	97	71	A	
NA2M	340,431	559	203	B	
W2ENY	204,336	387	176	B	
KC2CRO	2,898	42	23	B	
W2XL	2,074,002	2147	322	C	
W2ZU	1,026,285	1235	277	C	
K2EP	515,592	682	252	C	
W2YK	324,783	523	207	C	
WX2N	18,432	128	48	B	15

NYC-Long Island

WA2VZQ	373,296	616	202	20	B
KA2D	225,036	399	188	B	
W3EH	106,752	256	139	B	
KG2BI	44,988	163	92	B	
N2GC	1,176,348	1174	334	C	
N2UN	1,025,820	1230	278	C	
WB2TPS	45,312	128	118	C	
WB2AMU	37,440	208	60	B	40
K2FMY	177,870	605	98	B	10
W2HLI	39,894	218	61	C	10
WB2ART	21,600	120	60	C	10

Northern New Jersey

KR2Q	1,201,335	1415	283	A	
K2DM	1,094,331	1271	287	A	
K2JT	299,970	505	198	A	
W2JEK	10,335	65	53	A	
NA2U	1,672,272	1764	316	B	
K2WA	281,088	488	192	B	
W2CVW	268,515	459	195	B	
W2UDT	233,856	464	168	B	
N2LK	200,334	386	173	B	
N2LT	3,614,940	3020	399	C	
W2EN	1,996,098	2041	326	C	
K2WK	1,102,608	1482	248	C	
WA2VYA	969,681	1229	263	C	
N7UN	506,520	670	252	C	
AB2DE	243,006	401	202	C	
N2ST	130,521	313	139	C	
WA2ASQ	31,755	145	73	C	20
AE2JL	30,408	181	56	C	15

Northern New York

WZ2T	297,414	533	186	A	
N2JNZ	3,828	44	29	A	10

Southern New Jersey

K1JT	584,907	809	241	B	
WA2VQV	303,912	504	201	B	
K2JF	275,388	433	212	B	
KK2CW	8,100	60	45	B	
KQ3E	7,434	59	42	B	
K2KID	12	2	2	B	
KX2CW	9	3	1	B	
WW2Y	2,672,991	2553	349	C	
N2MR	560,598	802	233	C	

Western New York

K2CY	16,740	90	62	A	
W2TZ	2,064,804	2092	329	B	
N2CU	1,380,825	1425	323	B	
N2WK	1,025,568	1187	288	B	
WB2ABD	663,408	816	271	B	
KM2L	590,085	837	235	B	
WA2EYA	480,012	724	221	B	
WA2YSJ	344,421	497	231	B	
K2CS	169,650	390	145	B	
WB2JFP	129,504	304	142	B	
K9EEE	31,317	143	73	B	
K2YW	23,310	111	70	B	
KB2QCW	1,701	27	21	B	
W2LC	2,782,188	2493	372	C	
K2NV	1,903,923	1929	329	C	
K2FU	1,456,128	1536	316	C	
KW2J	697,305	1015	229	C	
K2UA	660,348	1326	166	C	
W2EZ	310,662	523	198	C	
KX2H	296,820	510	194	C	
W2FUI	162,348	326	166	C	
AE2T	130,410	315	138	C	
WF2Y	63,135	183	115	C	
KV2X	10,998	78	47	C	
W2VO	2,574	33	26		160
W2FR	9,576	76	42	C	80
WB2DVU	64,326	302	71	B	40
N2PP	529,776	1698	104	C	15
N2MF	508,800	1600	106	C	15
WB2YQH	121,980	535	76	C	15
K2CF	34,944	224	52	B	10

3

Delaware

N8NA	536,940	785	228	B	
N9GG	26,973	111	81	B	

Eastern Pennsylvania

KB3TS	288,225	525	183	A	
K3PH	1,303,557	1483	293	B	
KB3MM	703,560	820	286	B	
WF3M	401,676	748	179	B	
WA3IIA	238,170	467	170	B	
W3BEN	137,700	300	153	B	
N3NZ	130,284	308	141	B	
N3EA	13,905	103	45	B	
KQ3F	2,494,800	2640	315	C	
K3ZA	753,267	977	257	C	
N3KR	641,940	823	260	C	
WT3W	585,882	807	242	C	
K4JLD	470,952	633	248	C	
N3RJ	431,115	701	205	C	
W3BYX	395,385	613	215	C	
W3KV	351,480	580	202	C	
K3QIA	173,346	346	167	C	
AA3JU	158,925	325	163	C	
K3VA	73,926	222	111	C	
W3EVW	29,250	130	75	C	
K3RR	7,134	58	41	C	160
K3SV	18,084	137	44	B	40
WA3NNA	1,998	37	18	A	40
W8IJ	6	2	1	C	40
NE3I	6,435	65	33	B	10

Maryland-DC

WD3P	15,423	97	53	A	
N1WR	1,133,406	1251	302	B	
W3DF	849,384	1004	282	B	
W3UJ	847,080	1086	260	B	
W3DAD	446,880	665	224	B	
KE3VV	365,070	566	215	B	
N3UMA	282,672	453	208	B	
W3BUY	236,295	445	177	B	
W3EE	137,640	296	155	B	
W3FQE	44,376	172	86	B	
K3YDX	38,016	144	88	B	
N3WK	13,050	75	58	B	
K3LO	8,085	55	49	B	
W3DQ	3,744	52	24	B	
WN3C	2,184	28	26	B	
K3ZO	4,543,200	3786	400	C	
K2PLF	1,989,972	2004	331	C	
W3AZ	607,932	866	234	C	
W3CP	59,598	301	66	B	10
W3GN	24,021	157	51	C	10

Western Pennsylvania

W3BBO	337,212	551	204	A	
K3WWP	279,552	512	182	A	
AA3GM	24,600	100	82	A	
WA3SES	286,635	485	197	B	
K3FH	130,065	299	145	B	
WA3EQJ	67,095	213	105	B	
NB4J	55,332	174	106	B	
KB3AZK	20,016	139	48	B	
K3CR (KB3AFT,op)					
	3,281,892	3022	362	C	
W3HDH	234,600	425	184	C	
WB3EPE	39,600	150	88	C	
K3MD	148,674	698	71	C	10
WO3Z	90,525	425	71	B	10
K3JHT	4,524	58	26	B	10

4

Alabama

W4NTI	474,525	703	225	B	
K4NVJ	55,935	165	113	B	
K4AGT	39,840	166	80	B	
K4AB	2,553,480	2460	346	C	
AG4W	1,458	27	18	C	80

Georgia

W4KYW	21,828	107	68	A	
K4OGG	1,627,164	1761	308	B	
N8LM	465,786	687	226	B	
W4TED	200,718	378	177	C	
K4TEA	6,960	58	40	C	160
N4DU	1,188	22	18	B	160
N4NX	102,375	375	91	B	10
K6EID	87,696	406	72	B	10

Kentucky

KG4BIG	367,155	597	205	B	
K4AO	1,255,995	1469	285	C	
K4IE	810,768	1064	254	C	
K4IU	139,329	339	137	C	
WB4ZDU	106,020	310	114	C	
KA4JMZ	35,526	191	62	B	15
K4FXN	50,799	287	59	B	10
N4XM	24,327	159	51	B	10

North Carolina

K4EYE	9,699	61	4	A	
WJ9B	1,045,836	1254	278	B	
KF4OAD	40,905	135	101	B	
AE4EC	10,098	66	12	B	
N4AF	3,466,683	3201	361	C	
K4MA	2,813,940	2895	324	C	
W4MR (N4CW,op)					
	2,080,206	2127	326	C	
N4AA	330,096	529	208	C	
N4UH	3,654	42	29	C	
KZ2I	78,771	341	77	C	40
N4TL	240	10	8	C	40
K5LZT	1,125	25	15	B	15
W4ZV	570,723	1847	103	C	10

Northern Florida

K9BG/4	549,780	748	245	B	
KN4Y	70,620	220	107	B	
W2EJG	68,076	186	122	B	
W4YA	53,301	163	109	B	
N4GI	1,109,952	1504	246	C	
WA4IMC	1,096,110	1282	285	C	
W7QF	204,852	397	172	C	
AE4NJ	103,359	263	131	C	
N4PN	330,960	1379	80	C	10

South Carolina

WA9FWO	46,002	187	82	A	
K4DLJ	1,146,684	1309	292	C	
W3VT	1,051,392	1184	296	C	
AF4OX	1,049,727	1351	259	C	
N4GJ	137,295	339	135	C	
WB4NRI	74,664	183	136	C	
K0COP	55,554	197	94	C	
N2FY	11,610	90	43	C	80
W4JKC	65,490	295	74	B	40

Southern Florida

WA3NKO	347,616	568	204	A	
N2PK	493,767	661	249	B	
K4ZT	97,500	250	130	B	
WA2CPP	83,916	222	126	B	
K1PT	2,427,075	2345	345	C	
N3II	469,728	699	224	C	
N4CU	2,415	35	23	C	
W4GD	4,224	44	32	B	160
W2YX (N4PL,op)					
	38,211	271	47	C	80
WB4OSN	123,084	526	78	C	40
NA4CW	256,824	984	87	C	15
W6HJ	11,088	88	42	C	15
N4GM	54,288	232	78	B	10

Tennessee

N1CWR	366,513	563	217	A	
K0EJ	1,924,272	1932	332	B	
NA4K	1,014,420	1166	290	B	
K4BEV	421,080	638	220	B	
N4UW	315,192	571	184	B	
W4TYU	238,095	429	185	B	
N4KN	172,530	426	135	B	
AC4JI	132,741	301	147	B	
WD4OHD	73,920	220	112	B	
W4HZD	48,888	168	97	B	
AA4WX	855	19	15	B	
NN4T	1,749,825	1925	303	C	
K4RO	1,534,767	1711	299	C	
N4ZI	1,458,096	1642	296	C	
N4DW	1,097,928	1224	299	C	
W4NI	20,313	111	61	C	
W4OGG	6,804	54	42	C	
K1KY	2,139	31	23	C	160
W4NZ	296,088	949	104	C	20
K4WX	471,870	1498	105	C	15
WO4O (at K4JNY)					
	392,268	1348	97	C	10
K4AMC	276,078	1034	89	C	10
N4IR	232,050	910	85	C	10

Virginia

N3BJ	927,360	1104	280	A	
N4UY	41,652	156	89	A	
KC4TVN	20,280	104	65	A	
KC4GIA	17,340	85	68	A	
W4HM	767,496	904	283	B	
K4FPF	698,058	834	279	B	
K4UVT	607,530	770	263	B	
AB4I	319,806	489	218	B	
AA4KD	195,714	393	166	B	
K6ETM	125,712	291	144	B	
K3SS	120,060	290	138	B	
N3TG	72,105	209	115	B	
W4SD	20,493	99	69	B	
N3ZYU	18,900	90	70	B	
W4YE	1,237,602	1318	313	C	
W0YR	1,165,752	1512	257	C	
N4MM	391,980	556	235	C	
N3JT	273,000	500	182	C	
W4IF	198,360	435	152	C	
N6MW	172,074	241	238	C	
K4VV	164,850	350	157	C	
N4OHE	136,590	314	145	C	
K4FOY	120,984	284	142	C	
K5VG	35,190	138	85	C	
N8AID	28,392	104	91	C	
WK4Y	66,300	340	65	B	40
K4RDU	32,391	177	61	B	20
KA4RLJ	1,368	24	19	B	20
K4OAQ	404,130	1418	95	C	15

West Central Florida

K1TO	3,073,590	2627	390	B	
WD4AHZ	1,089,972	1326	274	B	
N4IG	1,082,565	1215	297	B	
K4LQ	902,748	977	308	C	
N4TO	429,828	602	238	C	
N4AO	119,472	304	131	C	
K4XS	563,274	1647	114	C	20

5

Arkansas

KG5RM	68,640	220	104	B	
KF5PN	41,760	160	87	B	
KJ5WX	33,702	137	82	B	
KM5G	1,836,900	1950	314	C	
W5RZ	200,088	397	168	C	
N5DX	485,130	1570	103	C	15

Louisiana

W5WZ	6,201	53	39	A	
K5KLA	1,215,228	1258	322	B	

K5QK	170,499	353	161	B	
W5LA	150,150	325	154	B	
W5WMU	2,429,040	2320	349	C	

Mississippi

W5XX	2,030,259	2057	329	C	
WA5OYU	797,160	1022	260	C	

New Mexico

K5OI	9,450	75	42	A	
N7KA	865,800	975	296	C	
W5JRP	26,640	148	60	B	20
W6PU	300,573	1101	91	C	15
N7DF	337,548	1223	92	B	10

North Texas

WD5K	1,347,795	1473	305	B	
W0UO	1,305,630	1335	326	B	
N5AW	1,022,292	1167	292	B	
N5KB (KK7JS,op)					
	437,472	868	168	B	
KT5Q	276,804	466	198	B	
KY5N	240,075	485	165	B	
N5DUW	163,152	309	176	B	
WK5K	108,288	256	141	B	
K5RA	94,488	254	124	B	
WB5KAU	70,104	184	127	B	
K5WZI	38,070	135	94	B	
W5SQA	22,119	101	73	B	
NN5T	9,828	84	39	B	
N8SM	1,910,088	1912	333	C	
N5PO	1,357,515	1455	311	C	
K5OT	1,193,640	1421	280	C	
N5RG	1,188,732	1357	292	C	
N5JR	994,290	1310	253	C	
K5RX	477,855	1517	105	C	10
K6AZA	1,122	22	17	C	10

Oklahoma

K5AAR	72,750	194	125	A	
K0CIE	118,404	299	132	B	
N5OHL	25,872	112	77	B	
K2BA	279,090	886	105	C	20
K5HP	217,899	781	93	C	10

South Texas

K8EP	578,250	771	250	B	
K5LJ	250,848	416	201	B	
KA5KLU	247,338	453	182	B	
AJ4F	146,475	315	155	B	
KE5LQ	71,940	218	110	B	
W5BBR	10,863	71	51	B	
NX5M	1,782	27	22	C	160
K5NZ	178,755	701	85	C	40
KN5G	114,660	455	84	C	40
KD5EDO	15,288	104	49	B	20
K5GN	435,900	1453	100	C	15

West Texas

NZ5M	216	9	8	B	20

6

East Bay

K6WV	570,240	792	240	B	
KE6QR	3,876	68	19	B	
K6XV	85,020	260	109	C	

Los Angeles

K6LA	1,543,605	1687	305	B	
KQ6ES	354,816	616	192	B	
K6DDO	217,704	376	193	B	
N6GL	145,188	327	148	B	
WA6BIL	134,784	312	144	B	
K6ASK	31,500	125	84	B	
KH6DX/W6	25,479	149	57	B	
K6CEO	24,156	122	66	B	
N6ED	1,253,493	1763	237	C	
N6AA	1,140,615	1207	315	C	
W7RF	180,198	426	141	C	
N6IC	101,472	302	112	C	
K6SE	29,673	157	63	C	
KU6T	348,783	551	211	B	40
NK6A	32,922	177	62	C	15
W6ZH	10,989	99	37	A	10

Orange

AA6PW	508,245	1093	155	B	
W6TMD	440,202	658	223	B	
KG6O	345,072	553	208	B	
W6ZL	204,984	468	146	B	
W6SA	182,397	373	163	B	
KA6SAR	125,055	397	105	B	
W6EEN (N6RT,op)					
	3,750,858	3273	382	C	
N6MJ (at W6KP)					
	3,607,713	3259	369	C	
W6DCC	242,880	460	176	C	
K6HRT	49,086	202	81	C	
N6ER	2,112	44	16	C	

Santa Barbara

N6WS	174,195	395	147	A	
WA6FGV	306,138	518	197	B	
WA5VGI	1,095,654	1373	266	C	
W6TK	841,776	1136	247	C	
W7CB	78,540	385	68	C	40
W6OUL	13,200	100	44	B	20
N6HK	33,300	185	60	C	15

Santa Clara Valley

W6IO	90,720	280	108	A	
N6NF	664,830	890	249	B	
W6PLJ	302,244	566	178	B	
W9MAK	129,690	330	131	B	
WD6DX	108,360	301	120	B	
K6XX	867,600	1205	240	C	
N7FF	271,728	629	144	C	
K6GT	248,160	517	160	C	
AJ6V	8,316	84	33	C	
N6IV	4,536	54	28	C	
K6MO	75	5	5	B	160
K8PO	260,580	1010	86	C	40
K6III	66,822	301	74	A	15
W6PRI	3,999	43	31	B	15
NU6S	201,960	765	88	B	10

San Diego

W8QZA	380,160	660	192	A	
W6JVA	127,734	349	122	A	
AD6G	117,360	326	120	B	
AA6EE	53,100	177	100	B	
W6MVW	345,126	593	194	C	
W6YA	312,000	1040	100	C	10
WN6K	138,510	570	81	C	10

San Francisco

W6JTI	605,640	824	245	A	
K6UM	414,120	595	232	B	

San Joaquin Valley

W6UDX	76,680	213	120	C	
K6CSL	58,608	264	74	C	
N6MU (at N6NB)					
	277,488	984	94	C	10
KA6BIM	256,641	847	101	C	10

Sacramento Valley

N6WR	18,522	126	49	A	
KU6J	365,949	557	219	B	
K6KYJ	239,904	476	168	B	
N6JM	237,519	463	171	B	
K6UO	57,570	190	101	B	
W6EO	6,156	54	38	B	
K6DB	1,019,280	1240	274	C	
K6SRZ	551,628	796	231	C	
W6RFF	313,728	608	172	C	
W6NKR	152,100	390	130	C	
K6FO	120,576	256	157	C	
WF6O	45,435	233	65	C	
K6RN	26,598	143	62	C	15

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Arizona

N7IR	732,513	901	271	A	
K7FB	126,630	402	105	A	
NQ7X	86,400	240	120	A	
KN7Y	969,408	1188	272	B	
WN7J	594,048	832	238	B	
KJ7WY	222,372	426	174	B	
W2HTX	113,436	274	138	B	
KX7J	34,383	157	73	B	
NN7A	33,660	132	85	B	
KI7LS	9,504	72	44	B	
KC7V	1,664,832	1856	299	C	
W7YS	547,281	833	219	C	
N7JXS	210,438	433	162	C	
NU7V	21,312	111	64	C	
K2DI	12,462	67	62	C	
KN5H	1,173	23	17	C	
K7WP	118,125	525	75	C	40
N7VY	15,840	110	48	A	40
K6LL	454,803	1501	101	C	15
W7ZMD	1,302	31	14	C	15
N7KU (NJ6D,op)					
	405,720	1380	98	C	10
W7AYY	57,888	288	67	C	10
W7USA	47,742	218	73	B	10

Eastern Washington

WS7V	129,258	334	129	B	
W7GB	107,100	300	119	B	
N7YRT	22,401	131	57	B	
KC7WUE	3,432	52	22	B	
W7LGG	185,796	397	156	C	
K7EFB	4,611	53	29	B	10

Idaho

W1HUE	39,123	161	81	A	
WX7G	30,192	136	74	A	
W7QDM	523,920	740	236	B	
WO7Y	91,047	341	89	B	
W7II	30,099	127	79	B	
K7MK	6,480	72	30	B	
K0IP	14,310	90	53	C	
KA7T	54,450	275	66	B	20

Montana

KS7T	358,614	687	174	C	
K7BG	306,729	591	173	C	
KC7UP	93,372	251	124	C	

Nevada

KB7OVS	16,758	114	49	B	
WA6IQM	123,984	504	82	C	40
W6RCL	990	33	10	B	10

Oregon

W7YAQ	1,413,828	1482	318	B	
N7OU	1,164,060	1338	290	B	
KA7FEF	11,130	106	35	B	
K7EL	3,168	48	22	B	
W2VJN/7	2,238,966	2157	346	C	
K7MI	1,803,942	2163	278	C	
W7PXL	102,912	268	128	C	
K7EM	337,974	1238	91	C	40
K7ZUM	95,550	490	65	C	15
N7ZW	5,850	65	30	B	15
AA7LE	6,324	62	34	B	10

Utah

KE7NS	433,608	712	203	B	
W7HS	113,841	273	139	B	
AK7O	52,716	191	92	B	
N7IF	49,215	193	85	B	
NZ7T	47,502	174	91	B	
W8EQA	125,775	559	75	C	
KJ7CU	10,965	85	43	C	

Western Washington

W7/JR1NKN	24,477	199	41	A	
K7ZA	1,086,012	1244	291	B	
N7AN	889,380	1220	243	B	
AB7RW	385,560	714	180	B	
K1LKR	78,324	244	107	B	
AA7PM	29,760	155	64	B	
W7TGO	28,743	143	67	B	
NA7R	13,068	99	44	B	
N7TT	1,481,739	1907	259	C	
W7QN	369,954	663	186	C	
W7IIT	338,040	626	180	C	
W7GSW	232,470	410	189	C	
WA2OCG	35,340	155	76	C	

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Michigan

W8KX	571,113	713	267	B	
K8IR	521,100	772	225	B	
K8CV	245,952	427	192	B	
K8SIA	217,152	377	192	B	
W8WVU	94,416	281	112	B	
KC8FXR	93,366	273	114	B	
K8KU	92,202	254	121	B	
W8FEM	34,338	118	97	B	
N8NX	24,960	130	64	B	
K8GL	3,058,776	2499	408	C	
AA8U (WB8T,op)					
	2,017,800	2280	295	C	
N8KR	436,224	568	256	C	
KB8TI	404,244	591	228	C	
W8TWA	18,624	97	64	C	
AA8PA	16,416	76	72	C	
KB8PGW	16,020	89	60	C	
W8UE	21,783	137	53	B	40
W8UD	155,376	664	78	C	15
WA8OLD	21,024	146	48	B	15
W8WA	451,881	1357	111	C	10

Ohio

WA8RCN	418,500	620	225	A	
W8GOC	242,874	393	206	A	
W8ILC	198,996	412	161	A	
K8UCL	46,719	179	87	A	
K9DTB	37,944	136	93	A	
KA8NRC	29,202	157	62	A	
AA8IV	720	16	15	A	
N8AA	1,998,723	1909	349	B	
W8JGU	1,229,352	1448	283	B	
K8MR	782,145	955	273	B	
W8UPH	547,860	794	230	B	
WB8ZWY	483,960	740	218	B	
K8AB	334,191	533	209	B	
W8IDM	271,296	471	192	B	
W8VE	186,720	389	160	B	
WT8P	162,540	430	126	B	
N8LBI	78,987	233	113	B	
W8AZA	54,054	198	91	B	
AF8C	29,187	141	69	B	
KV8Q	22,950	90	85	B	
W8K (W8KH,op)					
	10,335	65	53	B	
W8DD	5,346	54	33	B	
W8PN	178,416	354	168	C	
WA8NVW	2,112	32	22	C	
K8DX	592,686	1733	114	C	15
ND8DX	63,504	294	72	B	15
N8AGU	113,883	493	77	C	10

West Virginia

N4ZR	2,037,960	2295	296	C	
K3JT	1,526,040	1620	314	C	
K2UOP	1,003,101	1243	269	C	
W8UMR	50,370	230	73	B	20
W3SAL	24,915	151	55	B	10

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Illinois

KE9EX	7,800	52	50	A	
K9MMS	941,460	1105	284	B	
KG9X	793,737	903	293	B	
W9IL	757,350	990	255	B	
K9YA	703,836	931	252	B	
N9JF	663,936	988	224	B	
W9ILY	475,200	704	225	B	
K9JE	438,243	661	221	B	
WA9TPQ	425,565	735	193	B	
W9SZ	406,752	608	223	B	
K9CS	276,012	451	204	B	
K9PPW	133,155	269	165	B	
AA9KH	119,511	271	147	B	
N9NT	117,936	273	144	B	
W9EBY	112,398	262	143	B	
K9KM	92,568	232	133	B	
N9NW	21,210	101	70	B	
W9YS	16,878	97	58	B	
W9LYA	2,856	34	28	B	
K9UQN	425,718	706	201	C	
W9OA	295,830	570	173	C	
K9ZO	237,072	449	176	C	
N9WKW	74,169	201	123	C	
W9YK	66,000	200	110	C	
W9AX	35,376	134	88	C	
AA9NF	25,872	112	77	C	
AA9IV	1,404	26	18	C	80
K9CJ	36,096	188	64	C	40
N9HT	23,490	135	58	B	20
W9DY	4,278	46	31	B	15
W9XG	437,472	1519	96	C	10
K9OM	240,000	640	125	B	10
K9WA	163,527	599	91	B	10
W9OF	57,297	269	71	C	10

Indiana

W9FHA	19,845	105	63	A	
K9DIY	2,400	40	20	A	
N4TZ	1,518,804	1722	294	B	
KJ9C	1,350,051	1447	311	B	
W9RE	3,593,322	3246	369	C	
W9KTP	224,700	428	175	C	
KC9OP	54,912	176	104	C	
WA9S	46,800	208	75	C	20

Wisconsin

AF9J	24,780	118	70	A	
W9OP	968,724	1137	284	B	
N9UA	948,441	1079	293	B	
W9WUU	512,568	756	226	B	
WD8AHR	417,360	740	188	B	
N9CIQ	335,400	559	200	B	
N9EZ	222,075	423	175	B	
K9IY	56,163	193	97	B	
W9DYG	23,490	135	58	B	
W9HR	8,280	60	46	B	
K9MA	2,307,102	2282	337	C	
N9CK	2,140,068	2044	349	C	
WI9WI	576,810	986	195	C	
K0SN	558,720	970	192	C	
AA9RR	93,666	233	134	C	
W9GXR	56,721	259	73	C	40
K9CAN	92,004	374	82	C	20
NI9C	201,228	818	82	B	15
K9RO	73,629	303	81	A	15
KB9RBN	1,710	30	19	B	10

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Colorado

K1EQA	11,880	90	44	A	
W0ETT	750,360	962	260	B	
K0RI	646,878	823	262	B	
N0IBT	50,955	215	79	B	
AB0IO	40,734	146	93	B	
WB0HZL	28,644	124	77	B	
N2IC	4,455,429	3649	407	C	
W0GG	817,020	1020	267	C	
W0ZP	542,322	913	198	C	
K0UK	241,839	507	159	C	
KV0Q	317,772	1164	91	C	40
AE0Q	46,050	307	50	B	15
N0NR	407,187	1371	99	C	10
W0TM	394,308	1217	108	C	10

Iowa

NU0V	12,792	82	52	A	
K0CF	350,682	554	211	B	
AA0AI	207,522	427	162	B	
NE0P	146,010	314	155	B	
NR0X	1,622,484	1629	332	C	
W0NFL	217,620	390	186	C	
N0AC (WA0ROI,op)					
	87,147	421	69	C	40
W0ETC	36,093	227	53	C	10

Kansas

W0EB	122,598	278	147	B	
W0UY	112,875	301	125	B	
W0YRN	49,290	155	106	B	
KB0WPY	30,099	127	79	B	
K0BJ	609,960	782	260	C	
W0RT	191,709	357	179	C	
KG0UA	159,795	335	159	C	

Minnesota

N0UR	688,884	973	236	A	
W0UC	86,676	233	124	B	
K0KGS	76,593	211	121	B	
WB0GGM	53,400	200	89	B	
WA0BNX	21,300	100	71	B	
AA0ZV	10,050	67	50	B	
K0CAT	1,420,389	1697	279	C	
W0ML	549,567	807	227	C	
KE0UI	526,680	770	228	C	
W0ZQ	416,292	614	226	C	
K0AD	87,750	250	117	C	
WA0MHJ	12,654	114	37	C	
K0IHG	19,557	123	53	B	20
K0IR	501,408	1741	96	C	15
WR0DK	39,537	191	69	B	10

Missouri

KI0HQ	84,672	252	112	B	
W0MZF	76,908	221	116	B	
K2HT	17,466	82	71	B	
KA0P	17,202	94	61	B	
K0GQ	1,385,202	1534	301	C	
W0TT	470,475	765	205	C	
KS0M	223,470	390	191	C	
K0JPL	191,688	392	163	C	
NS0Z (K9BGL,op)					
	271,620	1006	90	C	40
K2VV (at K4VX)					
	539,514	1854	97	C	15
K4VX (W9WI,op)					
	534,189	1763	101	C	10
N9HDE	7,350	70	35	B	10

Nebraska

KT0K	417,795	805	173	B	
NF0N	183,414	397	154	B	
AB0FX	130,968	321	136	B	
WN0L	61,254	249	82	B	
K0OAL	12,804	97	44	C	10

VE

New Brunswick

VE9DX	159,984	264	202	B	

Nova Scotia

VE1ZJ	195,324	794	82	C	40

Newfoundland-Labrador

VO1WET	79,968	238	112	B	
VO1MP	199,584	792	84	B	10

Quebec

VE2ABO	2,232	31	24	A	
VE2AWR	885,225	1073	275	B	
VE2FFE	9,729	69	47	B	
VE2AYU	1,565,487	1757	297	C	

Ontario

VE3KZ	602,112	784	256	A	
VA3SB	229,614	497	154	A	
VE3KP	842,700	1060	265	B	
VE3ZPD	825,192	942	292	B	
VA3TEE	402,069	601	223	B	
VE3GFN	374,100	580	215	B	
VE3STT	236,250	450	175	B	
VE3ZT	193,884	428	151	B	
VA3UZ	2,584,401	2273	379	C	
VE3DO	2,139	31	23	C	160
VA3TTT	80,109	387	69	B	15
VE3MQW	63,342	306	69	B	15
VE3HG	36,300	220	55	C	15
VA3UA	164,328	668	82	B	10
VE3IAY	61,758	219	94	B	10
VA3SWG	3,444	41	28	C	10

Manitoba

VE4IM	639,471	823	259	C	
VE4MF	31,590	130	81	B	15
VE4VV	232,560	816	95	B	10

Saskatchewan

VE5SF	794,592	1068	248	B	

Alberta

VE6BIR	76,275	225	113	A	
VE6YP	170,880	320	178	C	
VE6EPK	19,323	113	57	C	
VE6JY	1,827	29	21	C	80
VE6BMX	1,050	25	14	B	40
VE6BF	391,872	1256	104	C	20
VE6EX	111,714	433	86	B	20
VE6WQ (at VE6JY)					
	674,325	2025	111	C	15

British Columbia

VE7XF	523,146	706	247	B	
VA7DX	318,060	589	180	B	
VE7VR	263,712	536	164	B	
VE7QO	236,685	509	155	C	
VE7SL	741	19	13	B	160
W7DRA/VE7	1,935	43	15	B	40
VE7VF	100,302	458	73	B	10

Northwest Territories

VY1JA	17,898	157	38	B	

Single Operator Assisted

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KI1G	5,747,469	3983	481	C	
K1ZM	4,989,738	3763	442	C	
K1IR	3,819,060	2940	433	C	
W1CU	1,891,707	1621	389	C	
K2TE	1,853,118	1674	369	C	
K1OA	1,797,264	1783	336	B	
N1CX	1,794,654	1671	358	B	
K2RD	1,679,625	1493	375	C	
N6RFM	1,673,880	1480	377	C	
N4XR	1,500,240	1316	380	C	
K1VV	1,210,416	1208	334	C	
N1AU	1,154,979	1323	291	C	
N1DG	1,151,532	1103	348	C	
W1QK	1,145,184	1264	302	C	
W1BIH	1,077,363	1047	343	C	
NQ1K	1,037,130	955	362	C	
W1WFZ	885,843	903	327	C	
K1RV	764,664	844	302	C	
K1HI	749,787	853	293	C	
NZ1Q	719,364	794	302	C	
K1TS	705,600	960	245	C	
AA1V	508,089	659	257	C	
K1JE	501,024	614	272	C	
K1NU	432,432	528	273	C	
N1SP	402,990	505	266	B	
AA1QD	360,054	498	241	B	
K1TH	328,962	503	218	C	
K1AE	277,008	398	232	C	
K1JN	265,518	447	198	C	
NC1N	219,225	395	185	B	
W1SRG (N1XYR,op)					
	197,220	380	173	C	
K1KU	195,468	358	182	C	
N1KWF	191,166	422	151	C	
W1HR	182,682	306	199	C	
K1MY	172,872	294	196	C	
N1NQD	75,816	162	156	C	
K1TW	7,749	63	41	B	
K8CH	3,528	42	28	C	

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K2NG	4,473,585	3351	445	C	
W2GD	3,709,476	2889	428	C	
K2XA	3,653,184	2872	424	C	
K2BU	2,914,080	2335	416	C	
N1EU	2,882,745	2209	435	C	
K5KG	2,389,920	2080	383	C	
K2SX	2,343,168	2034	384	C	
W1GD	2,156,673	1877	383	C	
K2NJ	2,131,767	2013	353	C	
NO2R	1,702,935	1599	355	C	
K2ONP	1,531,056	1336	382	C	
WK2G	1,280,718	1282	333	C	
W2GDJ	1,229,445	1301	315	C	
K2PS	1,179,360	1248	315	C	
KF2O	1,082,016	884	408	C	
K2SB	870,912	864	336	C	
W2LE	745,521	917	271	C	
K2XF	703,296	792	296	C	
W2YR	614,880	672	305	C	
N1JP	517,638	713	242	C	
K2BM	515,799	669	257	C	
N2ATX	489,159	671	243	B	
WB2WPM	476,406	597	266	C	
K2OWE	428,244	562	254	C	
N2MG	397,896	562	236	C	
N2CQ	322,503	557	193	C	
K2BX	225,810	386	195	C	
KD2P	224,652	386	194	C	
K2RW	205,326	374	183	C	
N2VW	193,050	325	198	C	
K2UT	134,919	263	171	B	
N2BIM	58,650	230	85	C	
AA2WQ	33,480	124	90	B	
K2CO	30,702	119	86	C	

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K3WW	5,526,648	3903	472	C	
W2UP	3,880,602	3102	417	C	
N3RR	3,468,330	2670	433	C	
AA3B	3,293,784	2652	414	C	
W3FV	2,471,700	2140	385	C	
K3SA	2,388,498	1961	406	C	
N3AM	2,294,784	1992	384	C	
K3NZ	1,960,560	1680	389	C	
K3NW	1,569,678	1399	374	C	
NN3Q	1,553,364	1514	342	C	
K3ND	1,320,099	1199	367	C	
W3HVQ	1,268,634	1334	317	C	
W3OV	1,206,162	1186	339	C	
N3ZA	1,112,598	1094	339	C	
K3II	1,111,824	1103	336	C	
K3PP	1,071,882	987	362	C	
K3CP	923,160	980	314	C	
W8FJ	874,800	900	324	C	
WT3P	846,888	994	284	C	
WA3KPP	760,500	975	260	B	
W3GK	730,224	922	264	C	
KE3VN	718,200	840	285	C	
N3MKZ	695,856	763	304	C	
W3EKT	558,090	702	265	C	
K3UG	550,800	675	272	C	
K2YWE	443,445	629	235	B	
W3IZ	354,978	533	222	C	
W3UL	352,563	527	223	C	
WQ3E	196,695	423	155	C	
W3OU	194,994	314	207	C	
W3AG	189,525	361	175	B	
W3CF	131,898	247	178	C	
K3TG	26,196	118	74	B	
K3CT	23,625	125	63	C	
4U1WB (AJ3M,op)					
	72	12	2	C	

4

W4NF	2,020,305	1897	355	C	
K3KO	518,847	797	217	C	
NT4D	460,836	612	251	C	
W4WA	390,264	644	202	C	
K4WW	281,967	463	203	B	
N4RV	211,464	396	178	C	
W4PA	110,856	298	124	C	
W4WNT	84,189	211	133	C	
KE4OAR	32,103	123	87	B	

5

K5NA	2,606,256	2011	432	C	
KR5V	1,409,808	1277	368	C	
K5MC	668,568	712	313	C	
AA5AU	532,404	643	276	C	
K5AM	147,294	294	167	C	

6

W6OAT	1,292,598	1422	303	C	
N6HC	1,100,550	1265	290	C	
N6JV	956,175	1045	305	C	
KI6T	547,092	668	273	C	
K6RO	540,465	685	263	C	
K6RIM	145,866	322	151	C	
NF6R	142,290	306	155	C	
N6EE	62,118	174	119	C	
K6JG	45,864	147	104	C	

7

W7GG	1,418,634	1701	278	C
AA7A	1,224,600	1256	325	C
W7OM	1,053,216	1219	288	C
W1XT	835,035	895	311	C
K7ABV	561,600	936	200	C
K7KJ	114,648	281	136	C
K7ZO	44,616	169	88	B

8

N8BJQ	1,846,896	1744	353	C
NC8V	248,994	477	174	C

9

W9XT	2,090,799	1899	367	C
K9NR	1,084,200	1112	325	C
KC9TV	224,613	423	177	B
N9XX	201,960	360	187	C

0

N0AT	1,641,255	1595	343	C
KG0US	293,280	470	208	B
K0IL	222,066	338	219	B
K0BX	117,786	293	134	C
KK0DX	103,095	237	145	B
KB0VVT	54,774	179	102	B

VE

VA2FB	257,145	553	155	B
VE3RZ	716,784	872	274	B
VE4COZ	121,716	294	138	B

Multioperator Single Transmitter

1

WT1T (WO1N,W1ES,K1TWF,K1ZA, W1TQ,K1WD,ops)
3,265,512 2642 412 C

AA1ON (+W1RH)				
	2,312,400	1880	410	C
N1MD (+KZ1M)				
	1,255,824	1368	306	C
W1ES (+KB1EKJ)				
	954,018	1053	302	C
W1CC (+N1BSO)				
	102,102	221	154	C

2

AA2FB (+K2QMF)				
	4,078,656	3104	438	C
W2AA (at N2TX) (W2XX,N2TX,ops)				
	4,005,450	2967	450	C
N2GA (at K2KV) (+WM2V,W2AX)				
	2,952,378	2442	403	C
W6XR (+N2AU,N2VR)				
	2,701,089	2291	393	C
K2UG (+KY2J,WA2JQJ)				
	2,242,392	1864	401	C
N1NY (+N2IX,W2RE,N2IW)				
	1,856,400	1768	350	C
N2LBR (+WA1KKM)				
	1,095,000	1250	292	C
K3KYR (+K2JPM)				
	458,586	698	219	C

3

W3BGN (+K2TW)				
	5,550,636	3887	476	C
NE3F (+KS3F,K3ATO)				
	2,275,416	2028	374	C
W3LJ (+K3NCO)				
	297,984	512	194	C

4

K4OJ (+N4KM,W1CW)				
	3,912,480	2964	440	C
N4WW (+K0LUZ)				
	3,721,302	3078	403	C
W4PRO (+K4IX, N8CH, W4ZYT, WB4DNL)				
	1,253,628	1164	359	C
W4AUB (+N4AU,K4IZN)				
	358,938	578	207	C

5

WX0B (AD5Q,N5NJ,N5QQ,K5WO, OH7WV,N5CK,N5YA,N5UM,ops)
4,095,198 2974 459 C

N5CQ (+K5TR,N2LA)				
	3,220,344	2631	408	C
NA5B (+W5AO,K5TT,K5ZG,K5PX, AB5I,NA5B)				
	2,763,033	2639	349	C

6

W6YX (W6KNS,W6LD,N7MH,ops)				
	2,168,100	2190	330	C
K6ZM (K6WG,RA0FC,ops)				
	1,403,622	1683	278	C
W1HIJ (at K6CBS) (+K7GT)				
	1,193,757	1513	263	C
W6YRA (WA6AYI,WA7WYE,KU6T,ops)				
	16,848	144	39	C

7

N7NG (+W6EU)				
	2,322,246	2218	349	C
AD7U (+N6HR)				
	1,810,560	1840	328	C
W7CT (+NG7M)				
	1,722,918	1829	314	C
K7RI (+N0AX/7,K7LXC,KW4T,K7ST)				
	1,381,488	1693	272	C

9

K9SD (+K9SD,KA0GGI,KI9A,K9DD)				
	2,656,332	2324	381	C
WN9O (+W9IU)				
	2,110,098	1943	362	C

0

KE0A (+N0FW,KE0T,KC0BUD)				
	1,395,279	1667	279	C
N0MJ (+W0GJ)				
	780,516	803	324	C

VE

VE6AO (VE6CIZ,VE6EPK,VE6JAZ, VE6KC,VE6RTL,VE6EX,VE6IC,VE6JO, VE6KG,VE6TC,ops)
897,000 1150 260 C

VE7IN (+VE7FO)
602,976 1142 176 C

Multioperator Two Transmitters

N2RM (+N2AA,N2NC,N2NT,W2RQ)
10,693,221 6613 539 C

K1AR (+K1EA,N6IG)
10,629,135 6501 545 C

K8AZ (+K8BL,K8NZ,W8CAR,W8GN, W8KIC,N8TR,ND8L,WT8C)
8,586,756 5547 516 C

N3RS (+N3RD,N3ED,K3WU)
7,861,641 5381 487 C

W8AV (+K4LT,K8KM,KU8E,KI8IZ, W8RZ)
6,400,044 4578 466 C

K8LX (+K8GM,N8EA)
6,080,430 4205 482 C

N5TW (K5PI,W5TD,WQ5G,WS4G, KE5C,AF5Z,K5LN,N5IW,ops)
4,682,232 3681 424 C

KB1H (+K1EBY,NB1U,AA1CE,N1XS, KB1DFB)
4,675,212 3558 438 C

N0IJ (+AA0BY,AF9T,WJ0M)
4,530,864 3562 424 C

W8ZA (+K8OQL,N8II,WD3A)
3,419,040 2720 419 C

WR3L (+N3NT,AA3SC)
3,269,916 2652 411 C

W0AIH (KT0R,AA0ZZ,WV3B,ops)
3,012,240 2608 385 C

N1RR (+WM1K,KM1P)
2,249,994 1943 386 C

VE1JF (+VE1JS,VE1MOO)
1,445,703 1601 301 C

W2CG (+W2NO,KB5U)
966,966 1001 322 C

Multioperator Unlimited Transmitters

W3LPL (+K1HTV, WB2FFY, W2GG, AI3M, K3MM, N3OC, K3RA, KT3Y, WR3Z, KD4D, K4ZW, K9GY)
14,083,200 7824 600 C

K3LR (+W3YQ,VE3EJ,VA3RU,N9RV, NI3S,K8CX,K3UA,N3RA,N3GJ,K9VV)
13,997,340 7935 588 C

KC1XX (+AD1C,W1FV,K1GQ,K1TR, K1XX,KM3T,T93M)
13,281,246 7453 594 C

K1XM (+NB1B,W1FJ,W1KM)
12,093,975 7011 575 C

K9NS (AA9D,K9DX,K9HMB,K9PPY, K9PW,K9QVB,K9RS,KS9W,N9CO, W9RM,WV9T,ops)
10,837,260 6580 549 C

K1RX (+KF1V,K1EPJ,AA1SI.WA1S. W3SM,W1VE)
9,635,391 5981 537 C

W4MYA (+K4BAM,K4GAU,N3SB,W4DR, W4HJ,W4HZ,WA4QDM,WA8WV, WX3B)
9,572,220 5964 535 C

K8CC (+ K8GT, K8JM, K9TM, KT8X, N8CQA, N8VW,WD8S)
9,182,670 5990 511 C

W3PP (+AA1K,N3KW,WB4FDT,NW3Y, KW3Z,W2GJ,K3FT,N6ZO)
9,020,160 5760 522 C

NQ4I (+W4DD,AA4LR,NA8V,K2UFT, K4BAI,K4PI)
8,779,293 5553 527 C

K1TTT (+W1TO,K1MK,K2SIG,NT2X, KC2FEE,W2WB)
7,888,770 5106 515 C

K0RF (+W0UA,WC4E,WB0GAZ,W1XE, N0AH)
7,573,302 4989 506 C

NR4M (+K7SV,K4EC,K4UE,K1SE, K4GMH,WA4JUK,KI4RO)
6,848,266 4941 462 C

N6RO (+N6BV,K6AW,K7NV,KX7M, WA6O,WA3HAE)
6,279,690 4370 479 C

W3EEE (+N3NBA)
4,884,516 3692 441 C

K3ANS (+WF3H,AA2WN,K3YD)
4,251,000 3250 436 C

N2MM (+NO2R)
3,361,812 2588 433 C

W3MM (+W2YC)
3,134,934 2453 426 C

K6NO (+K6RC,K6SG)
2,826,594 2526 373 C

KV1W (+K1MBO,AI3E)
2,116,296 1938 364 C

NM3K (+AA2D,WE3E)
361,176 596 202 C

DX

Single Operator

Marine Mobile

UA0ZDA/MM
41,625 185 75 B

Africa

Nigeria

5N0W	259,875	1575	55	C	15

Senegal

6V6U (K3IPK,op)
3,300,387 4183 263 C

Ghana

9G5ZW (OK2ZW,op)
1,005,120 2094 160 C

Madeira Islands

CT3KN	548,973	1011	181	C

Canary Islands

EA8CN	1,284,096	2048	209	B
EA8/DJ1OJ				
	242,295	557	145	B

Egypt

SU9ZZ	815,964	1402	194	B

Mali

TZ6DX	517,590	1065	162	C

Ascension Island

ZD8Z (N6TJ,op)
3,791,304 4787 264 C

Asia

Azerbaijan

4K9W	7,770	70	37	B

Georgia

4L7AA	1,302	31	14	B 20

Israel

4Z5FW	2,964	38	26	B	
4X1VF	14,580	135	36	C	10

Cyprus

C4A (5B4ADA/9A3A,op)
1,483,176 2131 232 C

West Malaysia

9M2JI	30,360	184	55	B

Singapore

9V1XE (VK3DXI,op)
42,336 224 63 B

Taiwan

BV7FF	84,780	314	90	C

China

BA4DW	14,616	116	42	B

Palestinian Authority

E4/G3WQU
36,225 161 75 B

E41/OK1DTP
230,688 534 144 C

Armenia

EK4JJ	29,601	253	39	B 20

Kyrgyzstan

EX2X	175,152	656	89	C	
EX8QB	33,417	237	47	C	20

South Korea

HL5UOG	74,970	255	98	B
HL5AP	43,656	214	68	B
HL5BUT	8,400	70	40	B
HL1XP	120,432	386	104	C

HL1/JI1EFP
23,310 185 42 B 10

Thailand

E21EIC	113,082	401	94	B
HS0/G3NOM				
	105,342	362	97	C

Japan

JH1HRJ	291,549	619	157	A	
JR4DAH	221,940	540	137	A	
JA2HUN	74,955	263	95	A	
JH2OMM	52,866	198	89	A	
JA5DIM	35,577	177	67	A	
JE2CDC	4,134	53	26	A	
JL3SBE	2,829	41	23	A	
JL1ARF	1,036,458	1622	213	B	
JH4UYB	993,645	1555	213	B	
JA2BY	467,280	885	176	B	
JH8KYU	452,325	925	163	B	
JK1ASO	431,550	822	175	B	
JA1CG	269,748	708	127	B	
JE0UXR	255,780	609	140	B	
JA4KTE	244,167	539	151	B	
JH6OPP	201,630	517	130	B	
JR1XKU	193,920	505	128	B	
JG3LGD	163,191	409	133	B	
JA1JQY	141,246	413	114	B	
JE1REU	131,688	472	93	B	
JH0IXE	125,235	363	115	B	
JN1MSO	121,452	349	116	B	
JA2IU	117,486	366	107	B	
JA7BVA	113,796	327	116	B	
JA1XUY	108,360	344	105	B	
JA8AJE	106,605	309	115	B	
JA2OJ	105,600	320	110	B	
JA2KKA	104,160	310	112	B	
JH6TYD	103,206	334	103	B	

JH1SBE (KM6F,op)
103,155 299 115 B

JA1XRH	102,960	312	110	B
JA2BQX	101,565	305	111	B
JG0OXL	98,325	345	95	B
JA1CP	95,700	290	110	B
JQ1UKK	90,597	299	101	B
JG1EIQ	79,560	260	102	B
JA7ARW	74,970	255	98	B
JA7DNO	74,664	244	102	B
JP1SRG	74,472	232	107	B
JA1KZP	72,450	230	105	B
JJ3TBB	70,731	271	87	B
JA1AB	68,526	243	94	B
JA2CX/3	66,834	237	94	B
JR1KSK	65,706	233	94	B
JA1OZK	65,487	263	83	B
JA2UJ	62,790	230	91	B
JA1BUI	62,784	218	96	B
JE1HJV	62,100	225	92	B
JH3CUL	59,778	243	82	B
JI1CUP	59,724	237	84	B
JH3JYS	57,408	208	92	B
JA1BCP	49,632	188	88	B
JA4BAA	48,600	200	81	B
JA3HBF	43,254	178	81	B
JA1YPA	39,900	175	76	B
JH1PXY	38,808	168	77	B
JI7OED	38,232	177	72	B
JA3AVO	35,244	132	89	B
JA2MZ	33,750	150	75	B
JG1OWV	32,571	141	77	B
7L3KJT	31,284	158	66	B
JA1KI	30,888	143	72	B
JA1AZS	30,240	140	72	B
JA0GEY	29,784	146	68	B
JA0UFZ	26,670	127	70	B
JR3NDM	25,872	154	56	B
JF7GDF	21,168	126	56	B
JA1RRA	21,060	135	52	B
JP1DOA	20,691	121	57	B
JA6BIF	20,400	136	50	B
JM3XEJ	19,800	120	55	B
JR1LQK	18,480	112	55	B
JA1XPU	18,144	108	56	B
JA1HHU	16,800	100	56	B
JA1GTF	16,461	93	59	B
JA2KPV	14,628	92	53	B
7M2GCW	11,475	85	45	B
JA6QDU	10,440	87	40	B
JN7OJA	9,954	79	42	B
JR7XGL	8,964	83	36	B
JF7PHE	7,455	71	35	B
JM3LWR	6,552	56	39	B
JA3WFQ	6,549	59	37	B
JA1MXY	6,480	72	30	B
JF7HOD/6	5,760	64	30	B
JF7DXT	5,673	61	31	B
JI2VLM	5,265	65	27	B
JA3BQC	3,915	45	29	B
JA9RO	2,997	37	27	B
JH1UES	2,448	48	17	B
JS1WPD	1,848	28	22	B
JH8COB	1,554	37	14	B
JA8GTO	1,380	23	20	B
JJ1GWF	960	20	16	B
JE1SLP	798	19	14	B
JH1DLJ	594	11	11	B
JH4JUK	420	20	7	B
JH5FXP	1,720,872	2313	248	C
JA8RWU	1,694,712	2344	241	C
JH7XGN	1,481,784	2129	232	C
JH7AFR	946,308	1474	214	C
JA1JKG	779,328	1312	198	C
JH2BCN	759,594	1354	187	C
JA0QWO	620,025	1181	175	C
JA7SSB	524,628	1121	156	C
JR3KQJ	420,750	850	165	C
JA1PCY	373,272	824	151	C
JA9CWJ	344,706	787	146	C
JA2AXB	247,800	590	140	C
JA2FSM	231,030	510	151	C
JF2FIU	214,278	503	142	C
JF1EQA	199,260	492	135	C
JA5JCC	187,467	553	113	C
JA1RZD	169,500	452	125	C
JA6BGA	162,309	413	131	C
JR3WXA	154,791	441	117	C
JA1HP	148,320	412	120	C
JA3ARM	113,280	320	118	C
JA5ATN	106,704	342	104	C
JA5IP	93,960	270	116	C
JA5APU	86,178	542	53	C
JR1LEV	57,474	206	93	C
JA2QVP	48,114	198	81	C
JA3SOK	44,895	205	73	C
JE0EHE	43,788	178	82	C
7J1ABD	17,655	107	55	C
JJ4PPK	17,316	111	52	C
JA1SJV	10,350	75	46	C
JA4LCI	5,724	53	36	C
JA8TEZ	3,180	53	20	C
JR7VHZ	750	25	10	C 160
JA8NFV	594	22	9	C 160
JE1SPY	75	5	5	B 160
JK1GKG	6	2	1	B 160

JI2ZJS (JG2TSL,op)
16,926 182 31 C 80

JH1AEP	11,421	141	27	C 80
JA4YPE	120	8	5	B 80
JI2KVW	66,591	453	49	C 40
JS1OYN	24,480	204	40	B 40
JH1GNU	23,247	189	41	B 40
JA8XQI	6,612	76	29	B 40
JA1XEM	5,775	77	25	C 40
JS1PWV	5,688	79	24	B 40
JA0EKI	5,589	81	23	B 40
JG3EHD	225	15	5	B 40
7M4BZX	12	2	2	B 40
JH0EPI	40,131	273	49	B 20
JK1LUY	4,212	54	26	C 20
JA3HPD	27	3	3	B 20
JG3KIV	180,144	1112	54	C 15
JA9PPC	148,830	902	55	C 15
JI7NUF	137,214	847	54	C 15
JR1MQT	113,190	686	55	C 15
JR2DOL	96,228	594	54	C 15
JR9NVB	54,831	373	49	B 15
JA7NVF	54,621	357	51	B 15
JH7CJM	37,647	267	47	B 15
JH1JNR	35,574	242	49	C 15
JQ1NGT	29,700	220	45	C 15
JM2RUT	18,480	154	40	B 15
JA1EM	18,120	151	40	B 15
JH7QXJ	17,442	153	38	C 15
JJ6TWQ	14,070	134	35	B 15
JA2QS	11,988	111	36	B 15
JA1SIM	7,296	76	32	A 15
JA4JJI	4,725	63	25	B 15
JJ3WDG	3,567	41	29	B 15
JH1NXU	3,300	50	22	A 15
JA6IP	2,772	42	22	B 15
JM1MML	2,646	42	21	B 15
JM6NJU	3	1	1	B 15
JR7OMD	45,360	319	47	B 10
JH3AIU	151,635	919	55	C 10
JF1SQC	143,136	852	56	B 10
JR8OGB	111,300	700	53	C 10
JQ1UXN	106,689	671	53	B 10
JH8SLS	104,463	657	53	C 10
JR4PMX	96,390	595	54	B 10
JI1RXQ	86,178	542	53	B 10
JF2ION	74,682	461	54	B 10
JA1NLX	64,896	416	52	B 10
JE4MHL	40,608	288	47	B 10
JA7AMK	38,352	272	47	B 10
JF2VAX	37,365	265	47	B 10
JQ3UDL	30,702	238	43	B 10
JA1PS	30,174	214	47	B 10
JA0HC	26,496	192	46	C 10
JA6UBK	25,740	195	44	C 10
JA4ETH	22,176	176	42	B 10
JS1MTI	17,097	139	41	B 10
JK3GWT	15,873	143	37	B 10
JA0BJY/1	13,860	105	44	B 10
JH2NWP	13,542	122	37	B 10
JJ1NZA	12,528	116	36	B 10
JI1HFJ	11,877	107	37	B 10
JJ1JRH	10,791	109	33	C 10

7J7ADB (KG6DX,op)
9,696 101 32 B 10

JG2TKH	8,568	84	34	C 10
JG3NKP	8,400	80	35	B 10
JA6AVT	8,370	90	31	B 10
JE1ARQ	7,875	75	35	B 10
JL1UTS	6,468	77	28	B 10
JH3TBY	1,836	36	17	C 10
JR2TRC	1,653	29	19	B 10
JI1BBN	990	33	10	B 10
JA9XAT	810	27	10	B 10
7N3WRN	792	24	11	B 10
JA1AAT	336	14	8	B 10
7K2PBB	27	3	3	B 10

Mongolia

JT1CS	80,190	297	90	B

Jordan

JY9QJ	45,570	245	62	C

Lebanon

OD5/OK1MU
861,552 1488 193 C

Turkey

TA3BN	18,189	129	47	B

Asiatic Russia

UA0KCL	286,209	649	147	A
RU0LL	414,000	920	150	B
RA0FN	257,355	665	129	B
UA0ANW	157,410	495	106	B
RU9CI	134,499	419	107	B
RA9AN	124,932	359	116	B
RK9AD	57,159	219	87	B
RA0JJ	55,704	211	88	B
UA9APA	39,600	176	75	B
RW9QA	23,595	143	55	B
RX9TX	376,650	930	135	C
UA0LS	215,130	505	142	C
RK9JWV	155,388	563	92	C
UA9AOL	149,193	411	121	C
RZ9AE	96,600	322	100	C
UA9JO	81,000	500	54	C
UA9CDC	70,956	292	81	C
UA0AGI	42,864	188	76	C
UA9CR	42,705	195	73	C
UA0JDD	28,086	151	62	C
RA9OM	24,072	136	59	C
RW0QJ	6,030	67	30	C
RZ9UA	228,030	1382	55	C 20
RA9AC	113,238	699	54	C 20
RX9SX	104,328	644	54	C 20
UA9BS	87,966	543	54	C 20
UA0SAD	60,102	378	53	B 20
RA9MY	52,785	345	51	C 20
RW9TA	52,173	341	51	C 20
UA9LAC	37,440	260	48	C 20
UA0ZS	6,642	82	27	B 20
UA0SBQ	126	7	6	B 20
UA0FDX	138,672	856	54	C 15
UA0JQ	129,696	772	56	B 15
UA0CA	83,490	506	55	B 15
UA0KBG	56,643	239	79	B 15
UA9WQK	9,720	120	27	B 10
RX9LW	3,774	74	17	C 10
RW0LZ	2,835	35	27	B 10
UA9MZ	2,592	18		C 10

Kazakhstan

UN4PD 20,829 131 53 B
UP6P (UN6P,op)
375,498 907 138 C

UN8PF	39,480	188	70	C
UN4PG	6,438	74	29	C 20

Hong Kong

VR2BG	594,300	1132	175	C

Europe

Croatia

9A7P (9A6NHH,op)
441,540 892 165 A

9A3CY	9,990	111	30	B
9A2CW	65,007	233	93	C
9A2VR	12,096	144	28	C 80
9A5YA	1,482	38	13	B 80
9A4W	34,866	298	39	C 40
9A3LM	9,405	95	33	B 40
9A1AA	139,608	831	56	C 15
9A2NO	52,479	343	51	B 15
9A4BT	25,584	208	41	B 15
9A3VM	140,130	865	54	B 10
9A5MT	99,624	593	56	B 10
9A6KOI	79,866	522	51	B 10
9A4KK	66,297	451	49	B 10

Portugal

CT1FOK	199,584	504	132	B	
CT1BNW	8,700	100	29	C	20
CT1DJE	2,565	45	19	B	20
CT1FNT	966	23	14	C	20
CT1GFK	70,992	493	48	B	10

Fed. Rep. of Germany

DL3KVR	258,768	599	144	A
DL6RDR	247,269	649	127	A
DJ3XK	122,130	354	115	A
DL2DWP	44,625	175	85	A
DF5RF	13,905	103	45	A
DJ5AA	12,087	79	51	A
DL1JDQ	6,930	66	35	A
DL7ANR	606,441	1081	187	B
DF6LQ	380,316	773	164	B
DL5FU	323,700	650	166	B
DL5ASE	309,852	684	151	B
DK7FP	243,840	640	127	B
DL3DRN	227,700	550	138	B
DL5KUD	217,065	499	145	B
DL5SVB	216,300	515	140	B
DL1WA	200,430	510	131	B
DJ7XA	198,750	530	125	B
DL9XY	196,875	525	125	B
DK1YY	194,208	476	136	B
DL7QU	156,546	446	117	B
DL2ZAV	147,600	410	120	B
DL1DQY	120,375	375	107	B
DL5IAH	114,624	398	96	B
DL1TH	109,593	369	99	B
DL3ZAI	104,160	310	112	B
DL3BZZ	91,494	299	102	B
DL5WS	82,026	279	98	B
DL5XAT	77,658	301	86	B
DL4JYT	70,713	243	97	B
DF1ZN	65,610	270	81	B
DL3NSM	64,698	263	82	B
DL2RTJ	61,008	248	82	B
DL5DBH	59,760	240	83	B
DL3YEI	55,842	227	82	B
DL6DSA	47,760	199	80	B
DL7UGO	46,566	199	78	B
DM3FZN	43,665	205	71	B
DJ2QV	32,832	152	72	B
DL7AXM	21,018	113	62	B
DK5ZX	20,196	132	51	B

DM3RCK	17,613	103	57	B	
DL1FMG	17,595	115	51	B	
DL2HTF	13,968	97	11	B	
DM3PKK	13,332	101	44	B	
DL5FCO	12,699	83	51	B	
DL8UVG	10,332	84	41	B	
DL5ANS	3,024	36	28	B	
DL7ON	1,705,557	2359	241	C	
DL4MCF	1,517,376	2258	224	C	
DL2DX	1,114,074	1794	207	C	
DL4CF	1,018,440	1640	207	C	
DL6KVA	478,032	866	184	C	
DJ0MDR	409,770	785	174	C	
DL5AWI	392,886	897	146	C	
DL6UNF	367,902	757	162	C	
DL5YM	271,998	621	146	C	
DL4YAO	251,370	570	147	C	
DL8TWA (K3TW,op)	245,502	593	138	C	
DF5ZV	211,077	499	141	C	
DF6QV	183,744	464	132	C	
DK3LT	100,794	314	107	C	
DL6AG	60,672	256	79	C	
DL7YS	52,275	205	85	C	
DF5AU	9,225	75	41	C	
DJ1XT	2,040	34	20	C	
DK8LV	35,340	310	38	C	80
DF8AE	21,879	187	39	C	40
DL6SN	11,187	113	33	10	40
DJ2YE	5,658	82	23	4	40
DM3XI	1,131	29	13	2	40
DK5QN	163,944	1012	54	C	15
DK0UN	146,850	890	55	C	15
DK5IM	84,906	534	53	C	15
DJ5GG	39,903	283	47	C	15
DM4WW	35,328	256	46	C	15
DL4AAE	27,048	196	46	B	15
DL3TD	186,615	1131	55	C	10
DK3KD	149,526	923	54	C	10
DL2OBF	110,982	698	53	C	10
DL2MEH	110,505	695	53	B	10
DL6RAI	94,128	592	53	C	10
DL7BY	93,651	589	53	C	10
DL5AUA	72,981	459	53	B	10
DL8UD	71,883	489	49	17	10
DF9CY	16,263	139	39	B	10

Spain

EA7GTF	1,623,213	2283	237	B	
ED4TX	739,935	1215	203	B	
EA4ET	724,251	1291	187	B	
EA4DRV	398,937	847	157	B	
EA7AKJ	297,675	675	147	B	
EA7AJR	279,153	633	147	B	
EA5BS	176,850	450	131	B	
EA3ALV	124,875	375	111	B	
EA5AFH	4,032	42	32	B	
EC5AID	3,960	55	24	B	
EA1BXW	1,008	21	16	B	
EA5FV	1,895,748	2644	239	C	
EA4KA	1,249,023	1867	223	C	
EA5YU	1,096,410	1610	227	C	
EA3AR	794,895	1345	197	C	
EA4BWR	225,132	514	146	C	
EA5DCL	207,900	396	175	C	
EA1BAE	179,955	465	129	C	
EA4AMO	95,790	310	103	C	
EA3AJW	80,550	537	50	C	
EA5ABE	45,864	182	84	C	
EA1FBJ	31,671	153	69	C	
EA7EZQ	8,265	95	29	C	
EA7GSU	11,160	124	30	C	80
EA5FID	25,608	194	44	C	40
EA3BIM	64,050	427	50	C	20
EA5DWS	4,725	63	25	B	15
EA1DGG	2,160	40	18	B	15
EA2AZ	54	6	3	B	15
EA3BHB	30,375	225	45	C	10
EA1CXH	17,100	150	38	A	10
EA3BOW	8,184	88	31	B	10

Balearic Islands

EA6SK	2,052	38	18	A	
EA6BB	714	17	14	A	20

Ireland

EI4DW	648,348	1114	194	B	
EI8GP	71,346	506	47	B	10

Moldova

ER1CW	94,815	301	105	B	
ER4DX	1,417,680	2148	220	C	
ER1LW	31,122	266	39	B	40

Estonia

ES1CR	15,552	144	36	B	15

Belarus

EU8RZ	104,760	360	97	A	
EU6DX	293,208	643	152	B	
EW8OS	42,525	189	75	B	
EW1EA	23,850	150	53	B	
EU1SA	277,425	685	135	C	
EW2AA	237,600	660	120	C	
EW6AF	192,384	501	128	C	
EU1PA	21,060	130	54	C	
EW1WZ (EU1UN,op)	10,218	131	26	C	80
EW3EW	23,835	227	35	C	40
EW3LN	12,576	131	32	C	40
EW6EW	1,170	26	15	B	40
EW6CF	51,255	335	51	C	20
EU1MM	1,035	23	15	C	20
EU1DX	89,250	595	50	B	15
EW6BI	780	20	13	B	15
EU1UN	72,756	516	47	C	10
EW6AW	7,020	78	30	B	10

France

F5ICC	329,229	699	157	B	
F5MFL	259,632	601	144	B	
F5AKL	171,360	476	120	B	
F8PDR	162,360	451	120	B	
F5TVG	142,044	356	133	B	
F6GQO	131,196	377	116	B	
F6IEU	110,700	369	100	B	
F8AWQ	83,970	311	90	B	
F5JBR	80,571	251	107	B	
F5YJ	67,800	226	100	B	
F6IIA	65,340	220	99	B	
F6OIE	50,400	200	84	B	
F6DZD	21,228	122	58	B	
F6EEQ	10,665	79	45	B	
F5NLX	9,450	105	30	B	
TM6P (F5MZN,op)	2,178,816	2837	256	C	
F6CWA	305,490	599	170	C	
F5NSO	825	25	11	B	80
F6KPQ (F6ETI,op)	57,780	428	45	C	40
F5NQL	11,220	110	34	B	40
F5JX	90	6	5	B	40
F6HKA	137,748	883	52	C	20
F8BPN	112,788	723	52	C	15
F6AXD	2,580	43	20	A	15
F5JKK	105,144	674	52	B	10
F5NBX	71,424	496	48	B	10
F6ETI	32,250	250	43	C	10
F5JY	29,025	215	45	B	10
F5PHW	17,784	152	39	B	10
F8CNR	9,858	106	31	B	10

England

G0WKW	527,877	1197	147	B	
G3KKP	330,750	735	150	B	
G3TXF	309,120	644	160	B	
M0CQS (N0KV,op)	219,960	564	130	B	
G6QQ	165,060	420	131	B	
G3KKQ	87,870	290	101	B	
G0MRH	71,484	259	92	B	
M0AEK	68,886	258	89	B	
G3NAS	61,740	210	98	B	
G4ZME	50,358	218	77	B	
M6T (G4PIQ,op)	2,126,709	2847	249	C	
G3MXJ	1,402,245	2115	221	C	
G3XTT	1,347,984	2024	222	C	
G2QT	818,805	1235	221	C	
G4BWP	72,765	245	99	C	
G4BJM	64,449	217	99	C	
G4IUF	26,784	144	62	C	
G3UFY	22,194	137	54	C	
G5MY	20,475	175	39	B	40
G0IVZ	190,005	1195	53	C	20
G5G (G0LII,op)	188,160	1120	56	C	15
G3RSD	46,011	313	49	B	15
MJ0ASP (F5SHQ,op)	6,084	78	26	B	15
G3WVG	202,176	1248	54	C	10
G5M (G3WGN,op)	167,268	1052	53	C	10
G3TBK	136,188	873	52	C	10
G0MTN	127,836	804	53	B	10
G3PJT	73,140	460	53	B	10
G3KNU	27,456	208	44	B	10

Northern Ireland

GI4KSH	39,339	279	47	C	10

Scotland

GM4SID	123,543	371	111	B	
GM3ZAS	5,208	56	31	B	
GM3POI	263,424	1568	56	C	15
GM3CFS	63,828	394	54	B	15

Guernsey

2U0ARE	20,010	115	58	B	

Wales

GW0KZW	9,540	106	30	A	
GW3NJW	70,356	451	52	B	15

Hungary

HA2A	553,146	986	187	A	
HA8AR	275,418	642	143	B	
HA8IH	235,152	552	142	B	
HA5AZC	80,940	284	95	B	
HA8IC	49,920	260	64	B	
HA3GA	36,423	171	71	B	
HA3OU	119,700	350	114	C	
HA6PQ	116,706	367	106	C	
HG3M (HA3MY,op)	48,240	402	40	C	80
HA8FM	165,000	1000	55	C	40
HA3OV	91,287	621	49	C	40
HA0LM	71,280	495	48	B	40
HA5BSW	40,635	315	43	A	40
HA3LI	26,445	215	41	B	20
HA8YU	16,956	157	36	B	20
HA8TP	54,750	365	50	B	15
HA3NU	90,012	577	52	C	10
HA0HV	80,850	490	55	B	10
HA8FK	77,040	535	48	B	10
HA0IT	67,680	470	48	B	10
HA6IAM	17,901	153	39	B	10

Switzerland

HB2DAX	77,220	260	99	A	
HB2XY	43,143	197	73	A	
HB9AYZ	3,321	41	27	A	
HB9ARF	312,117	689	151	B	
HB9FBP	35,490	169	70	B	
HB2DOT	1,056	22	16	B	
HB2FAB	1,736,646	2402	241	C	
HB2FAP	1,650,033	2381	231	C	
HB9DCM	221,616	513	144	C	
HB2HFN	6,327	57	37	C	

Italy

I3BBK	207,264	544	127	A	
IK3JLS	44,814	194	77	A	
IK0ZSN	1,296	24	18	A	
I3JSS	813,960	1330	204	B	
IK0YVV	785,295	1385	189	B	
I0ZUT	300,456	642	156	B	
IK8WEI	173,052	437	132	B	
IK1AIT	117,645	341	115	B	
IK2WXV	108,870	382	95	B	
IK2RJK	103,290	313	110	B	
IK7FPU	78,861	271	97	B	
I2WIJ	71,325	317	75	B	
IZ8ANA	65,247	239	91	B	
IK2WYI	41,340	212	65	B	
IV3NVN	36,636	172	71	B	
IK8VRP	33,048	162	68	B	
IZ0ANC	17,442	114	51	B	
IV3KSE	7,752	68	38	B	
IK3SCB	6,498	57	38	B	
IK2AHB	972,024	1604	202	C	
I2SVA	612,498	1147	178	C	
I6FDJ	70,470	261	90	C	
IK3FHL	25,536	133	64	C	
IK2BCP	16,065	119	45	C	
IZ1DFI	11,880	99	40	C	
IK4MHB	6,270	95	22	C	160
I3VHO	2,295	51	15	C	160
IR4T (IK4UPB,op)	185,130	1122	55	C	40
IQ7A	96,876	598	54	C	20
IK0YUT	92,697	583	53	B	20
IU2C	45,540	345	44	C	20
I2JIN	3,060	60	17	B	20
IR4D	154,275	935	55	C	15
IT9AF	68,355	465	49	B	15
IZ5AXA	86,178	542	53	C	10
I8NHJ	85,701	539	53	C	10
IK0HBN	84,747	533	53	C	10
IK1RQQ	61,932	397	52	B	10
IZ0AIS	61,005	415	49	C	10
IU1W (I1WXY,op)	55,977	397	47	C	10
IK4WMH	27,456	208	44	C	10
I0FSP	2,829	41	23	A	10

Sardinia

IS0HQJ	410,067	849	161	B	
IS0IGV	248,784	568	146	B	
IS0SDX	58,344	221	88	B	
IS0UWX	15,000	125	40	B	
IS0OMH	70,848	246	96	C	
IS0GSR	70,218	498	47	C	10

Norway

LA9HFA	576,048	1091	176	B	
LA2HFA	258,408	582	148	B	
LA2O	350,676	764	153	C	

Luxembourg

LX1JH	48,285	185	87	B	

Lithuania

LY2TA	353,580	710	166	A	
LY3BA	346,338	813	142	A	
LY2FE	255,060	654	130	A	
LY2LA	550,800	1080	170	B	
LY2PBM	32,088	191	56	B	
LY3CI	904,821	1531	197	C	
LY2OX	289,170	630	153	C	
LY3CW	221,940	540	137	C	
LY2OU	1,056	32	11	C	80
LY2BLQ	15,300	150	34	B	40
LY2BM	130,572	806	54	C	20
LY3BAD	65,031	409	53	C	15
LY3IW	62,424	408	51	B	15
LY2GF	141,828	892	53	C	10
LY2ZZ	114,000	760	50	C	10
LY2AT	12,600	120	35	B	10

Bulgaria

LZ2RS	173,043	493	117	A	
LZ1IQ	18,645	113	55	A	
LZ2AU	204,972	551	124	B	
LZ1QH	153,543	403	127	B	
LZ2MP	111,870	330	113	B	
LZ1AQ	27,783	147	63	B	
LZ4RV	25,671	199	43	B	
LZ2VP	19,221	149	43	B	
LZ1NJ	3,120	40	26	B	
LZ2JE	2,310	35	22	B	
LZ2ZDL	45,990	219	70	C	
LZ4HM	28,644	154	62	C	
LZ2WM	21,411	117	61	C	
LZ2AG	9,975	95	35	C	
LZ3AB	864	24	12	C	160
LZ1ABC	2,907	57	17	B	40
LZ4ZP	100,128	596	56	C	20
LZ2JA	21,888	192	38	C	15
LZ2K (LZ2VL,op)	126,828	813	52	C	10
LZ1UQ	48,363	329	49	B	10
LZ3YY	42,255	313	45	B	10
LZ1PM	40,719	277	49	C	10
LZ2GS	36,000	250	48	B	10
LZ1FH	34,317	279	41	B	10
LZ1CF	28,350	210	45	B	10
LZ2TF	18,126	159	38	B	10
LZ4BU	4,704	56	28	B	10

Austria

OE1BKA	24,528	146	56	B	
OE3VIA	14,175	105	45	B	
OE3JOS	406,884	827	164	C	
OE6HZG	152,409	503	101	C	

Aland Islands

OH0B (OH2PM,op)	2,159,910	3090	233	C	

Finland

OH2YL	22,140	123	60	A	
OH3GD	294,840	630	156	B	
OH2NFS	194,661	503	129	B	
OH3IR	145,734	454	107	B	
OH2LYP	123,624	404	102	B	
OH2FS	82,008	268	102	B	
OH3TZ	35,100	150	78	B	
OH2U (ES2RR,op)	1,764,471	2591	227	C	
OH5NQ (OH5JOC,op)	939,360	1520	206	C	
OG3RM	196,950	650	101	C	
OH6XX	189,720	527	120	C	
OH3RF	139,302	327	142	C	
OH2VZ	100,440	310	108	C	
OH1BOI	31,557	157	67	C	
OH8A	61,659	403	51	C	40
OG6XY	37,200	248	50	C	40
OH7KA	75	5	5	B	40
OG8L (OH8LQ,op)	251,664	1498	56	C	20
OH2BPA	12,342	121	34	B	20
OG6AC (OH6CS,op)	210,870	1278	55	C	15
OG6Y (OH6YF,op)	148,995	903	55	C	15
OH3AG (OH3WW,op)	131,058	809	54	C	15
OH8CW	50,031	327	51	B	15
OH4TY	12,138	119	34	B	15
OG1MM	156,420	948	55	C	10
OH6OS	140,715	885	53	C	10
OG1F (OH1NOA,op)	82,161	537	51	C	10
OH1JMH	38,700	300	43	B	10
OH3KAV	17,082	146	39	B	10
OH7KD	15,300	150	34	B	10
OH5PA	8,160	80	34	B	10
OG1UP	2,835	45	21	B	10
OH6HAE	144	8	6	A	10

Czech Republic

OK2PLK	19,278	119	54	A	
OK1FKD	16,500	125	44	A	
OK1HX	576,576	1092	176	B	
OK1DSZ	439,734	883	166	B	
OK1ZP	372,060	780	159	B	
OK1TC	278,604	654	142	B	
OK1TD	269,892	588	153	B	
OK2HI	264,915	609	145	B	
OK2SGY	241,776	552	146	B	
OK1FHI	239,202	582	137	B	
OK2WY	200,277	561	119	B	
OK1FDY	179,310	430	139	B	
OK1FCA	148,230	366	135	B	
OK1DCF	138,807	477	97	B	
OK2SJ	132,714	438	101	B	
OK1AOU	73,272	284	86	B	
OK2VP	63,054	226	93	B	
OK2AJ	54,612	222	82	B	
OK2ON	45,144	228	66	B	
OK2XA	27,528	148	62	B	
OK2PKY	21,450	130	55	B	
OK2SPS	8,415	85	33	B	
OK1RP	7,500	50	50	B	
OK1FOG	5,427	67	27	B	
OK1DSU	4,515	43	35	B	
OK1JDJ	2,760	40	23	B	
OK1SRD	1,980	30	22	B	
OK1MD	1,727,250	2450	235	C	
OK2FD	1,139,976	1784	213	C	
OK1BA	483,525	921	175	C	
OK2ZU	479,601	837	191	C	
OK1AXB	431,040	898	160	C	
OK2HBR	394,785	849	155	C	
OK1DDO	290,562	613	158	C	
OK1DSF	282,528	654	144	C	
OK2ABU	270,894	528	151	C	
OK2HZ	56,889	387	49	C	
OK1FTW	27,903	131	71	C	
OK1FRO	5,250	50	35	C	
OK1TO	16,380	182	30	C	80
OL4M	4,902	86	19	C	80
OK1SI	2,226	53	14	B	80
OK1RF	213,510	1294	55	C	40
OK2BVG	59,400	440	45	C	40
OK1FC	41,760	348	40	C	40
OK1IE	37,800	300	42	C	40
OK1XJ	24,396	214	38	C	40
OK1GS	21,432	188	38	B	40
OK1HFP	13,365	135	33	B	40
OK2OP	7,938	98	27	B	40
OK2TBC	22,878	186	41	B	20
OK2SAT	117,819	741	53	C	15
OK2DU	87,204	559	52	B	15
OK1FKM	86,625	525	55	B	15
OK1MNW	44,274	314	47	B	15
OK2PCN	35,190	255	46	B	15
OK1NG	22,302	177	42	B	15
OK1WWJ	19,305	165	39	B	15
OK2SG	18,240	160	38	B	15
OK1DVK	14,484	142	34	B	15
OK1AIJ	957	29	11	A	15
OL5Y (OK1FUA,op)	155,661	979	53	C	10
OL6M (OK2BMV,op)	92,610	630	49	C	10
OK1QM	76,347	499	51	B	10
OK1AVY	74,880	480	52	C	10
OK1ACF	65,790	430	51	B	10
OK2ZC	65,709	447	49	B	10
OK1XC	54,144	376	48	B	10
OK1CZ	52,650	351	50	B	10
OK1AES	44,352	308	48	B	10
OK2WTM	43,335	321	45	B	10
OK2PDT	35,955	255	47	C	10
OK2ZJ	33,138	263	42	B	10
OK2EQ	26,676	234	38	B	10
OK1DEK	23,994	186	43	C	10
OK2WO	10,890	121	30	B	10
OK2BHE	2,700	45	20	B	10

Slovakia

OM5AW	429,912	853	168	B	
OM5NL	335,070	730	153	B	
OM3CND	237,984	536	148	B	
OM8AG	208,638	519	134	B	
OM4DN	201,252	541	124	B	
OM7AG	157,500	420	125	B	
OM8MM	89,991	303	99	B	
OM7VF	89,544	287	104	B	
OM5KM	72,576	252	96	B	
OM6TU	62,910	233	90	B	
OM3BA	55,200	200	92	B	
OM7IR	30,912	184	56	B	
OM4DA	16,632	126	44	B	
OM1AW	8,550	95	30	B	
OM3RM	2,071,566	2807	246	C	
OM3NA	1,031,037	1693	203	C	
OM0WR	3,024	72	14	C	160
OM2DX	23,661	239	33	C	80
OM5RJ	10,260	114	30	C	80
OM7RC	2,142	51	14	B	80
OM5M (OM2RA,op)	159,720	968	55	C	40
OM7M (OM5RM,op)	51,156	406	42	C	20
OM2TB	6,864	88	26	B	20
OM6AMZ	19,494	171	38	B	10
OM2EE	11,550	110	35	B	10

Belgium

ON7CC	97,644	316	103	A	
ON4XG	284,769	597	159	B	
ON4AWH	246,600	548	150	B	
ON6ML	130,644	382	114	B	
ON4CHK	40,581	167	81	B	
ON5JD	34,164	146	78	B	
ON4CAU	31,212	153	68	B	
ON4KMB	2,880	48	20	B	
OT0T (ON4UN,op)	84,882	602	47	C	80
ON6AB	5,940	90	22	B	80
ON4IG	17,763	191	31	B	40
ON4UN	188,568	1164	54	C	10
ON6TJ	23,880	199	40	B	10

Denmark

OZ8SW	116,064	372	104	B	
OZ5UR	54,027	207	87	B	
OZ5RM	11,400	100	38	B	
OZ1AA	1,339,260	2020	221	C	
OZ9Y	160,632	552	97	C	
OZ5MJ	143,625	383	125	C	
OZ4FF	111,555	335	111	C	
OZ3W	8,466	83	34	C	
OZ1BMA	15,750	150	35	B	20
OZ7YL	15,390	135	38	C	15
OZ8AE	37,338	254	49	B	10

Netherlands

PA0ADT	94,116	341	92	A	
PA3ELD	349,812	711	164	B	
PA3AYF	133,722	391	114	B	
PA3BFH	70,104	254	92	B	
PA0RBS	55,146	202	91	B	
PA3CAL	42,387	199	71	B	
PA0JR	15,876	126	42	B	
PA3FOZ	363	11	11	B	
PA0CLN	859,020	1390	206	C	
PA5KT	789,930	1310	201	C	
PA0MIR	73,968	268	92	C	
PA1BX	44,238	202	73	C	
PA3HEQ	3,744	52	24	B	20
PA3FSC	297	11	9	A	15
PA3EWP	50,508	366	46	C	10
PA0JED	25,800	215	40	B	10

Slovenia

S52GP	841,185	1395	201	B	
S57J	827,985	1445	191	B	
S56A	350,064	663	176	B	
S53Z	253,680	604	140	B	
S52RA	106,914	346	103	B	
S51WA	96,840	269	120	B	
S58A	2,424,951	3097	261	C	
S50R	1,542,420	2337	220	C	
S59AA	835,884	1302	214	C	
S57M	5,415	95	19	C	160
S50U	4,674	82	19	C	160
S57DX	141,912	876	54	C	40
S57XZ	53,460	405	44	C	40
S59UFB (S53CC,op)	166,632	1048	53	C	20
S57U	79,977	503	53	B	20
S57AW	184,140	1116	55	C	15
S50B	133,980	812	55	C	15
S52OP	133,326	823	54	C	15
S57KW	76,788	474	54	B	15
S51SL	33,924	257	44	C	15
S50K	192,294	1187	54	C	10
S51AY	184,518	1139	54	C	10
S53O	179,760	1070	56	C	10
S59DBC (S53MM,op)	125,550	775	54	C	10
S50Q	89,550	597	50	B	10

Sweden

8S5X	148,104	408	121	A	
SM7DBN	38,475	171	75	A	
SM2T (SM2EZT,op)	498,495	995	167	B	
SM0BDS	275,184	624	147	B	
SM7BJW	185,976	504	123	B	
SM7ATL	92,664	286	108	B	
SM5AOG	89,628	308	97	B	
SM4SX	57,405	215	89	B	
7S6W	31,506	178	59	B	
SM3ARR	27,948	137	68	B	
SM3DXC	7,326	74	33	B	
SM5CIL	668,220	1204	185	C	
SL3A (SM3WMV,op)	623,700	1188	175	C	
SK6HD (SM6FKF,op)	206,976	539	128	C	
SM3R (SM3CBR,op)	188,088	461	136	C	
SM6WQB	145,299	407	119	C	
SM7CWI	15,876	98	54	C	
SM6CNS (DU7CC,op)	3	1	1	C	160
SK0X	101,283	637	53	C	40
7S2E	35,604	276	43	C	40
SM5CLE	5,025	67	25	C	40
SM0JHF	249,480	1485	56	C	20
SM3DMP	96,390	595	54	C	20
SK0UX (SM0COL,op)	156,750	950	55	C	15
SM7N (SM7NDX,op)	68,391	447	51	B	15
7S5W (SM5BRW,op)	47,268	303	52	C	15
SM2CEW	46,656	324	48	C	15
7S3IK	29,304	222	44	B	15
SM5INC	101,919	641	53	C	10
SM0DRD	86,598	566	51	C	10
SM6BSK	51,606	366	47	B	10
SM6Z (SM6BZE,op)	38,736	269	48	B	10
SM3AVW	30,573	237	43	B	10
SM5NBE	29,970	222	45	B	10
SM3D (SM3WMU,op)	14,652	132	37	B	10
SM0BWM	2,223	39	19	B	10

Poland

SP5DDJ	171,000	475	120	A	
SP3HC	173,229	511	113	B	
SP5GDY	141,192	424	111	B	
SP5ICS	68,724	276	83	B	
SP3XR	58,344	221	88	B	
SP2FWC	47,670	227	70	B	
SP6BGZ	46,332	198	78	B	
SP9ADV	45,045	195	77	B	
SP9GFI	33,228	156	71	B	
SP6KYU	21,060	130	54	B	
SP5BNB	18,768	136	46	B	
SP4GHL	14,535	95	51	B	
SP9KJU	4,524	58	26	B	
SP2FAX	2,578,452	3268	263	C	
SP7GIQ	2,528,358	3254	259	C	
SP4Z (SP4EEZ,op)	692,604	1166	198	C	
SP3VT	432,768	896	161	C	
SP2FGO	293,436	627	156	C	
SP8FHJ	66,822	259	86	C	
SP6BAA	55,350	205	90	C	
SP2HPM	26,820	149	60	C	
SP1DPA	18,126	106	57	C	
SP5GH	4,914	78	21	C	80
SP6LV	384	16	8	B	80
SP4DEU	28,320	236	40	C	40
SP8BAB	29,040	220	44	B	20
3Z8HXN	6,900	92	25	B	20
SP8BRQ	114,639	721	53	C	15
SP9BBH	89,517	563	53	B	15
SP9NH	23,640	197	40	B	15
SP4MPG	23,607	183	43	B	15
SP1BLE	16,524	162	34	B	15
SP4BOS	7,440	80	31	B	15
SP6TRH	6,552	78	28	B	15
SQ4GXO	3,306	58	19	A	15
SP8NR	92,871	607	51	C	10
SP8FHK	59,472	413	48	C	10
SP6NIC	54,780	332	55	B	10

SP6BEN	33,507	219	51	B	10
SQ9HYM	31,218	242	43	B	10
SP3AZO	9,180	90	34	B	10
SP3AOT	5,628	67	28	B	10
SP3MEP	4,761	69	23	B	10

Greece

SV/OK1YM					
	223,095	535	139	B	
SV1DNW	33,948	164	69	B	
SV1CIB	18,744	142	44	B	
SV2AVP	216	9	8	C	160
SV1DKL	20,094	197	34	B	40
SV2BOH	54,096	392	46	B	10

Bosnia-Herzegovina

T99RM	6,930	66	35	B	
T97M	11,610	86	45	C	
T91AAW (T98R,op)					
	42,000	350	40	C	40
T94MZ	75,348	483	52	C	15
T92M	18,960	158	40	B	15

Iceland

TF/N2BA	3	1	1	C	20

Kaliningrad

UA2CZ	78,120	280	93	C	

European Russia

UA3AD	82,080	304	90	A	
RA1ACJ	428,640	893	160	B	
UA4HEJ	199,470	545	122	B	
RA3AF	168,861	473	119	B	
RA3WA	165,798	453	122	B	
UA4WAN	126,795	395	107	B	
UA4LY	122,820	356	115	B	
RV4LC	96,672	304	106	B	
RU4WE	84,966	289	98	B	
UA4RF	83,100	277	100	B	
RN3FA	79,764	289	92	B	
RA4CTR	79,170	290	91	B	
UA3XAC	74,676	254	98	B	
RW4YA	70,209	269	87	B	
RU3AQY	59,508	228	87	B	
RV3DAK	57,603	211	91	B	
UA4FEN	56,274	226	83	B	
UA6AN	48,585	205	79	B	
RN1AO	33,408	174	64	B	
RX3AGQ	32,670	165	66	B	
RV3YR	29,055	149	65	B	
UA4WEA	18,408	118	52	B	
RA1AKE	15,576	118	44	B	
RA3XA	6,480	72	30	B	
UA6LP	4,770	53	30	B	
RW1ZA	1,327,104	2048	216	C	
RW4AA	1,291,278	1786	241	C	
UF3CWR (RZ3AZ,op)					
	784,392	1421	184	C	
RA3AJ	782,184	1417	184	C	
RZ3AA	707,421	1261	187	C	
R3K (RX3DCX,op)					
	607,824	1072	189	C	
UA4LU	570,690	1119	170	C	
RN6AL	376,185	809	155	C	
UA3AP	296,361	663	149	C	
RV1CC	241,338	551	146	C	
RK3UWA	217,080	536	135	C	
RX3APM	196,215	515	127	C	
UA4HTT	193,401	551	117	C	
RZ6FZ	157,122	406	129	C	
UA1OAM	143,397	423	113	C	
RW3RQ	93,912	344	91	C	
RN3AY	92,022	313	98	C	
RW3DAR	87,048	279	104	C	
RA3NN	69,696	264	88	C	
RK3AD	60,903	303	67	C	
RU4HP	56,862	243	78	C	
RZ6BR	56,232	213	88	C	
RK6BZ	42,705	195	73	C	
RA4NF	7,350	70	35	C	
RA6AX	11,745	135	29	C	80
RX6LG	8,874	102	29	C	80
RA3XO	2,499	49	17	C	80
RA6LBS	9,360	120	26	B	40
UA6LFQ	6,351	73	29	B	40
UA3AB (UA3DPX,op)					
	100,440	620	54	C	20
RW3AX	31,725	225	47	B	20
UA3ABJ	26,400	200	44	B	20
RW3GB	93,060	564	55	B	15
RU6MM	75,348	483	52	C	15
UA4QK	11,730	115	34	B	15
UA3DJY	6,162	79	26	B	15
RX3AP	3,174	46	23	C	15
RK6AXS (UA6AJU,op)					
	40,560	338	40	C	10
RX3ARI	36,168	274	44	C	10
UA6LTI	33,396	253	44	B	10
UA6BS	14,040	130	36	B	10
UA6AK	10,137	109	31	C	10
RU3WR	7,905	85	31	C	10
RW4CW	5,325	71	25	B	10
RA6LAE	4,050	54	25	A	10

Ukraine

UR6IGG	22,833	129	59	A	
UR5MID	199,980	505	132	B	
UY5TE	103,950	350	99	B	
UT8LO	51,429	217	79	B	
UU2JZ	31,500	150	70	B	
UR7IJQ	29,445	151	65	B	
UX3MW	24,768	129	64	B	
UR5FCM	3,225	43	25	B	
UT7UW	2,736	38	24	B	
UX7IA	569,343	1097	173	C	
UR6IJ	51,513	223	77	C	
UX8IXX (US8ICA,US8IBS,US8IDV,ops)					
	29,376	144	68	C	
UY2RO	26,622	153	58	C	
UT5JAP	6,660	60	37	C	
UU4JMG	1,575	35	15	C	160
UT7IY	105,270	638	55	C	40
UR5IOK	77,550	517	50	C	40
UT7L (UR4QKD,op)					
	59,130	438	45	C	40
U5WF	56,970	422	45	C	40
UY3QW	40,950	325	42	C	40
UR5FEL	17,226	174	33	C	40
UR6QS	14,880	155	32	C	40
UT1YW	8,424	117	24	C	40
UY1M	1,560	40	13	C	40
UY5LW	86,184	532	54	C	20
UY5YA	6,624	92	24	C	20
UR3IOB	6,210	69	30	C	20
UR5TAU	2,346	46	17	A	20
UT9F (UT9FJ,op)					
	118,140	716	55	C	15
UU7JX	42,600	284	50	C	15
UR6MX	31,020	220	47	C	15
UT5UGR	18,369	157	39	C	15
US8QQ	11,817	101	39	B	15
UX2HX	6,570	73	30	C	15
UT1IA	3,363	59	19	B	15
EM7Q (UR3QT,op)					
	50,274	399	42	C	10
UY5ZZ	50,184	328	51	C	10
UW7U	47,388	359	44	B	10
UT2QT	25,038	214	39	B	10
UT3FM	16,560	138	40	B	10
US5HGO	15,768	146	36	C	10
UR4QOS	8,961	103	29	B	10

Latvia

YL2KA	351,075	775	151	B	
YL2LY	115,830	351	110	B	
YL2EC	8,448	88	32	B	
YL2LW	8,217	83	33	B	
YL2KO	793,233	1399	189	C	
YL2GD	27,798	226	41	C	40
YL2GTD	1,035	23	15	B	10

Romania

YO9GZV	21,528	156	46	A	
YO4AAC	4,956	59	28	A	
YO3APJ	313,560	804	130	B	
YO8FR	171,717	481	119	B	
YO8BPK	151,659	411	123	B	
YO3CTK	146,400	400	122	B	
YO4BBH	71,346	253	94	C	
YO7KJX	22,032	136	54	C	
YO3ND	56,994	413	46	C	40
YO9FJW	59,307	373	53	B	20
YO2ARV	15,336	142	36	B	20
YO9AGI	9,000	100	30	C	15
YO6BHN	41,124	298	46	B	10
YO2LPH	22,836	173	44	B	10
YO7ARY	5,250	70	25	B	10
YO8DHD	4,836	62	26	C	10

Yugoslavia

YT7TY	192,000	500	128	A	
YU7KW	218,691	517	141	B	
YU1OJ	199,920	595	112	B	
YZ1EZ	131,376	391	112	B	
YU1EA	85,554	291	98	B	
YU7BW	1,482,300	2025	244	C	
YU7LS	234,234	546	143	C	
YU1KR	15,921	183	29	C	80
YT1BB	152,880	910	56	B	40
YU1AU	144,990	895	54	C	40
YT7A	135,918	839	54	C	40
YT0T	35,796	314	38	B	40
YU1RA	1,008	21	16	B	40
YU1AAX (YU1ZZ,op)					
	193,026	1214	53	C	20
YT1AD	147,582	911	54	C	20
YU7CB	133,401	839	53	B	15
YZ9A (YU1NW,op)					
	131,493	827	53	C	10
4N1N (4N1JA,op)					
	90,168	578	52	B	10
YU7KMN (YZ7DM,op)					
	76,653	501	51	B	10
YU7SF	40,749	289	47	B	10
YU7KM	38,226	277	46	B	10
4N1FG	33,000	250	44	B	10

Macedonia

Z31MM	21,300	142	50	C	
Z32AF	52,140	395	44	C	40
Z31JA	108,120	680	53	C	15
Z32LM	11,772	109	36	C	15

North America
Barbados

8P9NX (W0SA,op)					
	1,141,524	1714	222	B	

Bahamas

C6A/WA3WSJ					
	67,575	265	85	A	
C6AKP (N4RP,op)					
	1,189,224	1592	249	B	
C6AKQ (N4BP,op)					
	157,950	975	54	B	80
C6A/K7RE	73,179	519	47	A	15

Cuba

CO8JY	28,080	240	39	C	160
CO8ZZ	96,264	573	56	B	80
CO8DM	79,527	541	49	B	80
CO8TW	6,474	83	26	B	40
CO8LY	129,168	828	52	B	15

Martinique

FM/F6FTB	41,616	272	51	B	

Panama

HO3A (KG6UH,op)					
	327,228	737	148	B	
HP1AC	9,810	109	30	A	10

Grenada

J38A (K4LTA,op)					
	2,292,255	2681	285	B	
J37ZA (K2KQ,op)					
	2,780,928	3264	284	C	

Alaska

AL7IF	191,730	1162	55	C	10

Virgin Islands

KV4FZ	52,128	362	48	C	160

Puerto Rico

NP3G	1,839,474	2246	273	B	
KP4Y	1,318,014	1979	222	B	
KP4/K3TEJ					
	831,870	1422	195	B	
WP4LNY	115,644	419	92	B	
WP3R (KE3Q, op)					
	4,360,320	4542	320	C	
NP4FW	4,212	54	26	A	20

Guatemala

TG9/IK2NCJ					
	226,380	1372	55	C	20

Costa Rica

TI5N (K9NW,op)					
	4,485,459	4687	319	C	
TI7/N4MO	220,719	1247	59	B	15

Antigua & Barbuda

V26G (N2ED,op)					
	3,075,732	3452	297	B	

Belize

V31JP (K8JP,op)					
	3,551,742	3869	306	C	

St. Kitts & Nevis

V47X (WT9U,op)					
	2,546,613	3303	257	B	
V47KP (W2OX,op)					
	2,343,540	2810	278	C	

Turks & Caicos Islands

VP5EA (WD5N,op)					
	3,534,876	3954	298	B	
VP5TT (K2KW,op)					
	360,903	2039	59	C	15

Mexico

XE1RGL	460,395	787	195	B	
XE2MX	356,940	661	180	B	
XE2DV	236,844	612	129	B	

Cayman Islands

ZF2NT (N6NT,op)					
	4,961,367	5217	317	C	
ZF1A (W5ASP,op)					
	329,175	1995	55	C	10

Oceania
Philippines

DU1ODX	68,634	279	82	B	
DU3NXE	66,822	259	86	C	

Mariana Islands

WH0V	25,608	194	44	C	40
WH0ABA	79,050	527	50	C	10

Hawaii

KH6/W6PH					
	2,161,008	2792	258	B	
KH6/WO9S					
	246,123	667	123	B	
KH7R (KH6ND,op)					
	3,921,690	4286	305	C	
NH7A (KH6TO,op)					
	3,012,126	3358	299	C	

Marshall Islands

V7G (AC4G,op)					
	1,642,572	2412	227	B	

Australia

VK5NJ	23,364	132	59	A	
VK2APK	1,003,995	1665	201	B	
VK4UC	575,100	1065	180	B	
VK5GN	546,576	944	193	B	
VK4TT	46,866	214	73	B	
VK6VZ	98,832	284	116	C	
VK4XY	63,147	217	97	C	
VK8AV	10,908	101	36	C	15
VK4XA	82,044	516	53	B	10

Pitcairn Island

VP6BR (OH2BR,op)					
	2,070,207	3151	219	B	

Indonesia

YC8TXW	20,160	140	48	B	
YC0LOW	4,275	57	25	C	
YB5QZ	6,972	83	28	B	20

South America
Chile

CE3AA (XQ3IDY,op)					
	91,572	587	52	B	15

Uruguay

CX9AU	69,231	491	47	B	10

Ecuador

HC2SL	263,010	1594	55	C	10
HC1HC	4,620	55	28	B	10

Galapagos Islands

HC8L (W6NL,op)					
	4,952,475	5175	319	C	

Argentina

LU1EWL	359,856	816	147	B	
LO7H	327,672	888	123	B	
LU2AYB	30,141	197	51	B	
LU1DZ	677,484	1394	162	C	
LU3DSI	1,008	21	16	C	
LU9APM	3	1	1	B	40
LU1FNH	135,270	835	54	B	15
LT4A (LU1BCE,op)					
	108,540	670	54	B	15
LU8VCC	9,408	98	32	A	15
LU7EE	113,025	685	55	A	10

Peru

OA4SS	2,165,784	2911	248	C	

Brazil

PY2YU	871,902	1642	177	B	
PR2W (PT2AW,op)					
	122,952	376	109	B	
PP7CI	42,336	196	72	B	
PY7OJ	24,111	141	57	B	
PP7CW	14,688	96	51	B	
ZZ2Z (PY2YP,op)					
	583,200	1200	162	C	
PY2QI	337,020	820	137	C	
PY4LH	39,528	183	72	C	
PS7ZZ	36	4	3	B	80
PY2NY	123,543	777	53	C	40
PY7IQ	136,800	800	57	B	20
PY3PAZ	218,862	1351	54	C	15
ZW2Z (PY2ZI,op)					
	69,750	465	50	B	15
PY4FQ	29,430	218	45	B	15
PY3FBI	24,816	188	44	B	15
PY1KN	201,465	1221	55	C	10
PY2NW	34,638	251	46	B	10

Fernando de Noronha

PY0FF	205,425	1245	55	C	40

Venezuela

YV4/OH0XX					
	136,584	542	84	C	
YV7QP	80,325	255	105	C	

Paraguay

ZP6CW	96,831	609	53	C	10

Single Operator Assisted
Asia

JG1ILF	1,264,242	1942	217	C
JA1YNE	963,630	1494	215	C
JQ1BVI	642,546	1467	146	C
JH4NMT	411,183	873	157	C
JM1LRQ	311,448	683	152	B
JA9XBW	291,984	632	154	B
7L4IOU	225,996	509	148	B
7N2JJP (JH7AJD,op)				
	203,310	502	135	C
JH1AZO	153,720	610	84	C
JK2VOC	80,316	276	97	B
JH5OXF	65,412	276	79	B

Europe

YL4U (YL2KL,op)				
	1,961,154	2958	221	C
DK3GI	1,538,310	2182	235	C
OK1DG	686,760	1180	194	C
DL1ASA	623,040	1180	176	C
DJ9RR	575,073	1083	177	C
LY5W (LY1DR,op)				
	549,792	996	184	C
OK1AU	510,786	1051	162	C
G3LZQ	451,008	783	192	C
S57XX	386,937	843	153	C
DL3NM	350,124	716	163	C
G3TMA	195,072	512	127	C
S53AU	132,240	380	116	B
G0DEZ	17,808	112	53	B

Multioperator Single Transmitter
Asia

JA7YAA (7M1JAS,JM1QPR,JG7PSJ, JH0NZN,JE7HLZ,ops)				
	1,578,240	2192	240	C
JJ3YBB (JA3PJL,JH3FQF,JF3MOK, JF3RLG,JS3VEX,ops)				
	1,567,638	2397	218	C
JR3NZC (+JF2SKV)				
	1,404,207	2157	217	A
JA2ZJW (JH2CMI,JE2PCY,ops)				
	852,093	1359	209	C
RK9CZO (RX9CAZ,RV9CDW,ops)				
	306,675	725	141	C
JE2YHS (JA2OLJ,JE2WWB,JG2NUD, JR2JVR,ops)				
	303,324	644	157	C

Europe

IR2W (I2VXJ,IK2QEI,IZ2AAJ,ops)				
	2,486,619	3411	243	C
OL3A (OK1AY,OK1CM,OK1DX,OK1FCJ, OK1DRQ,OK1MR,ops)				
	1,974,210	2686	245	C
ON7TK (+ON4AFU,ON4ASG,ON5OO)				
	1,913,565	2407	265	C
OL5Q (OK1HRA,OK1FLC,OK1FFU,ops)				
	1,577,088	2368	222	C
HG5A (HA5IW,HA5GK,HA5OM,HA5ML, HA5MK,ops)				
	1,478,520	2220	222	C
II1R (I1NVU,IK1LWL,IK1QBT,ops)				
	1,240,326	1854	223	C
S56O (S57Q,S51Z,S51QA,op)				
	1,207,647	1983	203	C
DL0DX (DL5JS,DL5KUT,DK2OY,ops)				
	1,186,773	1823	217	C
RI3A (RX3DUK,RK3FM,RV3BA, RK3FT,RU3DGD,ops)				
	1,169,874	1893	206	C
M2000A (G3WGV,G3XWK,G4VXE,G0OPB, JG1VGX,ops)				
	1,038,336	1664	208	C
UU5J (UU1JA,UU2JQ,UU2JZ,UU0JX, ops)	968,136	1508	214	C
RZ1AWO (UA1ACC,UA1AAF,UA1AQF, RA1ARJ,ops)				
	834,057	1471	189	C
YU7AL (+4N7RGH,YZ7EM)				
	750,426	1382	181	C
9A1CMS (9A5TR,9A5AVW,9ATW,ops)				
	517,293	1071	161	B
YT1Z (YT1WN,YU1YR,4N1DX,ops)				
	350,304	712	164	C
OK2KDS (OK2VWB,OK2HIJ, OK2TCW,ops)				
	337,716	708	159	C
IO2L (IZ2ACZ,IZ2CEF,IK2MLV, IK2PIG,ops)				
	315,900	780	135	C
YZ7A (+ops)				
	310,218	694	149	C
US4QWX	281,718	666	141	C
DF0RE (DJ1YFK,DH5YDT,ops)				
	263,106	622	141	B
OM3KZA (OM6FN,OM3YDX, OM3TPN,ops)				
	179,010	442	135	B
HA6KZS (HA6ZS,HA6WT,HA6WW, HA5IGM,ops)				
	96,192	334	96	C
9A2L (9A2VJ,op)				
	85,221	557	51	B
UR4LWY (UR5LJC,UR4LQA,UR3LDJ, ops)	64,008	254	84	C
RZ4PZL (UA4PMG,UA4PNP,ops)				
	37,818	191	66	C
UR4RWO (UR5RMO,UT5RQ,UT0RW, ops)	28,776	218	44	C	15

North America

3E1CW (N4UK,W4OC,ops)				
	5,096,409	5359	317	C
8P9JA (K4MA,AA4NC,ops)				
	4,914,936	5251	312	C
V31TP (WC0W,N0SS,ops)				
	4,783,224	4861	328	C
KP2F (KP2L,NP2L,K8RF,W9EFL, W0CG,ops)				
	4,315,185	4655	309	C
C6/AC8W (+K8DD)				
	3,750,366	3994	313	B
V47C (DK5AX,VE3BW,VE3VFR,W4OV, WD4JR,ops)				
	2,473,137	2913	283	C

South America

P49V (AI6V,I2UIY,ops)				
	5,305,272	5492	322	C
CE0ZY (DK1BT,DK7YY,DL2OAP, DL3DXX, DL7UFN,ops)				
	127,566	373	114	C
PY2LDS (PY5FB,PY2NX,ops)				
	55,080	255	72	C

Multioperator Two Transmitters
Asia

UA9LM (+UA9LP)				
	231,231	637	121	C
RK0SXF (RU0SN,RU0ST,RA0SID,ops)				
	170,829	513	111	C

Europe

MD/DL3OI (+DL4LQM,DL5AXX,DL5LYM, DL7URH,DL8WAA)				
	4,387,761	5397	271	C
G4BUO(+W3EF, G4TSH)				
	+3,999,030	4865	274	C
OT0A (ON5UM,ON6ZX,PA3EZL,PA7BY, OH2JA,JK3GAD,ops)				
	3,408,804	4509	252	C
RU1A (RW1AC,RV1AW,RX1AA,RN1AM, RA1ARZ,ops)				
	3,120,264	4228	246	C
9A7A (9A7V,9A8A,9A3OS,9A3TR, 9A4PA,9A4RX,9A6DM,ops)				
	2,973,834	3798	261	C
SK3W (SM1TDE,SM3SGP,SM5FUG, SM5IMO,SM0GNU,SM0NSJ,SM0OEK, ops)	2,905,128	3768	257	C
LA8W (LA3BO,LA4DCA,LA8SDA, LA9HW,ops)				
	2,823,870	3955	238	C
GM7R (GM0NAI,GM3YOR,GM0CLN, MM0CCC)				
	1,372,680	2232	205	C
HG6N (HA2RX,HA6ND,HA6NL,HA6NQ, HA6ON, HA6PX,YO5BRZ,ops)				
	1,296,141	1991	217	C
YZ1U (YU1XA, YU1WS, ops)				
	325,962	1194	91	C
IQ3X (IV3HAX,IV3SKB,ops)				
	299,040	712	140	C

North America

KL7Y (+WA2GO,KL9A,KL7FH,NL7Z)				
	6,036,255	6597	305	C

Multioperator Unlimited Transmitters
Asia

JN3PYQ/1 (+JJ1VOM)				
	847,665	1449	195	B

Europe

9AY2K (9A5W,9A3GW,9A6A,9A7R, 9A2R,9A2B,9A2EU,9A9A,ops)				
	4,551,480	5380	282	C
RW2F (RA2FA,RA4LW,RN2FA,UA2FB, UA2FF,UA2FM,RA2FBC,UA2FZ,ops)				
	3,852,618	4774	269	C
LY7A (LY3DA,LY3HD,LY2KZ,LY2UF, LY4AA,LY2NK,LYR-346,LYR-728,ops)				
	2,177,070	2962	245	C
OL7W (OK1DUT,OK1DXW,OK1EP, OK1FDR,OK1FUT,OK1VBA,ops)				
	1,562,895	2295	227	C
JW5E (LA6YEA, + ops)				
	1,330,218	2206	201	C
PI4CC (PA3BSQ,PA3EPD,PB0AIU,ops)				
	23,751	203	39	C

North America

6D2X (K5KA,K5TSQ,K9PG,N5JA,N5RZ, N6ZZ,W5VX,XE2XDX,XE2YNE, XE2YNS,ops)				
	8,518,797	8631	329	C

South America

LU6UO (+ops)				
	109,188	674	54	C
LU1FAM (+ops)				
	17,766	141	42	C

Checklogs: 3D2RK, 4Z1GY, 7S4A, 7S5J, 9A6W, DF3OL, DJ7AA, DJ9DZ, DL1ARD, DL1DQJ, DL5AMF, DL5CD, DL5NA, DL6HTA, DL7VAF, DL7VGU, DL9GMC, DM3UH, EA4BIN, EA5EU, EA7MT, ES4RO, F6ABI, G0WHO, HA0GK, HA7UG, HB9CEY, HB9LDO, IK0XBX, IK2RZP, IZ6BTN, JH6SCA, JH7DNO, JM1NKT, LU5FA, LU7DIR, LY1DS, LY1DT, LY3BS, LZ1AU, LZ1JZ, LZ2PL, LZ3BG, OK1DMP, OK2BHD, OK2PBG, OK2PCX, OK2PPM, OK2RZ, OM3PC, ON7SS, OZ5WQ, OZ6TL, PA5TT, PY2TNT, PY3AU, PY7YL, RA0AM, RA3MB, RA3NZ, RA3XP, RA4AI, RA4UAT, RA9CZ, RA9DZ, RU3AA, RU3DX, RV2FW, RV3PN, RX9FB, RZ4SWM, S51WO, S53M, S55A, S57NW, SM2KAL, SM2UJW, SM4BNK, SM4TU, SM5BUH, SM6CDN, SP2JGK, SP5ALV, SP6CES, SQ1BVG, SV2BFL, UA1CEC, UA1PBI, UA1WAL, UA2FS, UA3NFG, UT1FA, UW7Q, UY0UY, YO2CJX, YO5ODT, YO5OEF, YO5PBF, YO8KOS, ZS0E, ZX2XX, K1DW, K2LP, K2TR, K3SWZ, K6FM, K6VL, K8RS, KJ5CI, KO3Q, N7RO, VA3IX, VE3BR, W2HAZ, W2TO, W2YE, W4LYV, W4UM, W7EAI, W7LR, W8LYT, WA0OTV, WA2BMH, WB9MII, WW3S

Disqualifications: HG1S

SECTION NEWS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Fall is upon us and school is back in session. Keep in mind that school is not just for the children. Has your club ever considered having a training session instead of or in addition to your regular club meeting? Continuing education is a major part of any technical or professional endeavor, and Amateur Radio is really no different. Keeping up on new things always makes things more interesting. One does not have to limit these sessions to just technical discussions. They can include such operational interests as contesting, county hunting, special event stations, fox hunting, or any other topic your club might be interested in. Another option is to pick some topics that your club does not have a great knowledge in, and then the club members' research the topic and report back at one of the meetings. This way everyone learns something in the investigation process. On a sadder note, it is my duty to pass on that John Penrod, K3JP, has become a Silent Key. John was one of the founding members of the Kent County Amateur Radio Club. Our condolences to John's family and friends. He will be missed. 73, Randall.

EASTERN PENNSYLVANIA: SM, Allen R. Breiner, W3TI—SEC: Eric Olena, WB3FPL. ACC: Steve Maslin, N3ORH. OOC: Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: W3ZRQ. TC: Lawrence Thomas, AA3PX. ASMs: Ron Creitz, KB3CFV, Paul Craig, N3YSI, Vince Banville, WB2YGA, Dave Heller, K3TX, George Law, N3KYZ, J. Yogi Bear, WB3FQY, Harry Thomas, W3KOD. The above EPA cabinet officials will hold its second annual cabinet meeting in October. All items subject for discussion should be sent to the Section Manager and received by September 25. A demonstration at the Chester Co Public Safety Day exercise was given by K3JV KD3OK KB3DMF KA3DYX KE3MN K5HAL N3EBG N3ZO KB3EYQ KB3FCU WA3LVR WA3MME and KC3XL. A Public Information Officer appointment was made to WB3CRG and NG3F has been appointed an OES for Snyder Co. Communications for the Memorial Day parade in Columbia was handled successfully by Southern Pennsylvania ARC club members WB3FQY N3LON KI6NJ N3ABC N3XPA and KB3BGS. Delaware -Lehigh ARC member WX3W N3ULW N3ZSR N3QIM N3ZST KE3AW N3VUO W3PYF W3JD N3XRL were the ears and eyes for the Derriere in the Delaware. No mishaps were reported. The Chester Co ARES/RACES group is in the process of installing a new controller in the W3EOC 146.94 repeater. Each October, ECs gear up for the annual Simulated Emergency Test. Although similar to a Field Day exercise, the SET tends to be more down to earth for the county's emergency communications system. Our section comprises 134 counties, yet only a few of our ECs actually run a simulated test. It's never too late to teach old dogs new tricks and harder yet when our young pups have never been given some early training. How many ECs plan to try their hand at entering the simulated test this year? You would be surprised what you can learn even if it's only a desk-top exercise. It's been five years now that I've been writing items for this column, and it wonders me. Does anyone ever read it, because I keep on getting a continuous flow of mail with questions pertaining to the Pennsylvania Amateur Radio call letter license plates. PLEASE DO NOT call or write to Harrisburg with your questions about Amateur call letter plates. The person with whom you should talk knows nothing about the issuing of those Amateur license plates. If you have a problem, call Dave Heller, K3TX, at 215-736-3333. Dave has a direct connection with Harrisburg and has the answers. Your new tags should have *"Amateur Radio"* stamped across the bottom. Tfc: N3YSI 273, W3IPX 221, W3UAQ 141, N3EFW 115, W3HK 106, W3IVS 67, N3SW 59, N8JSO 26, W3JKX 24, W3TWV 16, N3AO 14, KB3BBR 12, KB3CVO 8, KA3LVT 8, NG3F 8, AD3X 7, N3HR 7, W3TI 6, W3SD 6, KB3CEZ 6, N3ZXE 5, N3IRN 4, N3AS 3, KB3DDL 2, K3ARR 2, W3KOD 1, W3BNR 1. Net Reports: EPAEPTN 132, EPA 132 PFN 38 PTTN 33 MARCTN 15 SEPTTN 13 LCARES 10 D3ARES 7 MCOES 1.

MARYLAND/DC: SM, Bill Howard, WB3V 410-551-6775 wb3v@arrl.org—MDC Section Web homepage http://users.erols.com/wb3v/mdc/. Our ASM Jerry Gavin, NU3D, is recovering from a fall on his roof. He wishes to thank all for their letters and prayers during his recovery. WICO EC WB3MJR reports he is in the process of moving to a new QTH in WICO. Carl will be off the air temporarily until the move is completed. WASH EC KD3JK reports 9 net sessions, drills, and tests this month. HOWA EC K3EF reports 22 members. HOWA RO WA1QAA reports taking advantage of the HOWA ARES hiatus by conducting training classes in directed net operation and formal traffic for new HOWA ARES/RACES members and those who desire a refresher in those subjects. The following amateurs are attending: N3ZPL, WB3GNO, K3UOD, W1TRT and KB3BQI. We conducted an HF net, beginning on 75 M, then QSYing to 10M to continue our evaluation of ground wave propagation throughout the section, and finally returning to 75M. Participation was quite good during this exercise. The following stations participated in the HF Net on 75M. Call signs proceeded by an asterisk (*) were also heard on 10M. County representation is also indicated. (*) W3YVQ, BACO; KB3AMO, STMA; (*) N3ZKP, BALT; (*) N3GT, ANAR; (*) WA1QAA; HOWA; (*) N3WKE, BACO; W3TOM, CHAR; (*) KO4A, ANAR; (*) N3QXW, ANAR; (*) WA3WRT, BACO; (*) W3BOB, ANAR ; W3COU, CECI; (*) N3VNG, FRED; (*) W3CCI, HOWA; K3WJ, GARR; (*) K3UOD, HOWA; (*) W3DFW, ALLE; (*) KB3TB, PRGE; KB3DVC, PRGE; W3YD, PRGE; N3JFI Bedford, PA (10M connectivity via W3DFW); (*) N3SEO, ANAR; K3FOR, ANAR; KA3SKW, GARR; (*) KZ3AB, HOWA; (*) N3ZOC, ANAR; KK3F, PRGE. ANAR EC N3QXW reports 38 members, 4 sessions of the ANAR ARES Net on 147.805 with liaison to EPA, NCAC, MEPN, WVA, BTN and MDD. Brian also reports 1 training session and ARES participation in the HF exercise. N3WOF, N3HKJ, N3SEO, N3SEP and WOZIG provided communications support for the CAM (Cycle Across Maryland) bicycle tour. 73 from Bill WB3V - and with the nets: Net/ NM/QND/QTC/QNI: MSN/KC3Y/31/44/230; MEPN/N3WKE/31/50/480; MDD/WJ3K/60/383/827. MDD Top Brass KJ3E 217, AA3GV 174, AA3SB 196, June BTN AA3LN/30/55/394, June MEPN N3WKE/30/53/461. Tfc: KK3F 1755, KJ3E 452, N3QA 452, AA3GV 182, AA3SB 130, W3YVQ 89, N3WKE 88, W3CB 74, N3DE 67, N3WK 60, KC3Y 49, KB3AMO 30, W3VK 21, N3EGF 15, K3CSX 7, N3ZKP 6, WA3WRT 5, WA1QAA 4, N3KGM 4, WA3GYW 3, KE3FL 2. (Jun) N3WKE 69. PSHR: KJ3E 277, KK3F 206, N3WKE 157, W3YVQ 148, AA3SB 146, W3VK 131, N3WK 122, AA3GV 121, N3AKP 103, KC3Y 90, KB3AMO 88, WA1QAA 84, W3CB 80, KE3FL 75, K3CSX 73. (Jun) N3WKE 119.

NORTHERN NEW YORK: SM, Thomas A. Dick, KF2GC http://www.northnet.org/nnyham, e-mail: kf2gc@arrl.org— NNY-Section meets in Lake Placid, NY, at the Youth Center. Many of the NNY-Clubs would like to hold a NNY-Hamfest in 2001 and the feasibility of this will be the order of the day. A total of 19 hams participated in the Tupper Lake Tin-man Triathlon. The Tri Lakes Amateur Radio Club, organized this year's service event. It organized operators and made the tri-lakes public aware of what Amateur Radio can do for our area, through an informative media blitz. Our NNY-Section has been busy with Public /Service Events this summer and all our NNY-Clubs have shown that they can pull off these big events. The Champlain Valley Amateur Radio Club, Digital Operators Emergency Service and the Mountain Valley Amateur Radio Club continue to make events like Ironman 2000 USA, and Schroon Lake's Adirondack Marathon successful public service events. Amateurs have pulled together from many NNY-Clubs. Many letters of thanks to all the Amateurs have been forthcoming, showing only again the value that each one of us holds to our communities, counties and section. Thanks again for all who helped in Public/Service events.

SOUTHERN NEW JERSEY: SM, Jean Priestley KA2YKN (@K2AA) e-mail ka2ykn@voicenet.com—ASM: W2BE K2WB W2OB N2OO N2YAJ SEC: N2SRO. STM: K2UL. ACC: KB2ADL. SGL: KB2WKY. OOC: K2PSC. TC: W2EKB. TS: W2PAU. WB2MNF AA2BN KD4HZW WB3IJB WA2NBL KA1AOR N2QNX N2XFM. Red Cross Chapters of New Jersey are looking for radio club affiliations to help with operating and maintaining their amateur stations. Contact your local Red Cross or David Hurley at n2zhy@amsat.org. Be part of a great tradition. With the onset of fall, we think about what to do indoors. The first thing that comes to mind is the HF bands. Plan to fill those empty lines in your lonely log. I will be working toward my DXCC. The first Monday of the month is the SNJ Section Net at 9 PM on 147.345. All are welcome to check in or just listen. Report for July 2000: QNI reports, NJPN W2CC 176, NJSN K2PB 127, NJM WA2OPY 161, NJN/E AG2R 196, NJN/L AG2R 203, JSARS KC2ATQ 367, SJVN WB2UVB 221, WA2CUW 97, AA2SV 71, K2UL 65, KB2RTZ 53, K2UL-4 48, WB2UVB 36, N2VQA 24, W2AZ 15, KA2CQX 7, KB2VYZ 4, KB2VSR KB2YBM KC2ETU 1. PSHR totals KB2RTZ 212, K2UL 180, WB2UVB 154, AA2SV 121, KA2CQX 116, WA2CUW 97, N2VQA 75, JSARS has the unique distinction of having the first and oldest VHF traffic net in NJ.

WESTERN NEW YORK: SM, Scott Bauer, W2LC — A new season of club meetings is well underway for us all. Volunteer some time to make your club a better one. You'll be glad you did. October is my first month as an elected SM, I was appointed to finish the last 9 months of Bill, W2MTA's, term. SM is a job that I have taken with some apprehension, but with lots of enthusiasm as well. Meeting many of you for the first time this summer at the hamfests was enjoyable and enlightening. It is nice to meet an excellent group of hams who volunteer their time for different activities. My goals as a new SM are simple, and maybe a bit ambitious too. I would like WNY to lead in new ARRL memberships. Why? The ARRL is the voice of Amateur Radio, and a fine organization. A few new appointees for the WNY field organization would be nice too! I would like each and everyone of you to volunteer some time to an Amateur Radio public service event, a local club or net, or maybe a school presentation or town event, even if only for a couple of hours. Not a member of the group? It doesn't matter. They will welcome you. Give it some thought, go for it, and let me know what you did. Besides being SM, I coach baseball. It is a good feeling when a kid tells you they want to be on your team next year. It lets you know you did something right. For the few thanks that you receive for the time you volunteer, that one time someone says thank you, you will remember for a lifetime. Amateurs are a diversified group. Show everyone what Amateur Radio is all about. The town board will remember you for it! HAMFESTS: October 7, RAGS Hamfest, at the Pompey Hill Fire Dept. Remember to send hamfest information in early! Net Summaries:

Net	NM	Sess	QNI	QSP	Net	NM	Sess	QNI	QSP
BRVSN	WB2OFU	26	201	2	CHN	W2EAG	31	176	34
CNYTN	WA2PUU	31	373	53	EBN	WB2IJZ	21	286	0
NYPHONE	N2LTC	31	191	224	NYPON	N2YJZ	31	303	122
NYS/E	WB2QIX	31	304	167	NYS/L	W2YGW	31	238	225
NYS/M	KA2GJV	31	174	75	NYSCN	W2MTA	4	17	4
NYSPTEN	KD2V	31	324	38	OARCN	N2KPR	4	30	5
OCTEN/E	KA2ZNZ	31	1675	175	OCTEN/L	KA2ZNZ	31	718	188
OMEN	K2DYB	1	7	0	STAR	N2NCB	29	294	19
WDN/E	N2JRS	31	563	65	WDN/L	W2GUT	31	540	66
WDN/M	KB2VVD	31	573	57	TIGARDS	W2MTA	4	20	4

Traffic (July 00), * indicates PSHR, # for BPL: N2LTC*# 774, KA2ZNZ*# 542, KA2GJV* 325, W2MTA* 235, NN2H* 202, WB2QIX* 111, KG2D* 97, KC2EOT* 92, N2KPR* 92, K2GTS* 88, WI2G* 78, W2LC* 74, N2CCN* 54, AF2K* 42, W2PII* 36, NY2V* 34, W2GUT 30, AA2ED* 28, K2DN* 26, KB2ETO* 25, N2WDS* 22, KA2DBD* 16, WA2UKX* 15, KA2BCE* 9, KB2WII* 6, WB2IJH 3. Digital; Stn Rx/Tx: N2LTC 179/101, KA2GJV 31/0, K2DN 1/1, NY2V 0/1.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE—ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. OOC: KB3A. PIC: W3CG. STM: N3WAV. TC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: N3BZW. DEC-Rapid Response: N3HJY. DEC-OES: K3TB I would like to welcome K3TB, Tim Bartlow, to the ARES staff. SEC Rich Beaver, N3SRJ, recently appointed Tim as the DEC for Official Emergency Stations. Tim will be recruiting and making appointments to this position. I also want to thank Chris Spack, KB3EST, for revising the section Website. This 10-year-old young man has been a great help and is doing an outstanding job on several Web sites. Take a look at the section site at http://www.bfdin.com/wpasec/index.htm. The month of October will be a busy one in the section. On the weekend of October 14 and 15 will be the PA-QSO Party. This operating event is second only to Field Day for me. I hope to have the opportunity to work many of you during the contest. I invite the clubs in the section to turn this into a mini Field Day and have some fun. The following weekend will be the scouting "Jamboree On The Air". This is a great opportunity for amateurs to introduce some new people to the hobby and service. Contact a local troop and get something set up and watch the excitement as these scouts chat with other scouts around the world. Finally on the 28th of October will be the simulated emergency test. This will be under the leadership of the Section Emergency Coordinator Rich Beaver, N3SRJ, and Section Traffic Manager Bob Livrone, N3WAV. I hope all will participate in these worthwhile events. 73, John Rodgers, N3MSE, WPA-SM, n3mse@arrl.org.

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH—ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central: N9FNP. DEC-S/W KB9AIL. The Peoria Area ARC has become a partner in Project IMAPCT. The organization is devoted to disaster preparedness. The Fox River Radio League operated a special event station in August as part of the International Lighthouse/Lightship weekend. The club operated near the lighthouse on the Fox River island in Fabyan Park in Batavia. Sangamon Valley RC reports 13 members provided communications for the Iron Horse Triathlon in Springfield. Over 500 competitors showed up to swim a 1.5 mile course, race 45 miles on a bike, and then finish up with a 10 mile sprint on foot. The Northern Illinois DX Association's 48th annual W9DXCC convention and banquet was held September 16 in Rolling Meadows. ARRL staff member N7NG was the scheduled speaker at the banquet. Central DEC N9FNP reports the ARES team has been called on several times in recent weeks to assist local officials with various activities. Nine Wheaton Community Radio Amateur members provided communications for DuPage County's National Trails Day. The team served as shadows to event officials and helped with traffic control for more than 300 bikers, hikers, and equestrians. Former WCRA newsletter editor K9ZE was honored for his six years of service to the club as their editor. Officers for the Lamoine Emergency ARC were elected at the monthly meeting and annual picnic in Glenwood Park in Macomb. All officers were re-elected to their posts. They include Pres KA9SQB, VP KA9CFD, Sec N9RDD and Trea KB9EBJ. Several LEARC members discussed Amateur Radio during a radio talk show at WJEQ. The Antique Radio Club of Illinois held Radiofest XIX in Elgin during August. The event featured many classic radios including some amateur gear. Technical Coordinator N9RF reported helping an individual on what was thought to be TVI. It turned out to be an entirely different problem; a nearby air conditioner was cooling down the set so much when the TV was off that the vertical oscillator was drifting off frequency and causing the picture to become unstable. The Western Illinois ARC in Quincy set a goal earlier in the year to reach a membership of 100. The latest report showed them near the goal with 93 members. A researcher for Encyclopedia Brittanica contacted WIARC in search of information on amateur radio after spotting their site on the Internet. Hamfesters RC is still receiving responses from their Submarines on the Air event. The group plans to run the special event station again next year. The Starved Rock RC reports ARES members are planning to work on a disaster drill at LaSalle Station in October. ARES and SRRC club members also were involved with the USCF bicycle race in Ottawa. The Egyptian RC had an unusual visit during their Field Day operation-an entire wedding party. The new bride even took a moment to make a contact on 20 meters. July traffic: W9HLX-47, WB9TVD-35, NC9T-22, NN9M-19, HA9IMX-15, WA9RUM 7, W9FIF-5. ISN report QNI-193, QTC-73, Sessions-31. 9RN report de KF9UBX, check-ins 417, traffic 154, time 691, sessions held 62, traffic handled 154, average per session 2.48, rate of traffic 4.48, total time 691 min, percent of section represented 85% by nn9m w9hlx n9plm ns9f. W9VEY Memorial Net report de K9AXS 7 with 208 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ—Sympathy extended to the families and friends of Silent Keys: 6/22, Frank J. Giszewski, W9LPD, South Bend; 7/22, Ivan H. Dotson, K9GRU, Muncie; 8/4, Earl A. Sprague, WD9HAI, Muncie; 8/

Continued on page 118.

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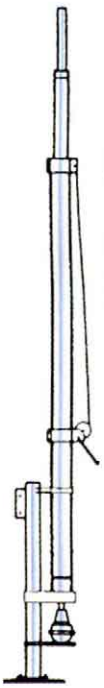

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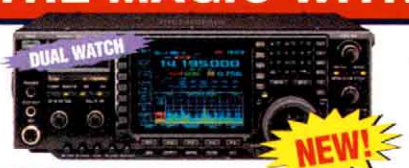

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FT-847
Ultimate Base Station, HF, VHF, UHF
- 100w HF/6M, 50w 2M/430 mHz
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2M/440 Mini Dualbander Transceiver
- 50w 2m, 40w 440mHz
- Wide Rx • Detachable Front Panel
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- Built-in CTCSS/DCS Encoder/Decoder
- Less than 4" wide!

NEW!

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- Built-in DVR, CW Memory Keyer
- DSP, Auto-Notch • 99 Memories
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- Ultra Compact • 50w/35w 2m/440
- 110 memories • Wide Band RX
- Backlit mic • Remotable front panel w/op

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- 50W 2M, 35W 440
- Built-in Duplexer
- 9600 Baud ready
- 50 Memory chanels
- RX Range 136-174mHz/420-470mHz
- CTCSS built in

Call For Low Pricing!

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- 50 Watt out • Alpha Numeric Display
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- CTCSS/DCS Encode/Decode built in

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- 100W 160-10 Mtrs • 100W 6M, Gencov. Rx
- Full QSK, 100 Mems. • Compact, Remotable
- Dual VFO, 12VDC • 6.2 lbs.

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Dual band "Miracle Baby" style antenna, with a male SMA connector. Shown on the popular FT-50R by Yaesu. The antenna is only 1.75 inches tall, and exhibits surprising performance.

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CN-410 3.5-150MHz 150W

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- Compact, Mobile Meter
- Cross Needle Design
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40M-70cm Mobile Antenna

40/*20/*17/15/10/6/2M/70cm
* optional coils

A 6M/2M/70cm whip that accepts 1,2 or 3 HF coils for up to 6 band operation. Simply screw on any combination of HF coils you choose.

Standard PL-259 connector allows easy mounting. Convenient fold-over hinge for entering garages, parking structures, etc...

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NEW!

High Sunspots= Great HF Mobiling!

MSG Series

2M/70cm Mobile Antennas with spring-loaded whip to absorb impacts. Fold-over hinge included as well.

MSG-1000C	MSG-1100C
Length: 39 inches	Length: 43 inches
Max Pwr: 150W	Max Pwr: 150w
Conn: PL-259	Conn: PL-259

NEW!

MH-510

NEW!

6/2M/70cm HT Antenna w/SMA Connector
The first aftermarket gain antenna for the YAESU VX-5 and the ICOM T8A.

A dramatic improvement over the stock antenna, 20.75 inches of TRIBAND performance.

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- 2M HT, 5W optional
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- Encode Built-In

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Ameritron gives you four 811A tubes, 800 Watts and far better quality -- for less money than the competitor's 3 tube 600 watt unit . . . Why settle for less power, less quality and pay more money?

AL-811H
$795
Suggested Retail

AL-811
$649
Suggested Retail

Only the Ameritron AL-811H gives you four *fully neutralized* 811A transmitting tubes. You get absolute stability and superb performance on higher bands that can't be matched by un-neutralized tubes.

Ameritron mounts the 811A tubes vertically -- not horizontally -- to prevent hot tube elements from sagging and shorting out. Others, using *potentially damaging horizontal mounting*, require special 811A tubes to retard sagging and shorting.

A quiet, powerful computer grade blower draws in plenty of cool air. It *pressurizes* the cabinet and efficiently cools your 811A tubes. Our air flow is so quiet, you'll hardly know it's there--unlike noisy, poorly chosen blowers.

You also get efficient full size heavy duty tank coils, full height computer grade capacitors, heavy duty high silicon core power transformer, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual meters, QSK compatibility with QSK-5 plus much more.

AL-811 has three 811A tubes and gives 600 Watts ouptut for only $649.

Near Legal Limit ™ Amplifier

AL-572
$1395
Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of a full legal limit amp! Four rugged *Svetlana* Russian 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 8½Hx 15½Dx14½W in. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

HF Linears with Eimac 3CX800A7

AL-800H
$2495
Two tubes, 1500 W plus

AL-800
$1695
Single tube, 1250 Watts

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

AL-80B . . . Desktop Killowatt 3-500ZG Amplifier

Ameritron's AL-80B kilowatt output desktop linear amplifier can double your average SSB power output with high level RF processing using Ameritron's exclusive *Dynamic ALC*™!

AL-80B
$1299
Suggested Retail

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

You get a full kilowatt PEP output from a whisper quiet desktop linear. It's a compact 8½Hx14Dx15½ inches and plugs into your nearest 120 VAC outlet. Covers 160 to 15 Meters, including WARC and MARS (user modified for 10/12 Meters with license).

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

AMERITRON offers the best selection of legal limit amplifiers

AMERITRON's legal limit amplifiers use a super heavy duty Hypersil® power transformer capable of 2500 Watts!

Ameritron's most powerful Linear

AL-1500
$2945
Suggested Retail

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

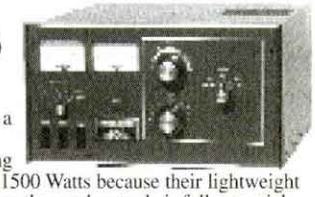
Ameritron's 3CX1200A7 linear Amp

AL-1200
$2495
Suggested Retail

Get ham radio's toughest tube with the Ameritron AL-1200 -- the EimacR 3cx1200A7. It has a 50 Watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 Watts PEP two tone output for a half hour.

Ameritron's dual 3-500 linear

AL-82
$2395
Suggested Retail



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

AMERITRON no tune Solid State Amplifiers

ALS-500M 500 Watt Mobile Amp

AL-500M
$799
Suggested Retail

Ideal Mobile amplifier uses 13.8 VDC mobile electrical system, very compact 31/2x9x15 inches, extremely quiet, 500 Watts output, 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm-up, no tubes, SWR protected.

ALS-600 Base 600 Watt Amp

AL-600
$1299
Suggested Retail

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Oil cooled 50 Ohm dummy load handles 1500 Watts for 5 minutes. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz.

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Self-contained, connects externally to most HF amps. Handles 2.5 kW PEP, 2 kW CW. Six times faster than vacuum relay. 6x4x9½ in.

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4, John G. Foster, N9CBM, Lebanon. They will be missed. Mich City ARC has been busy providing communications for a parade with N9ZIP, KB9ORJ, N9TPC, WD9BDR, K9ET and N9RG. Also assisting another event KA9PGC, KA9LOW, KB9WFP, N9ZIP, K9ET, KB9ORJ, N9SJR and W9DZ when they helped reunite a lost toddler with her distraught mother. The Tippecanoe ARA assisted the Greater Lafayette Soap Box Derby. Those helping were KA1LXG, WB9BRX, N9LF, W9TN and KF9UP. The Lake Co. ARC members provided communications for a Brickyard Run those assisting were W9MAL, W9WY, K9MNQ, W9ZRO, W9CCY and AA9XS. The IN SET scheduled date is Oct. 7th. This is a time when your club or group can be sure you are ready for an emergency. Test out your equipment etc. All ECs should be prepared. Our SEC has put a wonderful article on the IN Website, go to http://www.inarrl.org. It will help you prepare. I need your input. What are you doing in your club or group. Let me know what you are doing. Maybe others would also be interested. Have you sent in your Amateur of the Year recipient? They could be the Indiana Amateur of the Year. Send nominations to me, Sandy Parker, KA9RNY, or Jim Sellers, K9ZBM. You don't want them to lose out because you didn't send in their nomination. The award this year will be awarded at the Indiana State Convention at the Fort Wayne Hamfest Nov 18/19 at the ARRL Forum. You won't want to miss it to find out what IN is up to next. Our ASM Chuck Crist, W9IH, has had some great ideas. It's never too early to plan on being there. The Hoosier Hills Hamfest on Oct 1st. NMs ITN/W9ZY, QIN/K9PUI &KJ9J , ICN/K8LEN, WN/AB9AA, VHF/W9FU.

Net	*Freq*	*Time/Daily/UTC*	*QNI*	*QTC*	*QTR*	*Sess*
ITN	3910	1330/2130/2300	2257	544	1632	31
QIN	3656	1430/0000	No report			
ICN	3705	2315	92	19	357	29
IWN	3910	1310	2443	–	310	31
IWN VHF Bloomington			487	–	465	31
IWN VHF Kokomo			688	–	155	31
IWN VHF Northeast			1234	–	620	31
Hoosier VHF nets(13 nets)			742	38	—	61

D9RN Total QTC 154 in 62 sessions IN represented by K9GBR, W9UEM, WB9QPA, N9KNJ, KB9NPU, KF9VA and W9YEA. 9RN Total QTC 183 in 62 sessions IN stations KJ9J, KO9D, K9PUI, WB9UYU, and W9FC. Tfc: W9FC 265, W9ZY 136, WB9QPA 81, W9FU 75, K9PUI 66, AB9AA 63, KJ9J 55, KO9D 54, W9JUJ 48, K9GBR 41, W9UEM 38, KA9EIV 38, KB9NPU 36, W9EHY 28, KA9QWC 28, K8LEN 19, W9BRW 11, K9SXM 8, K9RPZ 8, AB9A 7, K9ZBM 7, K9DIY 5, WB9NCE 4, K9OUP 3, N9HZ 2.

WISCONSIN: SM, Don Michalski, W9IXG—BWN 3985 0600 W9RCW. BEN 3985 1200 KE9VU. WSBN 3985 1730 WB9WHQ. WNN 3723 1800 KB9OCZ . WSSN 3645 1830 N9BDL. WIN-E 3662 1900 WB9ICH. WIN-L 3662 2200 W9UW. It is with deep regret that I inform you of the passing of Walt Reid, W9CUZ, age 68. Walt was a member of the Milwaukee Repeater Club. Also, Ken Jacobchick, W9CCZ, is a SK. Ken was member of the MRAC. Our congratulations to Dick McNew, WB9PTC, for his MRAC certificate of appreciation with on-the-air code practice, helping new hams, and promoting ham radio. Bette and Art Kratz, KF9ZU and N9TD, respectively, will be retiring to Arizona. Bette was our ARRL ACC and WNA secretary. Both have been very active in Wisconsin amateur radio and will be missed by all. Our best wishes to them in the sun country! I will need to appoint someone to the ACC position. If interested, please contact me. The detailed job description is posted on the Web at: www.arrl.org/field/org/acc.html. Our congratulations to David, KB9SGY, and to Jane, KB9USE, for upgrading to General! Where have all the Elmers gone? We need more amateurs who would be willing to help newcomers into the hobby. Let's not be too busy to open up our arms to the new hams in the club meetings. Many are just there it feel out the club before making a commitment. You have one or, maybe, two shots to make these folks welcome. Don't miss this opportunity to get them involved in club activities! The FCC will soon begin the CORES registration system. Hams who registered under the ULS before mid-June should already have a FRN. New amateurs should contact the FCC to apply for one using their TIN or SSN. Do it now! 73, Don, W9IXG.eboard.com. Tfc: W9RCW 907, K9JPS 816, W9IHW 672, W9YPY 549, K9GU 514, N9TVT 405, W9CBE 135, K9FHI 110, WZ7V 105, N9BDL 85, AG9G 78, K9LGU 71, N9CK 71, KE9VU 71, N9KHD 66, W9YCV 56, KA9FVX 45, KB9ROB 41, AA9BB 38, W9BHL 37, W9UW 33, K9HDF 28, WB9ICH 22, WD9FLJ 13, KA9BHK 12, W9ODV 5, K9UTQ 3, W9PVD 1. (Jun) K9UTQ.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, KMØD—Effective Aug 1 my new callsign is KMØD. I'm happy to announce that we have a new NM for the MSN/1 CW net. Bob Fehr-KØWPK of St. Paul will take over these duties due to Jim Swisher's-WØHPD "retirement". Jim has been involved in our FO activities for many years (used to write this column when he was STM). We have very few stations on HF who participate on our ARRL nets from the Twin Cities, and I'm glad to see Bob is willing to be NM. Bob has also been a long-time participant on the MSN. Bob, we thank you and to Jim we salute your past efforts! No comm-reports to pass along from the Granite Falls tornado. Terry Thurn, KBØSVW, was on-scene with Sal Army for 4 days lending a technical hand and John Edwardson, NØZEU, of Willmar, had a hand with Kandiyohi comm-trailor there for the city. MN DEM comm group did go on active stand-by. 2 more blocks and the tornado would have affected the county comms. It was a close call as far as communications go. A handful of cell companies were on scene to help with local cellphone use. Rod Vlachs' (WAØQMP) XYL Diane of Willmar is candidate for state senate of District 15. 73 from Randy Wendel KMØD.

Net	*Freq*	*Time*	*QNI/QTC/Sess*	*NM*
MSPN/E	3860	5:30 P	580/70/31	WØWVO
MSPN/N	3860	12 P	384/80/31	WAØTFC
MSSN	3710	6 P	N/A	vacant
MSN/1	3605	6:30 P	186/67/31	KØWPK
MSN/2	3605	10 P	151/28/31	KØPIZ
PAW	3925	9A-5P	1685/82/63	KAØIZA

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P.S. We now have brand new displays in stock for the 590 we will offer the displays to those that purchase the $2750.00 version for an additional $100.00 installed! That's for both displays!!!

Very good condition $2,250

Selected Excellent condition $2,750

HARRIS RF 131-122
EXCITER

It features digital tuning with remote control capability in the 2-30MHz range, 100 mw output. Modes of operation are U/LSB, compatible AM, CW, and ISB. This is a very good, reliable exciter.

*** no microphones available***

Price: good tested condition .....$750 ea

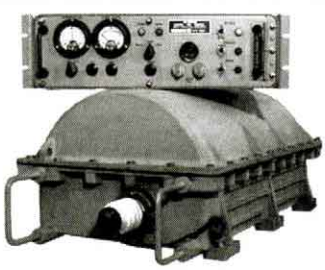
Pick of the litter.....$950 ea

HARRIS RF 551A
PRE/POSTSELECTOR

Covers 2-30MHz via frequency controls on front panel or it can be remotely controlled via digital interface (installed). These units have an average 5dB gain and exhibit excellent rejection outside of the selected frequency.

Price: $325 Excellent Cond. or 2 for $595

(Or: Fix it yourself, as-is: $145.00)

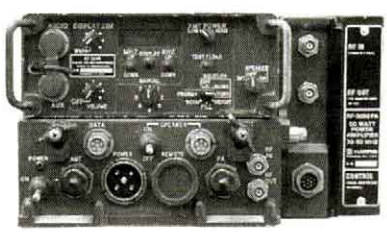


HARRIS RF 601A
ANTENNA COUPLER GROUP

Ruggedly designed to meet any weather conditions head-on. This 1kW manual/automatic coupler is solidly constructed and pressurized with inert nitrogen gas. It covers 2-30MHz & comes with the RF-601A/C coupler control unit. No expense was spared at $12K ea original gov't cost!

Price: good clean cond.....$1,150 ea

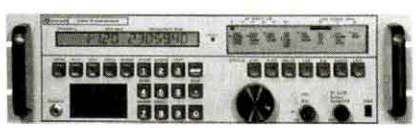
Dirty and scratched but ok.....$750 ea



HARRIS RF-3090 AU
DOCKING STATION / VEHICLE ADAPTER UNIT

This ruggedized military Adapter is designed for the PRC 117. The unit comes with the RF-3090 power amplifier (30-90MHz) @50 watts output. It features 2400 channels in 25kHz steps, voice or data. These units are sold untested as removed from service, but they appear to be in good used shape. No cables are included with these items. PRC 117 is not available.

Price: .....$850 ea



ROCKWELL-COLLINS HF 2050
COMMERCIAL COMMUNICATIONS RECEIVER

Continuing the tradition of fine professional communications receivers designed and built by Rockwell-Collins Canada. The HF 2050 covers 14kHz-30MHz and features a built-in speaker, DSP, noise blanker, squelch, up to 30 memories, 3 speed 10Hz tuning resolution, keypad for data entry, scan, variable AGC, extensive built-in self test, and a large liquid crystal alpha-numeric display. Very Collectable!!

Price: $2,850 Including operation/service manual. These are fully tested and burned-in.

CAL ASTRONAUTICS
MOBILE SATELLITE COMMUNICATIONS STATION

This is a box chock full of high-end technology. The terminal features a back-lit 4 line LCD display and illuminated keys; one of the transceiver's most impressive features is an "L" Band 1.65GHz 60 watt amp and helix antenna with built-in LNA. We consider this the ultimate gadgeteers goodie pack" with all kinds of RF satellite ground technology inside. Best of all they operate on 12VDC. Installation manual supplied (but, there is no subscriber data).

Used, good condition, untested.

$145 EA. Or three units for: $295

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Tfc: WO0A, WA0TFC, W0LAW, KB0OHI, KB0AII, K0PIZ, W0HPD, W3FAF, K0WPK, W0WVO, KB0AIJ, K0PHS, KA0IZA, KN9U, WD0GUF, N0JP.

NORTH DAKOTA: Bill Kurtti, WC0M—FORX (Grand Forks) Hamfest Oct 14, Location to be announced later. The FORX BBS has been shut down due to inactivity & path loss. CDARC (Bismarck) Hams have got their FEMA Communications trailer in operation. We all wish Ray, WB0NAD, a speedy recovery from his recent illness. I am sorry to report that VE4RO is a Silent Key. Bob was very active in the Peace Garden Hamfest a excellent cw operator & anytime someone was needed to do hard work in behalf of Ham Radio we knew we could depend on Bob to be there. RRRA (Fargo) Hams this year went all out for Field Day with beams for 10, 15 & 20 meters along with Dipoles for 40 & 80 and a triband beam & 6 meter beam just to be sure its done right. Took 5 hours to set up & 3 to take down. Include a large grill to feed the hungry workers. Traffic: N0RDJ 4. HF net reports by KB0XT. Data 3937 kc 6 PM daily, 26 sess, 455 QNI, 6 QTC Wx 3937 kc 8:30 AM Mon-Sat 28/560/20. Goose River 1.895 kc 8:30 AM Sun. 4/25/0.

SOUTH DAKOTA: SM, R. L. Cory, W0YMB—Lark of Watertown reported a successful Field Day with 500 contacts and a total score of 2242 points - up from 1850 points last year. They also have an Internet site at http://www.qsl.net/lark. Club activities for July were down due to weather vacations, poor band conditions, etc. Northern Hills ARC assisted in locating the site of a forest fire and by ham radio they got the information to the fire officials so they could get into the site. They also worked with the Black Hill ARC and Hot Springs Club in communications for the 2000 Mount Rushmore trail run. This is an annual 100-mile endurance run on July 29-30. 22 hams were involved with their communications. Weather information is vital to a run of this length. They also had coordination with law enforcement agencies for any emergencies. This is a call to club secretaries to send me items to put in this column.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs@arrl.org —This summer here in Arkansas has been too hot and too busy. Over the last 2 months, I have visited with several clubs during Field Day, special events, and meetings. During these meetings, I met a lot of new hams and many who have upgraded since the new rules have gone into effect. At Field Day both Russellville and Greers Ferry had a lakefront (or riverfront) view that was excellent for Field Day activities. The combined Field Day of Batesville, Stone County and NCAARS was entirely solar powered running 2A with 100 watts and a novice station and VHF station. The most important part was everyone was having fun. I also participated in the Steamboat Days Special event at DesArc and the White River Water Carnival Special Event at Batesville, both of which were on the bank of the White River. Terry Busby, W5ARS, our SEC tells me that we are well on our way to reestablishing the packet network for statewide communications during disasters. We have also discussed a PSK31 HF network to parallel it during communications outages. Until next month, have fun and enjoy the hobby. Traffic and net reports (June): K5BOC 139, K7ZQR 101, K5DEL 30, KC5TMU 30, W5RXU 26, AB5AU 21, KO5E 10, KA5MGL 10, AB5SG 7, W9YCE 4, KA6VAN 2, ARN 96, AMN 50, APN 26, OZK 13. (July) KC5TMU 112, K7ZQR 85, K5BOC 60, K5DEL 21, AB5AU 17, W5RXU 16, W9YCE 12, W5HDN 10, WB5HIL 8, KC5UEW 8, W5LZQ 3, AB5SG 3, ARN 96, APN 24, OZK 13, AMN 6.

LOUISIANA: SM, Mickey Cox, K5MC — I'm very sorry to report that K5WOD is now a Silent Key. Val was a traffic handler for many years. He was an ORS, served as an NCS on LTN, and regularly represented our section on the Fifth Region Net. Val was a fine gentleman who will be missed. I also want to extend condolences to W5NK for the recent loss of his XYL. Bob has been a very active traffic man for a number of years. Everyone on LCW and LTN is hoping that Bob will return to the air as soon as possible. Thanks to W5XX (MS SM), a formal memorandum of understanding now exists between the LA, MS, and STX sections for emergency communications during storm events. Kudos to the Ozone ARC for a job well done as sponsor of the Slidell Hamfest. The forums at the hamfest were well attended, including the ARRL Forum. Several hams commented positively on the quality of the forums. Other clubs might consider increasing the number and variety of their forums as one way to help increase hamfest attendance. Thanks to K1DW's invitation, I had the pleasure of meeting some of the section's most dedicated and accomplished DXers at the Delta DX Association's monthly meeting in New Orleans. As a reminder to all field appointees, net control stations, and traffic handlers, please send your reports to the proper person in a timely manner. Tfc: WB5ZED 968 (BPL), K5IQZ 178, K5MC 135, K5DPG 25, KG5GE 22. PSHR: WB5ZED 212, K5IQZ 123, K5DPG 119, K5MC 108, KG5GE 105. Net Reports: sessions/QNI/QTC. LTN: 31/301/82.

MISSISSIPPI: SM, Malcolm Keown, W5XX—Mississippi Section Web Page at arrlmiss@org. Web Master K5IBM at k5ibm@arrl.net. STM: KJ5YY. NM: N5JCG, KB5W, N5YNY, KI5UK, K5XU, KM5UH, KB5WJJ, KB5IXI. The SET is here again! Be ready to go at 8 AM local time September 16 on 3862 with a switch to 40 meters sometime during the SET. Local two meter nets will also be activated. In addition to a series of statewide problems for SET participants to deal with, several of the Emergency Coordinators will have a local exercise in progress on two meters that will add to the confusion. We will find that antennas suddenly won't load, repeater links will go down, HT batteries won't stay charged, etc., but that is what the SET is all about. Let's find out where the problem areas are now instead of when a real emergency strikes! Congratulations to Team Mississippi (WQ5L, W5XX, KB5IXI, AC5SU, N5JGK) for placing 17th out of 37 entries in the January North American QSO Party. AB5WF made a presentation to the Mississippi State Guard on ham radio emergency preparedness capabilities in the State, hopefully laying the groundwork for another agency for hams to serve. Regret to report the passing of Walker, W5NCB, Past Section Communications Manager, and Bo, KB5LAD, a regular check in on the MSPN for many years. PIO Report: W5KWB. DEC/EC Reports: KD5CKP, KD5FUO, WB5OCD, AB5WF,

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MFJ-989C *Legal Limit* Antenna Tuner

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MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

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The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).

MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

MFJ's exclusive *Self-Resonance Killer*™ keeps damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

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MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

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Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

MFJ-962D **$269.95**

A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969 **$199.95**

Superb *AirCore*™ Roller Inductor tuning. Covers *6 Meters* thru 160 Meters! 300 Watts PEP SSB. *Active* true peak reading lighted Cross-Needle SWR Wattmeter, *QRM-Free PreTune*™, antenna switch, dummy load, 4:1 balun, Lexan front panel. 3½Hx10½Wx9½D inches.

MFJ-949E *deluxe* 300 Watt Tuner

MFJ-949E **$149.95**

More hams use MFJ-949s than any other antenna tuner in the world! Handles 300 Watts. Full 1.8 to 30 MHz coverage, 48 position *Precision48*™ inductor, 1000 Volt tuning capacitors, *full size* peak/average lighted Cross-Needle SWR/Wattmeter, 8 position antenna switch, dummy load, *QRM-Free PreTune*™, scratch proof Lexan front panel. 3½Hx10⅝Wx7D inches. **MFJ-948, $129.95.** Economy version of MFJ-949E, less dummy load, Lexan front panel.

MFJ-941E *super value* Tuner

MFJ-941E **$129.95**

The most for your money! Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter *mobile* Tuner

MFJ-945E **$119.95**

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971 **$99.95**

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B **$79.95**

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-16010 *random* wire Tuner

MFJ-16010 **$49.95**

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921 or MFJ-924 **$69.95**

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 *artificial* RF Ground

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Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95**, Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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N5ZNT. Net Reports: sessions/QNI/QTC: MSPN 31/2795/51, MTN 31/94/50, MSN 31/1059/13, PBRA 31/788/18, Jackson Co ARES/RACES 31/580/17, MSSN 21/57/2, WCMS 13/138/3, Stone Co ARES 5/42/0, MAEN 5/72/0, MBHN 5/38/0, Lowndes Co ARES 4/51/0, NW Miss Skywarn 4/29/0, MCARA 4/32/0, JARCEN 3/57/1. PSHR: N5XGI 151, KB5W 144, K5VV 129, W5XX 103, KJ5YY 74. Traffic: KB5W 313, K5VV 97, N5XGI 62, W5XX 1.

TENNESSEE: SM, O.D. Keaton, WA4GLS—ACC: WA4GLS. PIC: KE4CES. SEC: WD4JJ. STM: WA4HKU. TC: KB4LJV. Attention TN DXCCers: Terry Cox, KB4KA, has been approved by ARRL as an official card checker. Terry is planning to attend the Chattanooga Hamfest Oct 28 and as many other section events as possible to check cards. You may contact Terry at his e-mail address tacox@concentric.net. Thanks to all CARC members who helped with the "ADA Tour de Cure 2000." Thanks to KN4VY for listing the area's public service nets in the RCARS' July issue of the Transponder. The following DARC members participated in a very successful, "Memphis in May Special Events Activities," on May 27 & 28, were Tommy, KF4TJO, Tony, WA4KHN, Gerry, N9SCJ, Tom, K4TTA. Paul KG4GYV, Freddy, KF4ZGJ, Terry, KD4JTY, Ed, KD5IEI, Dave, KF4PFY, Barry, WA4MFF, Philip, KF4TAF & Melina, KE4DXN. According to the July Spectrum report, the SRARC was very successful in its Field Day and the ADA Bike Ride. DRN-5 rpt 62 sess, 610 msg, TN rep 63% by W4OGG, KE4GYR, WB4UDD & KC4TJZ. Net Sess/QTC/QNI: TEMPN 21/45/697; TEPN 26/26/1945; TSCWN 21/3/101; TMPN 31/33/2277. TCWN 19/20/133. Tfc: WA4HKU 50, W4SQE 35, KE4GYR 31, WB4DYJ 29, W4SYE 13, N4PU 7, WA4GLS 4.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—ASM:. Tom Lykins, K4LID. SEC. Ron Dodson, KA4MAP. SGL. Bill Burger, WB4KY. STM. John Farler, K4AVX. PIC. Steve McCallum, W2ZBY. TC. Scotty Thompson, KI4AT. ACC. Todd Schrader, KF4WFZ. BM: Ernie Pridemore, KC4IVG. It is with deep regret that we mention that Gatson Roberts, N4IXY, became a SK during July. All ARRL affiliated ARCS need to check out the ARRL Web page and read about the ARRL Achievement Awards for Amateur Radio Clubs. Beginning September 1, 2000, KB4VKS, will assume the responsibilities for the KTN, late session. Soon it will be SET time and I am sure that Ron Dodson, KA4MAP, is hard at work preparing for this annual Amateur Radio test. Also the third weekend in October is JOTA weekend. Jamboree On The Air is a good opportunity for ARCs to demonstrate Amateur Radio to our youth and, possibly, future Amateur Radio Operators. More info is available on the ARRL Web page.

Net	*QNI*	*QTC*	*Sess*	*Mgr*
KTN	2053	74	61	K4LID
TSTMN	552	27	31	KG4EAB
CARN	385	29	30	AD4EI
4ARES	465	32	31	WA4RRR
NKEN	32	1	4	WD4PBF
SEKEN	106	0	4	KE4BHZ

Tfc: K4AVX 35, WD8JAW 14, KO4OL19.

MICHIGAN: SM, Dick Mondro, W8FQT (w8fqt@arrl.org)—ASM: Roger Edwards, WB8WJV. (wb8wjv@arrl.net). ASM: John Freeman, N8ZE (n8ze@arrl.net). SEC: Deborah Kirkbride, KA8YKK (ka8ykk@arrl.net). STM: James Wades, WB8SIW (wb8siw@arrl.net). ACC: Sandra Mondro, KG8HM (kg8hm@arrl.net). OOC: Donald Sefcik, N8NJE (n8nje@arrl.net). PIC/SNE: David Colangelo, KB8RJI (dcolangelo@ameritech.net). SGL: John LaRock, K8XD (k8xd@voyager.net). TC: Dave Smith (DSmith@smithassoc.com). Youth Activities: Steve Lendzion, KC8MCQ (kc8mcq@arrl.net). BM: Thomas Durfee, Jr., WI8W (wi8w@arrl.net). My many thanks to all who participated in this years SET (Simulated Emergency Test). Michigan held their SET on September 23 to avoid conflict with other events. Please don't wait until December 31st to turn in your SET reports. Remember if you could not do an SET during this weekend, you can still use a county exercise or a county event as your SET. This being my 3rd year as Section Emergency Coordinator for Michigan, I would like to take this time to let everyone in the Michigan Section know how much I appreciate their support, friendship and valued knowledge. Every one from ARES/RACES members, ECs and assistants, DECs and assistants, Traffic handlers, ASMs, and Technical Specialists are to be commended for helping to form this outstanding section. Thank you for your time and effort each of you have put into this organization. My thanks to Jim Harvey, KA8DDQ, for keeping our State Emergency Operations Center running in Lansing. Jim has done a great job of keeping our antennas and radios and packet station running at peak performance. He is also a Technical Specialist for Michigan. I am very proud to be a member of this Section. I would like to encourage any one not participating in a program to sign on and get involved. There are so many more amateurs in Michigan that have multiple talents and your valued skills could be put to use. Please make it a point to step forward and volunteer for the many areas of public service, traffic skills, and technical specialties. Maybe you just received your General ticket. Why not try out a traffic net. Many cities can use good traffic handlers. Contact your local ARES organization to find out how to handle traffic. For those of you good with the media consider becoming a Public Information Officer for your county. Don't wait, contact our Section Manager Dick Mondro, W8FQT@arrl.org, to see how to get involved in any aspect of the Amateur Radio Public Service Corp. Don't forget this month will be the time to change the clocks and that means our Sunday night 5:00 PM ARPSC net will be soon changing back to 3.932. Looking forward to hearing everyone on the net. Deborah Kirkbride KA8YKK, Section Emergency Coordinator Michigan/ State RACES Officer. Traffic reports for July 2000: KB8ZYY 235, K8GA 160, N8FPN 124, K8LJG 87, W8RTN 82, AA8PI 76, AA8SN 68, K8AE 66, K8KV 58, N8JGS 58, W8RNQ 48, WI8K 34, K8UPE 29, W8YIQ 29, K8ZJU 27, KC8GMT 22, WA8DHB 20, K8JN 17, N8TDE 14, K8AI 10, KI8GR 9, KB8EIW 9, K3UWO 8, N8EXS 4.

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—The closing of the Voice of America transmit-

MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

***New** MFJ-259B reads antenna SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . smooth reduction drive tuning . . . and much more!*

***The** world's most popular SWR analyzer just got incredibly better and gives you more value than ever!*

MFJ-259B gives you a complete picture of your antenna's performance. You can read antenna SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

You can determine velocity factor, coax cable loss in dB, length of coax and distance to a short or open in feet.

You can read SWR, return loss and reflection coefficient at any frequency simultaneously at a single glance.

You can also read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance over the entire spectrum 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and approximate Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

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Call or write for Free Manual

MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1315, $14.95. Its rugged all metal cabinet is a compact 4x2x6¾ inches.

How good is the MFJ-259B?

MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

More MFJ SWR Analyzers™

MFJ-249B, $229.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

MFJ-209, $139.95. Like MFJ-249B but reads SWR only on meter and has no LCD or frequency counter.

MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½ x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

Genuine MFJ Carrying Case

MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

Made of special foam-filled fabric, the MFJ-29C cushions blows, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work -- the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs and connectors so you can use your MFJ *SWR Analyzer*™ without taking it out of your case. *Look for the MFJ logo for genuine authenticity!*

MFJ-99, $54.85. Accessory Package for MFJ-259/B/249/B/209. Includes *genuine* MFJ-29C carrying case, MFJ-66 dip meter adapter, MFJ-1315 110 VAC adapter. ***Save $5!***

***New!* Tunable Measurement Filter™**

MFJ-731, $89.95. *Exclusive* MFJ tunable RF filter allows accurate SWR and impedance measurements 1.8 to 30 MHz in presence of strong RF fields. Has virtually no effect on measurements. Works with all SWR Analyzers.

MFJ *No Matter What*™ warranty

MFJ will repair or replace (at our option) your MFJ *SWR Analyzer*™ for one full year.

Free MFJ Catalog

Nearest Dealer . . . 800-647-1800

http://www.mfjenterprises.com

• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders from MFJ

MFJ-224 **$159.95**

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

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Box 494, Miss. State, MS 39762
(662) 323-5869; 8-4:30 CST, Mon.-Fri.
FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

More hams use MFJ SWR Analyzers™ than any others in the world!

ting building in the Cincinnati area and its future use is in the news. Please understand the West Chester ARC hams work in this area and the reasons for doing so. The history of radio broadcasting is involved and the local hams are working to preserve our heritage. Look around. Are there radio historic treasures in your area? What are you and your fellow hams doing to preserve them? Ham radio is broadcasting's major hobby and support group. Preserving our heritage is always our responsibility. That is what's happening at Cincinnati's Voice of America property and West Chester hams ....Registering your Federal radio license with the FCC under Universal Licensing System (ULS) has been controversial due to the use of Social Security numbers. The new COARES registering system by the FCC has provisions for a different 10 digit number rather than your SSAN. Of course so did ULS, but this was not well known. No one is thrilled but protect your license and make it easier to work with the FCC in the future. Register....Speaking of 10 digit numbers, Ohio has pockets of 10 digit telephone dialing which has begun to affect autopatches on VHF and UHF repeaters. Some now require ten digit phone numbers to work. The Ohio Newsletter Contest winners and Severson Memorial Award winners along with other Ohio Section Conference news was all unavailable at press time. If your Ohio ham radio club isn't a Special Service Club of the ARRL, contact ACC Brenda Kurkowski, KB8IUP, (kb8iup@arrl.net) and see if your group qualifies and you wish to enjoy its special privileges....OHIO HAMFESTS FOR OCTOBER; (8) at Medina for the 2Meter Group, (15) at Lima for Northwest ARC; (15) at Ashland for the Ashland Area ARC; (29) at Marion for the Marion ARC and (29) at Canton for the Massilion ARC...de K8QOE. Now for traffic reports for July.

Net	QNI	QTC	QTR	Sess	Time	Freq	Mgr
BN (E)	124	55	241	31	1845	3.577	WD8KFN
BN (L)	174	58	296	31	2200	3.577	NY8V
OSN	120	46	468	31	1810	3.708	WB8KQJ
OSSBN	1450	340	1990	93	1030, 1615, 1845	3.9725	N8IO
OH Section ARES Net					1700 Sn	3.875	WD8IHP

Tfc: NB8V 127, W8STX 120, N8TNV 107, KC8HJL 99, KD8HB 86, N8IO 76, KA8FCC 74, K3RC 73, WD8KFN 73, N8CW 58, W8BO 54, N8DD 52, KD9K 49, N8RRB 47, WA8EYQ 46, WD8KBW 42, WB8HHZ 42, KA8VWE 41, W8PBX 39, KI8IM 34, WA8HED 34, KB8RGY 29, NY8V 27, WA8SSI 26, KB8TIA 18, AA8XS 15, NS8C 15, N8GOB 14, N8WLE 13, KC8HTP 12, KC8JKE 12, N8GP 11, N8IBR 11, W8RG 10, KC8KYP 7, KK8J 6, KI8O 6, WB8SIQ 5, KX8B 5, KC8HPR 4, K8QIP 4, N8RAK 4, W8RPS 3, N7CEU 2, K8WC 1.

HUDSON DIVISION

EASTERN NEW YORK: SM, Rob Leiden, KR2L— STM: Pete Cecere, N2YJZ. SEC: Ken Akasofu, KL7JCQ. ACC: Shirley Dahlgren, N2SKP. SGL: Herb Sweet, K2GBH. PIC: John Farina, WA2QCY. BM: Ed Rubin, N2JBA. OOC: Hal Post, AK2E. TC: Rudy Dehn, W2JVF. ASM: Tom Raffaelli, WB2NHC. ASM: Bob Chamberlain, N2KBC. ASM: Andrew Schmidt, N2FTR. ASM: Richard Sandell, WK6R. ASM: Phil Bradway, KB2HQ. Net Reports (Jul 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 42/6 CDN 284/118 CGESN 19/0 ESS 239/104 HVN 549/190 SDN 405/175 NYPHONE 191/450 NYPON 303/246 NYS/E 304/355 NYS/M 174/159 NYS/L 238/466 Section News: The SET is coming in October! Are you ready? Contact Ken, KL7JCQ, to prepare. Public service helps protect our frequencies! 73 de Rob. PSHR N2YJZ 175, WB2ZCM 146, W2AKT 135, KC2DAA 133, WA2YBM 128, W2JHO 126, N2JBA 124, WB2IIV 111. Tfc: N2YJZ 186, WB2IIV 63, N2JBA 55, WB2ZCM 53, KC2BUV 32, KC2DAA 32, W2JHO 30, W2CJO 27, WA2YBM 20, K2AVV 8, W2AKT 8, N2AWI 5, KL7JCQ 3, WA2BSS 2, KC2BUW 1.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA. ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SGL: N2TX. SEC: KA2D. ACC: N2MUN. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: W2IW. OOC: N1XL. STM: WA2YOW. Congratulations to ARRL Hudson Division awards winners: Ham of the Year - Phil Lewis N2MUN, Grand Ole Ham - John Burgio W2JB, Technical Achievement - Bob Wilson N2DVQ. Congratulations to Phillip J. McGan Silver Antenna award winner Diane Ortiz, K2DO, for the national award for public relations. NLI Section staff meeting will be on Saturday, October 7 at 9:30 AM at Babylon Town Hall. Simulated Emergency Test is also in October - check with your EC for details. October section hamfests: HOSARC on October 15 in Queens, RCARC on October 22 in Farmingdale, GSBARC on October 29 in Lindenhurst. Check the NLI Web page at www.arrlhudson.org/nli for more information on upcoming events. NYC/LI VE exam list follows: Manhattan: BEARS, ABC Cafeteria, 125 West End Ave at 66th Street, Contact Jerry Cudmore W2JRC at 212-456-5224 for dates & times; East Village ARC, 2nd Friday at 7 PM, Laguardia HS, Amsterdam Ave and West 65th Street, Manhattan. Contact Robina Asti KD2IZ at 212-838-5995; Columbia University VE Team, 3rd Monday at 6:30 PM, Watson Lab, 6th Floor, 612 West 115th Street, Manhattan. Contact Alan Crosswell, N2YGK, at 212-854-3754; Queens: Hellenic ARC, 4th Tuesday at 6:30 PM, Pontion Society, 31-25 23rd Ave, Astoria, NY. Contact George Anastasiadis, KF2PG, at 516-937-0775. Nassau County: Grumman ARC (W5YI), 2nd Tuesday at 5 PM, Northrop-Grumman Plant 5, South Oyster Bay Road via Hazel Street, Bethpage, NY. Contact Bob Wexelbaum, W2ILP, at 631-499-2214; LIMARC, 2nd Saturday at 9 AM, NY Institute of Technology, 300 Building, Room 311, Northern Blvd, Greenvale, NY. Contact Al Bender W2QZ at 516-623-6449. Suffolk County: Great South Bay ARC, 4th Sunday at 12 noon, Babylon Town Hall, ARES/RACES Room, 200 East Sunrise Hwy, North Lindenhurst. Contact Tom Carrubba at 631-422-9594; Larkfield ARC, 2nd Saturday in Feb, May, Sep, Nov, Huntington Town Hall, Room 114. Contact Stan Mehlman, N2YKT, at 631-423-7132; Peconic ARC, exams held January, April, July, and October on next to last Friday at 6:30 PM at Southold School, Oaklawn Ave, Southold, NY. Contact Ralph Williams N3VT at 631-323-3646. Mid Island ARC, last Weds of each month at 7 PM at 36 Dew Flag Rd, Ridge NY 11961, Contact: Mike Christopher W2IW at 631-924-3535. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 288, KB2KLH 81, N2AKZ 76, W2RJL 67, WA2YOW 35, KA2D 4.

MFJ *Switching* Power Supplies

Power your HF transceiver, 2 meter/440 MHz mobile/base and accessories with these new 25 or 45 Amp MFJ MightyLite™ Switching Power Supplies!

No RF hash . . . Super lightweight . . . Super small . . . Volt/Amp Meters . . .

MFJ's new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJ's *MightyLites*™ are so light and small you can carry them in the palm of your hand! Take them with you anywhere.

No more picking up and hauling around heavy, bulky supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies won't hear *any* RF hash on your signal! *None* in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low Ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up our power supplies!

No RF Hash!

MFJ-4225MV
25 Amp
$149.95
plus s&h

MFJ-4245MV
45 Amp
$199.95
plus s&h

No RF Hash!

They are fully protected with Over Voltage and Over Current protection circuits.

Worldwide Versatility

MFJ *MightyLites*™ can be used anywhere in the world! They have switchable AC input voltage and work from 85 to 135 VAC or 170 to 260 VAC. Replaceable fuse.

MightyLites™ . . . Mighty Features

Front-panel control lets you vary output from 9 to 15 Volts DC.

Front-panel has easy access five-way binding posts for heavy duty use and cigarette lighter socket for mobile accessories. MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Brightly illuminated 3 inch meters let you monitor load voltage and current.

A whisper quiet internal fan efficiently cools your power supply for long life.

Two models to choose from . . .

MFJ-4225MV, $149.95. 25 Amps maximum or 22 Amps continuous. Weighs 3.7 pounds. Measures 5¾Wx4½Hx6D in.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D in.

NEW! 25 Amp MightyLite™

Super light, super compact switching power supply delivers 25 Amps maximum/ 22 Amps continuous at 13.8 Volts DC. Low ripple, highly regulated. *No RF Hash!* Five-way binding posts for high current. Quick connects for accessories. Over voltage/current protection. 110 or 220 VAC operation. Meets FCC Class B regs. 3.5 lbs. 5½Wx2½Hx10¾D in.

MFJ-4125
25 Amp
$109.95
plus s&h

MFJ 35/30 Amp Adjustable Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

MFJ-4035MV
$149.95
plus s&h

MFJ's heavy duty conventional power supply is excellent for powering HF or 2 Meter/440 MHz transceiver/accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for accessories and a covered cigarette lighter socket for mobile accessories.

A front-panel fuse holder makes fuse replacement easy. Whisper quiet fan speed increases as load current increases -- keeps components cool. 9½Wx6Hx9¾D inches.

MFJ *High Current* Multiple DC Power Outlets

Power two HF/VHF transceivers and six or more accessories from your 12 VDC power supply

MFJ-1118
$74.95
plus s&h

MFJ-1116
$49.95
plus s&h

MFJ-1112
$34.95
plus s&h

New!
MFJ-1117
$54.95

MFJ-1118, $74.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. Lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC supply.

Two pairs of super heavy duty 30 amp 5-way binding posts connect your transceivers. Each pair is fused and RF bypassed. Handles 35 Amps total.Six pairs of heavy duty, RF bypassed 5-way binding posts let you power your accessories. They handle 15 Amps total, are protected by a master fuse and have an ON/OFF switch with "ON" LED indicator.

Built-in 0-25 VDC voltmeter. Six feet super heavy duty eight gauge color-coded cable with ring tongue terminals. Binding posts are spaced for standard dual banana plugs. Heavy duty aluminum construction. 12½x2¾x2½ in.

MFJ-1116, $49.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $34.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

NEW! MFJ-1117, $54.95. For powering four HF /VHF radios (two at 35 Amps each and two at 35 Amps combined) simultaneously. Tiny 8x2x3 inches.

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• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

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Tech Help: (662) 323-0549

All are protected by MFJ's famous No Matter What™ one year limited warranty.

NORTHERN NEW JERSEY: Jeffrey Friedman, K3JF—Traffic report submitted by STM WB2FTX.

Net	*NM*	*Sess*	*QNI*	*QTC*	*QSP*
NJM	WA2OPY	31	161	61	60
NJPN	W2CC	36	176	26	19
NJSN	K2PB	30	127	12	12
NJN/E	AG2R	31	16	51	43
NJN/L	AG2R	31	203	73	290
CJTN	KB2VRO	30	242	42	34
NJVN/E	N2RPI	31	367	45	40
NJVN/L	N2OPJ	31	350	36	36

Tfc: KC2AHS 66, N2GJ 53, KB2VRO 47, N2RPI 46, K2VX 35, N2OPJ 35, W2MTO 25, W2JG 24, K2PB 20, W2CC 9.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—ASM: N0LDD. SEC-NA0R; ACC-N0IJP @ KE0OX; BM: K0IIR @ W0CXX; SGL-K0KD...EIDXA and DMRAA note that it is time for officer elections again. Time does fly! They also are helping support a couple of DXpeditions. KU0A did a nice review of the FT-100 for EIDXA. Looks like lots of rebuild is going on in the DX packet cluster network. NIARC now has the Back Scatter via email. Looks like a group in the Quad Cities helped with the air show. It sounds like the Ft Madison club only barely survived FD! And the fridge didn't get raided! TSARCN is at it again (still?) raising money to add to their emergency van. I regret to report the loss of W0PJ, N0FEL, and also WA0OEV, and less than two months after his wife, KB0DAF. Lots of things going on in and around CR. Check with CVARC. Looks like new CW testing standards are coming. I think it is time. FMARC is going Nowhere again...Nowhere, IL on October 21st! All indications are for another successful hamfest at Amana. I couldn't be there. Silly daughter thought she should go to college. SEITS published over a page of comments from their web site for their members. Very nice comments. Well, tis the time of the year to seriously plan to complete those projects we have all been avoiding all summer. I need some antenna work or I'll be off the air soon. And what would make a nice indoor project for winter? Newsletters were received from EIDXA, NIARC, MWDIV FMARC, DMRAA, TSARCN, CAARC SA RA, CVARC, SEITS. Traffic: W0SS 169, KA0ADF 50, NIII 73, 73 de N0JL.

KANSAS: SM, Orlan Cook, W0OYH—ASM/ACC/OOC: Robert Summers, K0BXF. SEC: Joseph Plankinton, WD0DMV. STM: Ron Cowan, KB0DTI. SGL: Marshall Reese, AA0GL. PIC: Scott Slocum, KC0DYA, and TC: Frank Neal, N8FN. "SET" Simulated Emergency Test is Oct. 7 & 8. I plan to send all DECs & ECs information on participation. I want the EC, our grassroots level for a disaster, to activate their ARES net on Saturday or Sunday to simulate and emergency among their individual groups. I want the ECs to send a mgs to their DEC and SEC via ham radio, not other means, stating numbers participating and messages handled. The DECs can compile their EC reports and send it to their SEC. All Ks ARES members can send messages of their participation to the SEC. Those participating in the NTS nets, can send their Section Manager a message through their Section Traffic Manager. Ok ARES & NTS, activate your nets and generate some tfc. Let it flow! Let's make KS look good in *QST*. June. Kansas Nets: sessions/QNI/QTC, KSBN 30/831/85; KPN 21/285/33; KMWN 30/522/429; KWN 30/665/427; CSTN 26/1789/80; QKS 55/287/53; SEC 77/636/31. QNS KB0AMY N0BTH K0BXF WD0DDG WD0DVM/SEC N0LLK KF4LM WA0SSR KB0WEQ TEN 265msgs, 60 sessions Kansas 52; QNS KB0DTI AC0E KX0I AA0OF KX0I, K0PY W0WWR NB0Z WB0ZNY W0SS mgr. BBS reports: W1AW Bul /Per/NTS AA0HJ 4/304/0. Ks Stns tfc W0WWR 90, WB0ZNY 68, K0RY 33, KB0DTI 32,NB0Z 21, KX0I 16, W0OYH 13, N0RZ 12, N0LL 4, W0FCL 2, KC0HFA 2. Reports: TS WN8P, PIC KC0DYA. PIO DTI.

MISSOURI: SM, Dale Bagley, K0KY—ASM: John Seals, WR0R. ASM: Bill Coby, KB0MWG. ACC: Keith Haye, WE0G. BM: Brian Smith, KI0MB. OOC: Mike Musick, N0QBF. PIC: Dennis McCarthy, AA0A. SGL: E.B. DeCamp, KD0UD. STM: Charles Boyd, KE0K. SEC: Patrick Boyle, K0JPB. TC: Wayland McKenzie, K4CHS.Cliff Ahrens, K0CA DXCC Card Checker MO Traffic Nets, Daily: SSB 3.963 MHz 5:45 PM, CW 7:00 PM and 9:45 PM. William "Bill" Coby, KB0MWG, has been appointed as ASM for the MO Section. Bill is a very active Amateur Radio operator in the St. Louis, MO, region of the Section. He is currently President of the Suburban Radio Club and Secretary of St. Louis Repeaters, Inc. Bill is a Life member of the ARRL and also serves as EC for the St. Louis City. I was contacted by Orlan Cook, W0OYH, KS SM about a radio interference problem on the Missouri River near St Joseph, MO. The Coast Guard needed help finding the source of interference on marine band 16. I contacted John Bowser, N0YXG, in St. Joseph and asked for his assistance with this matter. John has been working with another local amateur with direction finding equipment in an effort to pin down the cause of the interference. We really appreciate the efforts of John and the other Amateurs that worked on this problem. During Field Day I received many messages from Field Day sites to the Section Manager. I would encourage all Field Day operations to sent this type of traffic next year using the MO Traffic Net. The SM will check into that net and accept the Field Day messages. The Zero Beaters had another great Hamfest in Washington, MO in July. There were lots of flea marketeers, excellent commercial vendors and the usual great Bratwurst. The weather started off foggy, but turned into a really nice July day. Mike Musick, N0QBF, Section OOC, reported that Jason Tuggle, N0OOC, was appointed an OO after successfully completed the testing requirements for that appointment.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASMs - W0KVM, N0MT, WY0F, WB0ULH & WB0YWO. I am pleased to announce the following appointments: KC0HOX and KC0HIE as Official Emergency Stations. Jerry, KC0HOX, is a visually impaired ham and Jay, KC0HIE, is 17 years old. Both reside in Kearney. Congratulations to Beth Engberg, KG0KR for being a recipient of a $1,000 Scholarship from 10-10 International. 108 volunteers provided communications support for the Cornhusker State Games in Lincoln. Net Reports: NE 40M Net, QNI 288, QTC 10 & 27 sessions. Lincoln/Logan

MFJ *tunable* Super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP Filters

MFJ's *tunable* super DSP filter automatically eliminates heterodynes, reduces noise and interference *simultaneously* on SSB, AM,CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite.

You get MFJ's *tunable* FIR linear phasse filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57 dB attenuation 75 Hz away.

***Only* MFJ gives you 5 *tunable* DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can *vary* the bandwidth to pinpoint and eliminate interference.**

***Only* MFJ gives you 5 *factory* pre-set filters and 10 *programmable* pre-set filters that you can customize. Instantly remove QRM with a turn of a switch!**

MFJ's *automatic notch* filter searches for and eliminates *multiple* heterodynes.

You also get MFJ's advanced *adaptive noise reduction*. It silences background noise and QRN so much that SSB signals sound like FM.

The *automatic* notch and *adaptive* noise reduction can be used with *all* relevant tunable pre-set filters.

***Automatic gain control* (AGC) keeps audio level constant during signal fade.**

U.S. Patent D374,010
MFJ-784B
$249.95

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's exclusive *tunable* FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

You can use two tunable filters together. For example, tune one to mark, one to space and set bandwidth tight for a super sharp RTTY filter.

Tunable highpass/lowpass filters

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create custom filters for voice, data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters -- an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

15 *pre-set* filters -- factory set or you custom program

You can select from 15 *pre-set* filters. Use for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode.

If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency/bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

2½ Watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9½x2½x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. use 12 VDC or 110 VAC with MFJ-1315, $14.95. Cable Pack, MFJ-5184, $7.95, includes receiver cable, DC cable, 2 open-end TNC cables.

New Features

MFJ's exclusive *tunable Spotting Tone*™ -- accurately tunes even the narrowest CW filter.

MFJ's exclusive *Adaptive Tuning*™ -- tuning rate automatically becomes finer as you narrow bandwidth -- makes narrow filters easy-to-use.

MFJ's exclusive *FilterTalk*™ -- sends precise filter settings in Morse code.

Has automatic notch with variable aggressiveness, new quieter 2½ Watt audio amplifier, new speaker switch keeps phones always active.

Manual and automatic notch can be used together. Noise reduction, automatic notch and custom filter you saved in memory is selected.

You get an accurate easy-to-use input level indicator, improved manual notch in the CW mode, adjustable line level output, more Mark-Space frequencies and baud rates for data filters and automatic bypass during transmit for monitoring CW sidetone, voice or data by sensing the PTT line.

Firmware Upgrade

For MFJ-784, order **MFJ-55, $29.95**. Gives you most features of the MFJ-784B.

60 dB Null *wipes out* noise and interference

MFJ-1026
$179.95

Wipe out noise and interference *before* it gets into your receiver with a 60 dB null!

Eliminate all types of noise -- severe power line noise from arcing transformers and insulators, fluorescent lamps, light dimmers, touch controlled lamps, computers, TV birdies, lightning crashes from distant thunderstorms, electric drills, motors, industrial processes . . .

It's *more effective* than a noise blanker because interference much stronger than your desired signal can be completely removed without affecting your signal.

It works on *all modes* -- SSB, AM, CW, FM -- and frequences from BCB to lower VHF.

You can null out strong QRM on top of weak rare DX and then work him! You can null out a strong local ham or AM broadcast station to prevent your receiver from overloading.

Use the MFJ-1026 as an *adjustable phasing network*. You can combine two antennas to give you various directional patterns. You can null out a strong interfering signal or peak a weak signal at a push of a button.

Easy-to-use! Plugs between transmitting antenna and transceiver. To null, adjust amplitude and phase controls for minimum S-meter reading or lowest noise. To peak, push reverse button. Use built-in active antenna or an external one. MFJ's exclusive *Constant Amplitude Phase Control*™ makes nulling easy.

RF sense T/R switch automatically bypasses your transceiver when you transmit. Adjustable delay time. Uses 12 VDC or 110 VAC with MFJ-1312B, $14.95. 6½x1½x6¼ inches.

MFJ-1025, $159.95. Like MFJ-1026 less built-in active antenna, use external antenna.

Add DSP to any Multimode

MFJ-781
$129.95

Add "brick wall" DSP filtering to any TNC or multi-mode data controller. Copy signals buried in noise and QRM. Under severe QRM, DSP greatly improves copy of Packet, AMTOR, PACTOR, GTOR, Clover, RTTY, SSTV, WeFAX, FAX, CW -- nearly any digital mode. Automatic gain control, On/Off Bypass switch. Plugs between transceiver and multi-mode. Uses 10-16 VDC or 110 VAC with MFJ-1312B, $14.95. 4½x2½x5 inches.

DSP for your MFJ-1278/B

Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multi-mode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, Pactor, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Plug in a MFJ-780 and copy signals that other multi-modes can't. *Some soldering needed.*

MFJ-780
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ARES, QNI 107, QTC 2 & 13 sessions. Mid NE 2M ARES, QNI 315, QTC 2 & 31 sessions. NESM, QNI 695, QTC 12 & 31 sessions. NCHN, QNI 266, QTC 16 & 28 sessions. MARES, QNI 243, QTC 2 & 8 sessions. Traffic: KE0XQ 22, WY0F 8, W0EXK 2, W0UJI 2, WB0ART 2, WC0O 2, KA0DBK 2. PSHR: PSHR: KA0DBK 109.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—BM: KD1YV. OOC: WA1TJT. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. October 1 begins a new term for me as your Section Manager. It continues to be a privilege for me to serve you in this capacity; a big thank you for your help and support. Seeing you at clubs and ham fests and communicating with you via e-mail or on the telephone are always enjoyable. The chance to put two people together to make something happen or solve a problem is particularly satisfying. So let's get together at the Nutmeg Ham Fest October 8 at Mountain Side in Wallingford. The Meriden and Middlesex clubs have worked very hard to prepare a vy fb event! Come hear Rosalie White talk about the exciting SAREX Program and listen to Wayne Green talk about various aspects of Amateur Radio! Meet this year's New England Division Volunteer of the Year. Jim Ritterbusch, KD1YV! Jim received this recognition for his outstanding volunteer work at the banquet during the New England Division Convention from Director Tom Frenaye, K1KI. Jim is distinguished by his versatile service in the hobby: former club president, managed the traffic handling booth at Special Olympics, an advisor to the Bethel Education ARS, an EC, serves on the cabinet as bulletin manager, an active member of three clubs and constantly elmers others on operating and technical skills. Jim works DX, is a QRP enthusiast, and is an avid traffic handler. It was a real joy to participate in this nomination along with the BEARS, CARA and Greater Norwalk Clubs. Congratulations Jim! Net sess/QNI/QTC/NM: WESCON 31/273/73/KA1GWE; ECTN 31/266/58/WA4QXT; NVTN 31/110/12/KB1CTC; CPN 31/211/36/N1DIO; CN 27/89/55/N1AEH. Tfc: NM1K 2222, KA1VEC 392, KE1AI 116, KA1GWE 109, K1STM 59, WA4QXT 54, K1UQE 53, KB1ETO 9.

EASTERN MASSACHUSETTS: SM, Joel Magid, WU1F—Nets and traffic report submitted by STM Bill, NZ1D.

Net	*Sess*	*QTC*	*QNI*	*QTR*	*NM*
EMRI	62	93	195	410	K1SEC
EMRIPN	31	99	135	405	WA1FNM
EM2MN	31	109	262	470	N1LKJ
HHTN	31	35	220	290	N1IST
CITN	31	72	292	551	N1SGL
WARPSN	5	10	62	NA	K1BZD
NEEPN	5	8	14	NA	WA1FNM
CHN	31	34	176	316	W2EAG

Tfc: WA1TBY 271, N1LKJ 145, W2EAG 106, WA1FNM 83, N1TPU 60, NZ1D 57, WA1LPM 51, N1SGB 51, K1SEC 48, N1LAH 44, N1IST 37, K8SH 24, KB1EB 19, WA1VRB 14, N1BNG 11, N1TDF 8, N1XQC 1.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: N1JBD. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst Dirs: W1KX, KA1TKS, K1NIT. Web Site: N1WFO. This past summer has been one of the shortest ones in my memory. I'm not sure if time flew because the weather was so mild, or if it was from the full platter of radio activity. I'd like to especially thank Ray Sirois, N1RY, for his commitment of time he so generously gave on Mon nights during July and August to be an instuctor/mentor to the Boy Scouts at Camp Hines in Raymond, ME. Many young scouts had memorable experiences as they were given demonstrations of HF, VHF, & APRS communications. I'm sure we will see many new amateurs as a result of his effort. To ensure a current resource of study material for all who want to become amateurs, I am asking clubs, as well as individuals, to make available a copy of the ARRL study guide, "Now You're Talking," to local public libraries and high school libraries. It is an excellent study manual, and a great resource for after they get their ticket.

RHODE ISLAND: SM, Armand Lambert, K1FLD—ASM: W1YRC. OOC: W1AOM. STM: KA1JXH. TC: N1DKF. PIC: WB1P. SEC: N1JMA. This year's Ocean State Radio Group picnic/meeting held at Colt's State Park provided terrific camaraderie and food as well as a scenic landscape view of the Narragansett Bay. The warm weather was complimented by the warm friendship that was extended to all that attended. / Another great club to visit is the Providence Radio Association, W1OP, headquartered at 1 Ludow Street in Johnston RI. The club meets regularly on Tuesday evenings, and weather permitting, holds an outdoor cookout. Great hospitality is always present at the oldest radio club in RI (established in 1919). Here radio brings people together for a good time. What can be considered the crown jewel of RI amateur radio is their 13 element log periodic covering frequencies from 40 to 10 meters. This impressive array establishes a noticeably prominent signal on the bands...you just got to see it to believe it! / When upgrading please be sure to bring copies and original of your license and CSCEs to the VE test sessions. This will help expedite your processing. / In closing remember "elmering" keeps the legacy going in Amateur Radio.

VERMONT: SM, Bob DeVarney, WE1U—Amateur Radio Clubs in Vermont seem to be going the way of telecommunications giants, and discussing mergers. The St Albans Amateur Radio Club (STARC) and the Border Amateur Radio Club (Border ARC) are in discussions about doing just that: merging the two clubs. Both have been around for a while. Border started in the mid-eighties, I believe. I am sure that the representatives of both will come out with a workable solution for all involved. The Burlington Amateur Radio club hamfest was held over the weekend (August 12) at the new location in Burlington. Attendance was off a bit, but I think it will come back up next year. BARC had to relocate the hamfest after the Old Lantern in Charlotte, it's home for several years, was sold recently. Good luck with future hamfests. That's about it for now, hope to see you all at Boxboro!! 73 de WE1U.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, w1ud@arrl.org—ASM: N1NZC. ASM (digital): KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. Another

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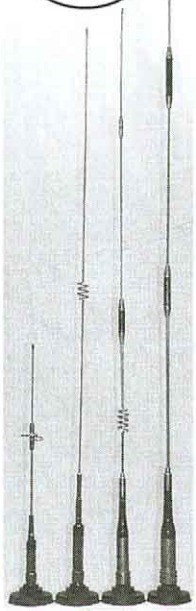

A. B. C. D.

Shown on mini mag mounts, not included.

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Stacked elements with high-Q phasing coils give you outstanding gain. Stay in solid contact!

Phased Radiators

Phased radiators flattens the radiation pattern and concentrates your power to give you *super gain.*

High-Q phasing coils are housed in weather proof high-tech plastic insulation. They're attached to stainless steel stacked radiators by solid metal end sections.

Heavy Duty Base

Rigid, heavy duty solid metal base reduces SWR flutter due to wind vibration. Two Allen set screws securely fastens radiator.

Specially treated center pin provides excellent electrical connection.

Quickly screws off -- helps prevents theft of your expensive rig.

Use SO-239 or NMO Mounts

RuffRiders™ have a PL-259 base mount for quick installation to your heavy duty SO-239 magnet, trunk/hatch, gutter or mirror mount.

A *free* NMO adapter is included for use with an NMO mount.

MFJ mounts are recommended.

All MFJ *RuffRiders*™ are dual band 144/440 MHz antennas and factory tuned for SWR less than 1.5:1 and have 50 Ohm impedance.

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All *RuffRider*™s are covered by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your antenna for one full year.

Choose from several different length and gain antennas . . .

A. ***RuffRider Junior*™.** Premium, short 16½" antenna fits in any garage on any auto. ¼ Wave on 2 Meters, ½ Wave, 3 dB gain on 440 MHz. 100 Watts. No fold-over.

MFJ-1402 **$34.95** add s/h

B. ***RuffRider High Power*™.** Just 40" long handles full *200 Watts.* Great for high power mobile amp. ½ Wave, 3 dB gain on 2 Meters, ⅝ Wave, 5.5 dB gain on 440 MHz.

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C. ***RuffRider High Gain*™.** 41½" long antenna gives extra gain with little height increase. Handles 150 Watts. ½ Wave, 3.2 dB gain on 2 Meters, ⅝ Wave, 5.7 dB gain on 440 MHz.

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D. ***RuffRider Hyper Gain*™.** 62½" brute gives a whopping 5 dB gain on ⅞ Wave 2 Meters, ⅝ Wave, 7.6 dB gain on 440 MHz. Our highest gain antenna. Handles 150 Watts.

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144/440 MHz Antenna Tuner with *built-in SWR/Wattmeter*

Covers 136 to 175 MHz. Handles 150 Watts. Compact 4x2½x1½". *New!* MFJ-922 **$79.95**

MFJ *RuffRider*™ super heavy duty Antenna Mounts

Trunk/Hatchback *Lip* Mount

MFJ-345 Lip Mount is shown mounted vertically to a mini-van's angled hatchback lip. Note extra-wide mount with reinforcing tab at right -- safely secures heavy antennas. Swivel mount is adjusted so antenna is near vertical away from mini-van to clear luggage rack.

MFJ-345 **$34.95** add s/h

MFJ's *RuffRider*™ super heavy duty solid steel Trunk/Hatchback *Lip* Mount mounts to any lip on your vehicle.

Extra-wide *four* inch lip and large reinforcing tabs on each side safely distributes the load over your vehicle's lip.

Two large set screws on each end of the mounting lip locks your mount in place. A scratch-proof rubber guard protects your vehicle's finish.

Secures large VHF, UHF and medium size HF antennas even at highway speeds.

Mounts on lips at any angle. Two axis of rotation lets you position your antenna vertically, horizontally or at any desired angle. Serrated swivel joints locks securely in place with huge 3/8 inch set screw.

Has SO-239 base mount. Use adapter for NMO. Includes low loss coax with PL-259 connector, Allen wrenches and protection caps for SO-239 and locking screw, One year MFJ *No Matter What*™ limited warranty.

Mirror/Luggage *Pipe Clamp* Mount

MFJ-340 Pipe Clamp Mount is shown clamped solidly to vertical mirror support rod on a pickup truck. Antenna is slightly swiveled to the left and positioned about 30 degrees from vertical to clear cab of the pickup truck.

MFJ-340 **$34.95** add s/h

MFJ's *RuffRider*™ Mirror/Luggage *Pipe Clamp* Mount mounts on support rod of mirror, luggage rack or spare tire carrier of your truck, van, RV or SUV. Mounts on any horizontal, vertical or angled rod or pipe up to 5/8 inches in diameter.

Secures VHF, UHF and medium size HF antennas even at highway speeds.

Two axis of rotation lets you position your antenna to any desired angle. Serrated swivel joints locks securely in place with huge 3/8 inch set screw.

Convenient *Thumb and Finger* turn knob makes fold-over operation quick and easy. Locks in twelve positions.

Fold down your antenna at night when pulling into your garage and quickly put it back up to its operating position in the morning.

Has SO-239 base mount. Use adapter for NMO. Includes low loss coax with PL-259 connector, Allen wrenches and protection caps for SO-239 base mount and locking screw, MFJ's famous One year *No Matter What*™ limited warranty.

MFJ's *MaxStrength*™ Hi-Flux Antenna Magnet Mounts

MFJ's *MaxStrength*™ high-flux magnet mounts give you maximum pull strength -- your antenna stays on top of your vehicle at highway speeds.

MFJ-333 **$14.95** add s/h

MFJ-335 **$19.95** add s/h

Base is *Euro-style*, black poly or chrome finish with a Mylar protective undersheet.

MFJ magnet mounts come with 17 feet of tough RG-58 coax with a PL-259 connector. Easily reaches operating position.

Choose your favorite antenna to go with these fabulous low-profile mounts for outstanding mobile performance.

MFJ-333 BS/BM, $14.95. Light to medium duty magnet mount. Low profile 3.5 inch diameter black base weighs 1½ lbs. For small to medium size antennas.

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season is approaching. Clubs will be having their first meeting and the operating season will be in full swing. The traffic system made it through the summer doldrums. Skeds were doubled because of operators being on vacation, but we survived. My summer project was the restoration of an L4B amplifier. A trip throughout the Internet revealed the new outlook on amplifier design, retrofit and modern materials. Cosmetically, it was beautiful both inside and out. Looked like it just came out of the box. A little TLC and a retrofit with Dick Measures QSK and anti parasitic circuits and even old man Drake would not recognize his amp. The amount of information that is accessible on the Internet is mind boggling and it's free for the taking. The amp now rests between CW characters and words. This feature should nearly double tube life. Checked the keying characteristics on the traffic nets and nothing but favorable report. The unit should last me a lifetime of enjoyable operation. Thanks go to many hams that have contributed freely to educate us. Now, look for a big signal in the DX pileups. The next thing on the agenda is a new tower. 73, Bill. Tfc (June): KD1SM 11, W1ZPB 145, N1ISB 28, W1SJV 13, W1UD 207.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T — Welcome new field organization member Gerianne Thorsness (WL7RY). Gerianne is an ASM acting as the Girl Scout's Susitna Council Liaison. Official liaisons are needed for the Girl Scout Farthest North Council and for all Boy Scout Councils within the section. APRS networks now established for Anchorage and Fairbanks Regions on 144.39 MHz with an I-Gate operational in Anchorage. Anchorage Mass Casualty Drill a success for South Central HAMS. Officials, up to and including the Mayor of Anchorage were mighty impressed with our abilities and want expanded interface. APRS, FM slow scan TV, and packet stole the show. Full-blown ATV is the challenge for next year's exercise. HF nets: Sniper's Net 3920 1800 AST, Bush Net 7093 2000 AST, Motley Group 3933 2100 AST, and Alaska Pacific Net 14292 M-F 0830 AST. Please report communication drills and exercises, emergency communication activations, and public service activities on FSD-157 to KL5T.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—Daniel Calzaretta, NX9C, of Walla Walla was named "1999 ARRL Professional Educator of the Year" by the ARRL Board of Directors and will receive an award in honor of his achievement. Congratulations, Daniel. 30 WARTS members attended the annual net picnic on July 9th. The first WARTS picnic was held 50 years ago. In Memoriam: E. John Adams, W7GZN, of Yakima; Mark Louis Myers, N7MDI, of Cle Elum; and Stu Mann, N7FVL, of Spokane all became a Silent Key. Many thanks to the 32 Tri-Cities area hams who put in 350 man-hours helping with the Hanford fire in June that burned about 200,000 acres including 52 buildings and 20 homes. There were 8 out of 10 OO reports for July. 73, KA7CSP. Net Activity: WSN: QNI 832, tfc 243; Noontime Net: QNI 8701, tfc 369; WARTS: QNI 3163, tfc 79. Tfc: K7GXZ 274, W7GB 150, KA7EKL 73, K7BFL 63. PSHR: W7GB 138, K7GXZ 119.

IDAHO: SM, M.P. Elliott, K7BOI—OOC: N7GHV, SEC: AA7VR, STM: W7GHT. Idaho has about 4500 hams (~ 4% of our population). Where are they? We must defend our privileges with public service and let the public know what a valuable resource we are. This is done with programs like ARES, message handling, and other public service. Our Section has spots available for involvement now. If you can help, let me know. Have you seen the "draft" legislation called the "Tower" bill for Idaho. If not, contact John Cline (K7BDS) at the Idaho Bureau of Disaster Services. He and his group want to get the "draft" to ALL Idaho hams. It is not long till the 2001 legislative session begins. 73 — Mike, K7BOI. Tfc: W7GHT 154, KB7GZU 75, WB7VYH 50, and N7MPS 7. PSHR: W7GHT 118, WB7VYH 100, and N7MPS 52. Net (SESS/QNI/QTC/Mgr.): FARM-31/2324/28/ W7WJH; NWTN-31/1042/58/ KC7UND; IDACD-21/416/10/K7UBC; IMN-31/404/ 175/ W6ZOH.

MONTANA: SM, Darrell Thomas, N7KOR—The main event for July in the Montana Section was the Glacier Waterton International Hamfest held in conjunction with the Montana State ARRL Convention at Three Forks Campground on the south edge of Glacier National Park. This was the 66th annual gathering of this event and attracted 533 registered amateurs. It once again was very well organized and provided educational workshops as well as entertainment for the whole family both ham and non ham. Special children's programs were also provided. With the many wildfires burning in the west, the Capital City Amateur Radio Club of Helena, MT, has been very active providing emergency communication at Red Cross Shelters and check points. Net/QNI/QTC/ NM MSN 121/0 W7OW MTN 1560/43 N7AIK IMN 404/185 W6ZOH. PSHR: N7AIK 133.

OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: AB7HB. ACC: K7SQ. There are several Official ARRL Field Organization Appointments open within the Oregon Section. At present, I am ready to appoint one Public Information Coordinator (PIC), and several Public Information Officers (PIO). All appointees must be Full members of the ARRL. The PIC should have professional public relations or journalism experience. PIOs are generally recommended by affiliated clubs, and approved by the Section Manager. More information and job responsibilities are listed on the ARRL Web Page, or contact me via e-mail. This would be a great way to have your club represented within the ARRL Oregon Section, so get those recommendations to me. I also want to appoint an ARRL DXCC Card Checker. This person must be a full member of the ARRL, have at least 150 countries confirmed, and be approved by the ARRL Northwest Division Director. The BIG 6th annual SWAP-TOBERFEST is coming Saturday, October 21st, to the Polk County Fairgrounds, west of Salem. Sponsored by the Mid-Valley ARES team, hours are from 9 AM to 3:30 PM. Take highway 22 west of Salem, and turn south at the "blinking light, " Hwy 99W. Go about 1/ 2 mile to the fairground entrance. There will be LOTS of swap tables, commercial exhibits, meetings and seminars. Emergency vehicles of all types will also be on display. And, yes, plenty of RV parking is available, too. There will be an ARRL Oregon Section Officers breakfast, sponsored by The Ham Operators Group (HOGS), beginning at 7AM, at the nearby Cafe. See everyone at Rickreall, and keep in touch! NTS traf-

MFJ *pocket size* Morse Code Tutor

Learn Morse code fast, anywhere . . . LCD display lets you check your copy instantly . . . Easy no-code beginner's course . . . Takes you beyond Extra Class . . . Customized Practice . . .Plain English QSOs . . . Word Recognition Mode™ . . . Interactive Mode™ . . . No memorization . . . Never run out of practice!

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Take it everywhere! Enjoy code at home, work, on vacation, on a plane or in a hotel -- anywhere!

A large LCD display reads out letters, numbers and punctuation in *plain English*. See code as it is being sent!

MFJ's proven *Beginner's Course* takes you from zero code speed to solid copy fast!

Realistic plain English QSO practice helps you pass your FCC Code exam.

High-speed practice takes you to Extra Class and beyond . . .

Practice copying *entire* words -- not individual characters. Instant word recognition makes you a true, high-speed CW pro.

InstantReplay™**--** check copy instantly!

MFJ's interactive mode lets *you* set the pace -- *you* decide when to copy the next group and how many -- *not the tutor.*

Easy-to-use -- choose from menus on LCD -- *no instruction manual needed!*

Beginner's Course

QST rate MFJ tutors *"the clear choice for beginners"*. Follows ARRL/VEC format. Learn small fixed sets of characters. Previously learned sets are combined with new sets to reinforce all you have learned.

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Practice copying, then instantly replay to check your copy on the LCD display.

Custom Character Sets

Having trouble with certain characters? Build and save 3 custom sets of 16 characters for extra practice -- *an MFJ exclusive.*

Realistic Plain English QSOs

Practice copying *realistic* on-the-air style plain English random QSOs. Gets you ready to pass your FCC test and upgrade. Also builds confidence for your first *real* contact.

MFJ Word Recognition Mode™

MFJ's *Word Recognition Mode*™ gives you hundreds of commonly used words in ham radio. Practice recognizing *entire words* instead of individual letters. Learn to copy words without writing it down. Carry on an entire CW QSO without paper -- just like pros on 40 Meter CW. You can also save 10 words of *your choice* for word recognition practice -- *an MFJ exclusive.*

You'll never run out of practice

Select letter, number, punctuation, prosign or FCC character sets (has *only* letters, numbers and prosigns required on FCC tests), random call signs, random words, QSOs or combination sets for practice -- *you'll never run out of study material!* You can even make up and save your own words and character sets for practice.

MFJ-418

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plus s&h

MFJ InteractiveMode™

InteractiveMode™ lets *you* decide when to copy the next or previous group and how many -- great for beginners!

Normal or Farnsworth

Select normal or Farnsworth spacing.

Farnsworth makes it easier to learn *entire* characters. Stop counting individual dots and dashes that slows learning! Farns- worth character speed is adjustable 10 to 60 Words-Per-Minute for high-speed practice.

Fixed or Random Length Groups

Use fixed length or more realistic random length groups (up to 8 characters).

Change speed on the Fly

You can change speed *on-the-fly* while playing a session 3 to 60 words-per-minute.

SettingSaver™

Settings are automatically saved, ready to use next time -- no more #$%@ resets! Turn it on, hit replay. Go back to practice!

No Instruction Manual Needed!

Choose from easy-to-use menus on LCD. Simple 3 button operation.

LARGE LCD Display

Check your copy, select from menus and program custom characters and words on 2 line LCD display with 32 *huge* 1/4 inch high-contrast characters -- *powerful sound and sight learning!*

SilkySmoothSidetone™

Only MFJ gives you *SilkySmooth Sidetone*™ with *TruTone*™ sinewave and *SoftStart*™ dots/dashes -- lets you concentrate on learning without the distraction of harsh keyclicks. Use earphones for private practice or built-in speaker for groups. Adjustable volume. Loud powerful audio amplifier. Variable pitch 300-1000 Hz.

True Pocket Size

Fits in your shirt pocket with room to spare -- smaller than a pack of cigarettes. Tiny 2¹/₄x3³/₄x1 in., weighs less than 5¹/₂ ounces. Uses 9 volt battery (not included).

Tapes can't compare

Tapes play the same old boring stuff over and over again. Unlike tapes, you'll *never* memorize the MFJ-418 random code sessions. You'll pay more for a few sets of code tapes. The MFJ-418 is less money, more fun and far more effective.

Pocket Tutor Accessories

MFJ-26, $12.95. Soft leather protective pouch for MFJ-418. Clear plastic overlay for display, knob/push button openings, strong pocket/belt clip secures your tutor.

MFJ-281, $12.95. Speaker for group practice. Loud, powerful audio! 3³/₄x3x2¹/₄"

MFJ-291I, $4.95. Comfortable foam earbud earphone for private listening.

MFJ-3400, $19.95. *Morse Code: Breaking the Barrier*. "How to learn by the Koch Method" book.

More pocket size MFJ Morse Tutors

MFJ-417, $59.95. Similar to MFJ-418, but no LCD. Most software features.

MFJ-413, $39.95. Similar to MFJ-417, less random words, QSOs, SettingSaver™.

Other Morse Code Tutor Products

MFJ-552, $79.95. "On-the-Air" CW fun using your HT. *JimHandy*™ plugs into your dual band HT and converts it into a modulated CW transceiver -- just plug in a key!

MFJ-554, $79.95. Classroom Code Practice Oscillator. Clear, sweet sounding CW. Delivers full 1 watt into built-in speaker.

MFJ-414, $199.95. Deluxe Classroom Morse Code Tutor. Everything in MFJ-418 plus down/upload custom practice from PC, store exams, printer port, on-the-air interface, deluxe keyer.

MFJ Code Practice Oscillator

MFJ-557

$29.95

Learn to send Morse code with MFJ-557. Straight key with adjustable travel and tension, and built-in speaker with volume and tone controls lets you practice to your heart's content. Earphone jack. Heavy non-skid steel base stays put as you tap out Morse code. Use 9V battery or 110 VAC with MFJ-1312, $14.95.

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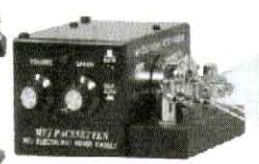

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fic totals for July: K7OVK 132, W7VSE 97, N7DRP 87, W7IZ 71, KC7ZZB 64, N7NLM 62. KC7SRL 59, N7YSS 25, KK1A 10, KC7SGM 6.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—The National Traffic System consists of various networks of Amateur communicators all involved in the handling of messages. This is part of the training so necessary for the day when the NTS, ARES & RACES teams may be called upon to handle emergency messages (traffic). One way to get your feet wet is to participate in the annual Simulated Emergency Test (SET) which occurs each October. Details are outlined in the ARRL Public Service Communications Manual and dates are to be found in *QST* magazine. Basically SET is designed to find out the strength and weaknesses of ARES, RACES, ACS and NTS. Do your part and participate. A new Official Observer is Richard Rosenau, KK7JA, of Shelton. When you're transmitting, he'll be listening. A new EC appointment for the Medical Services team is Paul Dunn, KC7QNQ, of Kent. In Pacific Co, a new EC is Emily Wolfe, KB7L of Ocean Park. Best wishes to the three and thanks for being a volunteer. Reports to SEC N7NVP indicate that this is the last year for the Puget Sound MS150. Ridership is down and the MS Society has decided there are more efficient ways to garner funds. There was actually an excess of Ham operators to support this year's event. APRS was used for tracking SAG wagons and other vehicles. The Kitsap Co comm van was operational and on display at Rest Stop 1. It was a fun time and a chance to show off our capabilities to the public. We'll miss this event. It was a great training opportunity. News from the counties includes Cowlitz Co being on standby for a search. The missing 8 yr old girl was found 15 minutes before the activation. Cowlitz also supported a fun run for the Red Cross. Clark Co held a field exercise in lieu of a monthly meeting. Teams went to 5 Red Cross shelters and a fire district. A HF Pactor link was established. All teams were able to work HF, 2 mtr. and simplex low band UHF (Red Cross). Was a well coordinated and executed exercise. Congratulations to all participants. We note that STM Pati, W7ZIW, is recovering from surgery, but took time to report this traffic: N7AJ 20, K7BDU 546, W7BO 91, W7LG 64, K7MQF 45, W7NWP 85, K7SUQ 16, W7QM 49, W7TVA 286, W7ZIW 158.

PACIFIC DIVISION

EAST BAY: SM, Andy Oppel, KF6RCO—EB Web Page: http://www.pdarrl.org/ebsec/. Webmaster is KB6MP. The Mother Lode DX / Contest Club is offering California gold to any club that can wrest the California QSO party title from them. Go for the gold! Congratulations to newly elected SARS officers: AC6LE/Pres, KE6RYN/VP and KO6FR/Sec-Treas. SARS welcomed new members WZ6X, KE6IOQ and KG6BAZ. MDARC recognized new licensee KG6BOF along with these upgrades: WA6ODX and WB6HIX to General; KM6KS, KI6TB, N6QNS, KQ6IT, KO6RO, W6NKF and KM6QX to Extra. EBARC welcomed new members KA6BQF and KG6CFS and congratulated the upgrade of KD6AGA to General along with KE6MRH and KF6HEN to Extra. ORCA tallied 20 operators at their Field Day Site. The following ORCA members participated in a July 4th Fire Patrol in Oakland: K6JAT, KF6GYW, WA6CUY, W6UAB, W6BUR, KQ6JZ, KE6SSY, KE6HCD, KF6GTT, KD6OAQ, KD6OCW and N6RCG. Hope to see you all at Pacificon, Oct. 20-22; details at http://www.pacificon.org. July tfc: W6DOB/621, WB6UZX/23. PSHR: W6DOB. BPL: W6DOB. Tfc nets: NCN1/3630/7 PM; NCN2-SLOW Sess/3705/9 PM; NCN-VHF/145.21/7:30 PM; RN6/3655/7:45 PM & 9:30 PM; PAN/3651/7052/8:30PM. Your check-ins are always welcome.

NEVADA: SM, Jan Welsh, NK7N—ASM: Dick,W6OLD. SEC: Paul, NN7B. TC: Jim, NW7O (he does WAS). NM: Bobby, AB7WZ. EC: Glenn, KB7REO. I attended SNARS hamfest in Reno as did Jim Maxwell, Pac Div Dir Many old friends attended, exams by N7BIP, KG7GP, WB7EIY, W7FWZ, W7VI, W7UIZ and KJ7EE-John., YLRL/ARRL table by KC7TCK-Carol and K7NHP very visible. KK7AA-Melissa and K7KFW-Ken grand prize winners along with K7VY-Gary although Reno was main winner and a good time was had by all. Too many antenna restrictions showing up. UNR Radio Pack assigned booth at NV State fair this month, aa7ut@arrl.net for info. N7TOD reporting fire started by lightning had 911 ph. Loss during 2 m. NNARS net, power also lost, so report on fire was handled by another NNARS member via the repeater. Ely to Hiko event 9/17/00 and Multiple Sclerosis event 9-(23&24) starts Las Vegas area active season. It's mountain topping time, antenna, repeater maintenance, lots of hard work this time of year. Exam sessions still going strong by WA6TNW, SNARS and SIERA. Rural Amateur Radio Assoc. August meeting in Churchill County, Fallon this month, finished with tailgate swap. KA7AJQ-Sheila can hold her own from what I heard. Member W7KKM, Max 1st licensed in 1919. ARES net 8.30 AM Saturday at 3965.5. nk7n@aol.com. 73, NK7N-Jan. Tfc: N7CPP 10, W7VPK 6, KK7KS 2.

PACIFIC: SM, Ron Phillips, AH6HN—Ed Conklin, KH7JJ, reports on May 30, the FCC assigned vanity call KH6BB to the Battleship Missouri Amateur Radio Club (BMARC). The proposal to the Missouri Association has been accepted, and BMARC is currently proceeding with plans for equipment and antenna installation aboard ship. The Club will be needing volunteer operators 7 days a week. Anyone interested in operating or providing engineering support or just joining BMARC should contact Ed (ekc@forth.com). Dan Spears has changed his callsign to KH6UW. Also, Dan has been busy recruiting new people into the OO group. Thanks, Dan, for your continued support. Also, congrats on becoming the Section's OOC. Jim Reid, KH7M, reports the Kauai ARC had a very successful Field Day and it was enjoyed by all. Hope your score is a good one, Jim. I would like to welcome aboard Tim Hayes, NH0H, from Saipan. Tim reports that things are picking up for the local hams. Tim has also accepted the task of DEC from our SEC, Dennis Carvalho, KH7H. Thanks for volunteering, Tim. Corky, W6ORS, is trying to get involved with 6 meters. Also, he is off to Mexico again to continue his Spanish lessons. Good Luck, Corky. Hurricane Daniel got everyone excited in Hawaii this month. All the emergency systems were activated and everything worked out very well. We were all relieved when the storm decided to spare us and move on into the western Pacific. My thanks to all who participated in the reporting activity. The weather reports from all islands was very helpful. The Hawaii DX Association was

accepted as an affiliate ARRL group. Two nominations for DXCC card checkers have been sent to ARRL. Hope to hear on their acceptance soon. Aloha and mahalo, Ron, AH6HN.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—A correction to last month's column is in order. The kudos to the Mt Vaca Radio Club for assisting with the Western States Endurance Run should have mentioned that the Golden Sierra Amateur Radio Group was the lead provider for this event. Thanks to both clubs for their efforts. Congratulations to Ed Braaten, K6EKB, on his appointment as District Emergency Coordinator for District 4. The recent GEARS Hamfest was a lot of fun. Mother Lode DX and Contest Club recently held a joint meeting with the Northern California Contest Club. MLDXCC is looking for some club competition in the California QSO Party. If you haven't yet checked into the League's continuing education certification programs I suggest you do so. You can download course outlines on the ARRL Members Only Webpage. Reminder that the Section Net is held on the first Sunday of each month at 7:45 PM (HF, 3987 kHz) and 8:00 PM on the 146.085 repeater. Restructuring continues to gain both upgrades and new hams. One of the upgrades (I have to brag on this one) to Extra Class is a student of mine at Bishop Quinn High School, Amy Morris-KF6YNT. While operating HF, I have been impressed with three things: the overall quality of operations by new amateurs; their willingness to ask questions in order to improve; and the willingness of experienced hams to provide them with help. Sorry for the editorial comment, but this is something we need to continue in the best interests of the future of the Amateur Radio service. Fire season is beginning to wind down, but let's not drop our guard just yet. Last year some of the most damaging fires occurred late in the season. Until next month, 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK— ASM: KH6GJV. SEC: KE6EAQ. Thanks to the Del Norte ARC and the Fortuna ARC for having the SM as a guest at their meetings. Hams in the section agree that we must do more to train for emergencies, advance the state of the art, and teach technical information. This is walking the walk and not just TALK!! KE6ORF completed a motorcycle tour of the US. Humboldt hams were active in weather spotting of severe thunder storms and passing information to local fire agencies. Humboldt is also planning a major hamfest for June 2001. Lake County ARS is getting ready for the annual "Peddle around the Lake" bicycle tour. Anyone wishing to help please check in on 146.775. Congratulations to the consolidation of the Marin County clubs. They now show a membership of 143!! Anchor Bay ARC found out that setting up for Field Day was an excellent training session. KE6MWX spoke to the Willits ARS about "fractal" antennas. Hams in the northern part of the section are on alert (early August) because of the high fire danger and draw down of fire personnel and equipment to other areas. Everyone should seriously read the "1,000 Marbles" story and see how it applies to their own life. Send your news in so it can be printed. See you all at Pacificon. W6AUO, from Willits, SK.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN— I am pleased to announce the appointment of Stephen Adams, AD6HP, to the post of Emergency Coordinator for Merced County. Welcome aboard, Stephen. In conjunction with emergency communications, traffic handling is a very important facet of our Field Operations in SJV. Simply stated, I need volunteers for the post of Official Relay Stations in all of the counties of the Section. I am also in need of individuals for the Official Observer program. If you are interested please contact me via e-mail at: w7wn@arrl.org . In 1935 the ARRL developed what is now called ARES (Amateur Radio Emergency Service. ARES is an organization of radio amateurs who voluntarily register their capabilities, equipment and time for emergency communications in service to our communities and State, Federal and County governments. ARES units are organized under League guidelines. Support your local ARES group by becoming a member. If your radio club doesn't have an ARES group in operation contact me for details on setting up an ARES operation.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W— SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. I'm now receiving quite a few club newsletters every month, thank you to all concerned! Most months I try to report on the activities of as many clubs as possible. This month, I'm spotlighting an excellent club newsletter. Having spent several years editing a club newsletter, I have a special appreciation for publications that are particularly good. The Santa Cruz County Amateur Radio Club, "Short Skip" is one such newsletter. Editor/publisher Ron Baldwin, K6EXT, produces a newsletter that is excellent in both format and content. Along with listings and articles about club meetings, nets, license classes and other events, he also has many excellent articles gathered from both the Internet and members. Art Lee, WF6P, always has a column well worth reading - in the most recent issue he sounds a bit like T.O.M. in a mild-mannered rant that might be titled "Rotten Bugs." Another excellent article describes AC6KW and KQ6DV's operation in the "Bumble Bee 2000" contest. Hey, what's a contest without a few bugs? The Santa Cruz County ARC meets at 7:30 PM on the third Friday at (temporarily) the Dominican Hospital Main building, 1515 Soquel DR, Santa Cruz. Their club URL is http://www.k6bj.org. There is another effort that deserves recognition and that is our own SCV Web miester Frank Kibbish, WB6MRQ. For the last several years, Frank has maintained the SCV homepage (http://www.pdarrl.org/scvsec/index.html). On it, one will find links to as many SCV club Web pages as we know about as well as news bulletins as needed. Keeping up a web page that includes Silicon Valley is quite a challenge. Frank has done and is doing an excellent job! See you next month! 73 de Glenn WB6W. Tfc: W6PRI 4.

ROANOKE DIVISION

NORTH CAROLINA: SM, John Covington, W4CC— SEC: KE4JHJ. STM: N0SU. BM: KD4YTU. TC: K4ITL. PIC: KN4AQ. OOC: W4ZRA. SGL: AB4W. ACC: vacant. http://www.ncarrl.org. A fabulous time was had by all at the Western Carolina hamfest in late July. At the ARRL forum, Roanoke Division Vice Director Les Shattuck, K4NK, gave a report on the happenings at the recent ARRL Board of Directors meeting. Details will probably appear in QST by the time you read this. I presented EC certificates to Don, N0SU (Swain), and Ron,

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LMR 400 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 3.1dB @ 450 MHz TPE JKT	.87/FT	.86/FT	.85/FT
LMR 600 (OD.590") SOLID CCA CNTR FOIL + BRAID 1.72dB @ 450 MHz WP/UV JK T	1.25/FT	1.22/FT	1.20/FT
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COAX (50 OHM "HF" GROUP)

	100FT/UP	500FT	1000FT
RG213/U STRD BC MIL-SPEC NC/DB/UV JACKET 1.2 dB/2500WATTS @ 30MHz	.40/FT	.38/FT	.36/FT
RG8/U STRD BC FOAM 95% BRAID UV RESISTANT JKT 0.9dB/1350WATTS @ 30MHz	.34/FT	.32/FT	.30/FT
RG8 MINI(X)95% BRAID UV RESISTANT JACKET 2.0dB/875 WATTS @ 30MHz	.15/FT	.13/FT	.12/FT
RG58/U 95% BRAID UV RESISTANT JACKET 2.5dB/400 WATTS@ 30MHz	.15/FT	.13/FT	.11/FT
RG58A/U STRD CENTER 95% TC BRD UV RESISTANT JKT 2.6dB/350 WATTS @ 30MHz	.17/FT	.15/FT	.13/FT
RG214/U STRD SC 2 95% BRD NC/DB/UV JKT 1.2dB/1800WATTS @ 30MHz	.25FT/UP	1.75/FT.	
RG142/U SOLID SCCS 2-95% SILVER BRAIDS *Teflon®* JKT 8.2dB/1100WATTS @ 400MHz	.25FT/UP	1.50/FT.	

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	100FT/UP	500FT	1000FT
RG11A/U STRD BC (VP-66%) 95% BRAID NC/DB/UV JKT 1.3dB/1000WATTS	.44/FT	.42/FT	.40/FT
RG6/U CATV FOAM 18GA CW FOIL + 60% ALUM BRAID	.20/FT	.13/FT	.11/FT
RG6/U CATV FOAM 18GA CW FOIL *QUAD SHIELD*	.25/FT	.18/FT	.16/FT

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	100FT/UP	500FT	1000FT
"FLEXIBLE" 450 OHM 16GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT+)	.20/FT	.18/FT	.16/FT
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300 OHM 20GA STRD (POWER: FULL LEGAL LIMIT)	.15/FT	.13/FT	.12/FT

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5971 8/COND (2/18 6/22) BLK UV RES JKT. Recommended up to 125ft	.20/FT	.18/FT	.16/FT
1618 8/COND (2/16 6/18) BLK UV RES JKT. Recommended up to 200ft	.35/FT	.34/FT	.32/FT
1418 8/COND (2/14 6/18) BLK UV RES JKT. Recommended up to 300ft	.47/FT	.45/FT	.43/FT
1216 8/COND (2/12 6/16) BLK UV RES JKT. Recommended up to 500ft	.78/FT	.74/FT	.70/FT
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT

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14GA 7 STRD *"HARD DRAWN" (perfect for permanent Dipoles etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
14GA SOLID *"COPPERWELD" (for long spans etc.)*	.15/FT	.12/FT	.08/FT	.06/FT
14GA SOLID *"SOFT DRAWN" (for ground radials etc.)*	.15/FT	.12/FT	.08/FT	.06/FT

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3/32" DOUBLE BRAID *"POLYESTER"* 260# TEST WEATHERPROOF	.075/FT	.06/FT	.045/FT	.04/FT
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AD4XV (Jackson), and thanked the Western Carolina hams who were present for all they do for us. The folks in this part of the state are rarely affected by hurricanes and often serve as net control stations during the aftermath of hurricanes. The annual Miriam Smith (KB4C) Memorial award was presented to two outstanding Western NC hams who have been involved in emergency communications. This year's recipients were Jeanne, AE4HJ, and Tom, KC4QPR. I have had a lot of feedback recently on including PSK31 as a part of our emergency communications capability. I agree that this mode is worth looking at. I see some pluses and minuses, and most of the minuses have to do with software issues, which could be corrected. Let me know your thoughts. Forum at the Cary Swapfest had some interesting discussion of the use of our web site to distribute information. I took lots of notes and we will try to implement these suggestions over the next several months. July Traffic: W4EAT 365, AB4E 296, K4IWW 129, KI4YV 118, KE4JHJ 93, W4IRE 66, NC4ML 58, N4AF 50, AC4DV 44, KE4AHC 35, WA4SRD 30, W3HL 29, W4CC 25, KR4ZJ 20, AA4YW 17, WD4MRD 16, AD4XV 15, WA2EDN 10, KB8VCZ 9, KT4CD 9, NT4K 7, KR4OE 5, N0SU 4, N8UTY 3, KE4YMA 2, KF4YHG 2.

SOUTH CAROLINA: SM, Patricia Hensley, N4ROS—The recent Shelby Hamfest ARRL meeting provided a great opportunity to meet many SC amateurs. It was indeed a pleasure to have spoken to many of you individually. I especially appreciate the support that you give me in accomplishing our goals. The latest SC amateur census indicates approximately 6,800 operators in our state. Of these, approximately 3000 are Technician/Technician Plus; 1400 Generals; and 950 Advanced class operators. As you can see, we have a large resource pool that is ready for upgrading if given the incentive and opportunity for class instruction. I would like to encourage all clubs to expand their instructional programs to include upgrade-training in addition to preparation for entry-level licenses. This will enable more amateurs to participate in additional areas of Amateur Radio as well as to increase our readiness for emergency communication. This month of October is especially important for amateur radio in SC. We are selecting our Section Manager who will help facilitate those policies initiated by the ARRL. No organization can speak for all amateurs, nor will all members approve of every policy of an organization. It is important to remember, however, that without the guidance of the ARRL Amateur Radio would probably not exist today. The challenges facing amateur radio will be even greater tomorrow. Looking forward to seeing you at the SC ARRL State Convention in Sumter. Tfc: AE4QZ 82, KT4SJ 79, KA4LRM 60, W4DRF 50, WA4UGD 35, WD4BUH 20, K4JMV 14, W4CQB 6.

VIRGINIA: SM, Lynn Gahagan, AF4CD—SEC OOC: KR4UQ. STM: W4CAC. ASM/A KE4MBX ASM/B: W4TLM. SM/C: TC, W4IN. ASM/D KC4ASF. PIC: W2MG. Frederick County, in District 1 now has two ECs. Wayne, KE4PMS, has moved to EC of Winchester City and Greg WA4VE is our new Frederick County EC. Wayne will keep the responsibilities for the Winchester Public Safety Office and the County Jail, where ARES packet stations are located. Greg will support the County EOC, Winchester Medical Center and Winchester Chapter of the Red Cross. Among Greg's new AECs are Tracy KF4ZFY, Don KU4KN and Brian KU4KV. A meeting was held between the Frederick County Sheriff Bob Williamson, the Frederick County Director of Emergency Operations Gary DuBrueler, Frank ,WB4YRB, and Steve, NB3O, to discuss incorporating ARES in their yearly SET. The WA4RS wide area UHF repeater was hit twice in one week. Although it was up and running within one week after the first hit in time for the Berryville Hamfest, the second strike rendered it non-repairable. Frank, WB4YRB, has graciously provided the means for purchasing a brand new Vertex VXR-5000 and a CAT-1000 controller with all the trimmings to keep this important system up and running. A new VDEN node in Fairfax is being upgraded to a MSYS BBS and relocated to the Red Cross National HQ. The new Red Cross Disaster Services radio station in Loudoun County will have SHARES, commercial, pubic safety and amateur equipment on HF, VHF and UHF. Planning is underway for permanent VHF/UHF digital and phone operating positions at the Dulles International Airport, the Fairfax County EOC, INOVA Fairfax Hospital and Alexandria Fire Training Center. Public safety officials and Virginia ARES staff are designing a SET as a prelude to the Virginia Department of Emergency Management's Local Emergency Management Operations Course being conducted in Fairfax County in March 2001. Virginia public safety agencies are coordinating exercise and equipment planning with ARES to meet ECom needs for Northern Virginia. Amateur Radio was an important factor in the success of the Dulles Disaster 2000 exercise and 28 Hams provided backup communications overnight during a phone outage at INOVA Fairfax Hospital. Very 73 de AF4CD. Tfc: W3BBQ 174, WA4DOX 123, KR4MA 121, W4CAC 106, K4YVX 94, N4ABM 80, KR4MU 74, K4MTX 57, AA4AT 52, AF4CD 46, WB4ZNB 42, K0IBS 36, W4YE 21, WB4UHC 17, W4VIC 16, N4FNT 11, W4MWC 8, W4JLS 6, K4JM 2.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart , WD8V— STM: KC8CON. SEC: W8XF. ASEC: KA8ZOO. SGL: K8BS. TC: K8LG. OOC: N8OYY. ACC: WD8MKS. APRSC: W8XF. PIC: N8TMW. I'm not going into any detail, but here it comes (ULS), there it goes (ULS). (CORES) and FCC Registration Number (FRN) is being implemented to replace ULS. If you are among the 20% of licensed amateurs who registered with the ULS system, no action will be required on your part. Your existing TIN will automatically feed into CORES which will generate a 10 digit FRN. It will not replace your license ID - the 9 character identification number beginning with the letter L. At the present time, neither is mandatory. Twelve of the fourteen Volunteer Examiner Coordinators (VECs) held their annual National Conference with the FCC. They did establish renewed guidelines for the conduct of the Morse code examination elements to be used by all VEs mandatory July 1, 2001, but may be implemented immediately at the VE's discretion. The ARRL Web site is a great source of information for all amateurs, please take advantage of it. Don't forget I was elected by you to serve you. Need information? Contact me. WVFN 3.865 6:00 PM local; phone 304-768-9534; fax (304) 766-1068; cell 304-541-WD8V (9388) or e-mail wd8v@arrl.org. 73. Tfc: KA8WNO 236, WD8V 227, W8YS 97, W8WWF 61, KC8CON 51. PSHR: WD8V 212, WD8DHC 128, KC8CON 125, KA8WNO 118. W8YS 115, W8IVF 84. WVFN 929/92/31

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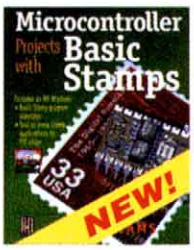

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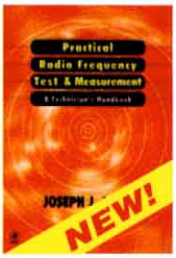

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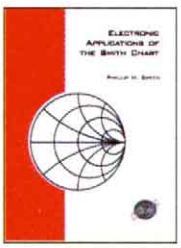

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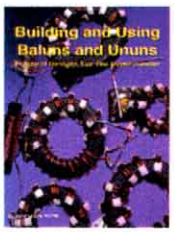

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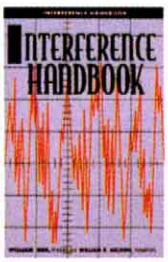

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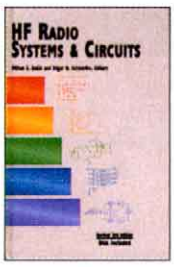

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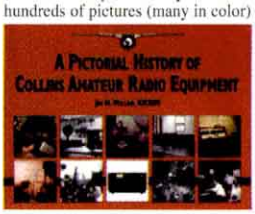

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ROCKY MOUNTAIN DIVISION

COLORADO: SM, Tim Armagost, WB0TUB— ASM: Jeff Ryan, N0WPA. SEC: Mike Morgan, N5LPZ. STM: Mike Stansberry, K0TER. ACC: Ron Deutsch, NK0P. PIC: Erik Dyce, W0ERX. OOC: Karen Schultz, KA0CDN & Glenn Schultz, W0IJR. SGL: Mark Baker, KG0PA. TC: Bob Armstrong, AE0B. BM: Jerry Cassidy, N0MYY. A very bad fire season had Colorado ham radio operators helping authorities by providing communications while the blazes were battled. First, in New Mexico, Wes Wilson, K0HBZ and Jeff Smith, KB0YCI, both members of the Mountain Amateur Radio Club (Woodland Park) used Wes' mobile communications trailer to provide emergency and auxiliary communications for authorities working the Los Alamos fire. Then, in June, Colorado had its own outbreak and ARES Districts 6 (Park County) and District 23/Jeffco RACES were mobilized to assist with the Hi Meadows fire. ARES Districts 11 (Boulder), 14 (El Paso/Teller), and 24 (Douglas/Elbert) also provided hams in support. Thanks, and well done to all. You can read the after action reports for this and many other events on the Colorado ARES Web page at **www.iex.net/ares/reports.htm**. There is also plenty of other information about ARES in Colorado as well, so give it a look next time you're out surfing the web. The MS-150 bike tour from Highlands Ranch to the Royal Gorge had hams from Boulder, the Denver metro area, the Springs, Pueblo and Cañon City cooperating to provide safety and logistics support to this two day event. Congrats to Jerry, N0MYY, Tom, N0KSR, and Rick, N0KKZ, for their leadership and thanks to everyone who participated. Any items for the column? Please e-mail them to me: **n0wpa@arrl.net** 73, de N0WPA. NTS traffic: AD0A 88, K0TER 55, N0UOD 35, KI0RP 30. CAWN: W0WPD 637, W0LVI 504, W0GGP 460, N0JUS 447, W0NCD 443, K0HBZ 436, K4ARM 371, WB0VET 316, N0NMP 299, N0FCR 222, KI0ND 196, WD0CKP 158, AA0ZR 121.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS & N5ART. SEC: K6YEJ. STM: N7IOM. NMs: WA5UNO & W5UWY. TC: W8GY. ACC: N5ART. New Mexico Roadrunner net handled 94 msgs with 1081 checkins. New Mexico Breakfast Club handled 224 msgs with 1030 checkins. Yucca Net handled 34 msgs with 664 checkins. Caravan Club Net handled 12 msgs with 57 checkins. SCAT Net handled 10 msgs with 490 checkins. Four Corners Net handled 14 msgs with 349 checkins. GARS Net handled 6 msgs with 16 checkins. Rusty's Net handled 82 msgs with 797 checkins. Valencia Co Net handled 10 msgs with 47 checkins. Deming ARC Net handled 11 msgs with 70 checkins. In a special presentation at the Governor's Office, NM Governor Gary Johnson expressed his strong thanks to all who participated in any way in communications during the NM fires and issued an executive proclamation proclaiming Aug 20th through the 26th as Amateur Radio Week throughout the State of NM. Pictures were made of the presentation. Our sincere thanks to W6TER for setting up the presentation and to KM5EH, Chairman of the State Convention, for all his help. The International Hamfiesta is Oct 28-29, hamfiesta.org. Socorro Hamfest is Nov 4. So sorry to report the passing of W1ICP, of Silver City, and KA5TLW, of Las Cruces. They will certainly be missed. Best 73, W5PDY.

UTAH: SM, Mel Parkes, AC7CP—I would like to thank all those who participated and made the Wasatch 100 endurance run a success. Now that fall is here, remember to get ready for that snow and ice. Get up and do that tower work now before it's too late. I have been very impressed with all those who have upgraded to new licenses or recently obtained a license. If you fit in that category and need help, don't be afraid to ask some one to elmer you with those areas you have questions or concern about. Recently we have had a few isolated cases of confusion over use of simplex frequencies. My suggestion is everyone should use common sense and above all be courteous. Rude remarks or arguments on the air will never resolve misunderstandings or confusion. If you ever have a concern over this topic, please feel free to contact me and I would be more than happy to help look into the area of concern. The Utah Hamfest Committee has made a decision to hold the hamfest again in July 2001 at Ruby's Inn. The decision was based on the many requests for us to have a hamfest every year and the majority of those who attended requested we do it there next year. If you would like to help with the planning, the committee has many opportunities for volunteers. Go to the Utah Hamfest web site for details: http://utahhamfest.org/. 73 de AC7CP.

WYOMING: SM, Bob Williams, N7LKH—We are saddened to report that Bob Johnston, WB7AHL, of Lander, has become a Silent Key. Bob was EC for Fremont Co for many years, and we are still searching for someone to fill his shoes. The Tour de Wyoming 2000 bicycle ride was held from July 16-21, going from Jackson to Pinedale, to Farson, to Lander (2 nights), to Shoshoni, to Thermopolis, for a total distance of 380 self-propelled miles. Participants ranged in ages from 9 (he rode 280 miles!) to 73. Hams assisting with communications were Mick, KC7FAL, Dennis, KS7WY, Dave, N7DBM, and Weldon, W7WTR, from Jackson; Loren, WS7X, form Pindale; Dave, W7YP, from Boulder; Merlene, N7EMI, and Larry, KD7BN, from Lander; Art, KK7BZ, Bert, KC7ZTS, and Jerry, WB7S, from Basin; and myself and Mary, N7LKH, and KF7MC, from Wapiti. Except for one strong afternoon, there were no significant injuries or other major problems. Thanks to all who helped and to the Tour participants for their donations to the HERC repeater system which totaled $111.04. Tfc: NN7H 141. PSHR: NN7H 193.

SOUTHEASTERN DIVISION

ALABAMA: SM Bill, Cleveland KR4TZ — ASMs: W4XI, WB4GM, KB4KOY. SEC: KC4PZA. STM: K4JSJ. BM: KA4ZXL. OOC: WB4GM. SGL: KU4PY. ACC: KV4CX. TC: W4OZK. PIC: KA4MGE. Scouts Jamboree on the Air (JOTA) is held on the third weekend in October, which is October 21 & 22 this year. Our goal this year is to have all the counties with active clubs and ARES groups to participate with at least one Boy or Girl Scout troop this year. Please contact your local scout organization, and see if your club can help them participate. To find your local Boy Scout Council, visit their

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Web site at www.scouting.org/councils/index.html. To find your local Girl Scout Council, visit their Web site at www.girlscouts.org. For more information about JOTA please visit the ARRL-JOTA Web site at www.arrl.org/ead/jota.html. The number of traffic net reports have dwindled a little over the summer months, and still haven't reached the amount we had last year. If you are a net manager, please send Shane Jackson (jack728@mindspring.com) and I (kr4tz@arrl.org) a net report. If you need help filling out a report please give me a call at 334-661-3892. I use these reports to keep track of the active nets in Alabama, and the ARRL uses them as evidence on how much public service is performed in Amateur Radio. I hope to hear you on the air! For more up-to-date news on what's happening in the Alabama Section visit our Web site at www.qsl.net/al-arrl. 73, Bill Cleveland, KR4TZ.

GEORGIA: SM, Sandy Donahue, W4RU—ASM/South Ga: Marshall Thigpen, W4IS .ASM/Legal: Jim Altman, W4UCK. SEC: Lowry Rouse, KM4Z. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Susan Swiderski, AF4FO, OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. I am happy and fortunate to announce that Lowry Rouse, KM4Z, has accepted the position as Section Emergency Coordinator. As SEC Lowry is in charge of ARES and all its training and communications responsibilities. ARRL members in Georgia are lucky in having Lowry accept this job. His resume includes stints as EC of Gwinnett County and DEC in liaison with the Ga. EMA. He is a member of the Gwinnett Amateur Radio Society and works in the construction business. It is difficult finding qualified amateurs who will provide leadership in ARES, especially at the rate we pay them (nothing). Lowry is looking for enthusiastic, well-trained individuals to accept appointments as ECs and DECs. Contact him (km4z@arrl.net) if you are interested. Once again I am grateful to KR4OL for the years he gave us as SEC. Lowry has big shoes (boots?) to fill. Atlanta Radio Club has new officers. Pres. K4PE, V Pres. K2UFT, Sec. KF4MDV, Tres W4LFC. On Sept 26 you can catch my act at the Lanierland ARC. Appearing with me are the SEC, ACC, and OOC. The LARC hamfest in July was a cool success. While it was sweltering outside, we were all comfortable inside the Ga Mountains Ctr. October hamfests include Rome on Oct 7 and Augusta on Oct 14. 73 Sandy. Tfc July: WB4GGS 91, AF4NS 85, WU4C 58 K4WKT 30, KA4HHE 28, K4ZC 26, K4JNL 10, K4BAI 3.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM: Capital, K4VRT. ASM: W Pan, KO4TT. ASM: APRS, WY8O. ASM: E Cen, K1CE. ASM: FL Crown, N4UF. ASM: W Cen, AB4OG. ASM: Suwannee, W2DWR. ASM: E Pan, WA4NDA. ACC: WA4B. BM: N4GMU. OOC: W4QV. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. Packet: N4GMU. If you do not yet have an Amateur Radio call sign license plate, you can make application for one by filling out and returning the proper form, the cost is $5 extra per year. There are among our ranks those deserving our appreciation and praise. The net managers, along with the net control operators are to be commended. They serve their duties, and almost no one ever tells them how much they are appreciated. Without them, we could not provide the service to the various disaster agencies, not to mention the National Traffic System. So, to each of you please accept this appreciation for your dedication and desire to perform a responsibility desperately needed. While on the subject of Nets, encourage others to participate in the Nets, whether they are local 2 meter or HF Nets. It is the experience of knowing what and how to do things when needed. Should you have any questions pertaining to the Nets, please do not hesitate to contact the staff. They are available to answer any and all of your questions, and if you cannot get an answer, contact me, and I assure you will get an answer. Florida Jammer goes to jail for ignoring numerous FCC warnings to stop jamming both HF and 2 meter nets. He was released on $100K bond. By now you know of the revised CW exam standards. Space does not permit a detail of the revision, but contact your local VEs. The Jax Hamfest is coming up in Oct. Lets help make this a good one, as this is usually one of the best in the State. 73, Rudy. Tfc: KF4NFP 332, AF4PU 240, KE4DNO 210, NR2F 102, K1JPG 96, WB2FGL 78, AD4DO 77, KE4PRB 72, AB4PG 57, AF4GF 48, K4DMH 46, K4JTD 36, K9MN 32, KC4FL 25, W4KIX 20, W5MEN 20, WA4EYU 10, KG4ELJ 8, W8IM 7, N4JAQ 7, WB2IMO 7, WB9GIU 6, WX4J 4.

PUERTO RICO: SM, Víctor Madera, KP4PQ — Con mucha pena anunciamos la perdida de nuestro pasado Section Manager y compañero Guillermo Schwarz, KP3S (SK) y su esposa Hildelisa en un accidente aéreo en Ohio. La FRA llevó a cabo su hamfest del Este en el pueblo de Humacao. El ARRL/VEC Team de Puerto Rico estará ofreciendo próximamente exámenes en toda la isla. Nos prometieron mas detalles tan pronto se formalicen los arreglos con una institución universitaria. El ARRL nombro a Julio Medina, WP4LNY, "field checker" para V/UHF. Felicitamos a WP3HL, WP3HQ y WP3HK por haber obtenido sus licencias de la Clase "Technician", tienen 9 años de edad. El PRARL está organizando una actividad en Arroyo para celebrar la estadía de Samuel Morse en ese pueblo donde instaló el primer telégrafo en Puerto Rico. La actividad esta a cargo de KP4UN. El Departamento de Transportación se ha comprometido a completar el sistema de renovación de las tablillas especiales para radioaficionados para el próximo mes de noviembre. Envíen información sobre sus intereses vía email a kp4pq@arrl.org. Special License Plates. Contact us via email at kp4pq@arrl.org.

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI - SEC: W4SS. STM: KJ4N. ACC: WA4AW. PIC: W4STB. TC: KI4T. OOC: K4GP. BM: KC4ZHF. SGL: KC4N. For expanded Section News, see www.sflarrl.org or request e-mail. My thanks to Naples, Ft Myers, Vero Beach and Indian River clubs for newsletters. They and EC reports help me publicize your special activities. I was honored to represent ARRL for 5 days at the International REACT 2000 convention. ARRL and REACT have signed an MOU and plan more cooperation in the future. We estimated from conference attendance that about 20% of the Reactors were hams. Chris Myers, KF4DQY, EC of Indian River County had the state DCAT equipment as a working display all week. My thanks to the Orlando Club for providing club brochures and running the testing session. Cooperation with REACT and ways to enhance our emergency response teams will be items to work on at the section

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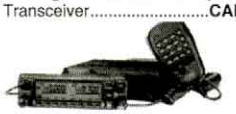

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meeting in Melbourne. Martin County participated in the Red Cross Hurricane Fair in Jensen Beach. They have a community network of non-hams using 400 MHz and linked via a ham to 2 meters at the EOC. Their ARES/RACES members also enjoyed touring the NWS Office in Melbourne. Broward County prepared for hurricane season by additional SKYWARN training, manning all shelters, and checking out the EOC SSTV and APRS systems. Their 4 deployable SSTV stations should enhance damage assessment. Congratulations to KC8EDS of Amhurst, who tracked down 3 stolen police radios to the 3 teenage boys using them to disrupt public services by badgering police over the air with obscenities and threats. Good work, Todd. NOTE: New banners are here for use in the section by clubs and Amateur groups for special events and hamfests. Your DECs and ASMs are: District 1, (Brevard/Indian River/Osceola) N4LEM, Ray Kassis. District 2, (Martin/Okeechobee/St. Lucie) WB9SHT, Bruce Reid District 3, (Glades/Hendry/Palm Beach) AA4BN, Jim Sparks District 4, (Broward/Dade/Monroe(Keys)) KD4GR, Jim Goldsberry District 5, (Collier/Lee/Monroe(Mainland)) WB2WPA, Gary Arnold. Traffic by KJ4N: WA9VND 509, KB4WBY 297, KA4FZI 214, KC4ZHF 193, KD4GR 158, KD4HGU 148, WA4CSQ 129, KE4IFD 125, WB4PAM 113, K4VMC (club) 105, KJ4N 76, K4FQU 66, WA4EIC 59, KD4JMV 47, A4BN 44, KT4XK 44, W4DWN 44, KE4UOF 43, KF4IDG 41, W8SZU 40, KG4CHW 29, WA4CSQ 29, W4WYR 11, W3JI 10, KE4WBI 9, K4OVC 8, WA8EXA 2, , AF4NR 1, KG4GZL 1. 73 and safe hamming this storm season!

VIRGIN ISLANDS: SM, John Ellis, NP2B, St Croix— ASM: Drew, NP2E, St Thomas. ASM: Mal, NP2L, St John. SEC: Duane, NP2CY. St Thomas. PIC: Lou KV4JC, St Croix. ACC: Debbie, NP2DJ, St Thomas. NM: Bob, VP2VI/W0DX Tortola. Visit the VI section Web site (http://www.viaccess.net/~jellis). As this is being written, we are all tentatively breathing a sigh of relief that Hurricane Alberto will pass north of the islands. Lou, KV4JC, is sporting a new puppy dog, Curly, a 3-month old "Purebred Crucian Curbside Pointer." See pix of Curly and Lou at (http://www.viaccess.net/~kv4jc). Al, KP2CF, is now the ARRL liaison VE for St Croix. Ham classes run by Cleo, NP2BW, continue to progress on St Croix. Contest season is approaching folks making plans to get antennas back in shape but not much work is being done prior to the end of the hurricane season. Initial plans being made for providing communications for the Coral Reef swim, a 5+ mile ocean trek from Buck Island to the island of St Croix itself to be headed up by Ed, NP2U. Local repeaters 146.63 St John, 146.81 St Thomas & 147.25 St Croix. 73, John, NP2B.

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR, ae4mr@arrl.org, http://www.wcfarrl.org—Congratulations to W1CW for 60, W2IQE for 50 and K4RBR for 40 years membership in the ARRL. Hamfest: 9/24 Suncoast/Pasco, 10/14 Egypt Temple. 10/1 WCF Section Net moves to 3.911 Sunday 7:30 PM. Informal net MWF 9:00 PM on 3.911. Be sure to check in. July:

Net/NM	*QNI*	*QTC*	*QND*	*Bulls*	*Sess*
AIN/WA4ATF	78	2	112	9	3
Polk ARES/KE4VBA	57	0	69	2	3
SPARC/KF4FCW	415	33	816	31	
Turtle/KT4TD	403	59	410	31	
HCAN/KD4CQG	74	1	64	7	4
FMSN/KT4PM	275	44	454	31	
TPTN/AD4IH	699	97	454	31	
QFNS/KF4KSN	182	44	627	31	
QFN/AB4XK	818	283	969	62	

PSHR: K4SCL 143, AB4XK 141, AD4IH 123, KT4PM 140, K4RBR 140, W4AUN 118, KF4KSN 111, WB2LEZ 106, AA4HT 97, KE4VBA 97, KT4TD 93. Tfc: K4SCL 176, AB4XK 173, AD4IH 82, AA4HT 52, KT4PM 51, KF4KSN 41, K4RBR 36, KE4VBA 28, KT4TD 21, W4AUN 17, KB4MON 9, WB2LEZ 6. 73, Dave, AE4MR.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—Fort Tuthill is over for the year 2000. Except for the heat (around 100), all went well. There was no rain and the attendance was about normal. This was the first time in over 25 years that Joe Knight, W5PDY, the SM for New Mexico missed our event. We will look for you next year. Thanks to the QRP organization for showing us how to build and solder a radio together. For many people this was the first time they used a solder iron. This class and demonstration was well received by many people. ARCA did a great job in setting up the facilities and putting together the talks. Now it is time to turn our attention to the ARRL Southwestern Division Convention, October 6-8th. This event comes to Arizona only once every 4-5 years so it is special. Reservations can be made through the Web site, www.w7asc.org/swdc2000, or by calling me. The Scottsdale club and the committee members have put together many talks and classes to cover all aspects of Amateur Radio, from the beginner up to an expert. Ed Hare will do his famous 2-meter antenna build demonstration, and Ned Stearns will give a class on how to work a contest. If you haven't experienced the joy of using Amateur Radio to help at a community event, then you are missing a lot of fun. Our community support helps out in many ways. You get to use your Amateur Radio equipment similar to a Field Day event, and you also get to help out your local community. Give this type of activity a try, you may like it. Net QNI/QTC/Sess: ATEN 849/20/31; CAN 199/40/29. 73, Clifford Hauser, KD6XH.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF—Our OOC, W6UPN, Joe, sends out more jokes than most OOCs. You may or may not have received some of these jokes from a different source. Nevertheless, Joe e-mails to me about 50 jokes per day. (Some are reported to be from real students with the jokes untouched by Joe.) AD6HR, Barry sent in his SCN report with QTR 140. Details of which are listed under Public Service Honor Roll of this issue of *QST*. Propagation is good these days but one, most important item is a good working antenna. You should consider the reliability of the antenna system as very essential to good communications. Designing the antenna system to withstand the wind gusts is very difficult in certain locations. Data is available for most beam antennas with respect to the number of square feet of

equivalent surface area or sail area. In order to appreciate the force of an 80 mile-per-hour wind on ten square feet of surface area, you need to realize that this force is calculated and measured to be about 168 pounds. At 130 mph this force is 433 pounds. The equations and charts for dynamic pressure of the wind and how to calculate it can be found on the Internet. This is one of the best articles found so far on this subject. (www.amerrescue.org/velocity) Testing can be accomplished by employing a spring scale and a rope. Someone is sure to ask sometime, won't that thing fall on the house or power line. If you test it you can explain your testing technique and show them the wind velocity EQUATION. - KA6GSE, Dennis our super active assistant Section Emergency Coordinator, has been slowed down working on his mobile antenna because his wife is using his toolbox for her home project. 73, de W6BF, Phineas.

ORANGE: SM, Joe Brown, W6UBQ, 909 687 8394—ASM Riv Co: Joe, KO6XB, 909 683 7531. ASM Org Co: Art, W6XD, 714 556 4396. ASM: SB Co, James KE6LWU, 909 824 5424. Riv Co RACES was activated during the Pechanga Fire to assist the Red Cross. Operators were utilized at the Vail Lake Command Post and the emergency shelter at the Vail Ranch School. The Riv Co RACES PMBO, under the call KF6NPC, operated by N6KZB has over 20 HF long haul pactor II users. They use the system to send/receive Internet e-mail from remote mobile or maritime mobile locations. Its 24 hour operation from March Field has provided valuable service in the tradition of NTS for the new millennium with a technology slant. HDSCS Field Day simulated the setup of a comm center that might be put together in a major area-wide disaster. It was a good exercise in team work, emergency setup and basic operating skills. April WA6OPS HDSCS Coordinator. The American Red Cross Inland Empire Chapter covers 7 cities, 400 square miles, and 750,000 residents. They need Amateur Radio Operator volunteers for Disaster and Safety Services. Contact Mike 909 476 8717 or visit IEARC Web site http://www.qsl.net/w6ier. TASMA NEWS, in the past few months, action taken by the FCC support the value of operating a coordinator repeater. Riley Hollingsworth FCC Special for Amateur Radio has contacted TASMA to verify repeater coordination. In the City of Huntington Beach Disaster Plan RACES Net Control will immediately assign RACES Communicators to each of the three school sites if an emergency occurs during school hours. Damage and injury reports will be passed to the City's EOC. Once again the media is full of warnings that the fire season is here. Most of us Californians are all too aware that it runs until the first rains. Because of the extreme dry conditions of our forests and hillsides and the frequent Santa Ana winds, any kind of fire can be devastating. Amateur Radio Operators be prepared to respond if called. If you are not, you can become part of the problem. We are pleased to report that Jack, W4KH, has been appointed Technical Specialist. Contact the Orange Section Coordinator Art, KQ6HF, 909-734-1485 or kq6hf@arrl.net for information on the Technical Specialist Program. STM Traffic Report: W6JPH 177, KC6SKK 159, KC6TW 94, W6QZ 63, N6GIW 22, KD6EY 14. PSHR W6QZ 158, W6JPH 121, KC6SKK 110. Digital. W6QZ NTS BBS 371. SCN/V Net Mgr. W6JPH: 31 Sess QNI 232, QTC 82, Avg. time14 mins.

SAN DIEGO: SM, Tuck Miller, NZ6T, 619-475-7333.; Just got back from the Santa Barbara Hamfest (Aug 13th) and had a great time. Good job to all the folks who put it together. Congratulations and thanks to Steve Frick, N6QEK who has taken on two very important positions. Not only did he accept the position of Public Information Coordinator, but he has also been appointed to take the job as the QSL manager for the 6th area. Steve, I am sure will be enlisting the help of area hams to help out with initial sorts of incoming QSL cards. If you would like to help from time to time, drop him an e-mail at n6qek@arrl.net. LAST CHANCE!! The Southwestern Division convention is getting closer and closer. On October 6 thru the 8th, hams will convene in Scottsdale, AZ for their fun and games, and the FCC "enforcer", Riley Hollingsworth will be the featured banquet speaker. I am looking forward to seeing many of you there. Prizes, food, forums, and more will be the main attraction to this year's event. Let's talk a bit about traffic. San Diego's Section Traffic Manager, Warren, KT6A has advised me that operators are needed on the 20-meter band to help pass NTS traffic. If you have never passed traffic, it is a great deal of fun, and is great practice for any actual disaster. With license restructuring now in full swing, there are many new folks entering the hf bands. Why not put your skill, or hone up on it a bit, and lend a hand. For more info, drop Warren an e-mail at: kt6a@juno.com. Join the traffic net on the Palomar machine, 8 PM, Tu, Th and Sat nights. Traffic: KT6A 697, KD6YJB 208, KO6BU 4, WA6IIK 3 BPL: KT6A 697 PSHR: KT6A 138 KD6YJB 63 KO6BU 20 until next month... Remember, Helping Others.....Always Worthwhile!! 73, Tuck, NZ6T.

SANTA BARBARA: SM, Robert Griffin, K6YR— (k6yr@arrl.org)—SEC: Jack Hunter, KD6HHG (kd6hhg@arrl.net). STM: Ed Shaw, KF6SHU. (ed@radshaw.com). SGL: Paul Lonnquist, NS6V, (paul@dock.net). ACC: Michael Atmore, KE6DKU (jatmore@telis.org). OOC: Howard Coleman, W6HQA, (w6hqa@arrl.net). PIC: Jeff Reinhardt, AA6JR (jreinh@ix.netcom.com). TC: Warren Glenn, KM6RZ (wglennrz@ix,netcom.com). ASM-Ventura, Don Milbury, W6YN (w6yn@arrl.net). ASM- Internet, Jack Bankson, AD6AD (jax@west.net); & DECs: Santa Barb-Dave Lamb, WA6BRW (dlamb@silcom.com); SLO-Bill Peirce, KE6FKS (ke6fks@arrl.net) & Ven-Dave Gilmore, AA6VH (aa6vh@arrl.net). Welcome to two new Section Cabinet Members: Ed Shaw, KF6SHU, as Section Traffic Manager, and Paul Lonnquist, NS6V, as State Gov't Liaison. The 8/13 SBARC Comm Fair & Hamfest was as success! Join the Section Reflector: Send a blank e-mail to: arrlsb-subscribe@egroups.com and be part of the Info Hotline. Receive instant updates on Section news-FREE! SB Sec Web: wwww.qsl.net/arrlsb/. Join in our Section NTS traffic nets: SCN slow speed NTS Net, M-F, at 1915 local on 3598 kHz & SCN/SB at 2100 local on 147.000+(131.8), 224.90- (131.8) & 449.300-(131.8). PSHR/Tfc: K6YR 168/215, KF6OIF 142/86, KE6MIW 96/28, KC6NBI 102/2, AD6LW 123/- & W6VIF -/6. Thats 30 in memory of Paul, WB6RVA & Reg, KE6ZQY. Rob, K6YR.

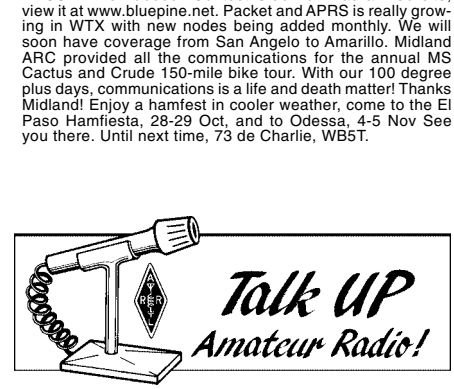
WEST GULF DIVISION

NORTH TEXAS: SM, Don Mathis, KB5YAM—STM: KC5OZT. BM: KC5OZT. SEC: K5MWC. SGL: N5GAR. OOC: WB5UDA. ACC: WN5PFI. ASM's: KX5K, K5RE, KK5QA, KK5NA, N5JZ, KB5LWZ, KD5HIS, AD5X, W5GPO. Visit the section Web page at (http://www.lsic.net/net/ntexas.html) for the most current information. ARRL 1999 Microwave Development Award: I have just been notified that Albert J Ward III, W5LUA, is the recipient of the 1999 year award for his efforts in promoting the technical advancement of Amateur Radio. Congratulations Albert. Jerry Combest, N5JL has agreed to take over the duties of section communications. This will include the section newsletter among other duties. He will be looking for additional folks to help him gather information. I would like to highlight the steady outstanding section service provided by Jim, N5JZ, ASM. I don't know how many miles that we have put on this last year attending meetings and ham fests. His support has been much appreciated during this last year. Tfc: (Jul) N5JZ 641, K5NHJ 515, KC5OZT 389, KB5WEE 279, W5AYX 172, N5GG 125 , KC5VLW 89, WA5I 77, KB5TCH 62, KB5YAM 4, AC5UZ. BPL: N5JZ, K5NHJ, KB5WEE.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: W5ZTN. ACC: KB5BOB. PIC: WA9AFM. OOC: WA9VMY. SGL: W5NZS. STM: K5KXL. It looks as though we were able to come to an agreement with the Ardmore city government on the antenna legislation that was passed back in July. They have agreed to amend the legislation and bring it in line with the provisions of PRB-1. I want to thank Melvin Miller, K5KXL, for his diligent and proactive work in obtaining and organizing the data for the next net directory. It was almost painless for your SM. The Central States VHF Society conference was excellent and very well attended. I would encourage you to make plans to attend the next conference, as it will be close to home. The 2001 CSVHFS conference will be held in the Dallas/Ft. Worth area. For more information check out http://www.csvhfs.org. Congratulations to the Tulsa Repeater Organization on their appointment as a Special Services Club. As of this writing we just finished working the Perseids Meteor Shower. While the meteors were mediocre this year, the propagation made it a night to remember. Tropo conditions existed early in the evening to KS, IA and MN. Then just before the peak on Aug 12 there was a geomagnetic storm which kicked off an extraordinary aurora. Au conditions were good in OK and extended all the way down into LA. There were times when you could hear the Au signal then it would be overshadowed by a meteor burn. Some contacts were possible by a combination of these two modes. Section web site http://www.busprod.com/k5ttt 73 for now, Charlie. Tfc: N5IKN 198, WB5NKC 179, WA5OUV 148, WB5NKD 107, KF5A 95, KM5VA 73.

SOUTH TEXAS: SM, Ray Taylor, N5NAV—ASMs: NR5ED, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, K5EJL, W5ZX,WA5TUM, KB5AWM, WA5JYK, K5PFE, K5PNV, and K5SBU. STM: W5GKH. SEC: W5ZX. ACC: N5WSW. TC: KJ5YN. BM: W5KLV. OOC: W5JAM. SGL: K5PNV. October and the leaves are starting to fall. We had a wonderful time at the Austin Summer Fest. We had a great turn out, but I didn't get the final count. If you missed David Woolweaver's forum, you really missed out. David was well versed in the future of the League and ham radio. There is a bright future for ham radio, through the League, for the upcoming century. One of the greatest concerns discussed was the new DXCC Card Checker rules. We, as Section Managers through out the country, think there should be one in each club or at least one in each city. You that are working on your DXCC Certificate should send your thoughts to your Division Director or to the League. I would like all the e-mail address's of the clubs. Also if you were in my address book, please send me an e-mail with your address. My computer went down, and I lost all 5 address books. 3 years hard work down the tube. Sorry about the inconvenience. Some have already done so. It was also our great honor to present the Roadrunners Microwave Group their Certificate of ARRL Affiliation. I also presented them with an ARRL 2000 Handbook, Antenna Handbook, and the ARRL Operating Manual. If your club would like a few words in the SM News, send me an e-mail. We had a very constructive meeting with the new SEC of South Texas, Bob Ehrhardt, W5ZX. Bob is restructuring ARES for South Texas. If you wish to keep your present appointment, let Bob know. We need some additional VEs in our clubs. We have people who want to take their test, but have trouble getting enough VEs together to give the test. If you have upgraded to Extra, this is one way you can help. Everyone have a good month. Tfc: W5SEG 570, W5KLV 190, W5GKH 102, KA5KLU 101, W5ZX 56, N5OUJ 47, N5NAV 35, KØYNW 34, W5ZIN 31, N5JUU 6, W6WF 2. (May) KA5KLU 271.

WEST TEXAS: SM, Charlie Royall, WB5T, 915-944-0469, WB5T@arrl.org. ASMs-Cley, K5TRW. Ron, KB5HGM. Jerome, K5IS. Fred, W6VPI. Sandy, W5MVJ. SEC-Alex, N5LRH; OOC-John, KO5D; OBM-Frank, N5WT. New DEC, Bob Ward WA5ROE, Alpine TX. New ARC officers: El Paso ARC - Pres, Rick Crespo, N5ZRE; VP, Pete Ortiz, KA5YLL. Secy, Thea Dick, KA5QGA; Treas, Mary Emert, WB5TRW. Midland ARC - Pres, Pete Stull, WB7AMP. VP, Larry Mitchell, N5OKO. Secy, Norma Bentley, WA5STG. Treas, C. A. Ross, KM5OK. The Lubbock Contest Club now has a Web site; view it at www.bluepine.net. Packet and APRS is really growing in WTX with new nodes being added monthly. We will soon have coverage from San Angelo to Amarillo. Midland ARC provided all the communications for the annual MS Cactus and Crude 150-mile bike tour. With our 100 degree plus days, communications is a life and death matter! Thanks Midland! Enjoy a hamfest in cooler weather, come to the El Paso Hamfiesta, 28-29 Oct, and to Odessa, 4-5 Nov See you there. Until next time, 73 de Charlie, WB5T.



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l) Advertising must pertain to products and services which are related to Amateur Radio.

2) The Ham-Ad rate for commercial firms offering products or services for sale is $1.00 per word. Individuals selling or buying personal equipment: ARRL member 50¢ per word. Non-ARRL member $1 per word. **Bolding** is available for $1.50 a word.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8½" x 11" sheet of paper.

4) Send ads to: the ARRL, 225 Main St., Newington, CT 06111 ATTN: Ham Ads. Or via fax 860-594-0259 or e-mail: hamads@arrl.org Payment must be included with ads (check or any major credit card accepted).

5) Closing date for Ham-Ads is the 15th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received September 16th through October 15th will appear in December *QST*. If the 15th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day. Please contact Melissa Yrayta at 860-594-0231 for further information.

6) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

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0508G	1	170	28	15/0.7	Standard	367
0510G	10	170	25	15/0.7	Standard	319
0550G	5-10	375	59	15/0.7	HPA	524
0552G	20-25	375	54	15/0.7	HPA	486
144 MHz						
1403G	1-5	10-50	6	15/0.7	LPA	163
1405G	1-2	100	14	15/0.7	Standard	295
1410G	5-10	160-200	28	15/0.7	Standard	328
1412G	25-45	160-200	22	15/0.7	Standard	286
1450G	5-10	350+	56	15/0.7	HPA	572
1452G	10-25	350+	52	15/0.7	HPA	525
220 MHz						
2203G	1-5	8-35	5	14/0.8	LPA	168
2210G	5-10	130	20	14/0.8	Standard	346
2212G	25-45	130	16	14/0.8	Standard	316
2250G	5-10	225	40	14/0.8	HPA	579
2252G	10-25	225	36	14/0.8	HPA	537
2254	75	225	32		HPA	494
440MHz						
4405G	1-5	15-50	9	12/1.2	LPA	309
4410G	10	100	19	12/1.2	Standard	367
4412G	15-30	100	19	12/1.2	Standard	355
4448G	1-5	75-100	25	12/1.2	HPA	429
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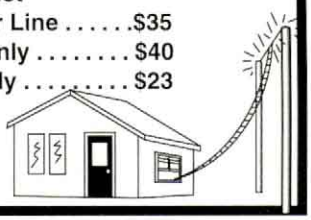

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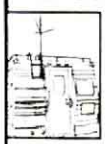

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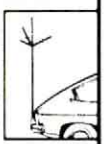

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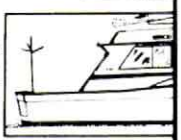

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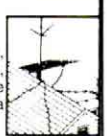

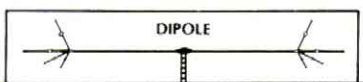

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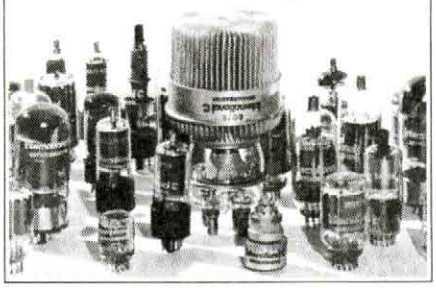

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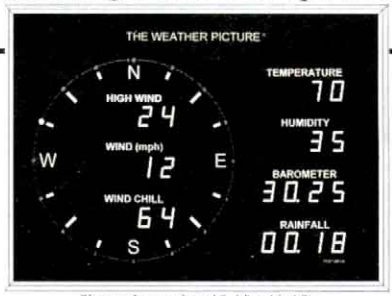

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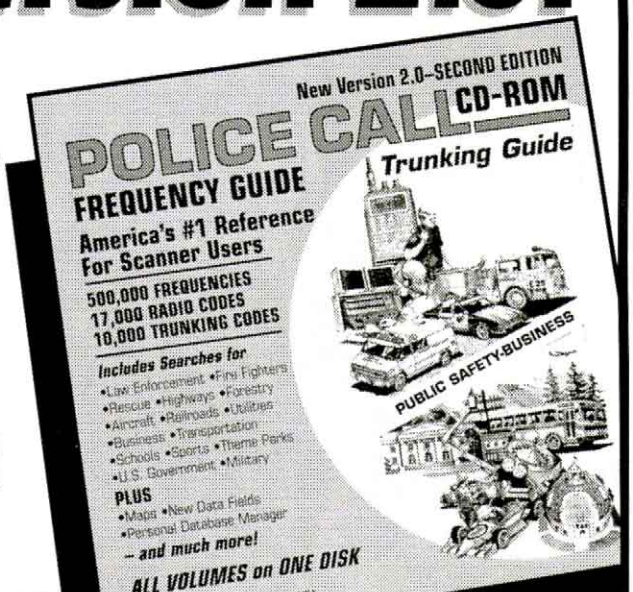

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SP-220	222	<.9	20 Adj.	650/200W	249.95
SP-7000	70cm	<.9	20 Adj.	500/100W	249.95
SP-23	1296	<.9	18	100/10W	359.95
SP-13	2304	1.2	18	50/10W	379.95
LNA	144	<.4	18	NA	219.95
LNA	432	<.5	18	NA	219.95
SLN	1296	<.4	30	NA	279.95
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Model	Bands	Traps	Length	Price
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D-42	10/15/20/40	2	55'	74.95
D-52	10/15/20/40/80	2	105'	79.95
D-56	10/15/20/40/80	6	82'	125.95
D-68	10/15/20/40/80/160	8	146'	162.95

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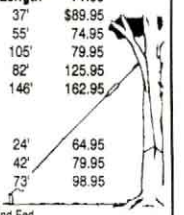
VS-53	10/15/20/40/80	3	42'	79.95
VS-64	10/15/20/40/80/160	4	73'	98.95



* Can be used without radials
* Feedline can be buried if desired
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Model	Band	Length	Kit Form Price	Assembled Price
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D-15	15	22'	18.95	23.95
D-20	20	33'	19.95	24.95
D-40	40	66'	24.95	28.95
D-80	80/75	130'	29.95	33.95
D-160	160	260'	41.95	45.95

Includes instructions, Deluxe Center Connector, 14 ga. Stranded Antenna Wire and End Insulators. Coax Fed.

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- Shorteners" are enclosed, sealed, weatherproof and lightweight.
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LS-80K	80/75	69'	54.95
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Any single band, or Trap antenna with PB-1 Balun instead of Deluxe Center Connector; Add $10.00 to antenna price. (For PB-1-C – Add $12.00)

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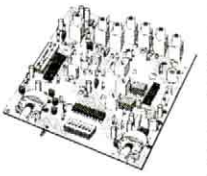

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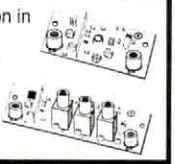

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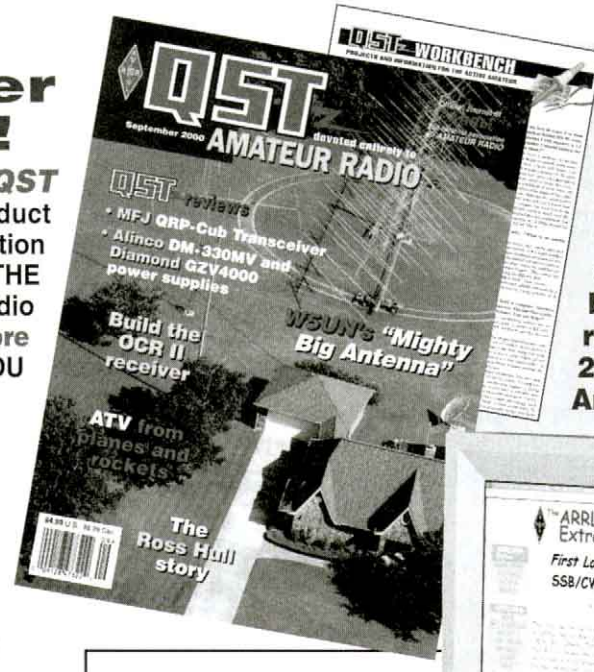

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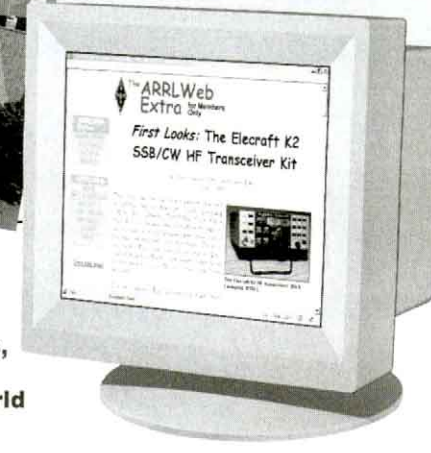

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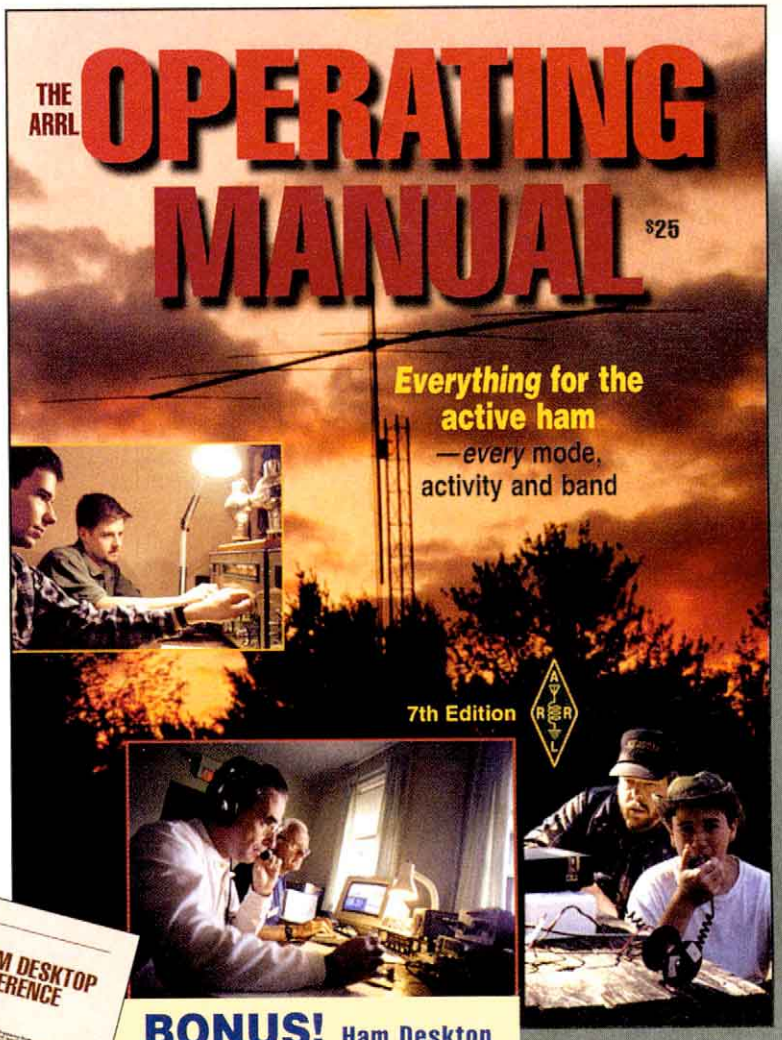

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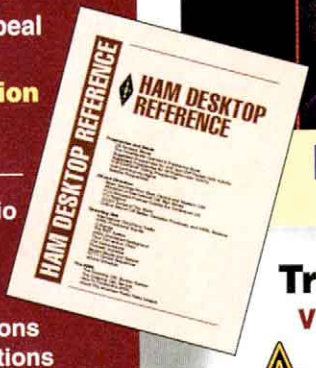

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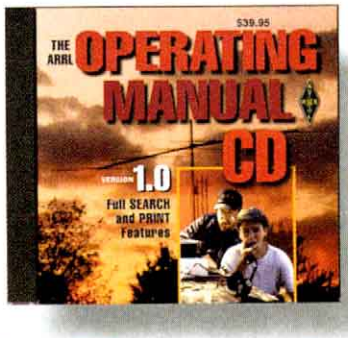

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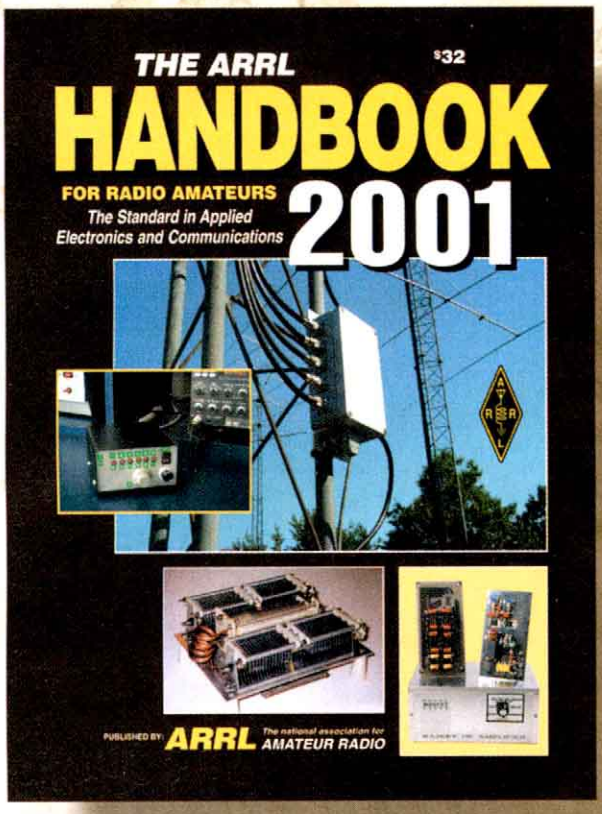

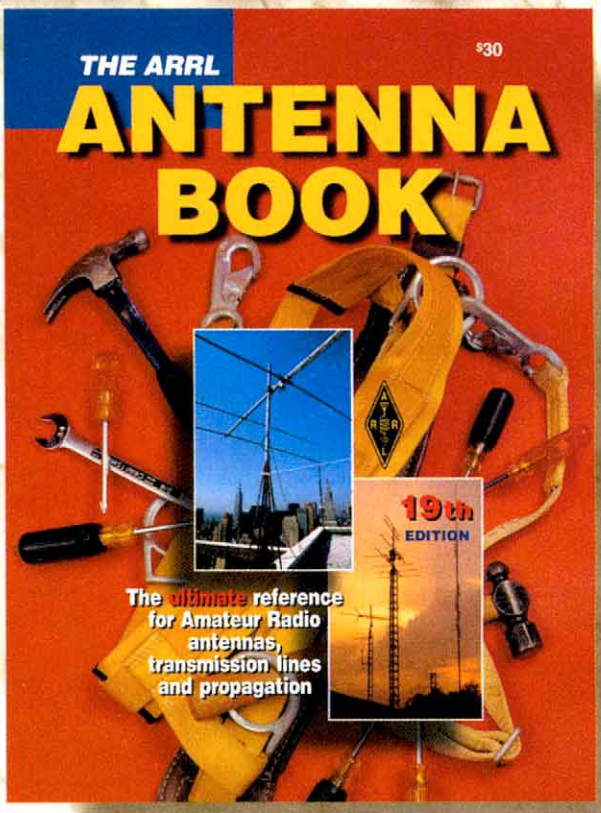

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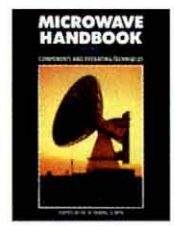

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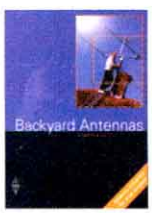

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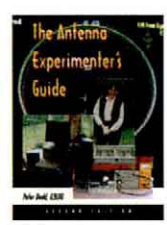

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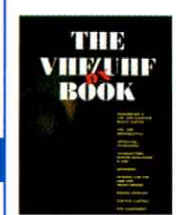

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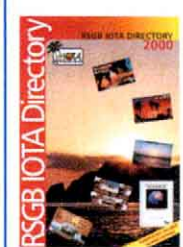

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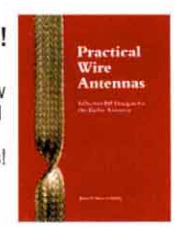

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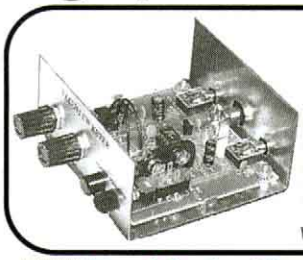

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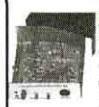

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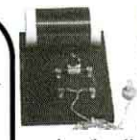

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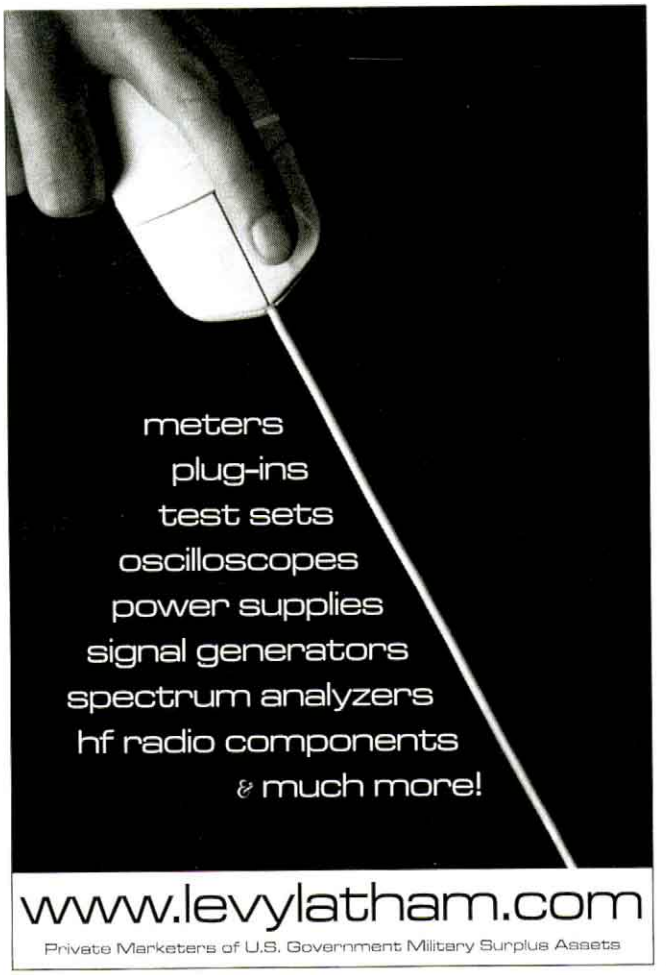

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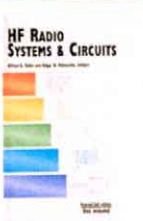

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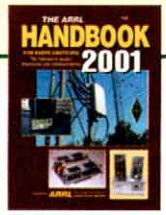

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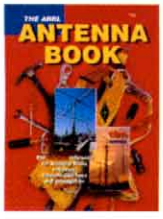

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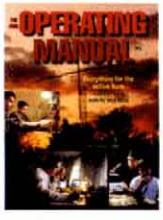

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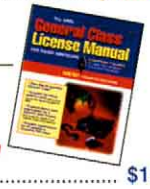

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Kenwood continues to provide new and advanced APRS™ ham radio equipment by introducing the new TM-D700A mobile transceiver. For current owners of the TH-D7A handheld with built-in TNC and APRS™ software, the TM-D700A offers even more features and versatility. The TM-D700A is unlike any other dual-band mobile radio Kenwood has ever produced. The control head is detached and comes with remote cable for easy installation. The new radio also incorporates a 9-pin PC connection for easy hook-up to program frequencies and other APRS™ mapping programs. Your TM-D700A is a full dual-band operation radio so VHF+VHF/VHF+UHF/UHF+UHF operation is possible. Full digipeater functions allow anyone to set up a digipeater location wherever needed to help fill in APRS™ nationwide network.

Popular Accessories for TM-D700A

Kenwood PG5A *Data Cable* **14.95**
Kenwood PS40 *Switching DC Power Supply* **199.95**
Kenwood VS3 *Voice Synthesizer Unit* **35.95**
UVS200 *Dual Band Base Antenna* **59.00**
HFS1 *External Speaker* **6.95**
Pyramid PS14K *Power Supply* **44.95**

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November Issue Focus: Computers & Software Deadline: September 20 , 2000
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SAVE BIG ON ANTENNAS, TOWERS & CABLE

TELESCOPING ALUMINUM TUBING

DRAWN 6063-T832

.375	$.60/ft	1.375"	$1.55/ft
.500"	$.70/ft	1.500"	$1.75/ft
.625"	$.80/ft	1.625"	$2.00/ft
.750"	$.90/ft	1.750"	$2.25/ft
.875"	$1.00/ft	1.875"	$2.50/ft
1.000"	$1.10/ft	2.000"	$2.75/ft
1.125"	$1.25/ft	2.125"	$3.00/ft

In 6' or 12' lengths, 6' lengths ship UPS. Call for 3/16"& 1/4" rod, bar stock, and extruded tubing.

CUSHCRAFT ANTENNAS

X7/X9	$569/819
XM240	$599
R6000/R8	$269/389
A50-3S/5S/6S	$89/139/219
AR2/ARX2B	$45/65
AR270/AR270B	$69/99
ARX270U/ARX270N	$219/219
13B2/17B2/26B2	$119/199/329
719B/729B	$115/179
A270-6S/A270-10S	$59/79

Please call for more Cushcraft items

FORCE 12–MULTIBAND

C3	10/12/15/17/20m, 7 el	$559
C3E	10/12/15/17/20m, 8 el	$599
C3S	10/12/15/17/20m, 6 el	$479
C3SS	10/12/15/17/20m, 6 el	$479
C4	10/12/15/17/20/40m, 8 el	$699
C4S	10/12/15/17/20/40m, 7 el	$629
C4SXL	10/12/15/17/20/40m, 8 el	$899
C4XL	10/12/15/17/20/40m, 9 el	$999
C19XR	10/15/20m, 11 el	$879
C31XR	10/15/20m, 14 el	$1169

Please call for more Force 12 items

TRYLON "TITAN" TOWERS

SELF-SUPPORTING STEEL TOWERS

T200-64	64', 15 square feet	$989
T200-72	72', 15 square feet	$1199
T200-80	80', 15 square feet	$1439
T200-88	88', 15 square feet	$1689
T200-96	96', 15 square feet	$1999
T300-88	88', 22 square feet	$1989
T400-80	80', 34 square feet	$1939
T500-72	72', 45 square feet	$1879
T600-64	64', 60 square feet	$1799

Many more Trylon towers in stock!

BENCHER / BUTTERNUT

Skyhawk, Triband Beam	$1129
HF2V, 2 Band Vertical	$219
HF5B, 5 Band Minibeam	$429
HF6VX, 6 Band Vertical	$299
HF9VX, 9 Band Vertical	$349
A1712, 12/17m Kit	$54
CPK, Counterpoise Kit	$129
RMKII, Roof Mount Kit	$159
STRII, Roof Radial Kit	$125
TBR160S, 160m Kit	$119

More Bencher/Butternut–call

M2 VHF/UHF ANTENNAS

144–148 MHz

2M4/2M7/2M9	$89/109/119
2M12/2M5WL	$149/189
2M5-440XP, 2m/70cm	$149

420–450 MHz

420-470-5W/420-450-11	$119/89
432-9WL/432-13WL	$169/219
440-18/440-21ATV	$119/139

Satellite Antennas

2MCP14/2MCP22	$155/209
436CP30/436CP42UG	$209/259

ROHN TOWER

25G/45G/55G	$79/179/229
AS25G/AS455G	$39/89
GA25GD/45/55	$68/89/115
GAR30/GAS604	$35/24
SB25G/45/55	$39/89/109
TB3/TB4	$85/99
HBX32/HBX40	$349/439
HBX48/HBX56	$589/699
HDBX40/HDBX48	$549/699
BXB5/6/7/8	$39/49/59/59

Please call for more Rohn prices

US TOWER

MA40/MA550	$849/1399
MA770/MA850	$2359/3649
TMM433SS/HD	$1139/1379
TMM541SS	$1499
TX438/TX455	$1069/1599
TX472/TX489	$2649/4599
HDX538/HDX555	$1379/2399
HDX572MDPL	$6329

Please call for help selecting a US Tower for your needs. Shipped factory direct to save you money!

COMET ANTENNAS

GP15, 6m/2m/70cm Vertical	$149
GP6, 2m/70cm Vertical	$139
GP9, 2m/70cm Vertical	$179
B10NMO, 2m/70cm Mobile	$36
B20NMO, 2m/70cm Mobile	$49
SBB2NMO, 2m/70cm Mobile	$39
SBB5NMO, 2m/70cm Mobile	$49
SBB7NMO, 2m/70cm Mobile	$75
Z750, 2m/70cm Mobile	$55
Z780, 2m/70cm Mobile	$69

Much more Comet in stock–call

M2 ANTENNAS

50–54 MHz

6M5X/6M7JHV	$199/239
6M2WLC/6M2.5WLC	$419/529

10/12/15/17/20m HF

10M4DX, 4 Element 10m	$379
12M4DX, 4 Element 12m	$379
15M4DX, 4 Element 15m	$419
17M3DX, 3 Element 17m	$379
20M4DX, 4 Element 20m	$499

More M2 models in stock–please call

GLEN MARTIN ENGINEERING

Hazer Elevators for 25G

H2, Aluminum Hazer, 12 sq ft	$359
H3, Aluminum Hazer, 8 sq ft	$269
H4, HD Steel Hazer, 16 sq ft	$339

Aluminum Roof Towers

RT424, 4 Foot, 6 sq ft	$159
RT832, 8 Foot, 8 sq ft	$229
RT936, 9 Foot, 18 sq ft	$389
RT1832, 17 Foot, 12 sq ft	$499

Please call for Glen Martin info

UNIVERSAL ALUMINUM TOWERS

4-40'/50'/60'	$519/739/1049
7-50'/60'/70'	$939/1369/1789
9-40'/50'/60'	$729/1049/1469
12-30'/40'	$559/869
15-40'/50'	$969/1399
23-30'/40'	$859/1289
35-30'/40'	$979/1509

Bold in part number shows wind-load capacity. Please call for more Universal models. All are shipped factory direct to save you money!

DIAMOND ANTENNAS

D130J/DPGH62	$79/139
F22A/F23A	$89/119
NR72BNMO/NR73BNMO	$39/54
NR770HBNMO/NR770RA	$55/49
X200A/X300A	$129/159
X500HNA/700HNA	$229/369
X510MA/510NA	$189/189
X50A/V2000A	$99/149
CR627B/SG2000HD	$99/79
SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ ANTENNAS

259B Antenna Analyzer	$219
1798, 80–2m Vertical	$239
1796, 40/20/15/10/6/2m Vert.	$179
1793, 80/40/20m Vertical	$159
1792, 80/40m Vertical	$145
1788, 40–15m Loop	$399
1786, 30–10m Loop	$349
1780, 14–30 MHz Loop	$229
1768, 2m/70cm Beam	$65
1762, 3 Element 6m Beam	$65

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR® COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$10/11
1/2"x9"EE / EJ Turnbuckle	$15/16
1/2"x12"EE / EJ Turnbuckle	$17/18
3/16" / 1/4" Preformed Grips	$4/5

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FTx .12" / .18"	$35/59
10 FT x .12" / .18"	$65/110
15 FT x .12" / 17 FT x .18"	$95/180
20 FT x .12" / 22 FT x .18"	$120/219
12 FT x .25" / 17 FT x .25"	$189/267

GAP ANTENNAS

Challenger DX	$259
Challenger Counterpoise	$25
Challenger Guy Kit	$14
Eagle DX	$269
Eagle Guy Kit	$22
Titan DX	$299
Titan Guy Kit	$22
Voyager DX	$389
Voyager Counterpoise	$49
Voyager Guy Kit	$38

Please Call for Delivery Information

LAKEVIEW HAMSTICKS

9106	6m	9115	15m	9130	30m
9110	10m	9117	17m	9140	40m
9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR ... $24.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/189
G6-270R, 2m/70cm Vertical	$149
G6-144B/G7-144B	$109/159

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800P	$1095
Yaesu G-450A	$239
Yaesu G-800SA/DXA	$319/399
Yaesu G-1000DXA	$479
Yaesu G-2800SDX	$1069
Yaesu G-550/G-5500	$289/589

ROTATOR CABLE

R51(#20)/R52 (#18)	$.22/.32/ft
R61 (#20)/R62 (#18)	$.28/32/ft.
R81/82/83/84	$.25/.39/.52/.85/ft

PHILYSTRAN GUY CABLE

HPTG1200I	$.39/ft
HPTG2100I	$.52/ft
PLP2738 Big Grip (2100)	$5.50
HPTG4000I	$.79/ft
PLP2739 Big Grip (4000)	$7.65
HPTG6700I	$1.15/ft
PLP2755 Big Grip (6700)	$10.95
HPTG11200	$1.55/ft
PLP2558 Big Grip (11200)	$16.50

Please call for more info or help selecting the Phillystran size you need.

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HUGE ICOM DEALS ★ HUGE YAESU DEALS

IC-775 DSP.. New Lower Price!
The Icom IC-775DSP is a competition class HF transceiver featuring 200 watt RF output, digital signal processing, automatic antenna tuner, true dual RX, CW memory keyer, CTCSS tone encode, twin pass band tuning, dual antenna inputs, 101 memory chanels, built-in power supply, and much more. Supplied with AC power cord.

PW-1 ..... New Lower Price!
The Icom PW-1 is a 1000 watt solid state linear amplifier for HF and 6m operation, featuring a high power automatic antenna tuner, built-in power supply, and a removable front control panel, and more.

IC-746 ..... Icom Special!
The Icom IC-746 is an all mode transceiver covering HF/6m/2m. The radio features digital signal processing, 100 watt RF output on all bands, twin PBT, a 4.9"multifunction LCD display with band scope, automatic antenna tuner, and more. Supplied with a hand mic and DC power cord.

IC-756PRO ..... New!
The Icom IC-756 PRO is an all mode HF/6m transceiver featuring DSP, automatic antenna tuner, 100 watts RF output, digital twin PBT, a 5" multifunction LCD display with band scope function, and more. Supplied with hand mic and DC power cord.

FT-1000MP Mark-V ..... New!
The Yaesu FT-1000MP Mark-V is a competition class HF DSP transceiver with auto tuner, 200 Watts RF output, and more!

FT-1000MP ..... In Stock!
Competition class HF DSP transceiver.

FT-1000D ..... In Stock!
The FT-1000D is a competition class HF XCVR featuring true dual RX, automatic tuner, 200 watts RF output, and more.

Quadra System ...Lower Price!
Solid state 1 kW autotuning amplifier.

FT-847 ..... Yaesu Special!
The Yaesu FT-847 is an all mode transceiver covering HF/6m/2m/70cm! The radio is perfect for satellite operation, and features digital signal processing, built-in RS-232 interface, tone encode/decode, and more. Supplied with an up/down microphone and DC power cord.

FT-920 ..... Yaesu Special!
The Yaesu FT-920 is an all mode HF/6m transceiver featuring digital signal processing, automatic antenna tuner, CW memory keyer, CTCSS tone encode/decode, 127 memories, and more. Supplied with up/down hand mic and DC power cord.

IC-706MK2G ..... Icom Special!
The Icom IC-706MK2G is a compact HF/6m/2m/70cm all mode transceiver with digital signal processing, automatic repeater offset, built-in CW keyer, built-in CTCSS tone encode/decode/scan, 107 memory channels and more. A detachable front panel offers convenient mounting, even in compact vehicles.

IC-718 ..... New!
The Icom IC-718 is an all mode HF transceiver featuring a front panel mounted speaker, IF shift, optional DSP module, multiple scanning modes, noise blanker, RIT, and more.

IC-2800H..... Icom Special!
The Icom IC-2800H is a 2m/70cm dual band mobile FM transceiver with a 3" color TFT display. The radio features a separate control face, video input, bandscope display, 9600 bps Packet jack, CTCSS tone encode/decode/scan, 232 memories, cross band duplex, and more. With DTMF hand mic, mounting brackets, and power cord.

IC-2100H ..... Great Low Price!
The IC-2100H is a rugged 2m mobile XCVR with CTCSS tone encode/decode/scan, DTMF paging/squelch, 113 memory channels, switchable display color and more.

FT-90R ..... New!
New ultra-compact 2m/70cm dual band mobile transceiver with detachable control panel, and huge extended RX range.

FT-2600M .. New Lower Price!
Rugged 2m mobile with intermod-proof receiver, big display, and an illuminated DTMF mic. Built to MIL-STD 810.

FT-8100 ..... New Lower Price!
Great 2m/70cm dual band mobile, 45/35 Watts, removable front panel, and more!

FT-100D ..... New!
The Yaesu FT-100D is an ultra-compact all mode transceiver for HF/6m/2m/70cm operation. The radio features a removable control panel, digital signal processing, CW memory keyer, built-in RS-232 interface, tone encode, 200 memory channels, VOX, and more. Supplied with a DTMF hand mic, DC power cord and mounting bracket.

FT-840 ..... New Lower Price!
The Yaesu FT-840 is an all mode HF transceiver with 100 watt output, optional FM unit.

IC-W32A ..... New Lower Price!
IC-Q7A ..... Icom Special!
IC-T7H ..... Icom Special!
IC-T81A ..... New QuadBand HT!
IC-T2H ..... Amazing Low Price!
IC-R3 . Video RX, Coming Soon!

IC-207H ..... Great Low Price!
The Icom IC-207H is a 2m/70cm dual band mobile transceiver featuring CTCSS tone encode/decode, 182 memory channels, removable front control panel, and more. Supplied with a back-lit DTMF hand mic, mounting bracket, and a DC power cord.

IC-PCR1000 ..... Icom Special!
IC-PCR100 ..... Icom Special!
IC-R8500 ..... In Stock!
IC-R75 ..... New, In Stock!
IC-R2 ..... In Stock!
IC-R10 ..... Icom Special!

G-2800SDX $1069
Heavy duty antenna rotator handles 34 sq. ft. of antenna load, and features 450° rotation, preset and variable speed.

G-1000DXA $479
G-800SA/DXA $319/399
G-450A $239
G-5500 ..... $589
G-550 ..... $289

VX-5R ..... Now In Stock!
Tiny 6m/2m/70cm triband HT, with CTCSS tone encode/decode/scan, high capacity Lithium-Ion battery pack, extended RX with AM/FM and FW Wide modes, and more.

FT-50RD ..... Yaesu Special!
VX-1R ..... Yaesu Special!

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"Brick-Wall" Selectivity

Today's elite-class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics save you seconds in a pile-up or a contest "run," and Yaesu's HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!

I. IDBT: Interlocked Digital Bandwidth Tracking System

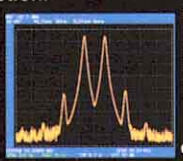
The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches the analog IF bandwidth.

II. VRF: Variable RF Front-End Filter

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.

III. 200 Watts of Transmitter Power Output

Utilizing two Philips® BLF147 Power MOSFETs in a 30-Volt, push-pull configuration, the MARK-V's transmitter puts out up to 200 Watts of clean output power, thanks to the conservative design of the PA section.



Class A 75 W PEP IMD

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP , a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd- order IMD suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!

V. Multi-Function Shuttle Jog Tuning/ Control Ring

The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!

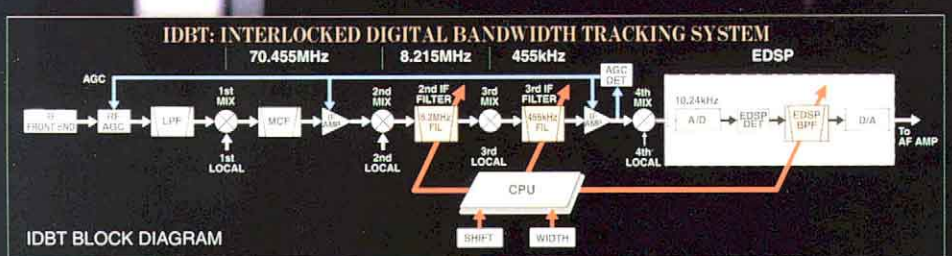
IDBT: A Breakthrough in Selectivity!

DC 30 V / 13.8 V Power Supply FP-29

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



IDBT BLOCK DIAGRAM

YAESU
Choice of the World's top DX'ers℠

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We Build Legends

FREE Operating Manuals and Brochures via the FTP site*

TS-570DG - The Best Selling HF Radios, Then and Now!

Back in 1973, Kenwood introduced the first affordable HF radio to the world, the legendary TS-520. Today 27 years later, the Kenwood TS-570DG HF and the TS-570SG with 6 Meters are by far the most popular HF and HF+6 transceivers on the market. The truth is that Kenwood has built and sold more HF Amateur radios than any other RF product manufacturer…ever! In 27 years, there have been several advancements in Amateur radio: solid state circuits, digital displays for quicker and more accurate tuning, built-in tuner, and Digital Signal Processing (DSP) for cleaner signals unheard of with the TS-520. Ask any experienced Ham which HF radios have the best audio…the answer has always been Kenwood! Whether a CW contester, DX chaser, or a new upgraded General Class Amateur, Kenwood has an HF radio for you. Don't be fooled by big boxes, high price tags, complex operation, and broken promises of performance.

TS-50S Compact Mobile

TS-870S 100% Digital IF DSP

Time marches on and your friends at Kenwood continue to build outstanding products with unparalleled performance and great value. It's not too late to own an "HF Legend," because we are still building them today.

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