
QST
devoted entirely to
AMATEUR RADIO
Official Journal of
ARRL
The national association
for AMATEUR RADIO
July 2000
QST reviews
• ICOM IC-718 HF transceiver
• Yaesu FT-1500M 2-meter FM mobile
Flags and pennants for the low bands
July Antenna Issue
Verticals and ground systems
Anything can radiate RF, but...
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Getting HUNGRY for today's HF?

IC-718

Makes getting into HF a piece of cake

HF

All Mode

100W of Power (40W on AM)

Simple Operation

One Touch Band Switching

Direct Frequency Input via 10 Button Keypad

Auto Tuning Steps (TS). Senses The Rate the Knob is Turned

Auto Notch Filter

Microphone Compressor

IF Shift

Meter Functions (Output Power, ALC, VSWR)

Adjustable Noise Blanker

Built-in Keyer

VOX

Large Front Firing Speaker

Latest RF & Digital Technology

Optional Voice Synthesizer

Optional DSP

PC Controllable*

12V Operation

Internal Auto Antenna Tuner

Adjustable AGC

VOX

CW Memory Keyer

Adjustable Noise Reduction

Band Scope

32 Bit Floating Point Unit IF-DSP

5" TFT Color Display Shows Operating Conditions & Spectrum

Auto & Manual Notch Filter

Digital Voice Recorder

Dual Watch

Twin Passband Tuning

Taylor Your Transmit Audio

100W of Power (40W on AM)

All Mode

HF/6M

The best thing to hit HF since sliced bread

IC-756PRO

The digital revolution took a huge leap forward with the introduction of the IC-756PRO. With its 32-bit Floating Point DSP, built-in 24-bit AD/DA converter, and other advanced features, the IC-756PRO is quickly becoming the HF radio that others are measured against. And we're doing it again with the IC-718, an easy to use, compact, feature packed HF with advanced features that up until now have been available only on more expensive radios. So whether you're looking for just a snack or a full course meal, ICOM is serving up what you want. Take a bite out of HF with an ICOM.

ICOM

www.icomamerica.com

ICOM IC-T81A*

Add the Wide-Open Microwaves to Your Fun

JIS 4 WATER RESISTANT

YOU'VE GOT IT ALL. With four bands at your command, excellent audio, 124 memory channels, water resistant construction, and ICOM durability, get ready for the most fun ever!

SIMPLICITY, RIGHT OUT OF THE BOX. Function keys can be confusing. The 'T81A doesn't use any! It's so easy to use, many operators said they never needed to open the instruction manual.

LISTEN BEYOND THE HAM BANDS. Pick up incredibly clear, wide band** reception. Tune in a ball game (radio *or* TV broadcast), listen to air traffic control, or scan for police activity. Take your 'T81A everywhere!

AN EXTRA BAND, AND 1/2 THE SIZE

Compared to an older tri-band HT model of just a few years ago, the IC-T81A is smaller, offers more features, is water resistant, and adds 6 meters! The IC-T81A is more affordable, too.

IC-T81A ACTUAL SIZE*

WORLD'S FIRST! FOUR BANDS IN ONE HAND

SPECIFICATIONS

Transmit: ..... 6M, 2M, 440 MHz, 1.2 GHz
Receive: ..... 50-54, 74-174, 400-470, and 1240-1300 MHz**
**Reception guaranteed on US ham bands only
Mode: ..... WFM and AM (Rx only), FM
Power: ..... Up to 5 Watts @ 13.5V, 1 Watt on 1.2 GHz
Memory Channels: ..... 124 total Including 100 regular, 20 scan edges, and 4 call
Size : ..... *2.3(W) x 4.2(H) x 1.1(D) in. 58(W) x 106(H) x 28.5(D) mm.
Weight : ..... 9.9 oz /280 kg

FEATURES

- **Slim, Powerful Ni-MH Battery**
  - 4.5 Watts @ 9.8V/680 mAh (4-6 hrs)
- **Rugged ICOM Construction**
  - Die-cast aluminum chassis
  - JIS-4 water resistance rating
- **CTCSS Encode/Decode (Tone Squelch)**
  - 50 tones, pocket beep
- **DTMF Encoder, 9 Memories**
- **Multi-Function "Joystick"**
  - Easy to change bands, cruise menu options, and set modes
- **Built-in Guide Function**
- **Auto Repeater**
- **Backlit Alphanumeric Display**
  - Use a PC to name channels
- **RIT and VXO for 1.2 GHz Band**
- **Battery Voltage Indicator**
- **9 Tuning Steps** (7 for 1.2 GHz band)
- **"AA" Alkaline Battery Pack** (optional)
- **Wall Charger and Belt Clip Included**

SHOCK MIL STD 810 C/D/E VIBRATION

PC Ready!

ICOM options required for PC operation:
OPC-478 Cloning cable,
CS-T81 Cloning software

Get in on more of the action. ICOM's 'T81A offers more bands for more fun! Call for a brochure:

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WORK THE MAGIC ICOM

There's something magical about amateur radio. The fact that you can speak into a little box and communicate with someone else on the other side of town, or even on the other side of the world, with nothing between you and that person but thin air...what an incredible, powerful feeling. It feels like magic. **Work the magic.**

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- Conditioning feature may rejuvenate dead battery packs!
- Microprocessor driven -deltaV and temperature sensor allow accurate charges.
- Car kit included.
- Support 4.8V to 12V battery packs. Automatic polarity protection.

MH-C888 FLEX
SMART UNIVERSAL DROP-IN CHARGER & CONDITIONER

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- Special FLEX Negative Pulse feature prevents crystallization of your battery pack, and extends battery life by keeping it at cooler temperature during the charge.
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- Bank up to 12 chargers on a single power source, hassle-free.
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- Memory-free operation. Can be charged any time without been fully drained.
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- Environment friendly.
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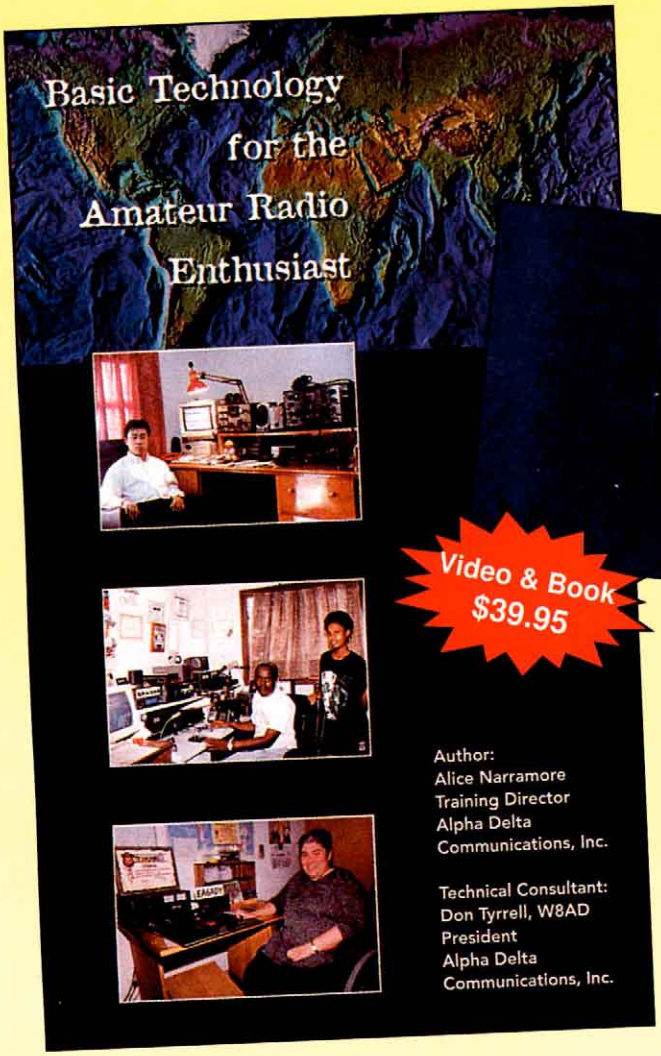
Come With us On a Fascinating Journey to Explore the Excitement of Amateur Radio and the Mystery of Basic Electronics



The Alpha Delta *video/book* production "Basic Technology for the Amateur Radio Enthusiast" is a simple straightforward program that takes you on this journey, explaining the wonderment of the hobby along the way.

• The ***video*** shows how radio waves are formed and how electrons move to do work, and explains terms like voltage, current, power, resistance and other terms you'll hear relating to the hobby. You will even go with a miniature **"tour guide"** on a walk through a receiver printed circuit board. He will show you how amplification, power supplies, radio frequency and audio amplifiers and other parts of a radio work. He will also explain what "semiconductors" are all about. Neither the video nor the book get into math or formulas--**we've kept it simple**

• The ***book*** is designed for the non-technical person interested in joining the hobby or the amateur operator who would like to know more about "what's behind the dials", and explains the fascination of the hobby in detail. The book is ideal as a support tool for someone who is being mentored by an "Elmer", and for amateurs involved with **school system programs**. The program was designed by our Training Director who formerly did college course development and was director of training for a major electronics company.

This **video/book program** is not a study guide for a specific license class but bridges the gap between study guides and programs that go into technical detail with formulas, math, circuits and theory. In fact, it is a great support program for license study guides, and the **new FCC License restructuring. Every aspiring or existing amateur should have this wonderful program in his or her collection!**

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Technical

News and Features

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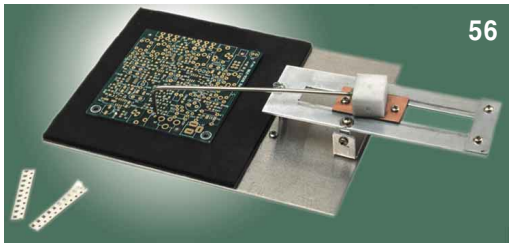
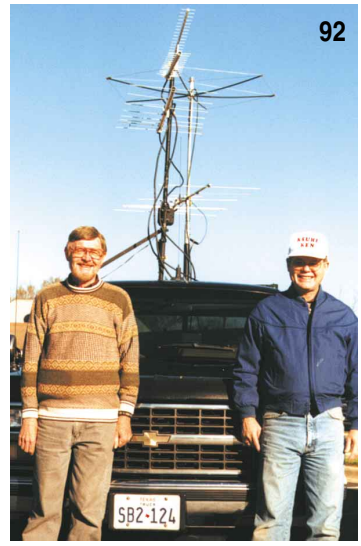
QST Workbench





Operating

Departments

HENRYK KOTOWSKI, SM0JHF

Our Cover

Snow-encrusted antennas in July. What better visual relief can you find during the height of summer? This impressive antenna farm belongs to club station SK0UX near Stockholm, Sweden. On their half-acre site the club has managed to erect antennas for every amateur band from 160 meters to 3 cm. Try some of the antenna ideas in this issue—before winter makes a return visit.

Membership in the ARRL, including a subscription to *QST*, is available to individuals at the following rates: $34 per year in the US and possessions, $47 Canada, $54 elsewhere, payable in US funds. Age 65 and over, with proof of age, $28 (US only). Licensed radio amateurs age 21 and under may qualify for special rates; write for application. Life membership is also available. Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Sub-scription rate for libraries and institutions: $34 per year postpaid in the US and possessions, $47 Canada, $54 elsewhere. Single copies $5 in the US.

Membership without *QST* is available to the immediate family of a member living at the same address, and to anyone who is legally blind, for $5 per year.

Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds.

QST is available to blind and physically handicapped individuals on audio cassette from the Library of Congress, National Library Service for the Blind and Physically Handicapped. Call 1-800-424-8567.

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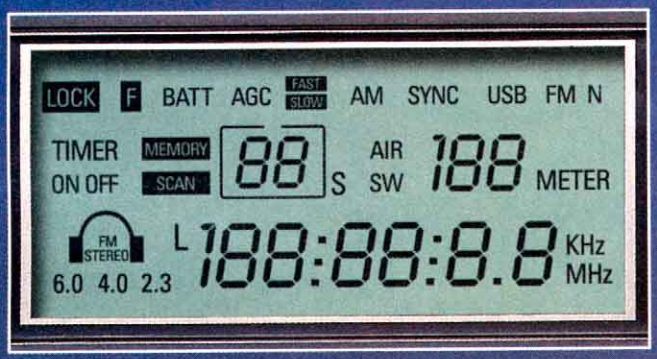
GRUNDIG The Ultimate in



The LCD
Big! Bold! Brightly Illuminated 6" by 3½". Liquid Crystal Display shows all important data: Frequency, Meter band, Memory position, Time, LSB/USB, Synchronous Detector and more.

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

The Signal Strength Meter
Elegant in its traditional Analog design, like the gauges in the world's finest sports cars. Large. Well Lit. Easy to read.

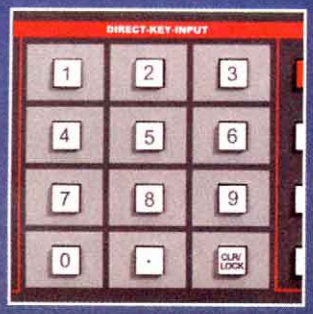
The Frequency Coverage
Longwave, AM and shortwave: continuous 100-30,000 KHz. FM: 87-108 MHz VHF Aircraft Band: 118-137 MHz.

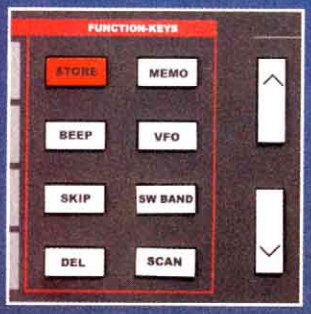
The Tuning Controls
• For the traditionalist: a smooth, precise tuning knob, produces no audio muting during use.

THESE ARE THE SATELLIT 800 MILLENNIUM'S MAJOR FEATURES. FOR A DETAILED SPECIFICATION SHEET, CONTACT GRUNDIG.

Shortwave

Digital Technology



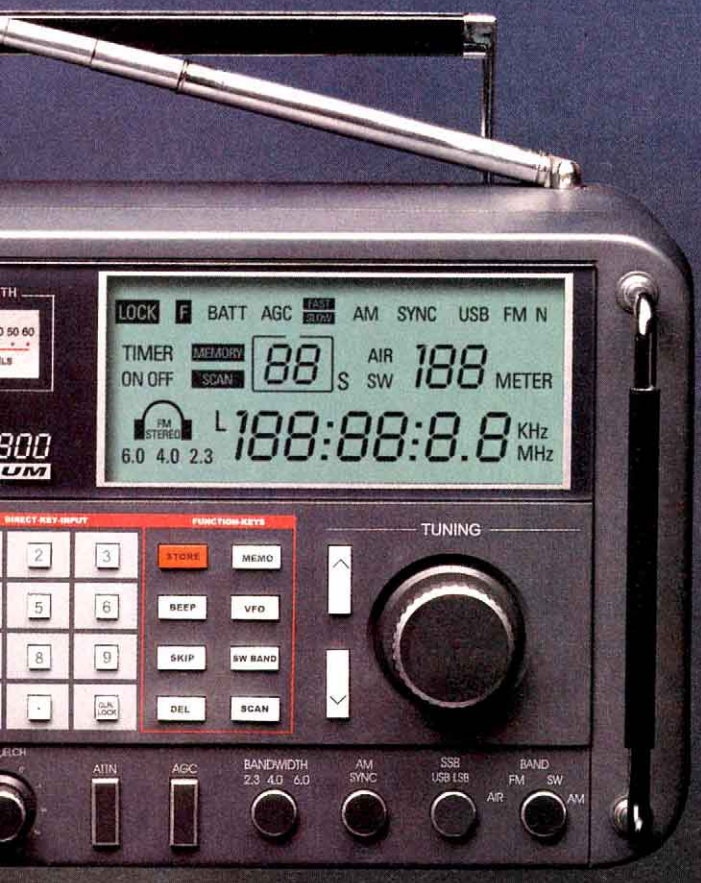


The Operational Controls
Knobs where you want them; Buttons where they make sense. The best combination of traditional and high-tech controls.

The Sound
Legendary Grundig Audio Fidelity with separate bass and treble controls, big sound from its powerful speaker and FM-stereo with the included high quality headphones.

The Technology
Today's latest engineering:
- Dual conversion superheterodyne circuitry.
- PLL synthesized tuner.

The Many Features
- 70 user-programmable memories.
- Two, 24 hour format clocks.
- Two ON/OFF sleep timers.
- Massive, built-in telescopic antenna.
- Connectors for external antennas – SW, AM, FM and VHF Aircraft Band.
- Line-out, headphone and external speaker jacks.



The Power Supply
A multi voltage (110, 220V) AC adapter is included. Also operates on 6 size D batteries. (not included)

Dimensions: 20.5" L × 9" H × 8" W

Weight: 14.50 lbs.

by GRUNDIG

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Family Radio *PLUS!* Family Radio users upgrading to GMRS can still communicate with their existing FRS radios! Channels 1-7 in both our *ClearConnect*™ and *SportConnect*™ are the **same as Family Radio channels 1-7**, so you can still talk with any FRS radios in your group!

PR-460: SportConnect™ and ***PR-460: ClearConnect***™

- 4-watts output power for talk range of up to 5 miles
- Includes 38 CTCSS Codes
- Uses UHF frequencies for superior range and penetration
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- Signal strength meter (S-Meter) gives you a visual indication of the strength of received signals
- Channel scan, dual watch, and priority scan modes
- Low Battery Warning
- Time Out Timer
- One Year Warranty
- Channels 1-7 correspond to Family Radio Service (FRS) channels 1-7, allowing you to communicate with any FRS radios that you may already have
- Operates on the General Mobile Radio Service (GMRS). An FCC issued GMRS license is required for use

PRYME SportConnect $199.95

PRYME ClearConnect $219.95

FCC License Required: Operation on the General Mobile Radio Service requires an FCC issued GMRS license. Information on obtaining a license is included with your transceiver. The FCC license fee is $80 for five years, which breaks down to a little more than $1.00 per month. One license covers you and everyone in your immediate family, including your children and parents. Your amateur radio license does NOT confer any privileges on the General Mobile Radio Service.

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"IT SEEMS TO US..."

Galileo

As these words were written the participants in the World Radiocommunication Conference, WRC-2000, had just completed their third of four weeks in Istanbul. Several difficult issues remained to be resolved including the all-important question of which items will be on the agenda for the next conference, to be held about three years from now.

While no decisions are final until the close of the conference, scheduled for June 2, it is quite safe to say that a number of issues have been settled with regard to WRC-2000 (although they could pop up again at a future conference). For example, it has been agreed that at this conference the little LEOs, the non-voice, low-Earth-orbit satellites that first received allocations at WARC-92 and have been seeking more allocations below 1 GHz ever since, will *not* be granted either additional allocations or relief from constraints on their use of their existing allocations. It is not yet settled whether the question of additional allocations for little LEOs will make it onto the agenda for the next conference; if it does, the incumbent services including the amateur and amateur-satellite services will face another round of studies in which little LEO proponents will attempt to identify spectrum they think they can share.

Another settled issue involves expanded allocations for the radionavigation-satellite service. The principal beneficiary is Galileo, a multinational European project that is proposed as a supplement to the United States' GPS and Russia's GLONASS.

Because the range of frequencies that is the most useful for such applications is very limited and is already used by a variety of other services, it was not easy for the conferees to identify spectrum to accommodate Galileo. A related issue facing them was how to accommodate a new so-called "L5" frequency for GPS at 1164-1188 MHz, in a band that is already used for distance measuring equipment (DME) operating in the aeronautical radionavigation service.

The conferees settled on a significant expansion of the radionavigation-satellite allocation in the vicinity of 1.2 GHz. They agreed to expand the existing space-to-Earth (downlink) band, 1215-1260 MHz, to 1164-1300 MHz and to recognize that there are space-to-space applications for radio-navigation-satellite services in these and other bands. They also added Earth-to-space radio-navigation-satellite allocations at 1300-1350 MHz and 5000-5010 MHz and a space-to-Earth allocation at 5010-5030 MHz. Radio-navigation-satellite operation will be subject to various constraints, some of which have not yet been determined, to protect the other primary services to which these bands are already allocated.

The reason for reporting this is, of course, that the amateur service has a secondary allocation of 1240-1300 MHz. The amateur-satellite service also has the use of 1260-1270 MHz in the Earth-to-space direction on a non-interference basis. It is reasonable to ask what will become of amateur operations in this band if Galileo is implemented (which is far from a sure thing given the billions of dollars that will be required, the popularity of GPS, and healthy skepticism as to whether the world really needs three different radionavigation-satellite systems). The short answer is that it is too early to tell. When the GPS and GLONASS allocations of 1215-1240 and 1240-1260 MHz were established at WARC-79, the amateur service allocation at 1215-1240 MHz was withdrawn but the allocation at 1240-1260 MHz was not. Also, the present plans for Galileo do not require the use of the entire 1260-1300 MHz band.

Even so, if you're an amateur with a significant investment in the 1240-1300 MHz band or with plans to use the band in the future, Galileo can hardly be considered good news. In that we have plenty of company. The band 1215-1300 MHz is heavily used by civilian and military radars (in ITU parlance, radionavigation and radiolocation services). There are also primary allocations to the Earth exploration-satellite and space research services. One may well wonder why WRC-2000 could not find a better solution for Galileo. The answer is that there is enormous pressure from many different directions to accommodate new uses of the radio spectrum. Incumbent users face an increasingly difficult task in defending their allocations. Even bands that one might reasonably expect to remain sacrosanct are under scrutiny. For example, the International Air Transport Association (IATA) has found it necessary to mount a massive education campaign to remind delegates that the decisions they make may affect their safety when they fly home from future conferences.

All of the international amateur allocations between 440 MHz and 24 GHz are on a secondary basis. This means that we must protect primary services from interference and that we must accept any interference they cause to our operations. Above 24 GHz our status is somewhat better. The amateur allocations between 24 and 275 GHz typically consist of primary allocations adjacent to wider secondary allocations. This arrangement, pioneered at WARC-79, offers an attractive combination of flexibility and protection.

The good news from WRC-2000 as far as allocations are concerned is that in rearranging the bands between 71 and 275 GHz to better protect radioastronomy and other passive services, this arrangement has been preserved. Some amateur allocations have been shifted, but our access to this part of the spectrum will be at least as good after WRC-2000 as it was before.

A few amateurs—all too few, unfortunately—are engaged in exciting pioneering work in the bands above 24 GHz. It's time more of us joined them. If Galileo were a radio amateur, can there be any doubt that that's what he would do?—*David Sumner, K1ZZ*

We're At Your Service

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

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If all else fails, send e-mail to hq@arrl.org and it will be routed to the right people or departments.

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Subject: **Info Request**
In the body of your message enter:

HELP
SEND INDEX
QUIT

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You'll also find the ARRL on the World Wide Web at:

http://www.arrl.org/

At the ARRL Web page you'll find the latest W1AW bulletins, a hamfest calendar, exam schedules, an on-line ARRL Publications Catalog and much more. We're always adding new features to our Web page, so check it often!

Members-Only Web Site

As an ARRL member you enjoy exclusive access to our Members-Only Web site. Just point your browser to http://www.arrl.org/members/ and you'll open the door to benefits that you won't find anywhere else.

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- *QST/QEX* searchable index (find that article you were looking for!)
- Previews of contest results and product reviews. See them here before they appear in *QST!*
- Access to your information in the ARRL membership database. Enter corrections or updates on line!

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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!

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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/.)

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Strays and Up Front

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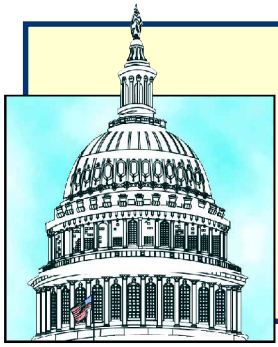

DC Currents

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.

On The Threshold Of Campaigns, Congress Moves Big Ticket Items

As Congress settles up its affairs in anticipation of the start of the November 2000 election season, both the House and the Senate have begun focusing on a few "big ticket" items to clear the decks so law makers can go home to campaign. Appropriations legislation has been the highest priority, because it affects the entire government and every American citizen. Other time-consuming items like extending Permanent Normalized Trade Relations with China have eclipsed smaller legislative issues on the floor, although Committee hearings and markups continue with the thought toward fleshing out a preliminary agenda for the 107th Congress next year.

While bills are not carried over from one session to another, they often are reintroduced with an unofficial "head start" from the previous session. A few telecommunications items are still considered to be "in play," but Congress seems unlikely to take up any new telecommunications legislation. However, some insiders are suggesting that, regardless of which party takes control of the Congress in 2001, so many confusing "high tech" issues have surfaced during this session that it is possible the new Congress will proclaim itself the "Technology Congress" and attempt a comprehensive look at telecommunications.

In the closing weeks of this Congress, the House Subcommittee on Telecommunications and Consumer Protection has focussed largely on internet issues such as the deployment of broadband technologies, taxation, "e-commerce" and internet pornography. Transcripts, statements and recordings of many of these hearings are now available from the Commerce Committee Web site at: **http://www.house.gov/commerce/**.

In the Senate, the Commerce Committee is focusing on Internet privacy and commerce. S.2255, introduced by Committee Chairman John McCain, would extend a moratorium on any form of taxation on Internet commerce for five years in order to give lawmakers a chance to assess the economic impact of taxing items purchased through e-commerce, as well as to look into the impact of such purchases on more traditional over-the-counter business. Transcripts, prepared statements and some live hearings are now available on the Web at: **http://www.senate.gov/~commerce/issues/telco.htm**.

Infamous House Bill 602-P Finally Gets Its Day in Congress!

● An Internet spoof involving the infamous "Congressman Schnell" (there is no Congressman Schnell) and his House Bill 602-P (there is no HB.602-P) finally got its long overdue "day in Congress" in May with the passage of HR.1291, which would specifically forbid the FCC from imposing new "access charges" (i.e. taxes) on Internet services. Last year, in response to a rapidly spreading Internet rumor about the apocryphal 602-P, Congressman Fred Upton (a real Republican Congressman from the real state of Michigan's sixth Congressional District) introduced the legislation ensuring that the rumor wouldn't become reality. The bill was not popular with all members of Congress, however. Upton's Michigan Colleague Representative John Dingell (D-MI-16th), who happens to be ranking minority member of the Commerce Committee, chided Congress in his committee report remarks for rushing the bill through.

"I am not convinced," Dingell said, "that mounting a massive legislative counter-attack on a fictitious bill, introduced by a make-believe Congressman, is the best use of this Committee's time, or that of the House." Dingell expressed amazement that "a phantom Congressman has more success jump-starting the legislative process than those of us elected by the people." In any event, HR.1291 passed on the floor of the House and is now awaiting action in the Senate.

House Looks at Deployment of "Broadband Technology"

♦ An ongoing debate in this Congress that is likely to reappear in future Congresses is the rapid growth of the Internet. Some members of Congress think it should be reined in by legislation; others think the Internet is an example of free enterprise at its best, and consumers and the marketplace will sort things out better than lawmakers might.

In his opening statement of the Telecommunications Subcommittee's hearing on "high speed broadband deployment issues," Subcommittee Chairman Billy Tauzin (R-LA-3rd) noted how quickly the Internet has grown from its infancy as a government project to its current near-ubiquity. In the year before passage of the 1996 Telecommunications Act, Tauzin said, his subcommittee heard at least seventy witnesses from local and long distance carriers, broadcasters, think tanks and governments; not one witness was an Internet service provider. As Tauzin put it, "the Internet wasn't even on the radar screen."

The chairman pointed out that in Congress, the biggest concern was to design the new law to increase competition among telephone companies and allow local carriers to compete in long distance markets, consistent with recent court rulings.

Today, the big issue is how to get good broadband service to the last redoubts in rural and inner city areas. Ranking minority member Edward Markey (D-MA-7th) noted that the deregulatory components of the bill created by the Commerce Committee actually broke down the barriers that finally allowed Internet Service Providers access to consumers. Markey said that 95% of the US population is within 50 miles of a high speed Internet POP.

Amaterur Radio Spectrum Protection Act Adds more Cosponsors

♦ Since we last reported on the Amateur Radio Spectrum Protection Act (HR.783 in the House and S.2183 in the Senate), the legislation has gained additional cosponsors. HR.783 now has 154 cosponsors, and S.2183 has nine. The ARRL will continue to press for passage of this important legislation, and we urge ARRL members to write to their Senators and Representatives urging them to cosponsor.

A sample letter and links to congressional addresses may be found on the ARRL web site at: **http://www.arrl.org/govrelations/hr783.html**.

The closer Congress gets to adjournment in October, the more it becomes likely that Amateur Radio spectrum protection legislation will become a long-term proposition. However, if Congress adjourns without addressing these bills, a substantial number of cosponsors will give reintroduction a boost next session.

LA Experimental Project Shows Signs of Life

After months of inaction, it appears that the LA County application for an airborne microwave downlink video experimental license has a bit of life left in it. After the initial application was filed last year to install and operate a microwave downlink system for public safety video at 2402-2448 MHz, the ARRL filed an informal objection claiming that the County had failed to justify the grant of an experimental license. Los Angeles area ATV enthusiasts also filed informal objections. The ARRL objection also stated the system could not operate without interference to Amateur Radio users at 2400-2450 MHz. The LA County application was to experiment with sending video downlinks from helicopters to five remote receive sites serving law enforcement, fire, disaster relief and other public safety agencies. The frequency range requested falls within a segment of the Amateur Radio 13-cm band, which consists of 2300-2310 MHz and 2390-2450 MHz. The County has replied to the ARRL objections in a fashion that suggested the issue is still alive.

The County has claimed that the experimental license was required because adequate spectrum was not available, and purported to have done compatibility studies of users of the band. The ARRL's reply to the County's opposition suggested that the monitoring studies were "fatally" flawed.

The ARRL said that "monitoring, such as was conducted with a directional antenna aimed at mountaintops will have a low probability of receiving amateur emissions from the myriad of users in the Los Angeles Basin. Monitoring of repeater input frequencies, absent a directional antenna aimed at stations transmitting to that repeater input antenna, reveals nothing about the occupancy of a particular band…"

The ARRL further faulted the application for failing to demonstrate how interference would be avoided. "That there was literally no coordination of the county's proposal with the Amateur community in Los Angeles prior to the filing of this experimental application… makes the suggestion that operations in the band will be 'coordinated' with the Amateur Service highly suspect," the ARRL said.

FCC Looks at Ultra Wide Band Radio Technology

● The current darling of the Federal Communications Commission is something called "ultra-wideband" (UWB) technology (not to be confused with "broadband"), which uses very short pulse durations over large bandwidths. The technology previously has been restricted to military tactical communications devices: data links for unmanned aircraft and robot vehicles, certain radars, geolocation systems and military and civilian ground penetrating radar systems used to spot underground structures.

The FCC wants to permit the use of UWB technology on an unlicensed basis, claiming the technology will have "enormous benefits" for public safety and commercial applications. In theory, ultra-wideband devices can operate on spectrum already allocated to other services without causing interference. The FCC claims UWB will permit greater spectrum efficiency, but the ARRL is currently evaluating the potential for interference to the Amateur Service should the concept be applied to applications with longer-range communications services. In addition, there appears to be some international concern about the new technology.

The FCC is particularly interested in regulatory measures that permit UWB communications devices for police, fire and rescue personnel to use in secure communications.

The high technology trade press points out that another reason for the FCC's interest is the sense that UWB may be a component in the continued move toward total communications portability. If UWB takes off, it is also likely to be used commercially in so called "last mile" applications, where it provides a cheaper way to bridge the gap between local distribution points and individual homes and offices than digging trenches or setting up poles for fiber optic cable. UWB is purported to be comparatively immune to multipath effects that plague other wireless technologies.

Virginia is for Hams!

The Virginia General Assembly passed a resolution in January praising Amateur Radio and ARES/RACES volunteers for their hard work in the wake of floods from Hurricane Floyd (see *QST,* April 2000, p 15). Now it has come to our attention that the Senate and House in Virginia also passed a resolution singling out Norfolk residents Dan Bigio, AD4ZK and Frank Shaw, KN4QG "for their vital volunteer services to the Norfolk fire and police departments, nonprofit organizations, and federal agencies." The joint resolution mentioned many of the volunteer efforts state ham radio operators have mounted to support events like the Special Olympics and the American Heart Association's Heart Walk, as well as local events, in additional to providing emergency communications capability.

Media Hits

• New Mexico hams got a pat on the back from the *Santa Fe Journal North*, in an article that pointed out how more than 100 local Amateur Radio operators maintained much needed communications during the Cerro Grande wildfire, despite power blackouts and downed telephone lines. Quoted was Joe Knight, W5PDY, the ARRL New Mexico Section Manager.

• The *San Diego Union Tribune* noted the communications support Amateur Radio operators provided for a "I Love a Clean San Diego Beach Cleanup" project. Local hams linked the volunteers, the US Navy and the Coast Guard Marine Safety Office.

• The *Petosky News-Review* called ham radio "an insurance policy for the Red Cross" in Michigan. The Straits Area Amateur Radio Club installed a ham shack at the local American Red Cross service center to provide emergency communications capability. Quoted was Dirk Esterline, KG8JK.

• Tornado Awareness Week in Wisconsin boosted Amateur Radio awareness after an article in the *Stevens Point Journal* noted the efforts of the Central Wisconsin Radio Amateurs, Ltd. These amateurs were lauded for their work with the National Weather Service and local officials to provide rapid and accurate weather information.

• South Carolina Amateur Radio storm spotters were also given accolades in an article in the *Greenville News*. The article talked about the training provided by the National Weather Service, and also gave a glimpse of what hams do behind the scenes. Featured were hams George Dickert, WB4YUO and Sue Chism, N4ENX.

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Hy-Gain's world famous Bell Shaped Rotator™ design is the standard that other rotators are measured against.

Its bell construction gives you total weather protection for super reliable operation. Its super heavy duty steel gear drive gives you years of superior and trouble-free performance. Many Hy-Gain rotators still provide excellent service after over 25 years of outstanding performance.

The last thing you want to fall apart is your rotator that's mounted on the top of your tower. You won't make any compromises when you buy and install high quality Hy-Gain rotators.

And we're the only manufacturer to offer a full line of rotators that are completely MADE IN THE USA.

HAM-IV, $529.95. *The heavy duty Ham-IV is the most popular rotator in the world!* It is designed for medium size antenna arrays up to 15 square feet wind load area when mounted in-tower, or 7.5 square feet when mast mounted with an optional lower mast bracket. New alloy ring gear gives extra strength up to 100,000 PSI for maximum reliability. New low temperature grease permits normal operation down to -30 degrees Fahrenheit. New wire-wound potentiometer gives reliable and precision directional indication, new ferrite beads reduce RF susceptibility, new Cinch plug connector plus 8-pin plug at control box (no screwdriver needed). Dual 98 ball bearing race for load bearing strength. Strong electric locking steel wedge brake prevents wind induced antenna movement. Easy-to-use Control Box has illuminated directional meter with North or South center of rotation scale, separate snap-action brake and rotation switches. Uses low voltage control for safe operation. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $13^{1}/_{2}$Hx8D inches.

T-2X, $619.95. *Extra heavy duty Tailtwister antenna rotator!* For large antennas up to 20 square feet wind load when mounted in-tower, or 10 square feet when mast mounted with optional support bracket. Triple 138 ball bearing race, strong electric locking steel wedge brake. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches. Accepts masts up to $2^{1}/_{16}$ inches diameter. Rotator size is $14^{1}/_{16}$Hx$9^{3}/_{16}$D in.

CD-45II, $369.95. *Medium duty antenna rotator.* Handles antenna arrays up to 8.5 square feet windload area when mounted in-tower, or 5 square feet when mast mounted with supplied lower support. Dual 48 ball bearing race, disc brake system. Control Box has an illuminated directional indicator with North or South center of rotation scale, separate snap-action brake and rotation control switches with disc brake release. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty lower mast support, Rotator size is $17^{3}/_{8}$Hx8 D inches.

AR-40, $269.95. *Lightweight antenna rotator.* Handles smaller ham antennas and large TV/FM antennas up to 3.0 square feet windload area when mounted in-tower, or 1.5 square feet when mast mounted using the supplied lower support bracket. Dual 12 ball bearing race, disc brake system. Silent, automatic control box -- just dial and touch for desired direction. Accepts mast sizes up to $2^{1}/_{8}$ diameter. Includes light duty mast support. Rotator size is $17^{3}/_{8}$Hx8D inches.

Call your dealer for your best price!

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

HAM IV

$529.95
Suggested Retail

T-2X

$619.95
Suggested Retail

CD-45II

$369.95
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AR-40

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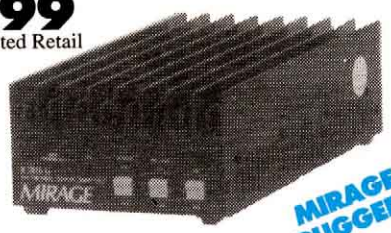
Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer . . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

B-5016-G
$299
Suggested Retail



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*

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.

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

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

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/10 W 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/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail

Power Curve -- typical B-310-G output power							
Watts Out	*25*	*50*	*75*	*95*	*100*	*100+*	*100+*
Watts In	*¼*	*½*	*1*	*2*	*4*	*6*	*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 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-34-G output power								
Watts Out	*18*	*30*	*33*	*35+*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*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. 3½x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

MIRAGE RUGGED!

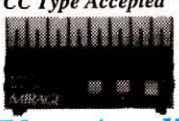
Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	*30*	*40*	*45*	*45+*	*45+*	*45+*	*45+*
Watts Out (440 MHz)	*16*	*26*	*32*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*

- ***45 Watts on 2 Meters/35W 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.

70cm 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. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps

KP-1

KP-2

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 160 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

Commercial amps for 150 - 174, 450-470 MHz and VHF marine bands, 70 -130 watts ou

Accurate SWR/Wattmeters

Read SWR directly andForward/ Reverse, Peak/Average power. Remote Coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

One Year Mirage Warranty

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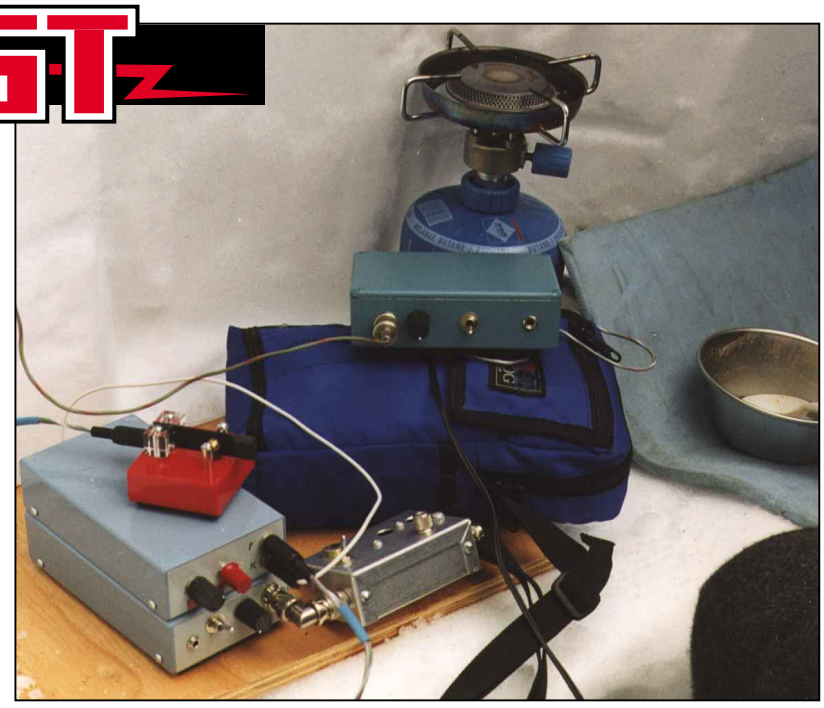
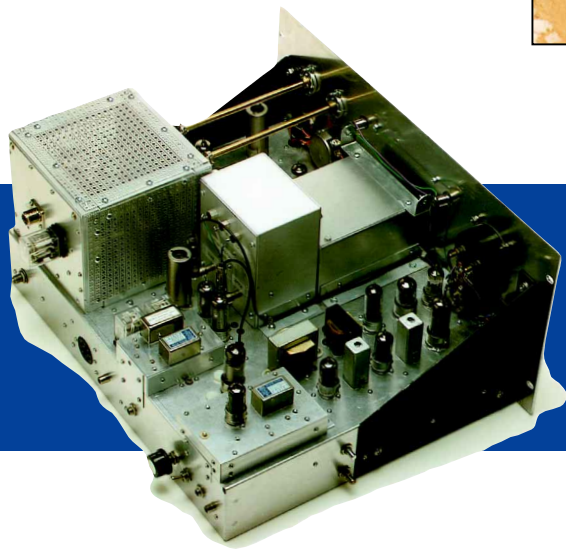


The Micromountaineer (see the article in this issue) is appropriately named because it *does* get used in the mountains! Wes Hayward, W7ZOI, and his son Roger Hayward, KA7EXM, took two Micro-mountaineers to the snowy hills in February. After digging a cave (complete with benches) in the seven-foot deep snow, they set up shop. The light plywood sheet is used beneath the stove and after coffee is brewed, it supports the rig. In the blue bag are the battery and back-up rig. The bottom box in the pile is the Micromountaineer; a CW keyer is in the upper box. The bare aluminum box houses an antenna tuner.



Is homebrewing an art or a science? This 20-meter CW/SSB transceiver created by John, AE8M, could certainly be considered a work of art, but John reports that it is a hot performer as well. The hybrid design is a combination of circuits published in '60s-vintage *ARRL Handbooks* and the 1970 *Single Sideband for the Radio Amateur*. It produces about 60 W output from a single 6DQ5 tube.

DAVE PAPERMAN, W5WP

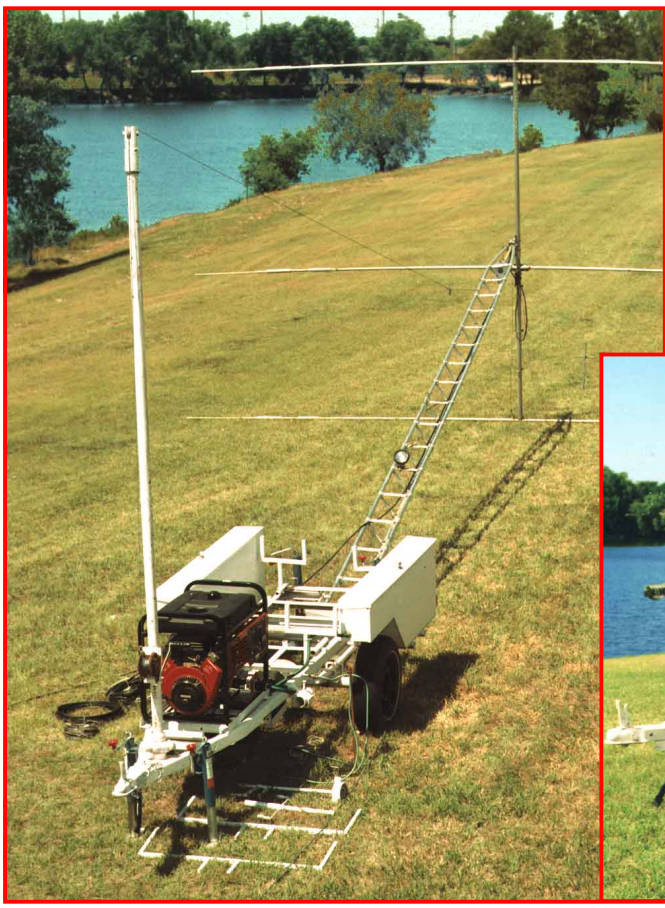
JIM DELEON

CQ Texas Children's Hospital. During the 1999 Holiday Season the Texas Children's Hospital Amateur Radio Club (TCHARC) initiated operation of K5TCH as a means to introduce young patients to the fun of Amateur Radio. In the photo at left, Mike Walker, KG5CM (left), Marc Isaacson, KD5FSS (center), and Les Shipp, N5DKP (right), put the finishing touches on the station antenna. (The portable gear was furnished by the Ant-Hill Gang.) At right, 10 year-old patient Tuesday Williams operates K5TCH under the supervision of trustee and control operator Dave Paperman, W5WP.

Elmering is alive and well in Morgan, Utah. Thanks to the efforts of Cliff Jenkins, N7ZTY and Dave Corpany, KC7VTE, the Morgan Elementary School Amateur Radio Club, KD7FRL, has attracted 15 fourth-grade members. Cliff and Dave assisted the students in obtaining a grant from the ARRL Foundation's Victor C. Clark Youth Incentive Program to help finance their station. At each meeting the students are taught electronic theory, then treated to supervised on-air time. Back row: Cliff Jenkins, N7TZY, club custodian; Joseph Davis; Mr Pomeroy (the principal of Morgan Elementary). Second row: Melissa Winterton; Tanya Hansen; Tanna Potter; Bryce Leishman; Zackary Comer; Justin Haslam; Clayton Pentz. Front row: Chase Jackson; Jeremy Shaw; Cash Pentz; Josh Browning; Conner Waldron; Alex Collins; Michael Hardy.

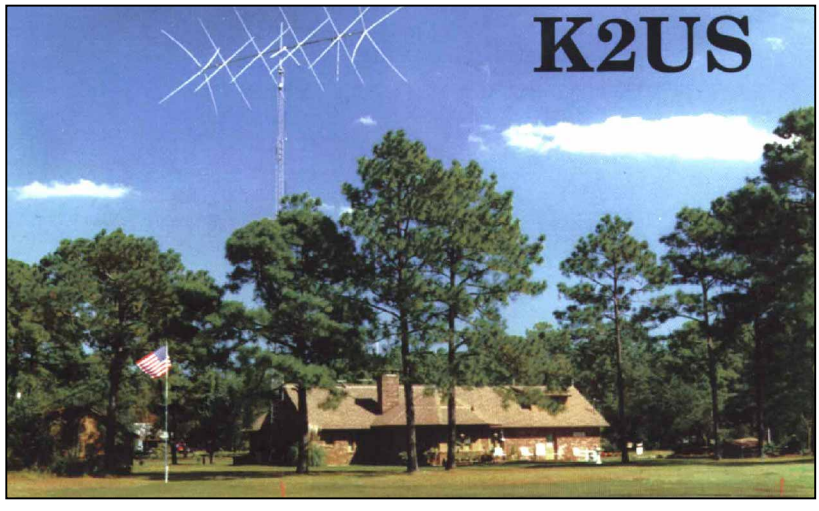
Someone said they needed an antenna—*now!* At last winter's Maine State Convention in Lewiston they needed to install a temporary antenna on the roof of the convention center for a live APRS (Automatic Position Reporting System) demonstration. That task fell to "lucky" volunteers Bill Woodhead, N1KAT, Maine section manager (right), and Andy Brown, N1WTQ.

Have MARTY, will travel. MARTY was the creation of David Doonan, KI0NN, of Great Bend, Kansas. The trailer is a mobile antenna platform used by the Golden Belt Amateur Radio Club for various public-service events, including Field Day. In its "collapsed" form (below), MARTY is easy to transport. The long, white PVC tube holds a triband HF beam antenna. Beneath the tube there is room for a couple of tower sections. The boxes contain cables, wire, tools and a battery to start the portable generator. When MARTY is ready for deployment (left), they connect the tower sections and the antenna, mount the generator, and raise the tower assembly using a pole and winch at the front of the trailer.



Noise? What Noise? Last year local electrical interference made it impossible for LF operator Steve Rawlings, GW4ALG, in Monmouthshire, Wales, to copy signals on 136 kHz. To solve the problem Steve built this noise canceller based on a design by VK5BR. The noise canceller enabled Steve to work his best DX ever on 136 kHz when he contacted OH3LYG in Tampere, Finland (1200 miles). You can find more details about the noise canceller on the Web at: **http://www.alg.demon.co.uk/radio/136/noise_can.htm**.

Behold the "3-hour antenna." Matt Plotts, N8ID, holds the shattered remains of his Diamond dual-band antenna. Eric, KB8QFF, helped him install the antenna one Saturday afternoon at 3 PM. The antenna worked perfectly and they celebrated with refreshments before Eric left at 4 PM. Matt disconnected his radio and was pondering his station plans when, at 6 PM sharp, a lightning bolt obliterated the Diamond! Back to the drawing board…



At 80 years of age, Bob, K2US, is still designing and building HF quad antennas. This impressive 6-element 20-meter quad is featured on his QSL card, which also shows Bob's home in Pawleys Island, South Carolina. The antenna is designed to survive the high winds that occasionally sweep through the area.

Everyone smile and say, "Myanmar!" The XZ0A DXpedition team poses for the camera in front of their antenna farm that includes a quarter wavelength vertical for 160 meters plus four squares for 80 and 40 meters. Other antennas included beams for 6 through 20 meters. From January 13 to February 6, 2000 more than 80,000 contacts were made from the first IOTA operation in Myanmar (Burma). SSTV, PSK31, RTTY, FM, SSB and CW contacts made it into the log. Other operators not shown arrived from Japan and Thailand as well as the US to participate. The Central Arizona DX Association organized the DXpedition. **Back row, left to right:** Van Sias, K7VS; Bob Johnsen, K7TR; Darryl Hazelgren, AF7O; Rich Chatelain, K7ZV; Don Wilson, K6RKE; Julio V. O'Niel, EA5XX; Paul Rubinfeld, WF5T; Dan Brown, NA7DB; Steve Wilson, G3VMW; Paul Playford, WA8AEF and Milt Jensen, N5IA. **Front row, left to right:** George Talbot, V73GT; Luis Chartarifsky, XE1L; Warren Hill, K7WX; Millie Thompson, WY7K and Clifford Hauser, KD6XH.

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!

FT-100D HIGHLIGHTS

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FT-1500M

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You can also submit letters by fax at 860-594-0259, or via e-mail to: **qst@arrl.org.**
We read every letter received, but we can only publish a few each month. We reserve the right to edit your letter for clarity, and to fit the available page space. Of course, the publishers of *QST* assume no responsibility for statements made by correspondents.

IN THE SPIRIT OF *FREQUENCY*

♦ Perhaps you didn't see the movie *Frequency* when it debuted this past spring, but you probably know the basic plot: time travel (of a sort) via Amateur Radio. I doubt that we'll ever see such fantastic temporal propagation, but one ham seems to have done something close to it!

Ken Weikel, KF4BAR, found a bunch of old QSLs that were ready to go to the dumpster. In the spirit of *Frequency* he looked up the names and address of as many operators as he could. A number of them were Silent Keys, but quite a few were still with us. With his list of addresses at hand, Ken mailed the QSLs back to their original senders.

Just imagine receiving a QSL back in the mail that you may have sent out when you were only in your teens, perhaps many decades ago! I had the pleasure of being Ken's Elmer, and I thought I'd pass this idea along. If you come across some old QSLs, think about trying it! It might rekindle some nice thoughts for many OMs who lived in the "Golden Age" of ham radio—*Bill Breuer, KE4SGV, Louisville, Kentucky*

PRIDE BEFORE A FALL

♦ My 2-meter FM buddies and I just lost a good friend. He was an older, widowed engineer who enjoyed ham radio very much. It was his main contact with the world outside his home. Despite his disabilities, he lived alone and was proud of being able to care for himself.

Perhaps that pride was his undoing. Despite many offers of assistance, this ham wanted to install new antennas alone. Last March he slipped and fell off the roof to his death. He was found by a shaken neighbor, who informed us along with the police.

We all love our radio hobby, but it's not worth dying for. If you have any doubts about your ability to climb on your roof or tower, please ask for assistance from your fellow amateurs. And all of you able-bodied operators: offer to assist seniors and the handicapped. They'll benefit from the association, and so will you.—*Thomas A. Stough, W0UFC, Thousand Oaks, California*

MEASURING BOGOSITY

♦ After reading "Continuous PEP Metering the Easy Way" by Eldon Bryant, K7ZQR, in the April *QST*, I was reminded of a little known research project that was done by an obscure group at MIT in the '60s. The short program revealed that "Bogosity" could be measured using a thermometer. By holding the thermometer near the mouth of the one being tested, an increase in temperature corresponded to the relative "Bogosity" of the information being given. The author may now be able to relate "Bogosity" to actual units of power dissipation.

Don't let this kind of good work go unexploited. Mr. Bryant should apply for a grant to continue his work. Far less worthy research has been rewarded with funding. Bravo and carry on!—*Ken Aldrich, KN1I, Lebanon, New Hampshire*

LOOK TO THE COSMOS

♦ Amateur Radio is failing to appeal to young people because it has lost its glamour. Radio communication was once the domain of an elite few, but now it is commonplace. Cell phones, wireless telephones, CBs, radio-controlled toys, etc. pervade society. Radio, in and of itself, is no longer special.

To interest newcomers, we need to set Amateur Radio apart from the commonplace. We need to reestablish it as something special. SAREX, EME, satellites, DXing, contesting, awards and traffic handling will still have their appeal and should be promoted. However, we need more. We need to explore new and exciting frontiers, frontiers that capture the imagination.

I can think of no better example of such a frontier than the search for extraterrestrial intelligence—SETI. My own recent experience has been that when I discuss Amateur Radio with nonhams the response is indifference. But when I discuss SETI, people become intrigued, enthusiastic and eager to learn more. SETI captures the imagination.

SETI is mainstream science, not fringe UFO-ology. SETI is receiving a great deal of positive coverage in the press, the movies, in television specials and in national magazines. Hardly a month goes by without major media coverage. One measure of SETI's appeal is the astonishing success of the SETI@Home project. This exercise in "distributed computing" has enlisted a million participants since last May! SETI is fascinating to a broad spectrum of people. And it is a natural match for Amateur Radio.

SETI is radio science at its most exciting. It encompasses microwave technologies, ultra-weak signal detection, digital signal processing/computer analysis and cosmology. And participation is within the economic reach of most hams. I believe making SETI a key facet of Amateur Radio, like SAREX, EME and satellite communications, would add substantially to the perception of our hobby. It would help project the forward-looking image we so badly need. Best of all, SETI would attract young people.

The SETI League, which already promotes the radio search for extraterrestrial intelligence, has much in common with Amateur Radio. About half of its members are hams. Collaboration between the ARRL and the SETI League could greatly benefit both. The SETI League pursues a very glamorous goal, but currently is a small organization. A regular SETI column in *QST* would stir a lot of interest in both SETI and Amateur Radio. I urge the League and *QST* to explore this idea.

The search for extraterrestrial life will continue to grow with or without us. We will miss a stellar opportunity to put new life into Amateur Radio if we fail to participate.—*George R. Fagan, W8QDX, Gales Ferry, Connecticut*

"THANKS" GOES A LONG WAY

♦ Several months ago I upgraded my license at a locally run VE session. After arriving back home I grabbed a few QSL cards and used them to write little thank-you notes to each of the VEs who had worked at the test. Although I didn't personally know any of these people, I wanted to express my appreciation to them for the time and energy that they expend on behalf of all of us. I threw the cards in the mail and started to enjoy my new privileges.

A few days later I received a reply from one of the VEs thanking me for my note. He told me that in his five years as a VE, I was the first ever to actually write him a thank-you!

I would like to encourage all of us to find the opportunities to thank, and to offer words of encouragement, to the VEs, club officers, League volunteers, net control operators, Elmers and all of the many others who do so much to enhance our hobby. It only takes a few minutes, and with e-mail it might not even cost you a stamp! "Don't forget your manners" has probably been said by more mothers to more children than almost any other parental instruction, but unfortunately, even as adults, we often need to be reminded to say our "please and thank-yous."—*Paul Huff, N8XMS, Livonia, Michigan*

THE DAY THE 18-WHEELERS CAME TO TOWN

♦ The 18-wheelers came to the nation's capital early this year, and some of them brought their 10-meter transceivers with them. They came, the TV newsreaders said, to protest

high fuel prices and to petition Congress for help. To presumably escape congestion on CB channel 19, a number of them switched to frequencies in our 10-meter band. I heard their activities on 28.264 MHz while I was at NN3SI, the Smithsonian Institution Amateur Radio station. I volunteer there as an operator on most Thursdays.

John Swafford, W4HU, and I can vouch that it was quite a performance. Their signals were strong and there was no doubt that they were nearby. The transmissions consisted of foul language as they shouted and hooted at each other. Unfortunately, at least one of our Smithsonian visitors happened by and very likely heard the bad language before we could turn the audio gain down.

I have heard that truckers and others invade the 10-meter band on a regular basis but, so far as I know, it is unusual in the DC area. I hope that this is not a sign of what we all can expect in the future.—*Carl Lagoda, W3CL, Washington, DC*

THE BEST COMMUNICATORS

♦ After having been involved with disaster response activities in which Amateur Radio has played a significant and many times crucial role, it has been observed that on many occasions the operators that are most qualified to carry out these critical operations are DXers and contesters. These operators, who by virtue of their experience on the air, are well prepared to deal with the operational demands that arise following natural disasters.

What better place to learn all the specific skills that are needed in disaster operations than from taking part in contest and DX activities? Where else does one learn to copy weak signals in heavy interference, or learn which paths will be open to particular areas of the world at certain times and frequencies? And although Field Day is not a contest, its competitive nature is an excellent training ground for anyone who wants to learn how to install, on short notice, a field station capable of accomplishing long range HF and satellite operations.

Last spring's Clipperton Island DXpedition vividly demonstrated the important relationship between on-the-air activities and vital public service that has always been a cornerstone of Amateur Radio. The Clipperton team showed that it was possible to conduct a smooth, professional radio operation under arduous circumstances. They handled the pileups with efficiency, carefully optimizing their operations to match propagation conditions.

The Clipperton effort is just another illustration of how Amateur Radio operators can be depended upon to be of service when natural disaster strikes, and why hams are undoubtedly the best communicators to be found anywhere.—*Dave Rosen, K2GM, New York, New York*

BAN EVERYTHING!

♦ I am concerned about the public's attitude toward cellular telephones in automobiles. It seems to me that people do not recognize the similarities between using a cell phone and many other in-vehicle activities. Is dialing a cell phone while driving any more dangerous than trying to find a certain radio station, inserting a tape or CD or eating? Has anyone not been actively involved in conversation with another passenger in the automobile? And what about a baby in a car seat? Talk about distractions!

I was involved in an accident once that was triggered by my attempt to reach for a sausage biscuit in a bag on the floorboard. I have run off the road tuning the radio, and I have run a red light twice while listening to audiotapes. When I was in college, I often drove home in deep discussion with my dad about one thing or another and hardly remembered the trip. I doubt many people could say they have not had similar experiences.

If a law bans only cellular phones, I would think it could be effectively challenged. To prevent such a challenge, I would think the law would have to be written in such a way as to ban *all* distractive devices and items, including cellular phones, passengers, food or drink and, of course, ham transceivers. Oh, yes! Be sure to require both hands on the wheel at all times and ban rubber-necking completely!—*Jack Rigsby, KC4LKT, Northport, Alabama*

SLASH ZERO REDUX

♦ As Mr. Schieler wrote in the April "Correspondence," I have been confused in the past looking at QSL cards with zeros in the call signs. Is that card from UF0OL, or L0OSE? I'm glad to see that someone else shares my confusion.

Mac users will find the slash zero in *Word for Mac* by pulling down the **Insert** menu, and selecting **Symbols**. You simply double click on the symbol you want to insert, in this case the slash zero.

It's a simple step from there to setting up a Hot Key for future use. Now if we could only get the Georgia State Motor Vehicle Department to use the slash zero on license tags!—*Bernard Ortmann, N6UBO, Peachtree City, Georgia*

♦ The slashed zero character that W0FM wrote about in the April *QST* is a good idea, but the reason computers and e-mail processors don't recognize it as a zero is because it's not. It's actually the slashed letter "oh" used by some Scandinavian alphabets. This is more obvious if we type 0248 while pressing **ALT**, which produces the lower case version of the same letter. **ALT** + 0216 produces an acceptable character for most uses, but it would still be nice if the software font producers would come up with a true slashed zero. I'm sort of a font junkie, but I haven't found one yet.—*John Stewart, W0CID, Leadville, Colorado* QST

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June 29, 1999
From: Gordon West
To: Don Tyrrell and Jim Burns, Alpha Delta
Re: **Outbacker** Performance On Radio School Van

Hi Don and Jim!

In our NEW communications van installation, we run with the **Outbacker Perth**, the regular **Outbacker** with the short stainless steel whip tip, and when we're parked, the 500 watt **Outreach**. When compared to other mobile antennas at the same approximate length, the **Outbackers** and the **Outreach** are equal if not better performers, and I don't need to unscrew them when we change bands. We have logged over 30,000 miles with all of our **Outbackers** constantly up in the air, and now and then tangles with trees failed to slow them down one bit!

Many of our graduating students who have earned their General class license have gone with our recommendation of the **Outbacker** over the less-expensive mobile whips. The benefit of all bands on one shaft is well worth the money. No extra loading coils–no extra whip tips–no extra shafts to carry...all the bands on just one nice, neat jet-black body.

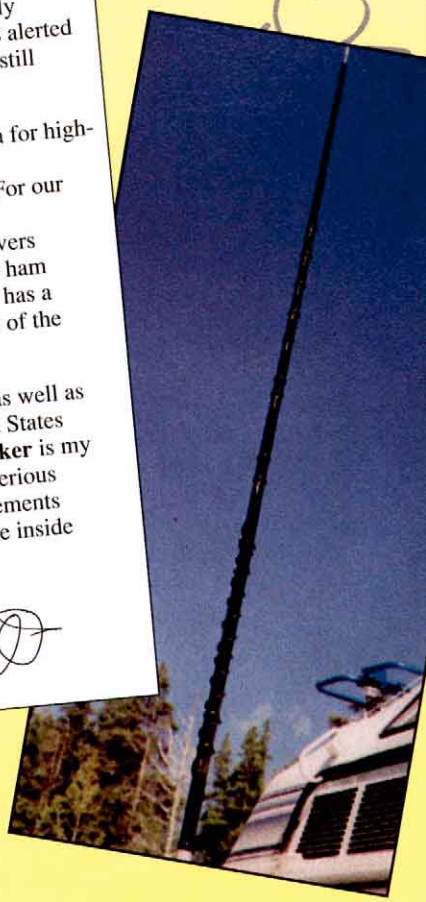
The 500-watt **Outbackers** can really handle the power, coolly. None of these 600-watt amps have been able to blow up the 500-watt **Outbackers**.

Many of our classroom demos use a single **Outbacker** and your tripod, and it works every time over almost any type of ground conductivity. And when we placed the tripod with the **Outbacker** over sea water, whowzers–what a signal!

One of our students dropped his marine **Outbacker** in the bay. After he dried it out, it still continues to work at optimum. Another student forgot to tighten his **Outbacker** into the mount, and it finally vibrated loose and dragged behind the vehicle–still attached by the fly lead–for about 5 miles until other motorists alerted him to the problem. It was scuffed up, but still continued to work great.

I wouldn't have any other mobile antenna for high-frequency work on our communications van than the proven **Outbacker** series. For our emergency Red Cross work, I use the international I.T.U. **Outbacker** that covers those frequencies above and below the ham bands. And if I need both, **Outbacker** has a combination ham/I.T.U. whip with all of the band taps on it clearly marked.

I have run the antenna both mobile as well as maritime mobile all over the United States and coastal waters, and the **Outbacker** is my favorite and ultimate choice for a serious HF whip that can withstand the elements with really nothing movable on the inside to go wrong.



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- *Handles 1500 Watts carrier*
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Two 500 pf -- *the highest of any antenna tuner* -- variable transmitting capacitors give you no-arc wide range impedance matching for true high power performance.

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Super heavy duty three core choke balun lets you match virtually any balanced feedline antenna without core saturation.

A 6 position antenna switch lets you select your desired operating antenna.

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Ameritron's active electronic *true* peak reading meter accurately reads forward and reflected power and SWR *simultaneously* on a lighted Cross-Needle meter.

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Roomy extra-strong .080 inch thick aluminum cabinet gives highest efficiency and lowest loss. 13¼Wx5⅝Hx17½D inches.

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ATR-15, $399. Handles 1500 Watts RF output. Slightly less on 160 Meters. Bandswitched T-Network, peak reading SWR/ Wattmeter, covers 1.8-30 MHz, 6 pos. antenna switch, balun. 13½ W x5½x13¼ in. Perfect for AL-80B/AL572.

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AMERITRON's legal limit amplifiers use Peter Dahl super heavy duty Hypersil power transformer capable of 2500 Watts!

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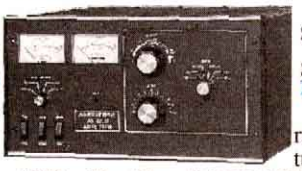
Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube



AL-1200

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Get ham radio's *toughest* tube with AL-1200. The Eimac® 3CX1200A7 has a 50 Watt control grid dissipation and the lowest history of field replacement of any modern transmitting tube that we use. 90 Watts in gives you full power out. All HF bands, all modes. 76 pounds, 18½Dx17Wx10H in.

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with 2 graphite plate Amperex® 3-500ZG tubes

AL-82

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Most linears using 3-500s can't give you 1500 Watts because their lightweight power supplies *can't* use these tubes to their full potential. AL-82 is ham radio's *only* super 3-500 amp! 100 Watts in gives you full power out. All HF bands, all modes. Hefty 76 pounds, 18½Dx17Wx10H inches.

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AL-800H, $2395 suggested retail. Two Eimac® 3CX800A7 tubes produces 1500 *plus* Watts SSB PEP with 55 Watts drive. 52 lbs., 8½Hx16½Dx14¼W in. **AL-800, $1695** suggested retail, single 3CX800A7, 1250 Watts out with 70 Watts drive.

NearLegalLimit™ Amp

with four Svetlana® 572B tubes

AL-572, $1395 suggested retail. New class of *Near Legal Limit*™ amplifier gives you 1300 Watts SSB PEP power output (70 Watts drive) for 65% of price of full legal limit amps! Instant 3-second warm-up. 40 lbs. 8½Hx15½Dx14½W inches.

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with Amperex® 3-500ZG tube

AL-80B, $1299 suggested retail. Gives you full kilowatt SSB PEP output (85 Watts in) from a whisper quiet compact desk- top linear. 8½x14x15½ in. Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500ZG tube. Nearly 70% efficiency. Weighs 48 lbs.

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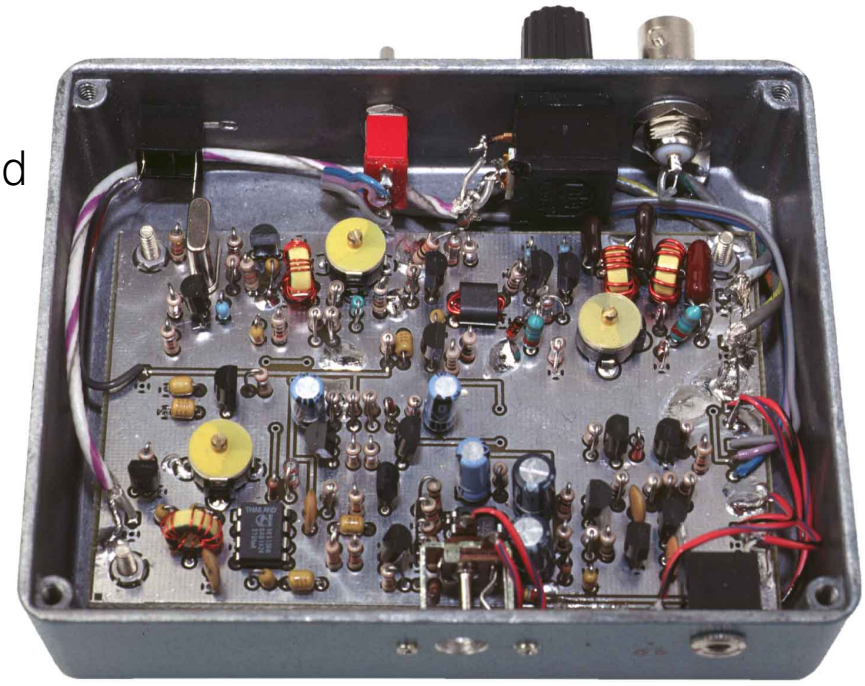
By Wes Hayward, W7ZOI, and Terry White, K7TAU

The Micromountaineer Revisited

Although this easy-to-build transceiver was initially designed for use on 10 meters, you can move it to other bands as well. As a bonus, you get a power meter, too!



An inside view of one of the Micromountaineers enclosed in a die-cast aluminum box.

In the early 1970s, we described a pair of small, crystal-controlled QRP stations.[1, 2] Both use direct conversion (D-C) receivers in the 40-meter band with a transmitter output of half a watt. The first (see Note 1) uses a tunable receiver, while the other, dubbed the Micromountaineer (see Note 2), uses the transmitter crystal oscillator as the receiver LO. We reasoned that there is little need to be able to receive on frequencies far removed from those of the transmitter. While a generation has brought much more sophistication to the QRP operator, the premise remains valid.

Although QRP operation has grown to become a major subculture within Amateur Radio, the activity is still largely confined to bands where commercial equipment predominates. Only the high-end commercial QRP boxes or 100-W transceivers with reduced power operate on the 10-meter band. This updated version of the Micromountaineer is aimed primarily at the 10-meter band where excellent propagation allows international communications with low power and simple antennas, but the rig can be built for use on other bands as well. (We're including component values for a 40-meter version of the rig, too.) The original Micromountaineer theme is retained: a $^1/_2$-W transmitter and a D-C receiver share a crystal oscillator. Electronic TR switching and *almost incremental tuning*, AIT, (explained later) have been added to enhance performance while retaining a primitive simplicity.

[1]Notes appear on page 33.

Circuit Details

Transmitter Section

The heart of the transceiver is the crystal-controlled oscillator, Q2 (Figure 1). The circuit uses third-overtone mode 28-MHz crystals and is tuned to frequency with T1 and C4. (See T1 detail in Figure 2.) Q1 is an electronic switch that shifts the oscillator frequency by about 1 kHz. (Large frequency shifts are available in fundamental-mode oscillators, but are more difficult

PHOTOS BY JOE BOTTIGLIERI, AA1GW

to obtain in overtone oscillators.) Without this shift, you might send CQ, get a reply *on-frequency* and never hear a beat note!

The oscillator output, nearly 10 mW, is extracted from T1 and applied to a power splitter consisting of three 51-Ω resistors. One output provides receiver LO injection, while the other is applied to Q3, the transmitter driver. Q3 is keyed through Q4, a PNP switch and shaping integrator that prevents key clicks. Driver output is extracted via ferrite transformer T2 (shown in greater detail in Figure 2). This transformer uses a binocular balun core in which *one wire turn* constitutes a complete pass through *both* holes.[3] This transformer has the primary exiting one end with the secondary at the other end.

The power amplifier (Q5 and Q6 in parallel) uses a pair of modest and inexpensive 2N3904s. Emitter degeneration forces the transistors to equally share current and provides thermal stability. A Zener diode, D5, prevents severe stress on the transistors during momentary operation without a load. Experimenters might want to try using other transistors in the PA stage. A single 2N4427 we tried worked well, as did four 2N2222As in parallel, both PAs producing over 1 W output. The 2N3904 pair is normally operated at about ½ W output, a level at which the transistors are not thermally abused, even without a heat sink. L3 and L4, with C13, 14, and 15, form a low-pass filter doubling as an impedance-matching network.[4] The result is a cool, robust amplifier with an efficiency of over 50%. Measured second-harmonic output is 58 dB below the desired output, easily meeting FCC 2002 spectral-purity requirements.[5] To obtain maximum output, the turns on L3 are spread or compressed as required. If you decide to try an alternative PA, you might need to alter the output-network component values to obtain maximum output with reasonable efficiency.

Receiver Section

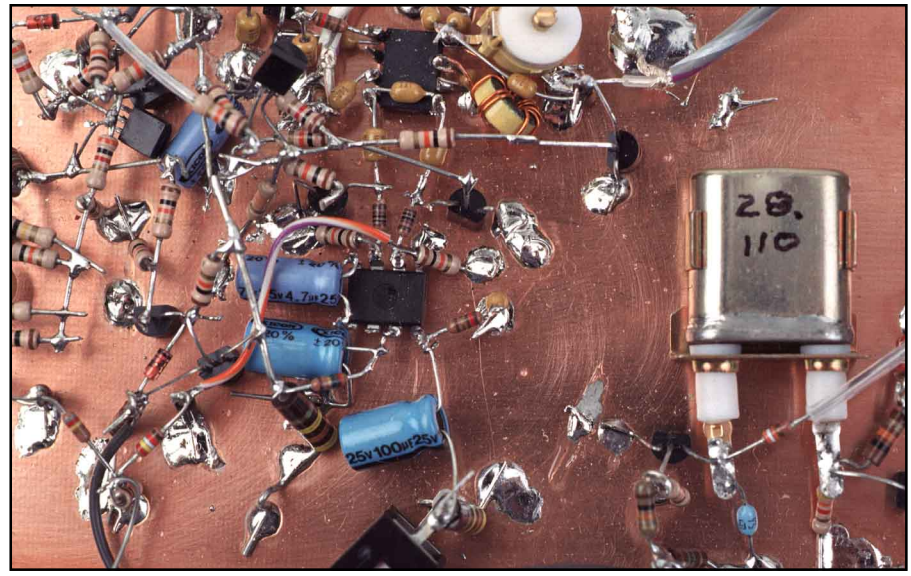
The receiver is a variation on the familiar Neophyte popularized by John Dillon, WA3RNC.[6] Mixer U2, an NE602 (an obsolete part, but still available—*Ed.*) or NE612 mixer, serves as a product detector followed by U3, an LM386D audio amplifier. The detector is biased at 5 V from U1, a 78L05 regulator. To provide receiver muting and a simple way of injecting a sidetone oscillator, the receiver is modified slightly from the original circuit. MOSFETs Q8 and Q9 are turned on during transmit intervals, shorting the audio from the detector. (The MOSFETs have a very low *on* resistance that is unavailable from a bipolar transistor with modest base current.) The input to U2 is tuned, but with an unbalanced input. This produced a large dc offset during transmit intervals until Q7 was added to enhance receiver muting. Replacing L5 with a balanced transformer will also reduce dc offset.

This Micromountaineer is housed in an LMB enclosure. Take care to remove paint on the inside of these enclosures to ensure contact with grounded components.

U2 uses very little current. Although this is a great advantage for portable applications, the low current results in severely degraded dynamic range. Enterprising experimenters can expect a large-signal performance improvement of up to 20-dB using diode-ring-based designs.[7]

A sidetone oscillator (Q10 and Q11) is keyed with a PNP switch, Q12, to produce a signal that is fed to U3 via R32. Sidetone level may be adjusted by changing the value of R33. Oscillator pitch can be decreased by increasing the values of R39 and R41.

Two PNP switches generate additional timing voltages when the key is pressed. Q16 mutes the receiver for a mute time determined by the values of C35 and R25. Q15 causes the +12R line to go low while the +12T line goes high. These signals are both present at toggle switch S1. Operating S1 allows you to apply the frequency offset to the crystal oscillator during either transmit or receive, affording some ability



A close-up of a portion of the prototype Mountaineer. Yes, it works just fine!

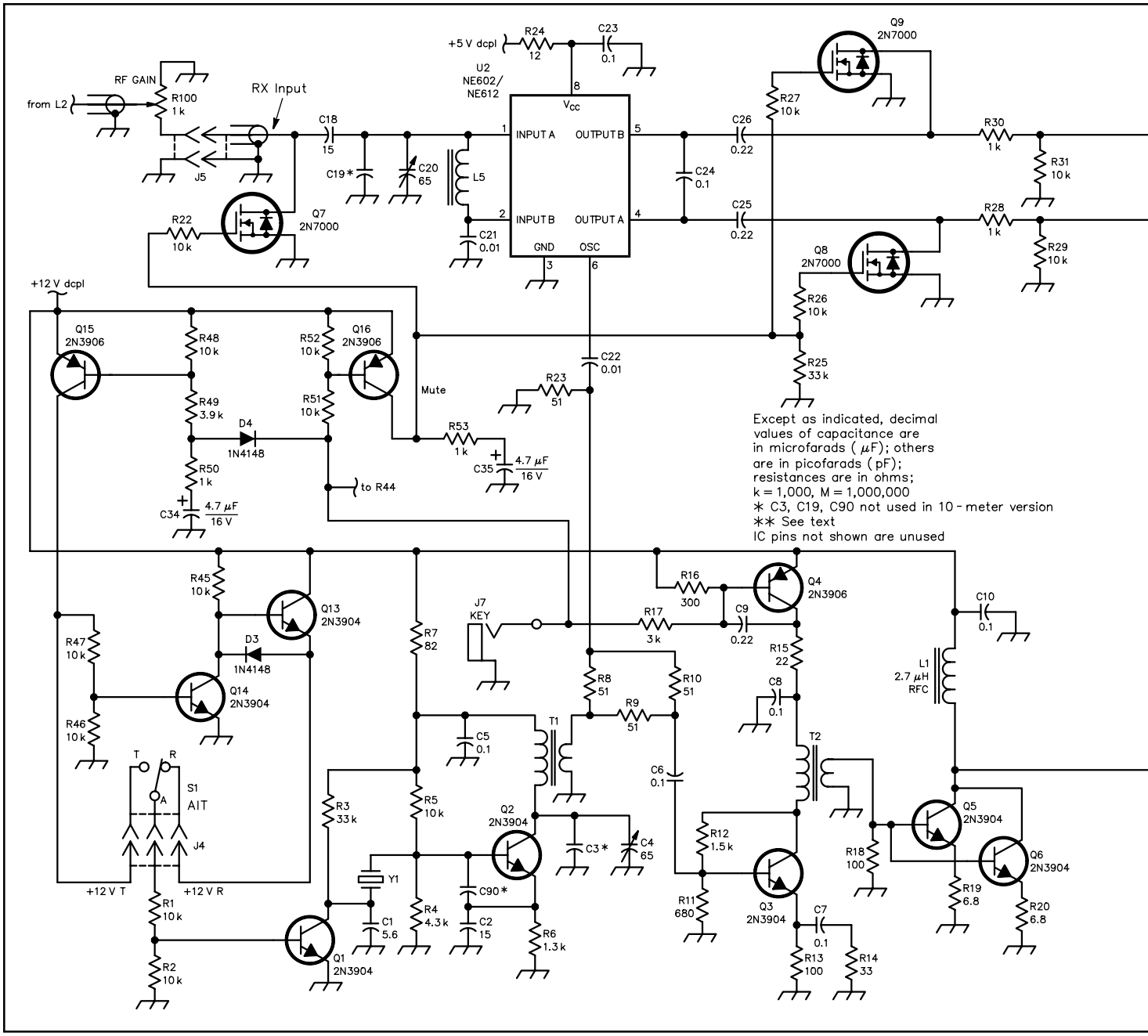
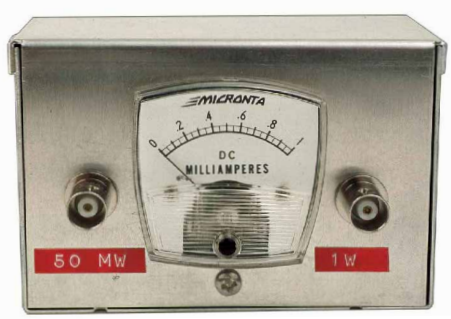


Figure 1—Schematic of the 10- and 40-meter Micromountaineer. Unless otherwise specified, resistors are 1/4-W, 5%-tolerance carbon-composition or film units. Fixed-value capacitors should be 5% tolerance; either ceramic (NP0/C0G) or mica are suitable. Equivalent parts can be substituted; n.c. indicates no connection. The parts list identifies band-specific components. In addition to the PC-board/component collection in Note 11, parts are available from several sources: 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; 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; RadioShack and others.

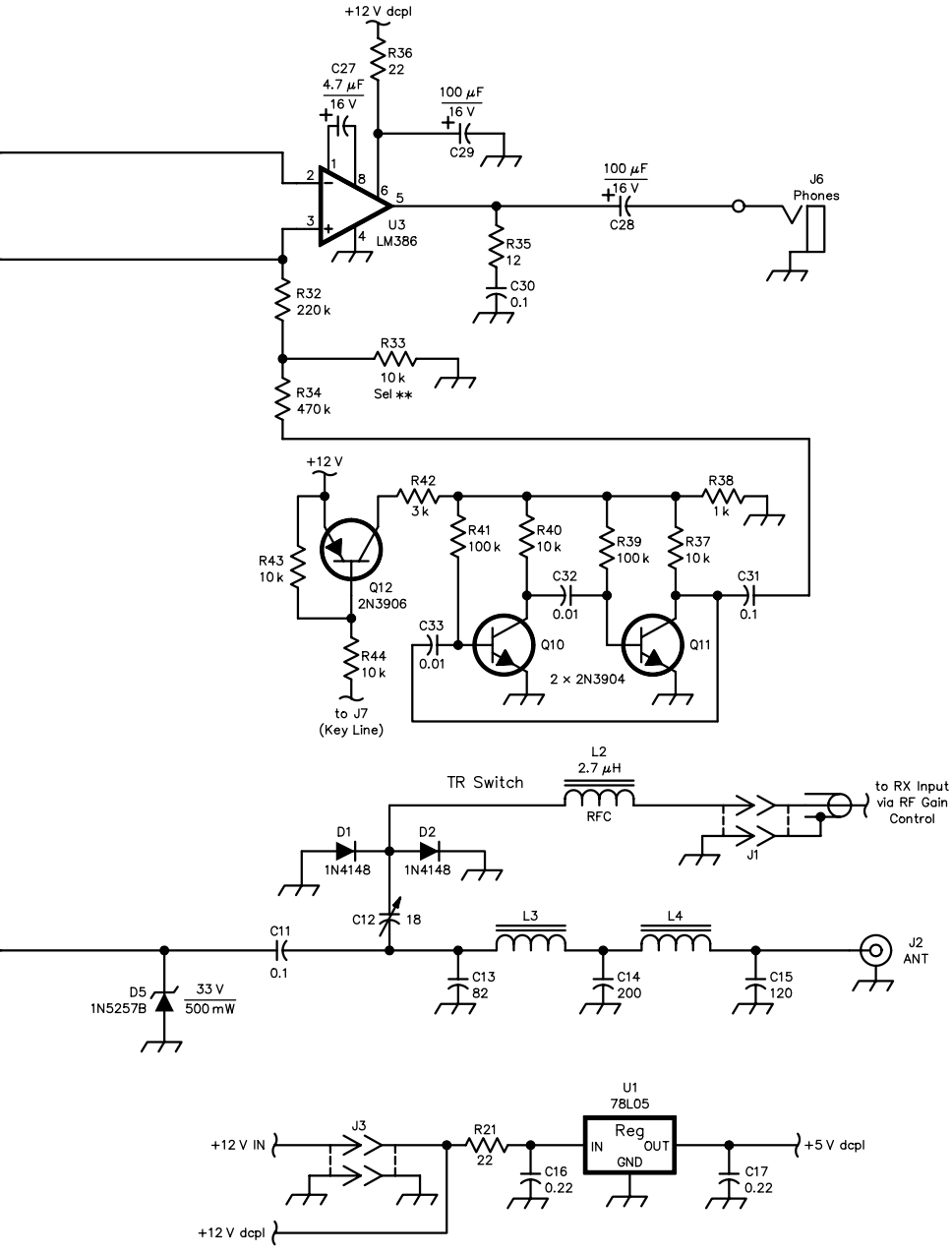
to dodge QRM. It's almost like having receiver incremental tuning (RIT) in a more-refined radio, hence the term AIT: *almost incremental tuning*. We have used the scheme in several simple VFO-controlled transceivers proved in severe portable situations.[8] Timing of the frequency toggle is controlled by the values of R49 and C34. You can reduce the frequency shift (about 1 kHz in our transceivers), by increasing the value of C1.

TR switching is handled by D1 and D2.



The front panel of the dual-range QRP power meter.

C12 and L2 form a series-tuned 28-MHz circuit that routes antenna signals from the transmitter to the **GAIN** control and the receiver. When the transmitting key is pressed (creating a strong signal), the diodes conduct, keeping the received-signal level low enough to prevent damage to mixer U2. Gain is controlled by R100, a panel-mounted potentiometer at the receiver input. Although a trimmer capacitor is used at C12 in the 10-meter transceiver, a fixed-value capacitor is employed in the 40-meter version.



C1—10 m: 5.6 pF; 40 m: 82 pF
C2—10 m: 15 pF; 40 m: 390 pF
C3—10 m: not used; 40 m: 100 pF
C4, C20—10 and 40 m: 4.5-65 pF trimmer (Digi-Key SG3009)
C12—10 m: 4.5-65 pF trimmer (Digi-Key SG3009); 40 m: 33 pF, 5%-tolerance NP0
C13—10 m: 82 pF; 40 m: 360 pF
C14—10 m: 200 pF; 40 m: 820 pF
C15—10 m: 120 pF; 40 m: 470 pF
C18—10 m: 15 pF; 40 m: 56 pF
C19—10 m: not used; 40 m: 180 pF
C27, C34, C35—4.7 µF, 16 V electrolytic
C28, C29—100 µF, 16 V electrolytic
C36-C89—not used.
C90—10 m: not used; 40 m: 390 pF
D1-D4—1N4148 or 1N4152
D5—33 V, 500 mW Zener diode
J1, J3, J5—Two-pin 0.1-inch male headers
J2—SO-239 or BNC
J4—Three-pin 0.1-inch male header
J6, J7—Two-circuit phone jack
L1, L2—10 m: 2.7 µH RFC; 40 m: 15 µH RFC
L3—10 m: 10 turns #24 enameled wire on a T30-6 core; 40 m: 22 turns #26 enameled wire on a T37-2 core; vary turns spacing to adjust power output; see text.
L4—10 m: 9 turns #24 enameled wire on a T30-6 core; 40 m: 19 turns #26 enameled wire on a T37-2 core
L5—10 m: 12 turns #26 enameled wire on a T30-6 core; 40 m: 22 turns #28 enameled wire on a T37-2 core
Q1, Q2, Q3, Q5, Q6, Q10, Q11, Q13, Q14—2N3904 NPN
Q4, Q12, Q15, Q16—2N3906 PNP
Q7-Q9—2N7000 MOSFET
R100—1 kΩ, linear-taper, panel-mount pot
S1—SPDT toggle
T1—10 m: 15 turns #26 enameled wire on T30-6 core, with 3-turn link of #22 enameled wire; 40 m: 30 turns #28 enameled wire on T37-2 core, with a 4-turn link of #22 enameled wire
T2—Pri: 4 turns #28 enameled wire; sec: 1 turn #22 enameled wire on BN-43-2402 ferrite balun core; keep lead lengths short.
U1—78L05 positive 5 V, 100 mA regulator
U2—NE602/NE612 (SA602/SA612) mixer/ oscillator; see text
U3—LM386-4 audio amp
Y1—10 m: third-overtone; 40 m: fundamental mode; Hy-Q type JG07C, HC-49/U holder; see Note 10. Experimenters wishing to try a VXO at 28 MHz should consider using a fundamental-mode crystal.

A Simple Power Meter

Figure 3 is a schematic of a simple dual-range power meter that you can use to test this rig (or other similar power sources). Consider first the 1-W range. D200 rectifies the peak RF voltage appearing across the 50-Ω, 1-W load formed by the parallel combination of R200 and R201. The resulting dc voltage is applied to a voltmeter (formed by R202 and the meter) having a 10-V full-scale reading.

After we built the single-range power meter, we noted that the dc voltage across the meter movement was small. Investigation showed that the meter had an internal resistance of only 100 Ω, a typical value for

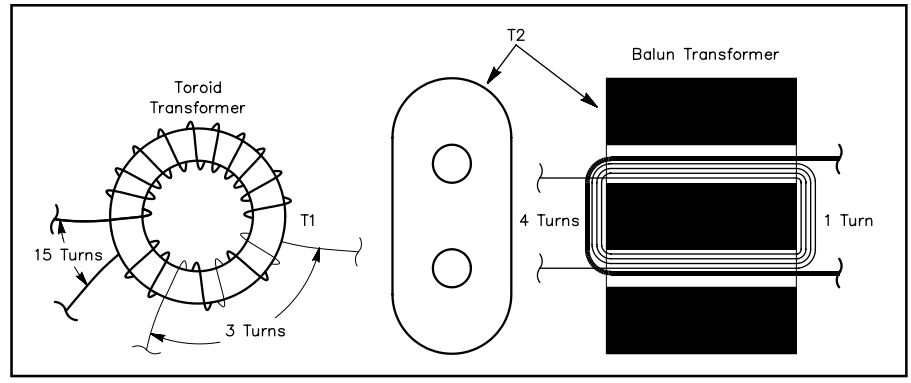
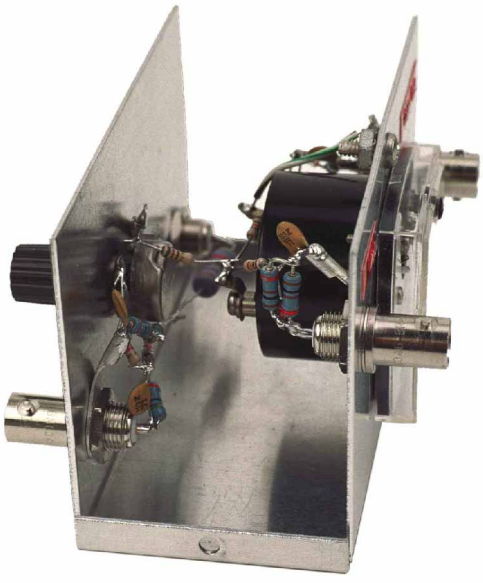


Figure 2—Winding details for the two transformers used in the 10-meter Micro-mountaineer. Each pass through the core center counts as a turn in a traditional toroid, T1 above. But each turn must pass through *both holes* of a balun core (see Note 3).



As this inside view of the power meter shows, it's simplicity itself. The components mounted on the rear panel of the box serve functions unrelated to that of the power meter.

inexpensive 1-mA movements. This allowed us to add a second detector and RF load to form a second, more-sensitive (50-mW) range. We calibrated this against the 1-W meter using the transmitter and a step attenuator, resulting in the calibration chart of Figure 4. This curve may be used directly for approximate measurements.[9]

This power meter includes 50-Ω terminations, acting as loads for whatever source is applied. This design differs from popular in-line power meters used by QRP operators that require an external load.

Building the Transceiver

There are probably as many ways to build this rig as there are experimenters. For our first version, we used "ugly construction."[10] But there are sure to be many prospective builders who want a PC-board version of the transceiver.[11] In any case, we strongly recommend that you build and test the rig as you build it *one stage at a time.*

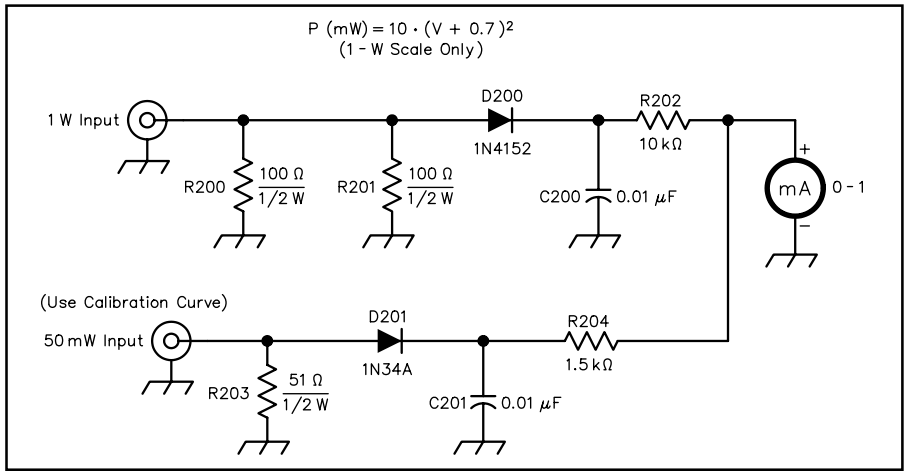


Figure 3—The transmitter can be tested with this simple power meter. When the meter reads 0.5 mA with RF applied to the 1-W input port, the indicated peak RF voltage is 5 V and the power is 325 mW, calculated with the formula shown. D200 is a 1N4152, 1N4148, or 1N914, while D201 is a more-sensitive 1N34A germanium diode.

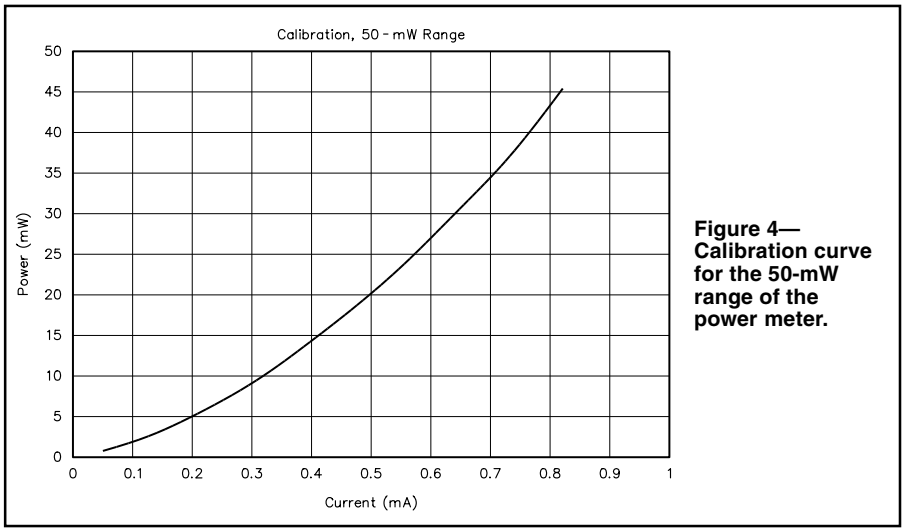


Figure 4—Calibration curve for the 50-mW range of the power meter.

Transmitter Section

Begin by building the crystal oscillator, including the frequency-controlling switch, Q1. Apply power and confirm oscillator operation by listening for its signal in a receiver tuned to the crystal frequency. To test the oscillator, attach the T1 link to a short piece of 50-Ω coaxial cable connected to the power meter. Adjust C4 for maximum output. Using the sensitive (50-mW) range of the power meter, the output from T1 should measure about 10 mW into the 50-Ω load. Only after this measurement is made and confirmed is the transformer secondary (link) attached to the next stage.[12]

Next, build the driver stage (Q3), including the keying switch (Q4) and confirm operation. Start with a 15-Ω resistor for R14, knowing that its value will be adjusted later. Confirm this stage's operation by attaching the output of T2 to a 50-Ω coaxial cable connected to the power meter. The indicated power should be about 35 mW. After testing, the T2 output is routed to the PA transistor bases.

Assemble the PA and output network. Then attach the output to the power meter's 1-W range, apply dc power and press the key. Adjust the circuit for maximum power output by squeezing or compressing the turns on L3. We found it useful to measure the inductor values prior to installing them. For this, we used a small LC meter available from Almost All Digital Electronics.[13]

Receiver Section

Wire the audio amplifier (U3) and test it by listening for a slight hiss in headphones plugged into J6. Touching one of the input leads with your finger or a screwdriver should produce some hum or perhaps even an AM broadcast signal. After building and testing the regulator circuit, U1, assemble the detector (U2) and attach an antenna. Even if it's late at night and the band is dead, you should still be able to hear background noise. Adjust C20 for maximum noise output. If you've got a signal generator, by all means, use it. Signal levels of 0.1 μV are easily copied with this receiver.

If you build this receiver on a PC board that's sitting on a table or workbench, you might observe considerable hum in the receiver. Don't be concerned—this tunable hum will go away once the board is installed in a metal box. With the ugly breadboard unit, the hum was barely detectable, but the hum was considerably louder when testing the PC-board version.

Other Circuits

Once the basic transceiver parts are working, you can start to add the "frills." Install the muting transistors (Q8 and Q9) and related switch, Q16. Make sure you

have a 50-Ω load attached to the transmitter output. (Don't operate the transmitter without a proper load attached.) Then apply power and press the key. You should hear the receiver noise drop to nearly nothing. Add and test the AIT-related parts, followed by the sidetone components. Finally, install the TR diodes and L2/C12 at the PA. Route a coaxial cable between the receiver input and the TR output and adjust C12 for maximum receiver output.

You're now ready to put the transceiver in a box. Avoid using a small enclosure that makes component access difficult. Once the rig is in the box, you might want to adjust R14 (discussed earlier) to maintain the power output at around 500 to 650 mW. For the 10-meter transceiver, we ended up with a value of 33 Ω for R14; on 40 meters, R14 is 47 Ω. It's also wise to anticipate changing R33's value for sidetone-level adjustment.

Putting the Rig on the Air

Now it's time to see what the rig can do! As always, a lot depends on the antenna used. We used a modest dipole at 30 feet. When we first put the rig on the air, 10 meters was open, but relatively quiet. After calling CQ a few times, a station 2000 miles away answered. Following a 20-minute chat, we ended the QSO by getting his e-mail address so we could QSL with a digital photo of the rig. The following day was even more productive, netting contacts from Vermont to Alaska.

Good operating practice calls for *listening first* to be sure that the frequency is not in use before calling CQ. If an answering station returns your call right on the same frequency, you'll hear the signal shortly after releasing the key, and at a pitch equal to the offset. By switching in the AIT, you can pick the best place to answer any other station that might have responded.

Concluding Thoughts

Although *any* QRP activity can be great fun, 10-meter CW QRP is about as good as it gets! You can work the world with a watt or less, even with a modest antenna. But the good band conditions won't be with us forever, so seize the moment!

Aggressive experimenters will want to consider expanding the performance of this transceiver. The rig can, of course, be put on bands other than 10 and 40 meters. The next refinement of interest is more flexible frequency control. Probably the simplest way to accomplish this is with a VFO. VFO stability is not as easy to obtain at 28 MHz as it is on lower bands, so a heterodyne approach may be required. In any case, use care to maintain spectral purity.

Builders of the original Micromountaineer often converted the oscillator to a VXO. This is considerably more difficult to do with overtone crystal-oscillator circuits than it is with fundamental crystal-oscillator circuits. It's also challenging to implement an offset circuit with uniform frequency shift in a VXO. But let's see what *you* can do!

Notes

[1]Wes Hayward, W7ZOI, and Terry White, K7TAU "The Mountaineer—An Ultraportable CW Station," *QST*, Aug, 1972, pp 23-26.

[2]Wes Hayward, W7ZOI, "The Micromountaineer," *QST*, Aug, 1973, pp 11-13 and 45. Also see Wes Hayward, W7ZOI, and Doug DeMaw, W1FB, *Solid-State Design for the Radio Amateur* (Newington: ARRL, 1977), p 219.

[3]Experiments easily demonstrate that there is minimum coupling from one hole to the next. A single winding through one hole produced a signal 16 dB lower in a single winding in the other hole. When both windings were in the same hole, the loss was only 4 dB. Measurements were at 28 MHz with 50-Ω terminations.

[4]The network was originally designed as a 31-MHz, 0.1-dB ripple Chebyshev low-pass filter with 50 Ω terminations at each end. L3 and C13 were then modified using Smith Chart analysis to provide a 28-MHz impedance of 100+*j*0 Ω at the PA collectors.

[5]Rick Campbell, KK7B, "Unwanted Emissions Comments," Technical Correspondence, *QST*, Jun 1998, pp 61-62.

[6]John Dillon, WA3RNC, "The Neophyte Receiver," *QST*, Feb 1988, pp 14-18.

[7]Rick Campbell, KK7B, "High-Performance Direct-Conversion Receivers," *QST*, Aug, 1992, pp 19-28.

[8]Read more about portable operation beyond the traditional mobile situations at the Web site for the Adventure Radio Society, **www.natworld.com/ars** and look at the online magazine, *The ARS Sojourner*.

[9]RadioShack sells a 0-15 V dc meter (RS 22-410), which is a 1-mA meter movement equipped with an external 15 kΩ resistor. The resistor is not needed in this application.

[10]This method is a point-to-point wiring scheme using circuit board scraps serving as a ground foil. Most components are supported by other components if they are not themselves soldered to the ground foil. Additional mechanical supports can be added in the form of dummy resistors of high value. See Roger Hayward, KA7EXM and Wes Hayward, W7ZOI, "The 'Ugly Weekender'," *QST*, Aug, 1981, pp 18-21. Also, visit our Web page at **www.teleport.com/~w7zoi/bboard.html**.

[11]A double-sided, plated-through-hole PC board and a component collection (but *not a kit*) are available from Kanga USA. See their Web site for price and availability information: **www.bright.net/~kanga/kanga**. The crystal used in this circuit is a third-overtone type in an HC-49 package. We recommend Hy-Q type JG07C from Hy-Q International, 1438 Cox Ave, Erlanger, KY 41018-3166; tel 606-283-5000, fax 606-283-0883; e-mail **sales@hyqusa.com**, **http://www.hyqusa.com**. The 10-meter QRP calling frequency is 28.060 MHz. A crystal lower in the band might be more productive for DX enthusiasts.

[12]This is a substitutional measurement, which is typical of RF studies. In contrast, most measurements in analog electronics are in situ (in place) measurements where probes are attached to functional systems.

[13]Almost All Digital Electronics 1412 Elm St SE, Auburn, WA 98092; tel 253-351-9316, fax 253-931-1940; e-mail **neil@aade.com**; **www.aade.com**.

Wes Hayward, W7ZOI, was first licensed in 1955 while in high school. A career in electron-device physics and circuit design took him to companies in the western states. Wes is now semi-retired, devoting his time to writing and research, with a smattering of backcountry hiking. You can contact Wes at 7700 SW Danielle Ave, Beaverton, OR 97008; **w7zoi@teleport.com**.

Terry White, K7TAU, taught himself Morse code and theory and received his Novice license, KN7TAU, in 1962. Employment has taken him worldwide, operating from New Delhi, India (VU2TAU) and Fairbanks, Alaska (KL7IAK). In 1992, he joined TriQuint Semiconductor in Hillsboro, Oregon, and is part of the advanced-receiver development group. Terry enjoys homebrewing his radios and test equipment with a twist on craftsmanship to each project. You can contact Terry at 9480 S Gribble Rd, Canby, OR 97013; **twhite@TQS.com**.

NEW PRODUCTS

UHF RF VOLTAGE PROBE FOR YOUR DVM

◊ Voltage and frequency are fundamental measurements on any electronics workbench. At high frequencies the equipment required for voltage measurements is typically expensive—real time oscilloscopes for use at and above 400 MHz can cost tens of thousands of dollars.

A company based in Melbourne, Australia, RF Probes Pty Ltd, now offers the RFP 5401A passive RF probe. The new probe is designed to allow the use of a DVM for measurement of in-circuit RF voltages and features a specified sensitivity of 10 mV and a claimed frequency response from 100 kHz to 750 MHz. (Usable reading are said to be obtainable beyond 1 GHz at reduced sensitivity.) The input stage is protected for a maximum of 70 V rms.

The fine probe tip is made of high tensile stainless steel to withstand repeated applications without blunting. The small tip size makes the unit especially well suited for probing surface mount components.

The RFP 5401A comes in a carry case with a plug-in ground lead (mandatory for high frequency use) and output leads with banana plugs for direct connection to nearly any DVM.

More details, including pricing and ordering information, are available on the company's Web site: **http://www.rfprobes.com.au/**. RF Probes Pty Ltd, ACN 083 078 264, PO Box 6, Greensborough 3088, Melbourne, Australia; tel 011-61-3-94321936; fax 011-61-3-94447750; **admin@rfprobes.com.au**.

Next New Product

By Earl W. Cunningham, K6SE

Flags, Pennants and Other Ground-Independent Low-Band Receiving Antennas

These simple, geometrically shaped etheric transducers work well no matter what the geologic characteristics beneath them may be.

Invented almost 80 years ago, the Beverage antenna is still the receiving antenna of choice among 160-meter DX enthusiasts. But not all amateurs have the necessary real estate to install a relatively short—550-foot—version of this antenna. Many of these "Topbanders" with limited room try using other smaller antennas (such as a small loop) in an effort to dig out those weak DX signals that they can't hear when using their noisy transmit antenna for receiving as well.

When Floyd Koontz, WA2WVL, wrote about an innovative directional receiving antenna called the Ewe, many Topbanders were inspired to try this relatively simple and easy-to-install antenna.[1] From the reports that appeared on the Topband reflector, many users were quite pleased with the results—however, just as many appeared too unhappy with its performance.

Why Some Ewes Don't Work

When I used *EZNEC*[2] to model the antenna, a possible cause of why some Ewes don't work became apparent: the soil conductivity over which the antenna is installed. The excellent azimuth pattern of a Ewe optimized for best F/B over average soil deteriorated greatly when I varied the soil conductivity from very poor to very good.

I then modeled Ewes for various soil conditions and found that the optimum antenna dimensions and termination-resistor value for best F/B ratio on 160 meters varied significantly with soil-conductivity changes. For example, an optimized 10-foot-high Ewe over very poor soil is 24 feet long and uses a 2295-Ω termination resistor, while an optimized Ewe over very good soil is 50 feet long and uses a 775-Ω termination resistor.

Although the feedpoint resistances for the optimized Ewes are approximately 450 Ω, all have a significant amount of reactance at the feedpoint, so performance degradation caused by improperly matching the feed line to the antenna could also exist. Although the optimized Ewes display a F/B of greater than 60 dB on 160 meters, when they were computer-modeled on 80 meters, the F/B deteriorates to about 15 dB.

In December 1997, I posted these findings on the Topband reflector. That resulted in some Ewe users experimenting with ways to alleviate the problems associated with varying soil conditions. Most of these attempts simply use a wire to connect the bottom ends of the Ewe together.

The Birth of the Pennant and Flag Antennas

It appeared that the primary problem with the Ewe was its dependence on the underlying ground. Jose, EA3VY, informed me by e-mail that he would attempt to find an answer to the problem by computer modeling. In January 1998, Jose sent me the details of an antenna he called a "terra-proof Ewe," elevated above ground and totally independent of any ground connection. When the underlying soil conductivity was varied, there was virtually no change in the antenna's directional characteristics. The triangular antenna resembles an elongated pennant with a 9.84-foot vertical section. The antenna's top and bottom wires meet at a point of the pennant 49.20 feet away from the vertical section. The bottom of the antenna, 3.28 feet above ground, is fed at the center of the vertical section, with a 725-Ω terminating resistor at the point of the pennant. This antenna exhibits a F/B of 23 dB on 160 meters, with a cardioid azimuth pattern similar to the pattern of a Ewe. Like the Ewe, however, the null at the back of the cardioid on 80 and 40 meters is not very deep, however, so it appeared to still be a single-band antenna.

A few days later, Jose sent me modified designs of an antenna that has a longer vertical side and a shorter distance between the vertical section and the point of the pennant. He also sent details of a rectangularly

An aptly named Pennant antenna.

[1]Notes appear on page 37.

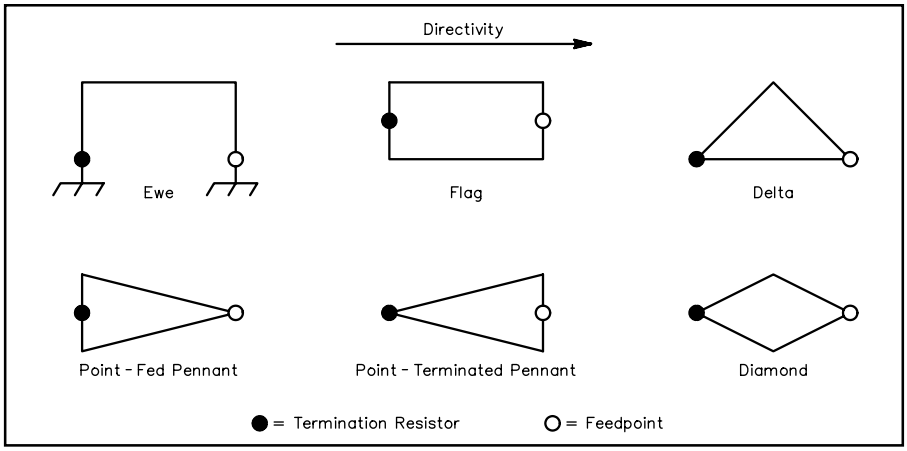


Figure 1—Configurations of the antennas described in this article. The dimensions of the Flag, both Pennants and the Diamond are 29 feet by 14 feet. The Delta is 17 feet high and 28 feet long. The ground-independent antennas are 6 feet above ground.

shaped terra-proof antenna. In addition to being terra-proof, these new designs are quite broadband. Between 1.8 to 7.3 MHz, they exhibit a null at the rear of the cardioid pattern at least 20 dB down from the front. Jose invited me to experiment with computer modeling to see if the designs could be improved. At this point, I began calling Jose's pennant-shaped terra-proof Ewe a "Pennant"; the rectangularly shaped antenna I dubbed the "Flag." Figure 1 illustrates all of the antennas described in this article. Supports used for the antennas should be nonmetallic.

The Final Pennant Design

One thing I noticed about Jose's design is that there is only a small amount of reactance at the feedpoint. I decided to try to optimize the designs by adjusting the antennas' dimensions so that the feedpoint resistance on 160 meters was close to the termination resistor value and the reactance was zero. That would make the antenna virtually nonresonant and easy to feed with an impedance-matching transformer.

By juggling the dimensions and termination value in the 160-meter model, I arrived at a design that was close to being a nonresonant antenna. The final Pennant design (the Point-Terminated Pennant) has a 14-foot vertical section, with the point of the Pennant 29 feet from the vertical section. The bottom of the Pennant is 6 feet above ground and the termination-resistor value at the point is 903 Ω. At the rear of the cardioid pattern, the null is 37.5 dB down from the front. Feedpoint resistance is 860 Ω with zero reactance.

Varying the model's ground conductivity from very poor to very good shows that the greater-than-37-dB F/B cardioid pattern is virtually unchanged even at the extremes. Varying the antenna height from 1 foot to 25 feet has virtually no effect on the pattern or feedpoint impedance. There is a deep null to the rear on 3.8 MHz and 7.2 MHz, and the feedpoint resistance on those two frequencies is still in the vicinity of 900 Ω with very little reactance.

Next, I reversed the locations of the feedpoint and termination resistor, placing the feedpoint at the Pennant's point (Point-Fed Pennant) and the resistor at the center of the vertical section. Curiously, I had to reduce the resistor value from 900 Ω to 860 Ω; the feedpoint resistance equaled 903 Ω, exactly the *opposite* values of those in the Point-Terminated Pennant! The Pennant dimensions remained the same. The characteristics of this Pennant are similar to those of the point-terminated version. Figures 2 and 3 show the elevation and azimuth plots for a Point-Fed Pennant over good soil. These patterns are typical for any of the ground-independent antennas.

The Flag, Diamond and Delta Antennas

Optimizing EA3VY's rectangular-shaped terra-proof Ewe resulted in a loop with two 14-foot vertical sides and two 29-foot horizontal sides. The termination-resistor value is 945 Ω and the resistor is placed at the center of one of the vertical sections. The feedpoint is at the center of the other vertical section. The feedpoint resistance on 160 meters is also 945 Ω with zero reactance and the null at the rear of the cardioid pattern is 35 dB down from the front. These parameters change very little on 80 and 40 meters. The gain of the Flag is about 5.5 dB greater than that of the Pennant on 160 meters.

Anticipating that some users might want to build a rotatable version of a terra-proof Ewe, I designed a configuration that can be made using a construction method similar to that of a cubical-quad element. This antenna, shaped like a small rhombic vertical antenna, I dubbed the Diamond. It has a vertical dimension of 14 feet and a horizontal dimension of 29 feet. The termination and feedpoint resistances of this antenna are each 925 Ω.

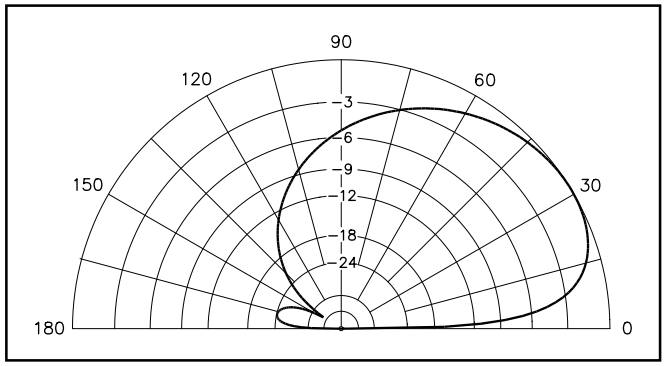


Figure 2—Elevation plot for a point-fed Pennant over good ground (typical of any of the ground-independent antennas).

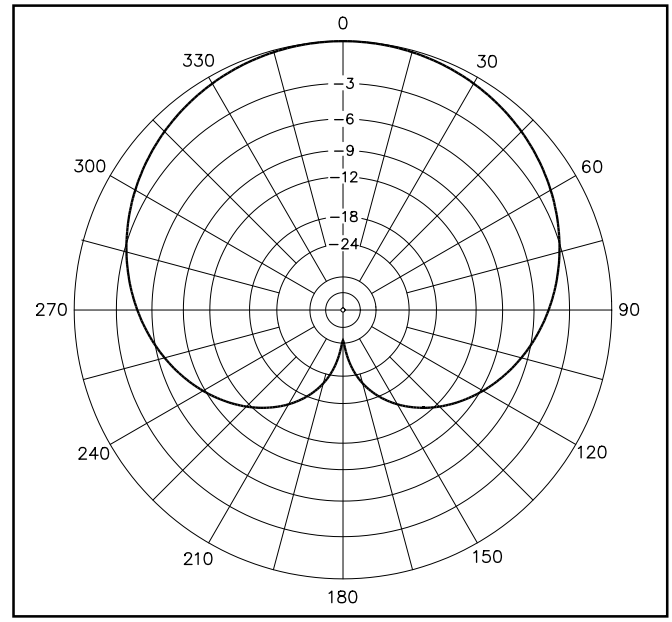


Figure 3—Azimuth plot for a point-fed Pennant at a 30° elevation angle over good ground (typical of all of the ground-independent antennas).

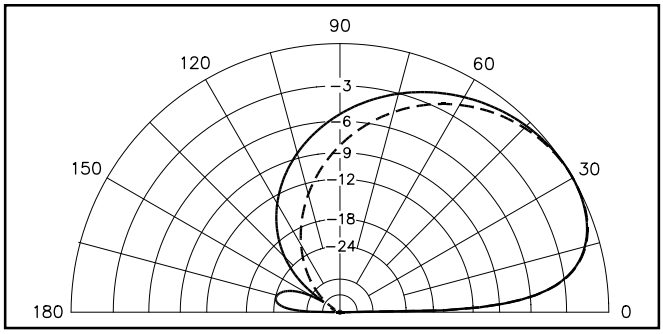


Figure 4—Combined plots of point-fed antennas. The dashed line shows the elevation plot for two point-fed Pennants in the end-fire configuration over good soil. Spacing is 135 feet with 90° phasing. The solid line shows the elevation plot over good ground for two point-fed Pennants spaced 315 feet in a broadside configuration and fed in phase.—*Tnx N6BV*

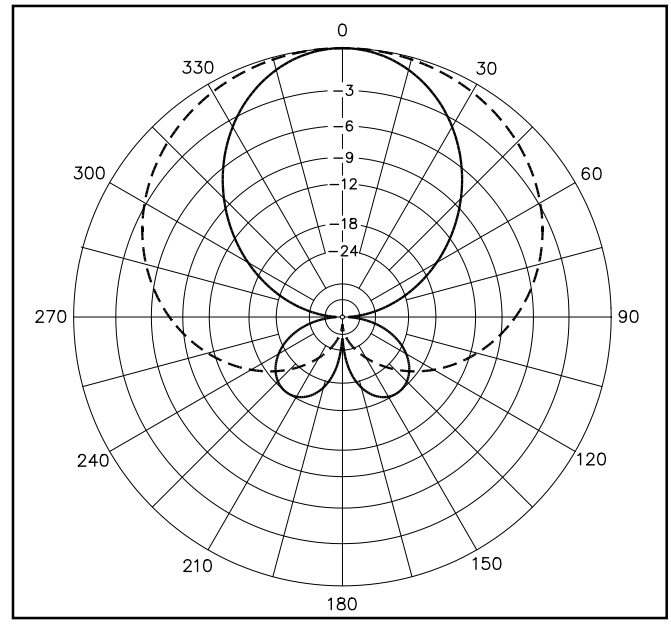


Figure 5—The dashed line is an azimuth plot at 30° elevation for end-fire Pennants over good soil with 135-foot spacing and 90° phasing. The solid line depicts an azimuth plot at a 30° elevation angle over good ground for two point-fed Pennants spaced 315 feet and fed in phase.—*Tnx N6BV*

A delta-shaped configuration that I developed lends itself to rotatable use; it is very similar to the Delta-loop-shaped Ewe described by John Devoldere, ON4UN, in *Low-Band DXing*.[3] The Delta measures 17 feet vertically and 28 feet horizontally, with the termination resistor at one bottom corner of the triangular loop and the feedpoint in the other bottom corner. The feedpoint resistance and termination-resistance values on 160 meters are each 948 Ω.

Feeding the Antenna

All of these antennas exhibit very low gains on the order of −30 dBi to −36 dBi; therefore, any signal picked up on the feed line degrades the good directional and S/N characteristics of the antenna. A suitable matching transformer can be made to step down the 900-Ω impedance of an antenna to 50- or 75-Ω coax by using two single-wire windings on an Palomar FT-140-43 toroid core. The low-impedance winding for the coax feed line should be 8 turns, and the high-impedance winding for the feedpoint should be 34 turns if 50-Ω coax feed line is used, or 28 turns if 75-Ω coax is employed. For minimum direct coupling, space the two windings from each other by placing them on opposite sides of the toroid core.

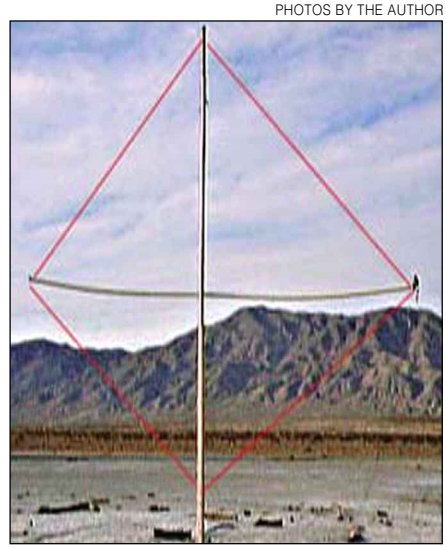
Another transformer, recommended by Tom Rauch, W8JI, is made of an Ameritron 412-5250 binocular core with a two-turn winding for the feed line and 8½ turns for the antenna winding if 50-Ω coax is used, or seven turns if 75-Ω coax is used. Type 73 and type 77 cores may also be used. Because of the low gain of these antennas, you should use a preamplifier ahead of the receiver.

The antenna pattern can be degraded by common-mode currents on the feed line caused by connecting the unbalanced coax to the balanced transformer winding. This can be alleviated by using a choke balun at the transformer end of the cable. The choke is made by winding 10 to 12 turns of the feed line into coil about 12 inches in diameter. Another method is to use enough high-mu ferrite beads at the transformer end of the cable to cover about 12 inches of the coax.

Multi-Element Arrays of the Antenna

I used *EZNEC* to model arrays of the Point-Fed Pennant in two-element end-fire, two-element broadside and four-element end-fire/broadside configurations. In the end-fire configuration, with 135-foot spacing and with the lead element fed 90° lagging, the cardioid pattern is narrower and has a gain of about 3 dB over a single Pennant. The minor lobe at the rear disappears and the null at the rear of the cardioid is much deeper. Figures 4 and 5 show the elevation and azimuth plots for a two-element Pennant end-fire array over good ground.

PHOTOS BY THE AUTHOR



A Diamond form of the antennas described in this article.

Figures 6 and 7 show the elevation and azimuth plots for two Point-Fed Pennants in a 315-foot-spaced broadside configuration with both elements fed in phase. This configuration provides a gain increase of about 3 dB and a much narrower azimuth pattern compared to that of a single Pennant.

If you have the room, the ultimate receiving antenna might consist of four Pennants in an end-fire/broadside configuration with a 135-foot end-fire spacing and 315-foot pair spacing. The azimuth pattern for this array rivals a 2-λ Beverage antenna. See Figures 6 and 7.

Switchable-Direction Antennas

Two or more antennas can be installed to cover multiple directions. If the antennas are adjacent one another, only one feed line and one impedance-matching transformer are required. However, modeling shows that this cannot be done if the *vertical sections* of two antennas are adjacent to each other because of the coupling between the closely spaced vertical wires. This means that a Flag antenna cannot be used for this purpose, nor can the Pennant be used if its vertical sections are adjacent to each other. Modeling shows that the Point-Fed Pennant can be used for this purpose when the Pennants are installed point-to-point. The Diamond and Delta can also be used in a switchable-direction array.

The feedpoints of all of the antennas used in a switchable-direction array can be conveniently located closely to one another, so a common *nonmetallic* support mast can be used where the feedpoints meet. A common feed line can be permanently connected to the low-impedance winding of the matching transformer, switching the transformer feedpoint winding between elements. *Both* sides of the feedpoint must be switched to totally isolate the unused antenna(s) from the active antenna.

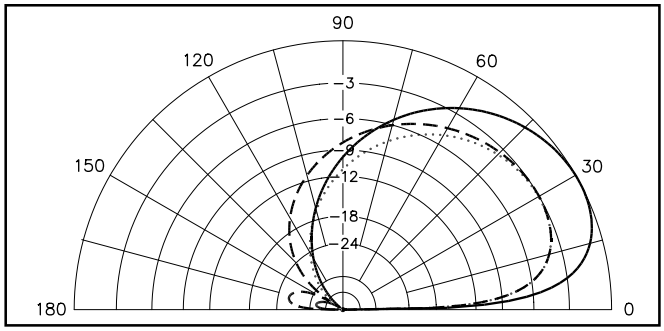


Figure 6—Combined elevation plots of three antennas over good soil. The dashed line is the pattern of two point-fed Pennants spaced 315 feet in a broadside configuration and fed in phase. The dotted line is the pattern of two point-fed Pennants in the end-fire configuration, spaced 315 feet apart and fed with 90° phasing. The solid line is that of a four-element point-fed Pennant array with 135-foot end-fire spacing and 315-foot broadside spacing with the lead elements fed –90° out of phase with the in-phase broadside elements.—*Tnx N6BV*

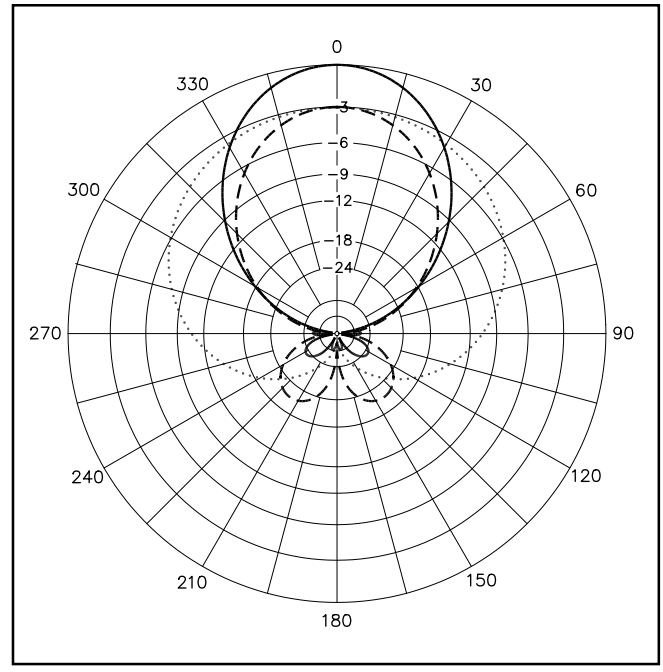


Figure 7—Combined 30° elevation azimuth plots of two point-fed Pennants spaced 315 feet apart and fed in phase (dashed line), end-fire Pennants with 135-foot spacing and 90° phasing (dotted line) and the four-element end-fire/broadside point-fed Pennant array (solid line) over good ground.—*Tnx N6BV*

For a two-direction switchable array, this is easily done using one DPDT relay. As more directions (and elements) are added, the switching circuitry becomes more complex.

Spreading the Word

In August 1998, I described these ground-independent antennas in postings on the Topband reflector. In September 1998, an article titled "Banderas y Gallardetes" (Flags and Pennants) co-authored by Jose Mata, EA3VY, and me appeared in the Spanish edition of *CQ Magazine*. This generated a great amount of interest in the low-band DXing community and Pennants and Flags began popping up all over the world.

Testing the Pennant

I erected two Point-Fed Pennants at K6SE to see if the antenna behaved as well in the real world as it did in the computer. I installed the Pennants in a point-to-point configuration in directions exactly opposite to each other. A local ham, Will Angenent, K6NDV, volunteered to participate in the tests, so the direction chosen for installation was directly toward (and away from) his location, which is 4.6 miles distant.

In the receiving tests, K6NDV transmitted a carrier and adjusted the power level so that my receiver's S meter indicated S9 on the Pennant pointing toward him. In the first test, when I switched to the Pennant in the opposite direction, there was absolutely no difference! The same results were obtained on 80 meters.

The Pennants were located near the 160- and 80-meter shunt-fed towers I use for transmitting. Suspecting possible interaction, I adjusted the tuning capacitors at the bases of the two towers to detune them and we repeated the tests.

With my towers detuned, the results were very gratifying. On 160 meters, the difference in received signal when switching directions was seven S units; on 80 meters, the difference was six S units! Assuming 6 dB per S unit, this is almost exactly what *EZNEC* had predicted. The lesson I learned here is that some Ewes may not work because a resonant vertical antenna is nearby.

K6NDV didn't have a vertical 40-meter transmitting antenna (the Pennant and its relatives respond to vertically polarized signals), so we couldn't repeat the test on that band. However, we noted a difference of three to seven S units when switching the antennas while listening to sky-wave signals on 7 MHz.

Summary

Soon after the word about these antennas began to spread, e-mail reports from radio amateurs using them began coming in. Here are some of those reports.

"Without the Delta receiving antenna, we would not have been able to hear the weak 160-meter signals, especially the Europeans.—FO0AAA (Clipperton 2000 DXpedition)

"I use a rotatable Flag mounted on my 160-meter shunt-fed tower. It is my primary receiving antenna. I use a TR relay at the base of my tower to short out my shunt feed when receiving."—K6UR

"Ewes never worked here, so I installed two Flags and am pleased with their performance. When comparing my EU Flag with my 585-foot EU Beverage, the Flag is about an S unit down, but the S/N is better."—K3SX

"We spent three days listening to the rest of the US work ZL9CI on 160 meters while we couldn't hear him, so AD6C and I hastily put up a Pennant and he was Q5 copy. Thanks a bunch!"—N6DX

"I have a Diamond up and it works well on 160-40 meters."—K5AQ

"I put up a Pennant for the US and a Flag for Africa to compare with my old phased loops. I now copy W7, W5, and W0 comfortably on the Pennant and EL2WW is two S points stronger on the Flag than on the phased loops."—G4VGO

"The Pennant has made a remarkable difference for me on 160 and 80 meters. QSOs with CN8WW and EL2WW on Topband and JA on 80 meters would have been impossible without it. Using the Pennant as my receive antenna has made me not only a convert, but a disciple."—VE3UOL

"With 24 dB of preamplification on 160 meters, my broadside Pennants (225-foot spacing) for EU on 160, they are quite comparable to my four-square, and with a much quieter noise floor. The difference on weak EU 160-meter signals compared to my long EU Beverage is quite small. On 80 meters, the antenna needs only about 12 dB of preamplification and is a real performer, as good as my 80 meters four-square looking into Europe."—K1ZM

"On 80 meters, the Europeans are very readable on my roof-mounted Pennant here in Buenos Aires. On 40 meters, the antenna is a sweetheart."—LU/KY0C

Perhaps you, too, ought to give one of these antenna designs a try!

Notes

[1]Floyd Koontz, WA2WVL, "Is this Ewe for You?", *QST*, Feb 1995, pp 31-33.

[2]*EZNEC* is available from Roy Lewallen, W7EL, PO Box 6658, Beaverton, OR 97007; tel 503-646-2885, fax 503-671-9046; **w7el@teleport.com**.

[3]John Devoldere, ON4UN, *Antennas and Techniques for Low-Band DXing*, (Newington: ARRL, 1994, 2nd ed.)

Earl W. Cunningham, K6SE, was first licensed in 1955 as W8DGP (General class); he obtained his Extra class license in 1963. In 1973, Earl received his BSEE from the University of Houston and was employed by General Electric and Northrop Aircraft Corporation. Earl retired in 1994. You can contact Earl at 41041 27th St W, Palmdale, CA 93551; **k6se@arrl.net**. QST

By Rudy Severns, N6LF

Verticals, Ground Systems and Some History

What makes a vertical antenna cook? Here you can gain some insight as to what this popular antenna likes and dislikes.

Over the past 100 years, beginning with Marconi and continuing to this day, vertical antennas and their associated ground systems have received considerable attention. Many fine articles and technical papers have explained the finer points of vertical antenna operation. Sometimes we forget the information's origins—and sometimes the wisdom gets a little distorted. Occasionally it's worthwhile to revisit the earlier work and recognize how the old relates to present-day applications.

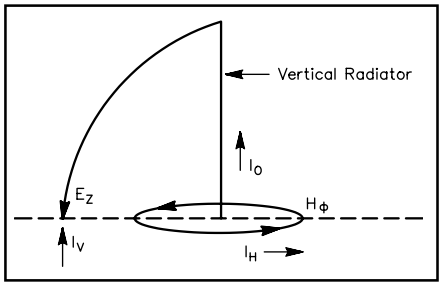


Figure 1—Fields and ground currents near the base of a vertical antenna.

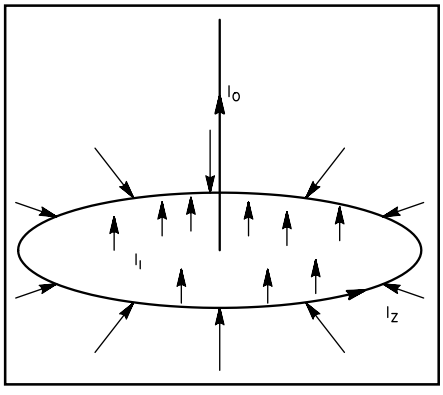


Figure 2—Definition of the current zone near the base of a vertical antenna. I_z represents the total current flowing through a zone at a given radius (r_1) by assuming the current is u niform to a depth of one skin depth (δ) as shown in Figure 13.

Research

A few years ago, I decided to get on 160 meters and wanted an effective antenna. I decided on a vertical of one form or another, but soon realized that I really didn't have a good understanding of how to get the best performance from a vertical. That led me to research the amateur and professional literature and discover a treasure trove of information.

Examining these early papers, I was struck by the depth of understanding and the quality of the work, both analytical and experimental. These papers represent a tremendous amount of effort—especially when you realize that up until a few years ago, all the computations were done manually with nothing more advanced than a pencil, a slide rule or a mechanical adding machine! Today, personal digital computers, equipped with a variety of software quickly manipulate the most complex expressions. With the software, it's easy for us to examine and manipulate mathematical expressions derived in earlier work and mine them for new understanding and insights. We now have antenna-modeling programs that are nothing short of magical, although their magic must be used with some caution. It's important to not only have a fundamentally solid understanding of antennas, but the modeling programs as well.[1]

[1]Notes appear on page 44.

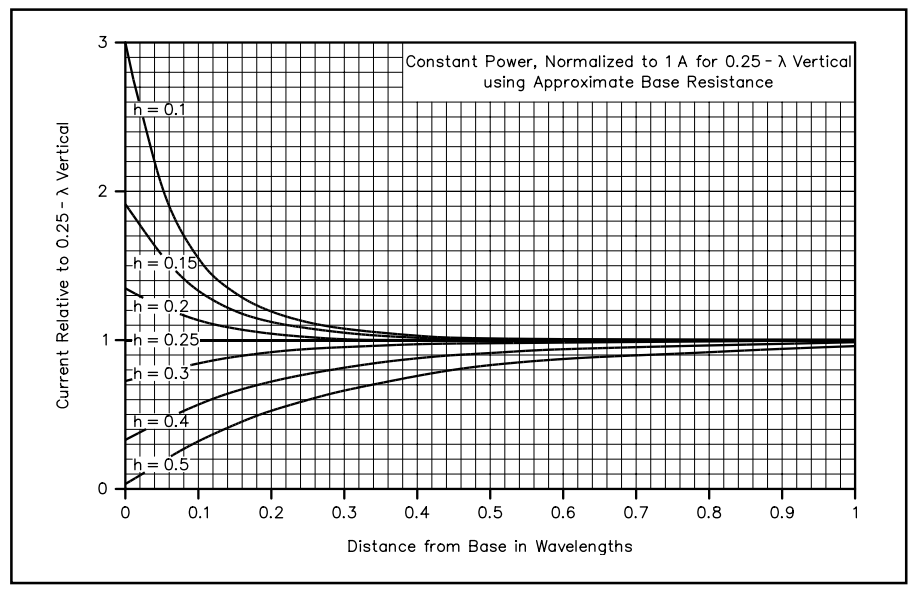


Figure 3—Plot of the current in amperes at the base of a vertical as a function of height and radius in wavelengths. The current in the base of the 0.25-λ antenna is assumed to be 1 A and the currents in the other antennas are adjusted to maintain the same input power.

What follows is a short tour of some of the earlier work that explains some of the lore of verticals and where it came from. I put the math in an Appendix and generated graphs for the discussion. All the graphs were done using a spreadsheet. After reading this article, I recommend you explore for yourself using the equations in the Appendix. The integration of power for Figure 6 was done with *Maple*; *MathCad* or *Mathmatica* would also do fine. You can also do integration with a spreadsheet.[2]

George Brown

In the mid-1930s, radio broadcasting was coming of age and the Institute of Radio Engineers (IRE) proceedings had many papers on vertical antennas and associated ground systems. One of the more influential writers of the time was George H. Brown. A series of papers written by Brown and his colleagues[3,4,5,6,7,8,9,10] at RCA have proved over time to be the most influential. The 1937 IRE paper (see Note 9) has been repeatedly referred to in Amateur Radio publications and is the basis for many later articles.[11,12,13,14,15,16,17,18,19] (References 16 and 19 have extensive bibliographies for further study.) At the time, these papers were so influential that they became the basis for the FCC standards for broadcast antenna installations! The way we think about verticals today has, in large part, been shaped by this work.

George Brown received his PhD from the University of Wisconsin-Madison in 1933. The core of his dissertation[20] is an analysis of the fields and ground currents associated with a vertical antenna with an extensive buried-radial ground system. This became the basis for much of the work that followed. Brown's work contains a great deal of analysis in addition to experimental results.

Papers on broadcast verticals were not Brown's only contributions to antenna art. He is credited with inventing the ground-plane antenna and wrote numerous other papers on antenna subjects. In later years, Brown was the director of the RCA Sarnoff laboratory. Although not a ham, George Brown contributed enormously to Amateur Radio.

A Closer Look at Verticals

A vertical antenna has two field components that induce currents in the ground around the antenna. Figure 1 shows (in a general way) the electric (E, V/m) and magnetic (H, A/m) field components in the region near the antenna. Because the soil near the antenna usually has a relatively high resistance, both of these field components can induce currents (I_V and I_H) in the ground surrounding the antenna resulting in losses. The worms may enjoy the heated ground, but the power dissipated there subtracts from the radiated power, weakening the signal. As indicated in Figure 1, the tangential component of the H field ($H\phi$) induces horizontal currents (I_H) flowing radially and the normal component of the E field (E_z) induces vertically flowing currents (I_v). Actually, things are a bit more complex than this, but we don't need to thrash that to understand conceptually what's going on. Introducing a system of ground wires, buried or elevated, modifies the current flowing in the ground and (hopefully) reduces loss.

Brown's work was primarily concerned with broadcast antennas in the 0.5 to 1.5 MHz range, although some of his experimental work was carried out at 3 MHz. To make the analysis tractable he made several assumptions:

- The ground system would consist of a large number of radials buried a short distance below the surface.
- The ground characteristics were predominately resistive, ie, dominated by conduction currents, so displacement currents could be ignored.
- Because of the extensive ground screen and its shallow depth, the E-field losses were assumed to be small.

For his work, these assumptions were good approximations, but they are not en-

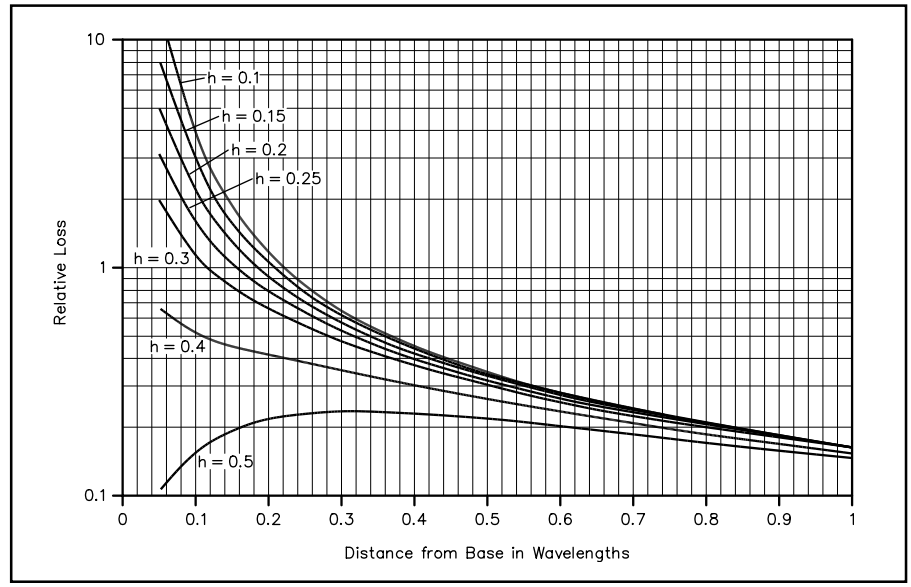


Figure 4—Relative ground loss for several different height verticals. The loss is normalized by allowing the expression which takes into account skin depth and ground conductivity to be equal to 1.

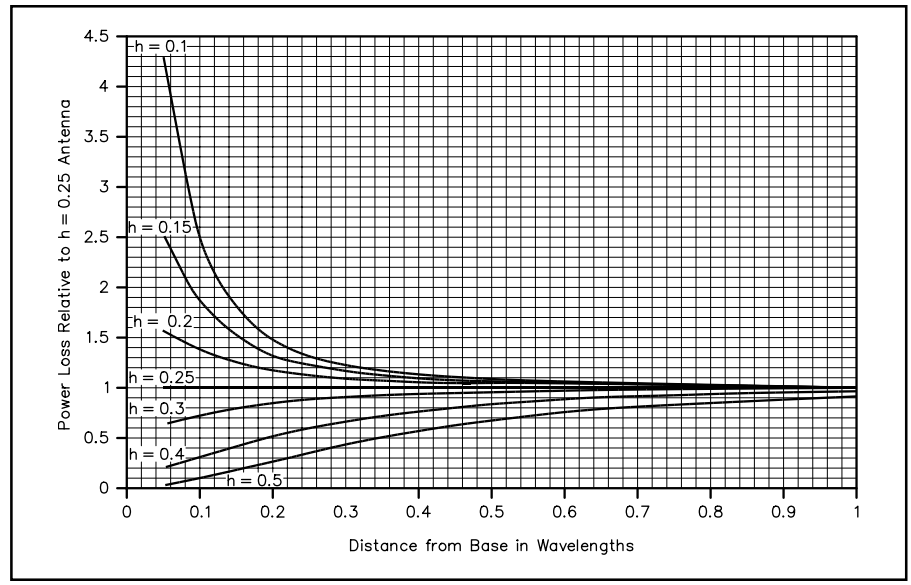


Figure 5—Ground loss at a given radius relative to a 0.25-λ vertical.

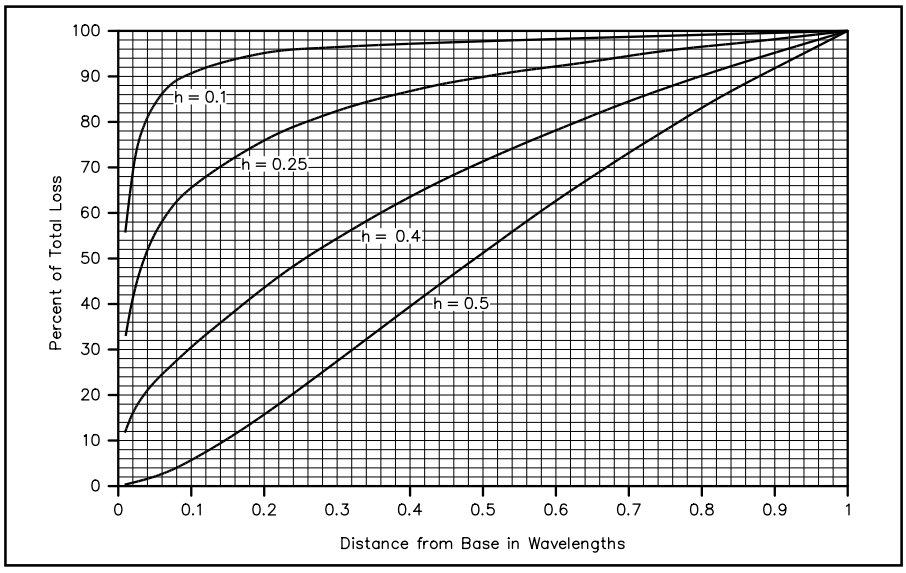


Figure 6—Percent of total ground loss within a given radius (in wavelengths) relative to the total loss at 1-l. This is a measure of the effectiveness of a ground system of a given radius.

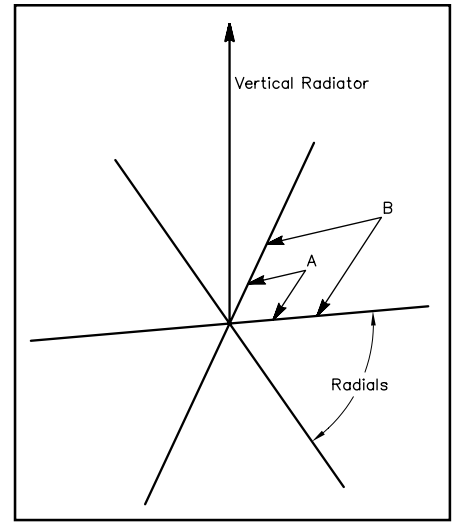


Figure 8—Current entering the ground between radial wires.

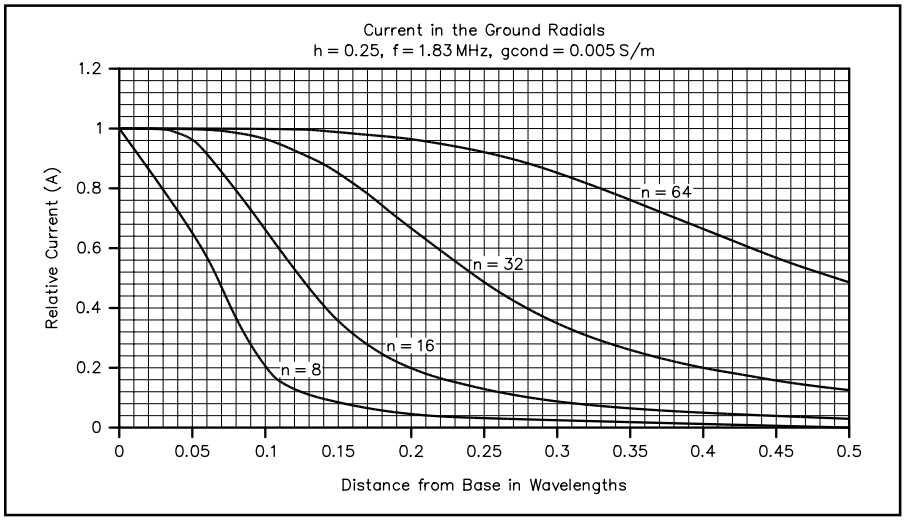


Figure 7—Total current in the radials (I_w) as a function of radius from the base of a 0.25-λ vertical operating at 1.83 MHz and with a ground conductivity of 0.005 S/m (average ground).

tirely valid for HF amateur verticals with small numbers of radials and certainly not valid for elevated radials. Nonetheless, his work is a very good place to start. At the end of the discussion we will look again at these assumptions.

Figure 2 is a sketch of current flow in the antenna and the surrounding ground. I_z represents the total current flowing through a cylindrical zone at a given radius. I_1 represents the current returning to the antenna in addition to the base current. I_o is the current at the base of the antenna. Brown derived an equation (see the Appendix) that describes the ground current as a function of antenna height and distance from the base of the antenna. The heights I will be using in the following discussion are the effective *electrical* heights. For example, if you use some top loading on the vertical, the effective electrical height is greater than the physical height. For the following graphs, I have used simplified expressions that use the effective height. It is important to recognize that simply adding a top hat to a vertical of given physical height can reduce the ground losses. We will be able to see this from the effect of height on ground-current amplitudes. Simply moving a loading coil from the antenna's base further into the antenna reduces ground losses because it reduces ground-current amplitude.

Figure 3 is a graph of this current (I_2)for several effective heights. The currents have been adjusted for constant input power (about 37 W) at the base of the antenna, with 1 A into a 0.25-λ vertical as the reference. This graph clearly shows the high currents flowing in the ground near the base of a short antenna. Compared to a 0.25-λ vertical, the 0.1-λ vertical has three times the ground current; as you further shorten the antenna, the ground current increases rapidly. Keep in mind that the ground loss is proportional to the *square* of the current (I^2R), so the power loss in the immediate region of the base is *much* higher for the shorter antenna.

One way to visualize the relative losses is to calculate them. This is where a spreadsheet really helps. If you take the currents given in Figure 3, square them and divide by the circumference of a circle at a given distance from the base—taking into account the ground resistance and the current's depth of penetration—you know the power loss at a given radius. Figure 4 is a graph of the power loss as a function of the distance from the antenna base. This shows that the losses are high near the base, are greater for shorter antennas and taper off rapidly as distance from the base increases. Note also that for a 0.5-λ vertical, the maximum loss occurs about 0.3-λ away from the base! The ground system in this region may profit from some additional attention. You may ask "Who uses 0.5-λ verticals, especially on 80 or 160 meters?" What about 0.5-λ slopers hung from towers? Even though they are typically not connected directly to ground, they would benefit from a ground system under them. John Devoldere, ON4UN, makes this point in his book (see Note 19). For simplicity, in Figure 4, I have assumed that the depth of current penetration into the soil and the soil conductivity are normalized to 1. For the

actual losses in real ground at amateur operating frequencies, the proper equations are in the Appendix if you would like to graph them for yourself. We can also generate a graph showing the loss relative to the 0.25-λ vertical as shown in Figure 5.

Now we can take the next step and integrate the total loss inside a given radius to get a feeling for how large we should make our ground systems. Figure 6 is a graph of the total loss within a given radius, relative to the total loss inside a 1-λ radius for *each* antenna height. I chose the 1-λ radius as the reference because it contains most of the near-field loss and also represents a practical maximum radial length for most installations (560 feet on 160 meters!). The absolute value of the total loss is, of course, higher for a short antenna when compared to a taller one. For the 0.1-λ-high antenna, if we have a good ground screen out to a distance of 0.1-λ, we'll eliminate over 90% of the ground loss! This is where the idea comes from that for short antennas we should concentrate our ground systems inside a short radius. A larger ground system will do no harm; in fact, it reduces the loss even more, but if we have a limited amount of wire, we are much better off to *use many short radials instead of a few long radials*. Note that this graph assumes a large number of radials (more than 100). If only a few radials are used, the effectiveness of the ground system is reduced, although for short antennas it is not necessary to use as large a number of radials.

We can see why this is so by using another of Brown's equations, the one for the current in the radials as a function of radial length and number of radials (see Appendix). Figure 7 is a graph of the current in the radials as you move away from the base of a 0.25-λ vertical with various numbers of radials. The vertical has a 1 A current in the base and (from Figure 3) the total current (I_Z) is constant as you move farther out. What we see is the current in the radials (I_w) falling off. The fewer the radials, the more rapidly the current decreases with distance from the base. The total current is still 1 A, but the remainder (I_e) is flowing in the ground and inducing losses. If you use only a few radials it does no good to make them very long because the outer portions of the radials pick up very little current.

What's happening here? Figure 8 is a sketch of a radial system with current entering the ground at two points (A and B). Current reaching the ground at point B has to flow much farther in the soil than current at point A before reaching a radial. The farther from the radiator you go, the greater is the distance between each radial and its neighbor and the farther is the distance the current must flow in the soil. There comes

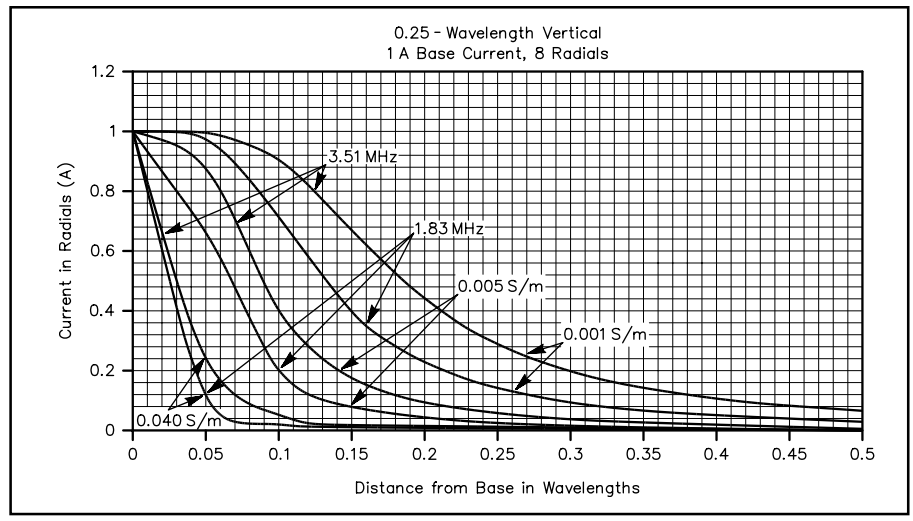


Figure 9—The effect of ground conductivity and frequency on the current in radial wires 1 A of base current and eight radials.

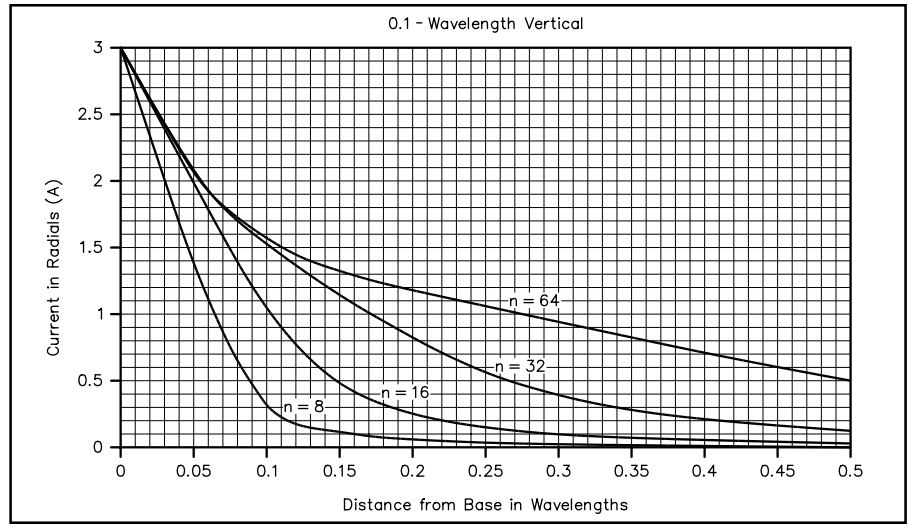


Figure 10—Radial-wire currents of a 0.1-λ vertical for several different numbers of radials (n).

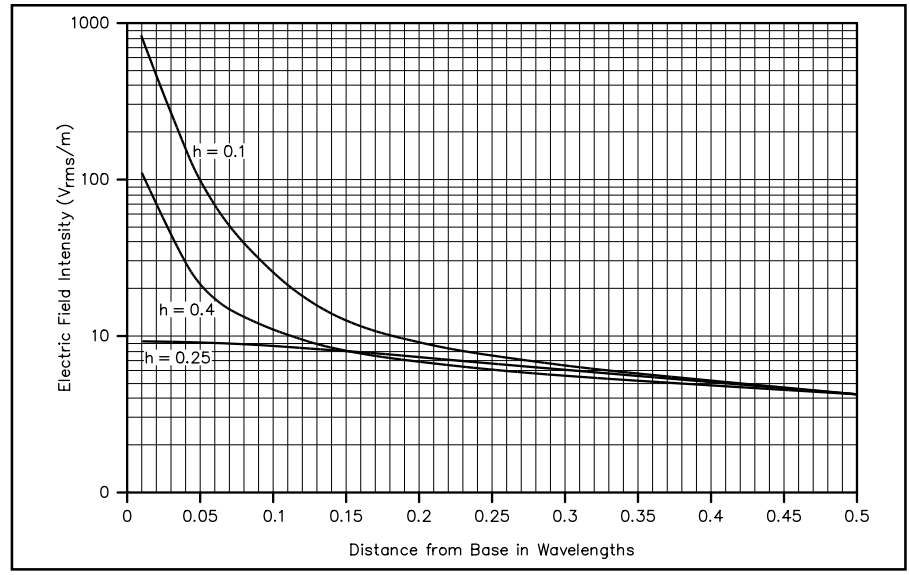


Figure 11—Electric-field intensity near the base of a vertical operating at 1.830 MHz with 1500 W input.

a point where the distance between the radials is so great that the radials are no longer effective. The more radials you use the closer together they will be (at a given radius) and the farther out will be the point at which the radial is no longer effective.

Now that we have Brown's equations in our spreadsheet we can explore further the effects of ground conductivity and frequency on radial number and length. In Brown's time this would have been very laborious, for us it is just a few mouse clicks! Figure 9 is a graph for a 0.25-λ vertical with eight radials, at 1.83 and 3.51 MHz for three different ground conductivities. Notice that as the ground improves (higher conductivity) the current in the radials falls more rapidly. This seems paradoxical: To get the full benefit of the radial system, you have to have more radials as the ground improves! Notice also that as frequency is increased, longer radials can be used effectively.

What about the change in radial current for shorter or longer antennas? That's easy. We just multiply the current values in Figure 3 times the values in Figure 7. Figure 10 is an example for a 0.1–λ vertical. Again we see the advantages of using lots of relatively short radials with a short vertical.

Electric Fields Near the Base

Another consideration is the intensity of the electric field (E) in the region around the base of the antenna. Figure 12 is a graph of E near the base of several verticals of different heights with an input power of 1500 W at 1.830 MHz. Notice how high the field is for the 0.1-λ antenna: about 100 times the value for the 0.25-λ vertical. This is an important consideration for any conductors or structures close to the base of the antenna. Large potentials can be induced into them. These fields can even ignite tall grass! Notice also that as the antenna height exceeds 0.25-λ, the field intensity again increases. The old-fashioned 0.25-λ vertical has many advantages.

A Word of Caution

George Brown's work has proven to be very useful and has been the basis for many articles in amateur publications. However, we have to keep in mind the assumptions Brown made (listed earlier) and remember that his concern was for *broadcast* applications. One assumption he made is that the ground characteristic is primarily resistive. This is a good approximation for most grounds at 160 and even 80 meters, but at higher frequencies, the ground behaves as though there is *capacitance in parallel with the resistance*: ie, there will be displacement as well as conduction currents.

For frequencies above 4 MHz, Brown's equations still give us a good qualitative feeling for what's going on and the overall guidance they offer is still valid. But Brown was careful to point out that you shouldn't rely on the absolute numbers. The need to consider displacement currents can be illustrated by looking at curves for skin depth in soil as a function of frequency and ground characteristics (the generating equations are in the Appendix). Figure 12 is representative of skin depths for typical soils. The graph is an extension of one given in *QST* by Charlie Michaels, W7XC (see Note 18). The dashed lines represent skin depth when conductivity only is considered. The solid lines represent skin depths using the com-

Appendix

Definitions

I_o = current in the base of the antenna or at the current loop in the case of the 1/2λ antenna
I_z = zone current at radius r_1 = $I_w + I_e$
I_e = total current in the earth at radius r_1
I_w = total current in radial wires at radius r_1
f = frequency in Hertz
f_{MHz} = frequency in MHz
E = electric field intensity
h = height of antenna in wavelengths
r_1 = distance from base in wavelengths
s = soil conductivity in Siemens/meter [S/m]
n = number of wires in the radial system
r_2 = radius of radial wires in cm

Zone Currents

$$\frac{|I_Z|}{|I_o|} \equiv I_n = \frac{1}{\sin 2\pi h}\sqrt{\left[\sin 2\pi p - \sin 2\pi r_1 \cos 2\pi h\right]^2 + \left[\cos 2\pi p - \cos 2\pi r_1 \cos 2\pi h\right]^2}$$

$$p \equiv \sqrt{r_1^2 + h^2}$$

(Equation 1)

Current Distribution in Radial Wires

$$\frac{I_e}{I_w} = j\left(\frac{3.6\sigma\pi^4 r_1^2}{f_{MHz}\, n^2}\right)\left[\log\left(\frac{3\times 10^4 \pi r_1}{f_{MHz}\, n r_2}\right) - 0.5\right] = j\left|\frac{I_e}{I_w}\right|$$

$$\left|\frac{I_w}{I_z}\right| = \frac{1}{\sqrt{1+\left|\frac{I_e}{I_w}\right|^2}}$$

$$\left|\frac{I_e}{I_z}\right| = \frac{1}{\sqrt{1+\left|\frac{I_w}{I_e}\right|^2}}$$

(Equation 2)

Electric Field Intensity

$$|E| = \left(\frac{2 f_{MHz} I_o}{\sin 2\pi h}\right)\sqrt{\left(\frac{\cos 2\pi \sin 2\pi r}{r_1} - \frac{\sin 2\pi p}{p}\right)^2 + \left(\frac{\cos 2\pi h \cos 2\pi r_1}{r_1} - \frac{\cos 2\pi p}{p}\right)^2}\left[\frac{V}{m}\right]$$

(Equation 3)

plete equation for skin depth in a general medium. What has been added is the *permittivity of the soil*, which is related to capacitance. For seawater, the conductivity dominates at any frequency below 2 meters. For very good soil, we see that conductivity still dominates over the HF range, but for average or poor soils, the expression for skin depth considering only conductivity gives a depth that is progressively much too large, especially for poor soils. This alters the ground-current distributions from those predicted by Brown; the actual losses may be higher.

If we look at most amateur literature concerning ground characteristics, we see that the emphasis is on measuring ground resistance and the effect of ground resistance on losses, with little said about the permittivity. This is a direct reflection of Brown's work and his concern with broadcast frequencies. We have been following his lead for the last 60 years. In reality, for most soils at HF, we need to take into account the permittivity of ground. Unfortunately, measuring the complex impedance of soil is considerably more difficult than measuring just soil conductivity. W7XC's article partially corrected this and was incorporated in later editions of the *ARRL Antenna Book*, but we still have some work to do.

Brown also assumed that the E-field losses were small. (In his 1935 paper and his thesis, he does compute the electric-field intensity, but then points out that these ground losses are small when a shallow, dense, buried radial system is used with a 0.25-λ vertical. For systems with many buried radials, this is a good approximation. However, when there are only a few radials, or when the radials are elevated above ground, the E-field loss may not be small at all. The importance of E-field losses to amateurs has been pointed out by Clay Whiffen, KF4IX, and Ben Zieg, K4OQK.[21] They showed the increased loss possible when the top of a vertical (where there is a very high electric field) is placed close to a tree. We also know that the outer ends of elevated radials have very high potentials and can induce E-field losses in the ground, grass, shrubs and sod beneath the radial system.

When we compare buried radials with elevated radials we find that the current distribution is very different between the two types of radial systems (see Note 14). Making buried radials longer may not help much if only a few radials are used, but it doesn't hurt. Buried radial systems with a radius greater than 0.5λ can be very effective if enough radials are used. However, as Burke and Miller[22] have shown, making *elevated* radials longer than 0.3λ can lead to greatly increased loss when only a few radials are used. Larger numbers of elevated radials do reduce this loss and allow larger elevated ground systems to be effective. It is important that we *do not directly equate* buried and elevated ground systems on the basis of Brown's work. They are different animals, both of which certainly have their place.

A Final Word

I hope you will find this information useful. If you really want a thorough understanding of the topic, you should graph these equations yourself and read the listed references.[22] The *QST*, *ham radio* and *CQ* articles are quite easy to follow; even Brown's papers are no great chore to read. Some modeling with *NEC* or *MININEC* software will give you even more insight. Particularly on

Skin-Depth Equations

The exact expression for penetration or skin depth in a general material is given by:

$$\delta = \left(\frac{\sqrt{2}}{\omega\sqrt{\mu\varepsilon}}\right)\left[\sqrt{1+\left(\frac{\sigma}{\omega\varepsilon}\right)^2}-1\right]^{-1/2} \quad \text{(Equation 4)}$$

where:
δ = skin depth in meters
$\omega = 2\pi f$
$\mu = \mu_o\mu_r$
$\mu_o = 4\pi 10^{-7}$ Henry/meter
μ_r = relative permeability
$\varepsilon = \varepsilon_o\varepsilon_r$
$\varepsilon_o = 8.85\times10^{-12}$ Farads/meter
ε_r = relative permittivity

For most soils, $\mu_r \approx 1$ (unless you set up shop in an open-pit iron mine!). For good conductors:

$$\frac{\sigma}{\omega\varepsilon} >> 1 \quad \text{(Equation 5)}$$

Which allows the equation for δ to be simplified to:

$$\delta = \frac{1}{\sqrt{\pi\sigma\mu f}} \text{ m} \quad \text{(Equation 6)}$$

where:
f is in Hertz

Ground loss

Ground loss for a ring of soil (dr) at a given radius (r_1) from the base can be calculated with the aid of figure 13. If we assume that the average current is uniform to one skin depth (δ), the loss in the ring will be:

$$\frac{dP}{dr} = \frac{I_e^2}{2\pi\delta\sigma r} = \frac{f_{MHz}\,I_e^2}{600\pi\delta\sigma r_1} = \left(\frac{f_{MHz}}{300\delta\sigma}\right)\left(\frac{I_e^2}{2\pi r_1}\right)\left[\frac{W}{m}\right] \quad \text{(Equation 7)}$$

where:

δ and r are in meters and r_1 is in wavelengths (λ).

$$\lambda = \frac{300}{f_{MHz}}\,[m] \quad \text{(Equation 8)}$$

The graph in Figure 4 assumes that

$$\frac{f_{MHz}}{300\delta\sigma} = 1 \quad \text{(Equation 9)}$$

and that r_1 is in wavelengths.

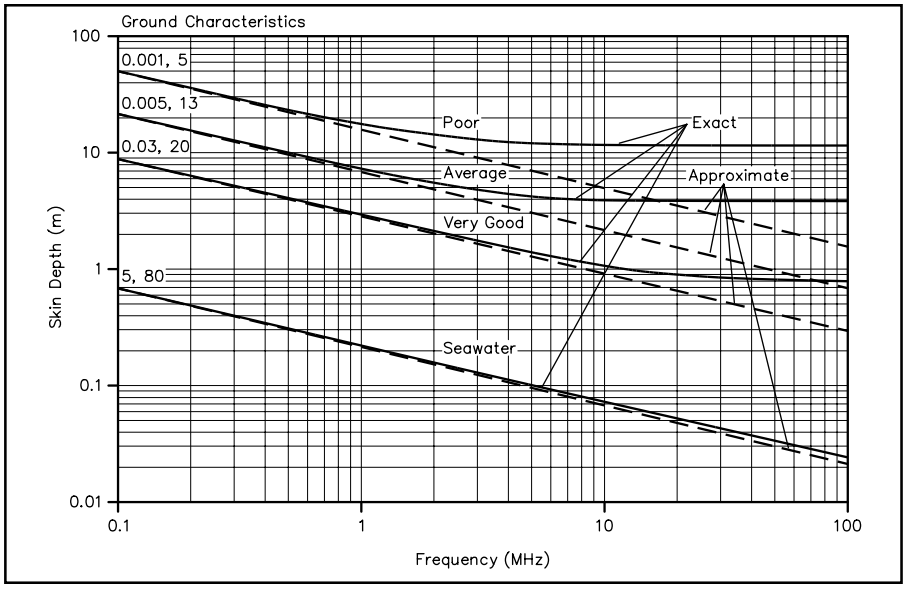


Figure 12—Skin depth in soil of various characteristics as a function of frequency.

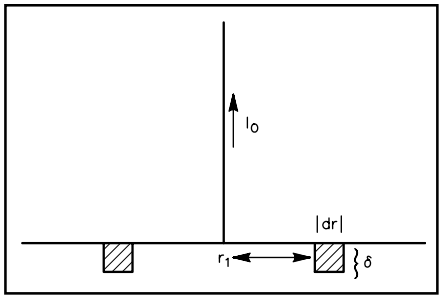


Figure 13—Calculation of ground loss in a small ring of soil at a given radius.

the lower bands, verticals can be very effective, but you have to understand what you are about to get good results.

Acknowledgement

The equations used here have been taken directly from Brown's 1935 (see Note 4) and 1937 (see Note 9) papers. All I have done is to restate them in a form handy for spreadsheet manipulations and to repeat some of his observations and conclusions.

Notes

[1]See also L. B. Cebik, W4RNL, "*NEC-4.1:* Limitations of Importance to Hams," *QEX*, May/Jun 1998, pp 3-16 and John Rockway and James Logan, N6BRF, "Wire Modeling Limitations of *NEC* and *MININEC* for *Windows*," *QEX*, May/Jun 1998, pp 17-21.

[2]Byron Gottfried, *Spreadsheet Tools For Engineers*, McGraw-Hill Basic Engineering Series Tools, 2000, see Chapter 9. A compressed *Excel* file (*SEVERNS.ZIP*) is available from **http://www.arrl.org/files/qst-binaries/**.

[3]G. H. Brown and Ronold King, "High-Frequency Models in Antenna Investigations," *IRE Proceedings*, Vol 22, No. 4, Apr 1934, pp 457-480.

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[14]Jerry Sevick, W2FMI, "Short Ground-Radial Systems for Short Verticals," *QST*, Apr 1978, pp 30-33.

[15]Archibald C. Doty, K8CFU (now W7ACD), John A. Frey, W3ESU, and Harry J. Mills, K4HU, "Efficient Ground Systems for Vertical Antennas" *QST*, Feb 1983, pp 20-25.

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[17]Brian Edward, N2MF, "Radial Systems for Ground-Mounted Vertical Antennas," *QST*, Jun 1985, pp 28-30.

[18]C. J. Michaels, W7XC, "Some Reflections On Vertical Antennas," *QST*, Jul 1987, pp 15-19.

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[21]Clay Whiffen, KF4IX, and Ben Zieg, K4OQK, "Trees and Verticals," Technical Correspondence, *QST*, Nov 1991, p53

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Rudy Severns, N6LF, was first licensed as WN7WAG in 1954 and has held an Extra class license since 1959. He is a consultant in the design of power electronics, magnetic components and power-conversion equipment. Rudy holds a BSE degree from the University of California at Los Angeles. He is the author of two books and over 80 technical papers. Rudy is also an IEEE Fellow. You can contact Rudy at PO Box 589, Cottage Grove, OR 97424; **rudys@ordata.com**. QST

NEW PRODUCTS

100 MHZ DDS MODULE OFFERS 1 MHZ RESOLUTION

◊ Novatech Instruments Inc announces the Model DDS8m, a 100 MHz quadrature direct digital synthesizer (DDS) module with 48-bit frequency resolution.

The DDS8m features simultaneous sine/cosine and ACMOS/TTL outputs at up to 100 MHz, RS232 or parallel binary control, external clock input, master clock output and an on-board TCXO. Stability is specified at ±1 ppm.

Based upon the Analog Devices AD9854, the DDS8m has pre-programmed frequency sweep, FSK, BPSK, chirp and single tone modes. Forty-eight bits of frequency resolution, 12 bits of amplitude resolution and 14 bits of phase resolution are built in.

The parallel interface allows frequency, phase and amplitude updates in less than 67 ns. A clock input is provided for users who wish to drive the DDS8m from an external source. The RS232 control mode features non-volatile storage of all settings.

The DDS8m measures approximately $3^1/_4 \times 3^1/_2$-inches. Price: $575.

For additional information, including a complete data sheet and manual, visit **http://www.novatech-instr.com**. Novatech Instruments Inc, PO Box 55997, Seattle, WA 98155; tel 206-301-8986; fax 206-363-4367; **sales@novatech-instr.com**. QST

Next New Product

By Ralph Henes, K9VDD

A Tale of Cell Sites and Towering Heights

Want a cellular telephone tower in your backyard? Before you answer, read on. If your height above average terrain passes muster, the author's experience may have you courting your local carriers!

I was watching the evening news one cold November evening in 1997 when a story happened to catch my ear. I scrambled for a pen and paper. The news anchor was talking about a neighborhood meeting scheduled for the following night at a church not far from my house. He was elaborating on the neighborhood's dismay at a cell phone company's application to the city to construct a tower in the area! That would definitely be a *big* meeting. As I thought things over I began to daydream about all the fantastic—but probably impossible—possibilities. I didn't sleep much that night, and the next day was mostly a blur.

My old 48-foot tower. I was more than happy to rent space on my tower to the cell company.

My new tower—courtesy of the cell phone company!

The meeting was scheduled for 7 PM, so I made sure I was there by 6:30. I began to mingle, listening to people talk. The attendees were neighbors, the media and me! I was sure the people from the cell company would show up and at least present their side. Nope, only us chickens! Finally, one of the TV guys told me who the carrier was and where they were from. That knowledge in hand, I quietly left.

The next day my campaign began. Two years earlier I had put up a 48-foot self-supporting Rohn tower in five yards of concrete. Perhaps they would want to install their gear on my tower—for an attractive annual rental fee, of course! I called the cell company and was transferred to the carrier's local attorney who, to my surprise, warmed to my plans.

The first thing we had to do was have the company's RF engineers come out to look at the site—my site, that is! My lot is quite elevated when compared to the surrounding terrain. In most directions it falls off 65 feet in only one block. This would allow coverage of a wide, heavily subdivided area with residential and commercial users.

Next, a geological company had to come out and do a test bore to analyze the soil composition. The big rig—set up like a well driller—sent a two-inch bit down to an eventual depth of 20 feet, where it hit solid bedrock. The tests were fine. By that time it was Thanksgiving, and that ended the month of November 1997.

When Good Things Happen to Good Hams

By the first week of December I was going nuts. No answers, no reports, nothing going on. But in the second week of December, the company reps wanted to talk to me. They said the site was fine, but they couldn't use my tower. They'd have to take mine down and put up a new one that would meet "commercial liability requirements."

I said okay—as long as I get to put my antennas on the top of the tower! The answer was "yes." I could have the top. I pushed my luck to the limit. "Can I design what I want?" I asked. The rep said, "You tell us what you want and we'll build it for you."

I almost had a stroke right there. I've been on the air for 40 years and have never had a real antenna farm! The company gave me only two weeks to design my antenna system, so I took the challenge and hit the ground running.

After I signed a letter of agreement so the engineering work could begin, I was dreaming about what I wanted. I knew I would only *get one shot at it*, so I had better shoot for the moon. And I did—all new antennas, coax, baluns, connectors, etc. And everything must rotate *from the ground*.

I packaged the specifications of my "super array" and presented them to the cell company folks. I expected to see heads wagging from side to side. As you can imagine, I was totally shocked when all I heard was, "Okay, let's do it!" I was in heaven.

The Longest Yard

The next hurdle was the city. What an education that was. We first had to secure a conditional use permit from the Planning Commission. Approval there happened in January1998. Then we had to take the project before the Zoning Board! That required two January meetings. Then our project had to go before the full City Council. I had to appear along with our attorney for the final approval,

which was granted in late January!

The next hurdle would be the most critical—the neighbors. How would we handle them? Very carefully. We had the city send invitations asking the neighbors to gather at my house one Saturday afternoon in January 1998. Coffee, cookies, a nice fire in the fireplace and soft music on the stereo were calculated to set the mood. My wife and I, the cell company rep, our attorney and our city alderperson welcomed the neighbors as they arrived.

I was really sweating this meeting, but to our surprise, it went off without one objection! It was handled quietly, respectfully, and not one person raised their voice in argument. It was great.

It then took from mid-January until May 1998 for all the drawings, permits, etc, to be okayed. In the meanwhile, the cell company's general contractor began letting bids to all the subs interested in the job. My old tower was carefully taken down on June 1, 1998, and delivered to the ham I'd sold it to (as promised). The new system was up and running by September 15, 1998.

With more and more cities becoming less focused on landscaping and more interested in accommodating commerce-producing wireless technologies, I'm sure I won't be the last ham to strike such a deal. It could happen to you!

You can contact the author at 402 S. Owen Dr, Madison, WI 53711; **k9vdd@tds.net**; **http://www.qsl.net/k9vdd/**. QST

NEW PRODUCTS

R8 HF MULTIBAND VERTICAL ANTENNA

◊ Cushcraft Corporation has introduced the R8, the latest addition to their line of HF vertical antennas.

The R8 covers 40, 30, 20, 17, 15, 12, 10 and 6 meters and has been specifically designed to withstand the high levels of mismatched transmit power that can result from the use of antenna matching devices and amplifiers.

The new model is 28½ feet tall and weighs approximately 23 lbs. It is rated for up to 1500 W (CW) and is specified to sustain a 3.0:1 VSWR mismatch at that level for typical operating periods.

The antenna employs only two traps that are specially designed to reduce the possibility of damage due to moisture-induced arcing. No additional radial kits or counterpoise wires are required. Seven 49-inch stainless steel radials extend from the base of the antenna.

For more information visit your favorite Amateur Radio products dealer or contact Cushcraft Corporation, 48 Perimeter Rd, Manchester, NH 03103; tel 603-627-7877; **sales@cushcraft.com**; **http://www.cushcraft.com**.

FULL-SIZE 30-METER ROTATABLE ANTENNAS FROM CAL-AV LABS

◊ CAL-AV Labs Inc has recently added two new 30-meter HF antennas to their product line.

The 2D-30 consists of two full-size 30-meter driven elements mounted on a 12-foot boom. The turning radius of the array is 25.3 feet and the weight is 54 lb.

Heavy-duty construction is used throughout. The integral balun-hairpin feed is rated at 3 kW. CAL-AV specifies wind survivability up to 100 MPH (with no icing), a projected area of 8.4 square feet and an effective area (calculated using RS-222-C) of 5.6 square feet.

The DIP-30A is a full-size 30-meter rotatable dipole and is designed to be easily integrated within a stack, with the element mounted parallel to the booms of the other multi-element directional antennas. This configuration allows the addition of 30-meter band capability while minimizing antenna interaction.

This antenna also employs heavy-duty construction and mounting hardware, uses a balun feed, and is rated at 3 kW. For the DIP-30A, CAL-AV specifies a turning radius of 25.3 feet, a weight of 20.5 lbs, no-ice wind survivability up to 100 MPH and a projected area of 4.63 square feet.

Price: 2D-30, $895; DIP-30A, $295. Shipping is additional.

The 2D-30 and the DIP-30A are available through Ham Radio Outlet stores or can be ordered directly from CAL-AV Labs Inc, 1802 W Grant Road, Suite 116, Tucson, AZ 85745; 520-624-1300; fax 520-624-1311; **info@cal-av.com**; **http://www.cal-av.com/**.

Next New Product QST

Net Directory Registration

Registration for the 2001-2002 edition of the *ARRL Net Directory* is now open. September 15, 2000, is the deadline for receipt of registrations. Even if your net appears in the current edition, please send along your net information to help ensure that the most up-to-date data will be shown in the new edition.

You may register your net on line via the following URL that's sponsored by ARRL Great Lakes Division Director George Race, WB8BGY. **http://www.MrRace.Com/ARRL/FSD85/Index.htm**. When submitted, the information is automatically sent to *Net Directory* editor Steve Ewald, WV1X, at HQ. His e-mail address is **sewald@arrl.org**. The net registration form (FSD-85) may also be mailed to ARRL Headquarters. Copies of this form are available from the ARRL Field and Educational Services Department.

This is a: Wide Coverage_____ Maritime_____ Area_____ Region_____ Section____
Local Net _____. Section and Local Nets give Section: _____

ARRL NET DIRECTORY REGISTRATION

1. Net name: _____
2. Net abbreviation: _____ 3. Freq (MHz): _____
4. Give days and times that net meets during the winter:
   Day(s) _____ Time(s) _____
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6. Affiliated with the National Traffic System? Yes _____ No _____
7. Direct coverage area: _____
8. Manager's call sign _____ 9. Date _____
10. Sender's call sign _____

~ INFORMATION WILL BE ENTERED *EXACTLY* AS STATED ABOVE ~

Incomplete or illegible registrations will not be processed. All nets must be registered once every *TWO* years. Send to:

ARRL, 225 Main St, Newington, CT 06111

FSD-85 (6/98)

By Thomas H. Schiller, N6BT

Everything Works

Your enjoyment of Amateur Radio is directly related to your antenna—although anything will "work."

"N6 Bravo Tango, this is N0 Papa Golf. Tony, Iowa, number 69591." I made it with one call: February 5th, 2000, my first contact with "The Illuminator." KB9TQI, Indiana; N0IJ, Minnesota; K4CIH, Alabama; WA9TPQ, Illinois; N5MT, Texas; KB0MZG, Kansas; and, KX9DX, Illinois were other contacts made in the 10/10 Contest, slipping into the radio room from time to time while working in the yard. The path to Indiana was the farthest on record for me with the 150-W light bulb perched on a fence post. What a pleasant surprise, and there was more to come.

One of the most important aspects of building and evaluating antennas is actually using them in environments where the performance can be measured in a meaningful manner. Claims for how well various antennas "work" are as plentiful as snow flakes in winter and this subject has surfaced in one way or other at every forum or club discussion I have presented since 1978. How many times have we heard someone say, "My antenna really 'works'"?

Performance Envelope

What does the word, "work" mean? The answer is, ***everything* does *work, to one degree or another***. I hope that everyone will agree that this statement is absolutely true. How well it "works" is the issue and this is the "performance envelope" of the antenna system.

The first time I presented this idea was at the ARRL Pacific Division Convention in the fall of 1998. It was well received and I was encouraged to completely rewrite all of my material. My revised presentation was first viewed at the ARRL Southwestern Division Convention in the fall of 1999. It was further augmented and presented a couple weeks later to a packed double room audience at the ARRL Pacific Division Convention. There were more than a few eyebrows raised when I began with the digital slide, "Everything Works." It seemed to be out of character, because I always focus on efficiency.

I followed with an example of my first antenna, which enabled me to make contacts all over the West Coast on the 40-meter Novice band. I was WV6KUQ and the year was 1959. It was a very simple antenna, since it was the screen on my bedroom window. I made contacts, so I thought it was doing all right. My high school science teacher, the late "Doc" Gmelin, W6ZRJ, tactfully informed me that it probably was not the best antenna and that it could be improved. He was the one who had given me my Novice test, became my Elmer and later was my high school physics teacher. At his suggestion, and with my Dad's assistance (both he and my Mom always encouraged and supported my adventures), we put up a Windom antenna. It was easy and did not require coax. The Windom certainly was not the greatest, but it was a tremendous improvement over the window screen. The performance envelope of the antenna system had been extended.

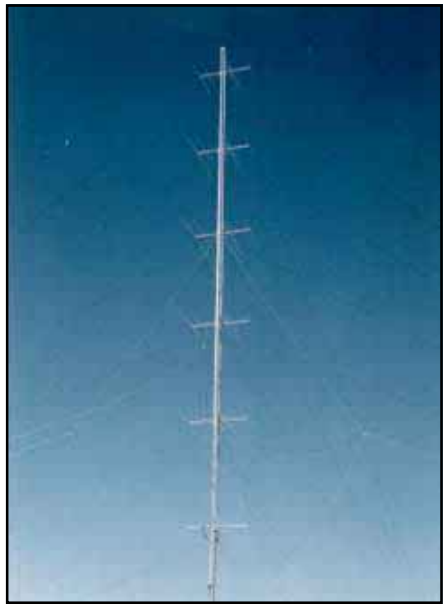
A single Illuminator. Notice the balun attached to the side of the post.

Witnessing the obvious improvement between the window screen and the Windom sparked my long-term interest in antennas. The performance difference between the two could best be summarized as, "Wow! This is going to be a lot more fun." The Windom antenna enabled me to make my first out-of-state QSO with a fellow Novice back in Delevan, Wisconsin. This was almost 2,000 miles away and we talked for more than 30 minutes. We then put up a vertical antenna for 40 meters made by attaching a large, insulated stranded wire on a wooden 2×4 frame. The ground system was a single ground rod (not very efficient, I later learned). This antenna enabled me to make my first DX QSO with JA2CMD. With my Dad's help again, we graduated to a 2-element, trapped tribander, which we managed to raise to 30 feet on a telescoping mast atop the roof. From my experience it was so impressive that I thought it must be the absolute best antenna possible.

This impression, of course, was incorrect. It was only the best one I had used so far. It was my personal, limited perception; certainly not an accurate assessment of the true situation. Strange as it might seem, it has taken years to realize that most everyone goes through this same learning process. Today, even with all the books on various antenna subjects, there remains a similar gap between perception and reality. My reality came into sharp focus in 1983.

Gary Caldwell, VA7RR (WA6VEF at the time), and I went to Saipan for the CQWW CW contest (AH0C). I had operated twice before from the southern end of the island utilizing the existing quad antennas of Byrd Brunemeier and Don Bower who worked for Far East Broadcasting Company (FEBC). After setting up the stations, we were asked if we would rather move to the north end of the island and use the FEBC short-wave broadcast antennas. These were located on Marpi Cliff, about 400 feet above the ocean. That decision took about two seconds.

We had brought along a typical trapped (new) tribander and a 30-foot mast. We also had about 1200 feet of coax. The antennas made available for us at FEBC's site were three TCI-611 curtains, designed for operation between 8-18 MHz (we used them on 40, 20, 15 and 10 meters). Each one cost



A stack of six Force 12 C-3s (30 to 180 feet) on a 190-foot rotating tower at N7ML.

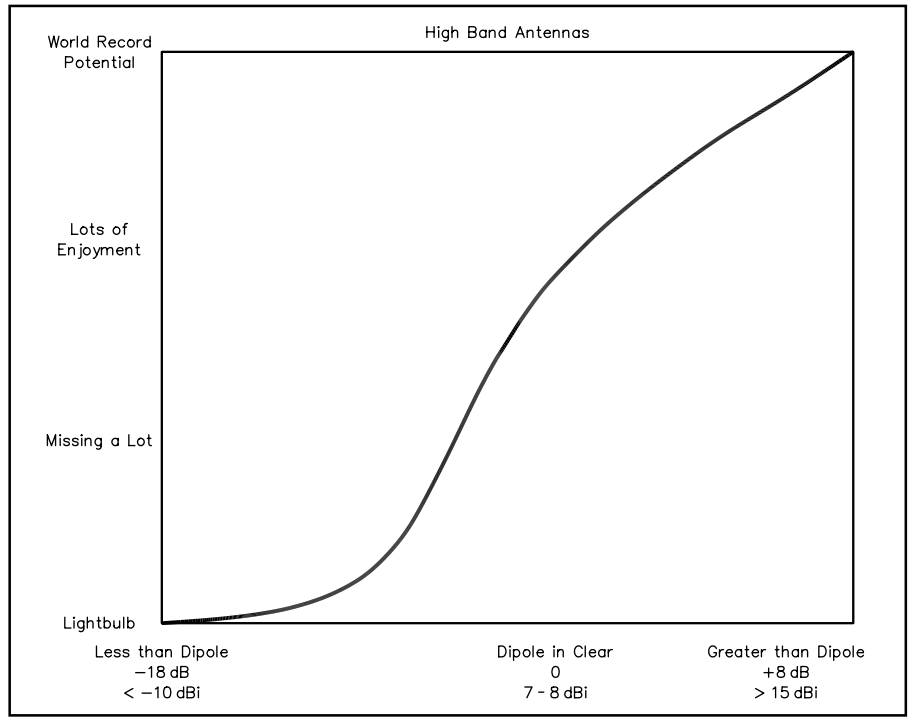


Figure 1—A chart relating "enjoyment" to HF antenna performance.

A triangular, phased kW Illuminator "array."

about $300,000 (in 1982 dollars) and consisted of a pair of 240-foot towers with 61 phased dipoles between them. There was a passive reflector behind all the dipoles and a switching system to move the main lobe from side-to-side. These are huge antenna systems! We set up the stations in the main operations building and the slew controls were behind us on a large panel. These curtain antennas were specified to provide 21 dBi gain and a F/B ratio of 20 dB. The tribander was specified to provide about 8.5 dBd, or 10.6 dBi. It was a fascinating observation that to achieve an additional (theoretical) 10 dB over the trapped tribander required so much more hardware (and money).

I have kicked myself ever since for not having a tape recorder to share the experience of the difference between our trapped tribander and the curtains. We had been listening on the tribander while we did other things. The sun had already slipped below the rim of the Pacific Ocean when Gary suggested we hook up the curtain for 15 meters. It was late evening by the time we had attached a 4:1 coaxial balun to the large open-wire feed line heading out to one of the curtains. We were ready to do the classic "antenna A, antenna B" comparison, but the band was almost dead. We plugged the curtain feed line into an antenna selector, flipped the switch and were not ready for what we heard: the band came alive with all kinds of signals. It sounded more like midday. It was like turning on a light bulb in a dark room. We had an incredible QSO with HZ1AB that is etched in our minds forever.

We made signal comparisons, both with 100 W to our antennas and with another station on Guam who was running 1 kW to a larger tribander. The difference between the antennas was unbelievable. HZ1AB said both tribanders were S7 and the curtain was at least S9+40: an S-meter difference of about 50 dB.

Part of the signal level difference can be attributed to the location and the take-off angle of the cliff. Our 100 W to the tribander was the same as the kilowatt on Guam, so the cliff location made up the power difference, or about 10 dB; however, both our tribander and the curtain were looking over the same cliff. To try to satisfy everyone on this comparison, let us make an impossible assumption that the difference between the curtain and our tribander locations (in reference to the same cliff) accounts for 30 dB. The remaining difference is still 20 dB and must be attributed to the performance envelopes of the tribander and the curtain.

The true difference between the antennas was so far removed from the specifications that something did not make sense. Our performance envelope had been recalibrated to a limit that can be achieved only by a handful of antenna systems used in Amateur Radio. The challenge to understand the observed difference in performance envelopes led me to design, build, and evaluate hundreds of antennas. These efforts answered the questions about performance and also became the genesis and core of an antenna design philosophy, which has since been produced and marketed under the name "Force 12."

The Illuminator Project

The performance envelope addresses the practical relationship between enjoyment of Amateur Radio and antenna performance. The entire station should be considered. However, the radios available today are all pretty good, so the antenna system is the major key. The primary effort in "The Illuminator" project was to quantify antennas (performance in dBi) and relate this to true performance. The basic chart relating performance to enjoyment is shown in Figure 1. It was developed with the assistance of many knowledgeable people, including typical amateurs, DXers, contesters and manufacturers.

The chart is intended to indicate the relationship between generalized antennas and expected enjoyment of Amateur Radio. It is certainly not a comprehensive representation of all antenna types and what can be accomplished. The ranges across the bottom of the chart, however, are pretty good indicators of antennas amateurs have used. The chart does not indicate take-off angle, which is very

important for working DX, but not everyone is interested in working long distances. Figure 1 is used to represent relative increases in enjoyment of radio through improvements in antenna efficiency.

The center "Dipole in Clear" is a horizontal dipole in the clear at about 1/3-1/2 wavelength high. This is an efficient antenna and it is horizontally polarized, so it has ground reflection gain. It is directional (figure 8 pattern), which produces additional gain and assistance in reception (front to side ratio to reduce noise). A rotary dipole is quite impressive, especially on the low bands where apparent small changes can make large improvements. The most common dipole on the 80 and 40 meter bands is an inverted **V** type. After performing more than 30 tests, I've determined that an inverted **V** dipole will be 6-10 dB down from a horizontal dipole at the same apex height.

The range to the right of the chart in Figure 1 (not the extreme right of the chart) indicates 13-14 dBi gain, which is approximately 6-7 dB more than the dipole. This can be achieved by using a well-designed Yagi with a minimum boom length of around 1/2 wavelength (35 feet on 20 meters). The extreme right of the chart is for systems with more gain. The largest HF arrays for amateurs rarely approach 20 dBi including ground reflection gain. The stack of six Force 12 C-3s (30 to 180 feet) on a 190-foot rotating tower at N7ML is in this range, as are the multi-element vertical dipole arrays on salt water at 6Y2A/4M7X.

The left-hand side of the Figure 1 chart refers to antennas that are very inefficient. As one moves from the center to the left of the chart (efficiency and gain decreasing), the ability to make QSOs, and hear what is going on, decreases rapidly. The extreme left side is pegged to a light bulb. Before approaching very poor performance (light bulb), we go through antennas that are either inefficient by design (intentionally or not), or by necessity (installation restrictions).

We should note the range across the bottom of the chart. My best estimate is that from –5 dBi to +13 dBi is the practical range of typical, installed (not in free space) amateur antennas. This represents inefficient verticals up to efficient Yagis at reasonable heights and is shown in the chart in Figure 2. Notice that this range is not all that large: 18 dB; and people with severe antenna restrictions will have a larger difference than 18 dB. If we take the center dipole, moving + or – a few dB makes a noticeable difference in the performance. Yagis and other horizontally polarized antennas receive a benefit from being over ground and will achieve ground reflection gain that can represent about 4 to 5.5 dB of the stated figures. Vertically polarized antennas do not benefit from ground reflection gain and usually lose energy because of the ground (unless it is over salt water).

It is important to keep in mind that this chart applies to both ends of the circuit. Oftentimes, a QSO is made because one end has an efficient system that has enough gain at the right angle(s) to overcome the shortcoming of the antenna at the other end and complete the path.

Once we are at a horizontal dipole (in the clear) performance level, we are doing very well and will experience a lot of fun and enjoyment in Amateur Radio. Below this envelope, we will be able to make QSOs, but our understanding of the activity on the air will be limited. If you think you are at this point, try something more efficient! Try something that "works better."

The charts are not intended to imply it is impossible to enjoy radio with something less than a dipole in the clear. Being able to hear anything and make QSOs can be enjoyable, but this will not necessarily move us along to share more of the enjoy-

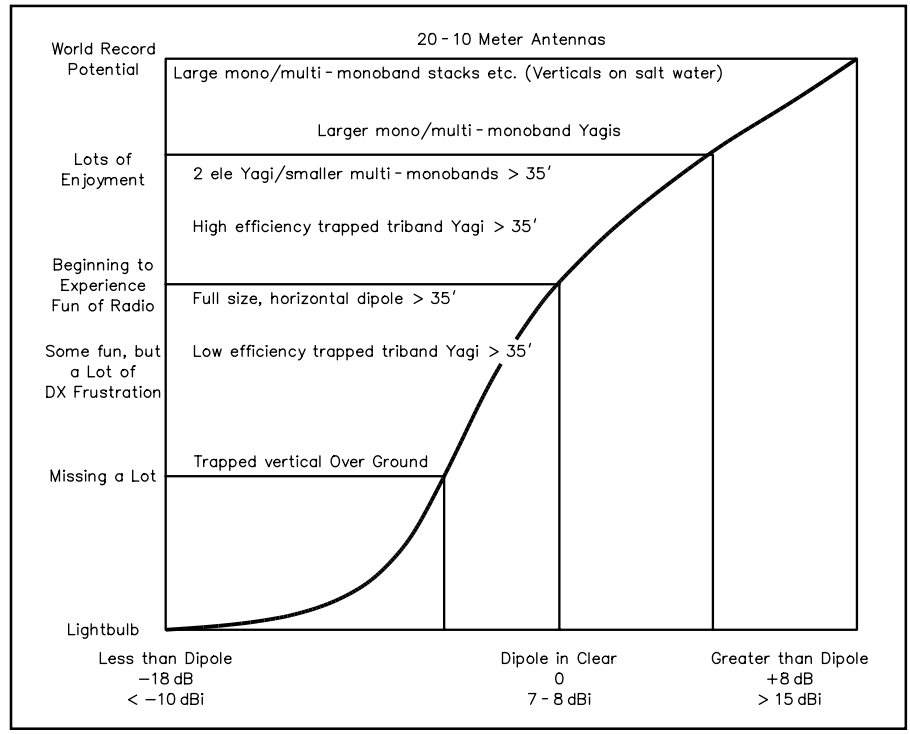


Figure 2—Comparing performance for specific antennas.

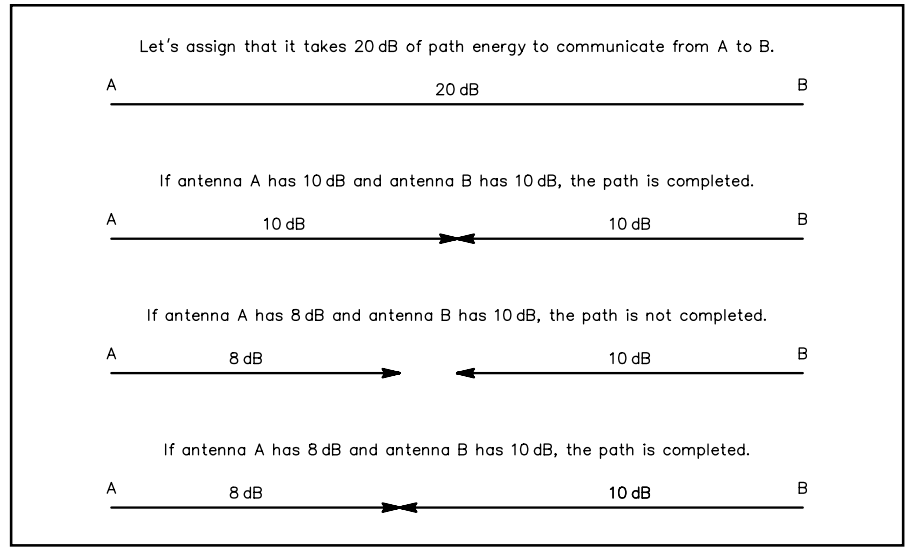


Figure 3—Comparing the gains necessary for success at both ends of the path.

ment in radio. We should recognize the capability, the performance envelope, of our current antenna system and contemplate if there is another step we can take—just like my history, moving from one antenna to another and making discoveries.

How much "better" does the antenna have to be to make how much difference? The chart in Figure 3 is a hypothetical communications path and the relationship between the antennas at both ends.

Translating the charts into practical antenna systems, the following becomes apparent:

More efficient antenna = expanded performance envelope

More efficient antenna = longer operating window to make contacts

More efficient antenna = more enjoyment of radio

Illuminator Antenna

A light bulb. Did someone actually say the left-hand side of the performance chart is a light bulb? Yes, it is. Can it actually "work"? Of course! As I stated in the beginning, everything does work. The difference is the performance envelope.

We gathered one day around a trio of laptop computers, a collection of coffee, soda and water, talking strategy for our contest team (6Y2A, 4M7X). The team leader, Kenny Silverman, K2KW shared some experiences he had many years ago using a light bulb. He was inside a building teaching code and using transceivers with light bulbs for dummy loads. He decided to move up into an amateur band and see what he could hear. Sure enough, he was able to make a couple QSOs on 20 meters. We all laughed at the incident and it was obvious an indoor light bulb had to be the worst antenna anyone could ever use.

In preparing Figure 1, we decided to select the light bulb for the left-hand side of the performance chart. *QST* Senior Assistant Technical Editor Dean Straw, N6BV, one of the contest team members and antenna collaborator for close to 25 years, agreed that the estimate of –18 dB to a dipole should be about right and proved to be so, at least on 10 meters. Note that the difference between a dipole and the world class performance antenna is much smaller than the difference between the light bulb and the dipole. I am my most staunch critic, so eventually it was time to test the light bulb (aka "The Illuminator") and see what it could do.

An Illuminating Experience

A 150-W bulb was selected for the antenna and a TS-850S transceiver was used. The Illuminator, ah, antenna, um, dummy load was mounted on a porcelain base atop a wooden fence post at a height of about 4 feet. The light bulb is fed through a Force 12 B-1 current balun with 3-inch leads and the feed line was 9913 Flex, to minimize loss. The balun was used to insure the feed line would not radiate. The VSWR of the 150-W bulb was about 4:1 and the built-in tuner matched it easily. I later utilized an external tuner to make small changes as the filament heated up and changed impedance.

The first time The Illuminator was on the air was during the recent 2000 10-10 contest. I operated a total of about an hour. All of the contacts were in the midwest United States. Experimentation showed that if a station moved the S-meter to S-3, I was fairly sure we could make the QSO. Many of the QSOs were made with one call, no repeats, and no comment about how weak the signal was. Interesting. It was obvious that the station on the other end was providing the majority of the necessary system gain to make the path. Nevertheless, it "worked." I remembered the many times I have heard how well an antenna "works," because of the number of countries that have been worked. All right, then, maybe we can do even better.

The ARRL DX CW contest was coming. I have operated contests for more than 35 years, but I never felt so ill equipped to call someone. It was mid-morning on Saturday and the wind and rain made it impossible to work outside. I knew it was time to get on the air. I could hear several DX stations running pile-ups. The first station I decided to try was V47KP. I send my call at 36 WPM—he comes right back. One call. Perfect. It was just like using a "real antenna." Hey, that wasn't just my first DX with a light bulb, but a new distance record. My sporadic operating using The Illuminator antenna produced 14 countries on 10 meters the first day. I brought the log to the Paso Robles Amateur Radio Club potluck dinner that evening and Larry, W7CB, noticed I was missing Africa for Worked All Continents. Aha—another challenge!

I figured the best bet to work Africa would be if Jim Neiger, ZD8Z, was on because he is using very high gain antennas pointed at the US. The sun had begun to brighten the morning sky and I was tuning across the band with The Illuminator. By the way, the band is really quiet on this antenna. I hear some one. Sure enough, there he is. ZD8Z was having trouble maintaining his frequency and hearing through some European stations. His signal was less than S1 on the meter, so based on experience with The Illuminator, I knew I would have to wait for conditions to improve. About 90 minutes later the sun was fully up, and so was ZD8Z, reaching S3/S4 on peaks. It took a few calls, but we made it: the first Worked All Continents on a light bulb. Now I was really motivated, but there was more work to be done outside before the next rain. I decided that short rest periods were necessary every hour. With casual operating, the country count at the end of the contest was 28, with 41 stations worked.

To date, the farthest QSO on 10 meters was with ZD8Z…all with a barefoot powered light bulb from California. To peg The Illuminator to other antennas you might have experienced, there have been only two stations whose signals reached S6-S7 on the meter, which pushes at least S9+25 signal on a 5-element monoband Yagi. The typical signal level required for contact runs between S1 and S3 on the meter, measuring about S9+10 on the Yagi. Occasionally, success with signals reading less than S1 is possible and is most assuredly due to an effective antenna system and quiet location on the other end. The obvious moral here is that if you do not hear many strong signals, the antenna system is not very efficient.

Shedding Light

Achieving Worked All Continents in a few hours with a light bulb clearly sheds light on the idea that "everything works." Putting the performance envelope in the spotlight is the important message of this experiment. Although I had fun using the light bulb, it certainly would not promote my interest in Amateur Radio if it were my only antenna. Adding a kilowatt amplifier would allow more QSOs to be made, but I would not hear any better. If I only had one (poor) antenna at my house, I would not be aware of the sea of activity on our bands. If I had two antennas, one would always work better and I would quickly discover the difference between their performance envelopes.

The more efficient your antenna, the more QSOs and enjoyment you'll receive from our wonderful hobby. Looking back to the Figure 2 chart, a dipole in the clear is a very good antenna and having an antenna with the gain of a 2-element Yagi gets us a long way to a potential world-class station.

While everything "works," some antennas certainly "work" much better than others.

Thomas H.Schiller, N6BT, was licensed in 1959. He is the author of Array of Light*; a member of the Northern California Contest Club, the Paso Robles Amateur Radio Club, the Mother Lode DX/Contest Club, QCWA and is a Life Member of the ARRL. He developed the antenna design philosophy and intellectual property that is the basis for the Force 12 product line and he is co-founder of Force 12, Inc. Tom holds several patents relating to communications and antennas and is a co-founder of other companies in the communications and electronics fields. You can contact the author at 120 Robles Rd, Paso Robles, CA 93446-7638;* ***force12@fix.net****.* QST

See Feedback, August 2000 *QST*, p 76.

By Steve Ewald, WV1X

1999 Simulated Emergency Test Results

The 1999 ARRL Simulated Emergency Test was held during the first weekend of October or, in some cases, on another date during the autumn months. This annual test involved members of the ARRL Field Organization, National Traffic System, Amateur Radio Emergency Service (ARES) and Radio Amateur Civil Emergency Service (RACES) among others. It was an excellent chance to showcase the capabilities of Amateur Radio.

The timing for the 1999 SET was perfect for radio amateurs to begin discussions and training with community agencies for potential Y2K-related problems. The feared "Y2K Bug" brought Amateur Radio into the limelight to combat potential communication failures. Luckily, no problems surfaced because of the change of date as the world welcomed 2000. The following SET results represent outstanding work, planning, and training. Thank you for your efforts to make sure the Amateur Radio Service remains steadfast to the first "Basis and Purpose" in the FCC Rules and Regulations: "Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications" [97.1 (a)].

SET 2000

The weekend of October 7 and 8 is the primary date for this year's ARRL Simulated Emergency Test. Please check with your ARRL Section Manager and/or Field Organization leaders for details on the SET in your area.

Massachusetts ARES/SKYWARN SET

Excerpts from the report by Rob Macedo, KD1CY, ARES SKYWARN Coordinator for NWS, Taunton, MA.

The Massachusetts National Guard in conjunction with Massachusetts ARES/RACES/SKYWARN and Air Force and Army MARS conducted a drill to simulate a Y2K communications outage along with an ice storm that affected much of Southern New England. The drill was held on Saturday, September 11, and the SKYWARN activation for this drill started at 9 AM and lasted through 3 PM. Glenn Field, Warning Coordination Meteorologist at the National Weather Service (NWS) in Taunton, wrote special weather statements on the simulated storm that was based on statements from an actual ice storm that had occurred in Maine in the winter of 1998.

SKYWARN nets were activated at 9 AM to take check ins of either weather reports in the ice storm drill scenario or actual weather conditions experienced that day. The Taunton NWS office also activated at 9 AM and established contact with Massachusetts Emergency Management Agency (MEMA) via the Amateur Radio repeater on 53.31 MHz on Mt Wachusett. Communications were established with all repeaters and functional SKYWARN groups. Tactical messages on the current weather situation were handled as appropriate and net reports were gathered from all the various nets. Having this 53.31 MHz repeater for liaison between MEMA and Western Massachusetts and Connecticut has been quite useful for numerous drills and actual activations since the NWS received the 6 meter/HF radio and antenna system in July, 1998.

1999 SET Top Ten

Section	*Points*	*Section*	*Points*
ARES Activity		**Section/Local Nets**	
North Carolina	9245	North Carolina	4169
Michigan	6986	Michigan	2720
Arkansas	5436	Ohio	2333
Ohio	2911	Western New York	2320
Eastern Pennsylvania	2389	Western Pennsylvania	1535
Western Pennsylvania	2209	Connecticut	921
Western New York	1878	Eastern New York	685
Virginia	1747	West Virginia	601
Western Massachusetts	1680	Arkansas	543
Illinois	1551	Kansas	540

SET Scorecard

The points for ARES activity were awarded in the following manner:

Category	*Points*
(A) Number of amateurs participating	2 (each)
(B) Number of new amateurs (licensed since 1996)	3 (each)
(C) Number of formal third party messages originated on behalf of served agencies	1 (each)
(D) Tactical communication was conducted on behalf of served agencies: (<0.5 hour, 5 points; 0.5-1 hour, 10 points, >1 hour, 20 points)	
(E) Number of stations on emergency power during test	2 (each)
(F) Number of emergency-powered repeaters used in test	10 (each)
(G) Dual membership in ARES and RACES is encouraged	10
(H) Liaison was maintained with an NTS section/local net	10
(I) Digital modes were used during test	10
(J) Number of different agencies for which communication was provided.	5 (each)
(K) Number of communities in which agencies were contacted	10 (each)
(L) Press release was submitted	10

The points for net activity were awarded in the following manner:

(A) Total number of messages handled.	1 (each)
(B) Number of different stations participating	2 (each)
(C) Number of different stations checking-in on emergency power	2 (each)
(D) Number of new amateurs (licensed since 1996) in test	3 (each)
(E) Number of net control stations	5 (each)
(F) Number of different stations performing NTS liaison	5 (each)

Successful Test in Kansas

Excerpts from the report by June Jeffers, KB0WEQ, ARRL EC, Kansas District 4, Zone 3.

The November 6, 1999, Simulated Emergency Test was designed to interact between three Kansas ARES groups (Zone 1, 3, and 3) in our District 4 and one ARES group in Jackson County, MO. Each ARES group worked with their own local Salvation Army.

The primary objective was to test communication links for the Salvation Army including the Emergency Disaster Services headquarters in Kansas City, MO (using Jackson County, MO, ARES) and Leavenworth, Johnson and Wyandotte County local Salvation Army locations. All participants were required to operate on backup power. ARES members who are also SATERN (Salvation Army Team Emergency Radio Net) members participated in this exercise using SATERN protocols while serving Salvation Army locations. The SET also tested packet communication between links between emergency management offices in Olathe and Topeka.

This exercise brought an immense amount of awareness between the agencies involved and ARES members. Agencies saw first hand what we can do, and the radio operators experienced first hand what would be expected of them in the event of an actual emergency. During the debriefing, every representative from agencies in our ARES Zone 3 indicated they were very impressed with our abilities and felt the exercise went extremely well.

ARRL EC Lee Cunningham, KC7CBK, is shown operating from the Prescott, Arizona, Emergency Operations Center during the Y2K event.

ARES Activity

Area/ Section	Reporter	Points	(Section total)
Atlantic Division			
Delaware			**(92)**
Kent Co	N3KRX	92	
Eastern Pennsylvania			**(2389)**
Montgomery Co	W3ZQN	1323	
Chester Co	KC3XL	429	
Lancaster Co	WB3FQY	461	
Monroe Co	N3ZQJ	176	
Maryland–DC			**(195)**
Ann Arundel	N3QXW	131	
Howard Co	K3EF	64	
Northern New York			**(80)**
Lewis Co	N2OYQ	80	
Southern New Jersey			**(296)**
Camden Co	KA2YKN	296	
Western New York			**(1878)**
Tompkins Co	N2WRC	498	
Oswego Co	KY2F	460	
Oneida, Madison Co	K2DYB	250	
Onondago Co	WA2PUU	238	
Chenango Co	WA2EYH	190	
Herkimer Co	N2ZWO	149	
Delaware Co	WB2JOW	93	
Western Pennsylvania			**(2209)**
Beaver Co	K3NPX	855	
Erie Co	N3HPR	533	
Westmoreland Co	N3WAV	247	
Blair Co	KA3EJV	168	
Fayette Co	K3FQI	162	
Greene Co	AA3KC	150	
Crawford Co	N3OJ	94	
Central Division			
Illinois			**(1551)**
Lake Co	K9DRW	393	
Williamson Co	WA9OPQ	359	
DuPage ARC	W9DUP	252	
Owen Co	WD9BKA	156	
DeKalb Co	W9ICU	131	
La Salle Co	KF9NZ	130	
Wabash Co	AI9H	130	
Indiana			**(732)**
Vigo Co	N9YNF	234	
Whitley Co	WB9UNL	205	
Pike Co	WB9NCE	123	
Howard Co	N9LRO	70	
St Joseph Co	N9KQD	56	
Boone Co	KG9LX	40	
Allen Co	N9ADS	4	
Wisconsin			**(118)**
Adams Co	WA9SZH	118	
Dakota Division			
Minnesota			**(493)**
Lyon, Lincoln Co	WD0BZU	204	
N St Louis Co	WD0GUF	134	
Stearns Co	W0MBD	95	
Redwood Co	KA0ISD	60	
Delta Division			
Arkansas			**(5436)**
SATERN	N5URB	2035	
Pope Co	W5RZ	1544	
Statewide	W5ARS	730	
Pulaski Co	K5SCD	298	
Little River Co	KC5MLC	128	
Howard Co	N5THS	123	
Miller Co	KC5TLW	119	
Sevier Co	KC5DOR	119	
Nevada Co	KB5SSW	78	
Hempstead Co	W5LZQ	73	
Faulkner Co	N7GK	66	
Columbia Co	KB5SSW	59	
Lafayette Co	KB5SSW	59	
Clay Co	N5SEB	5	
Mississippi			**(1139)**
Lauderdale Co	WB5OCD	261	
DeSoto Co	KD5CKD	211	
Lamar Co	KC5TYL	145	
Lincoln Co	N5ZNT	139	
Meridian Area	WB5OCD	131	
Hancock Co	K5DMC	113	
Forrest Co	KK5BY	43	
Stone Co	KB5DZJ	36	
Union Co	W5UBG	35	
George Co	KC5SPR	25	
Tennessee			**(1055)**
Knox Co	ND4F	343	
McMinn Co	KC4KUZ	298	
Sullivan Co	WD4PIW	208	
Meigs Co	KE4MBR	120	
Carter Co	KD4INB	86	
Great Lakes Division			
Kentucky			**(358)**
Scott Co	WD4KYD	199	
McCracken Co	KC6GNV	71	
12th Dist	K4JZ	62	
Mercer Co	KE4LZP	26	
Michigan			**(6986)**
Kent Co	N8ROM	1353	
Oakland Co	W8HIU	1184	
Bay Co	KC8BGK	433	
Tuscarawas Co	KB8FZY	375	
Ionia Co	N8ZMT	366	
Alcona Co	WD8OWM	358	
Arenac Co	KC8GTZ	328	
Calhoun Co	N8ZHR	293	
Jackson Co	N8RDP	284	
Lenawee Co	K8YZA	268	
Ottawa Co	N8GGO	245	
Iosco Co	KB8ZYY	189	
Leelanau Co	W8WFN	150	
Midland Co	KB8QWQ	144	
Ogemaw	K5EKP	141	
Muskegon Co	N8YJT	127	
Macomb Co	KB8DSC	132	
Newaygo Co	KC8FUV	115	
Huron Co	KG8BT	111	
Montmorency Co	WA8SCO	97	
Ontonagon Co	W8UXG	92	
Benzie Co	W8VWY	79	
Houghton Co	N8WAV	77	
Oceana Co	N8UKH	45	
Ohio			**(2911)**
Clermont Co	K8EC	404	
Loraine Co	KB8ZXV	364	
Shelby Co	N8KZL	313	
Richland Co	N8ICH	287	
Montgomery Co	KI8O	238	
Lucas Co	KC8FUG	200	
Erie Co	K8HLH	197	
Adams Co	N8HIA	164	
Marion Co	KB5SJK	153	
Jefferson Co	WA8DRL	139	
Fayette Co	WD8PHL	134	
Clinton Co	WB8ZZR	128	
Hancock Co	N8SNJ	61	
Preble Co	N8XP	59	
Wayne Co	WD8BVV	39	
Jackson Co	WB8LDB	31	
Hudson Division			
Eastern New York			**(207)**
Dutchess Co	K2KJ	207	
New York City/Long Island			**(472)**
Southold Township	N2QHV	160	
Huntington	N2JIY	159	
Babylon	KA2RGI	153	
Northern New Jersey			**(152)**
Sectionwide	N2OPJ	109	
Englewood	W2CC	43	
Midwest Division			
Iowa			**(261)**
Boone Co	K0CY	177	
DeMoines Co	N0EJD	84	
Kansas			**(440)**
Dist 4 -Zone 3	KB0WEQ	270	
Dist 2 –Zone 18	W0PBV	170	
Missouri			**(523)**
St Charles Co	N0PNP	523	
Nebraska			**(383)**
Madison Co	KD0JE	288	
Buffalo Co	KA0DBK	95	
New England Division			
Connecticut			**(205)**
Enfield	NM1K	205	
Eastern Massachusetts			**(1117)**
ARES/SKYWARN	KD1CY	895	
Plymouth	KD1CY	130	
Cape Cod	WQ1O	92	
New Hampshire			**(214)**
Coos Co	WA1JVV	133	
Strafford Co	K1BD	81	
Vermont			**(69)**
Windham Co	KA1ZQX	69	
Western Massachusetts			**(1680)**
ARES/SKYWARN	K1VSG	755	
Hampden Co	N1MUV	318	
Berkshire Co	W1SJV	310	
Worcester Co	KA1OTQ	160	
N Worcester Co	NZ1D	90	
Franklin Co	N1SCC	47	
Northwestern Division			
Eastern Washington			**(723)**
Spokane Co	WA7LNC	723	
Montana			**(14)**
Central MT	WB7TNH	14	
Oregon			**(1305)**
Statewide	KB7HEK	277	
Portland	KC7YOC	233	
Clackamas Co	KA7IJK	217	
Washington Co	N7OGM	195	
Klamath Co	K7DDI	179	
Yamhill Co	KB7OK	116	
Linn Co	WB9HZT	88	
Western Washington			**(424)**
Dist 6	N7LSL	176	
Western WA	N7UJK	119	
Dist 4	KC7AXW	111	
Skagit Co	KJ7SI	18	
Pacific Division			
East Bay			**(587)**
Mt Diablo	KE6ZZS	220	
Alameda Co	WA6TGF	148	
Oakland	N8RCG	123	
Solano Co	K6HEW	96	
Nevada			**(225)**
Central Western Dist	KA7AJQ	225	
Pacific			**(279)**
Kauai	WH6KS	198	
Maui Co	KH6H	81	
Sacramento Valley			**(236)**
Siskiyou Co	KC6HOY	236	
Santa Clara Valley			**(164)**
San Lorenzo Valley	N6FW	164	
Roanoke Division			
North Carolina			**(9245)**
Four Co ARES	K4NSM	2773	
Guilford Co	KE4IAM	1645	
Pitt Co	K4ROK	1151	
Buncombe Co	K4BNP	794	
Eastern Branch	WA4MOK	385	
Craven Co	N8UTY	330	
Orange Co	W4SAR	293	
Triad SKYWARN	KB1G	280	
Forsyth Co	KF4KYD	253	
Haywood Co	N2JLE	243	
Mecklenburg Co	W4OH	235	
Jackson Co	AD4XV	203	
Wilson Co	KF4OFP	150	
Cumberland Co	KL7NL	137	
Alamance Co	W4VU	126	
Currituck Co	KD4ATK	96	
Goldsboro	KD4DSV	77	
Area 3 (Floyd)	W9EF	63	
Lenoir Co	KB4OHX	11	
South Carolina			**(159)**
Oconee Co	N9GSX	159	
Virginia			**(1747)**
Statewide	W4IN	433	
Lynchburg	K4YCR	203	
Dist 8	KD4NVK	177	
Gloucester Co	KE4NBX	160	
York Co	WB4UHC	140	
Chesterfield Co	KA4CBB	137	
Williamsburg	KC4CMR	129	
Washington Co	K4HRO	116	
Dist 9	AE4EF	95	
Fauquier Co	WY2V	80	
Newport News	N4ZBV	77	
West Virginia			**(856)**
SW West VA	KB8KDR	749	
Fayette Co	K8NNK	107	
Rocky Mountain Division			
Colorado			**(129)**
Dist 6	W0WPD	129	
New Mexico			**(999)**
Statewide	KK5RIC	999	

Southeastern Division
Alabama (414)

District 1	KC4URL	262
Shelby Co	KF4NWP	79
Lauderdale	KF4FUG	73

Georgia (510)

Carroll Co	K4DEV	250
Colquitt Co	AA4P	140
Pickens Co	WW3A	120

Southern Florida (155)

Highlands Co	W4WDK	155

Southwestern Division
Arizona (499)

Cochise Co	N7INK	189
Flagstaff	AA7AC	172
Kingman	KC7WTX	138

Orange (862)

Hemet/San Jacinto	N6PLV	329
Riverside	N6FJX	240
Orange Co	W4SAR	293

Santa Barbara (350)

N Santa Barbara Co	KF6BNC	195
Central Co	KD6DYZ	155

San Diego (188)

Imperial Co	WB6CGJ	188

West Gulf Division
North Texas (1359)

Wichita Co	W5GPO	965
Irving	KA4OZC	207
Nacogdoches Co	KK5BE	187

Oklahoma (345)

Tulsa Co	WB5OSM	345

South Texas (419)

Williamson Co	N0AJP	204
Sabine Co	W5ZX	145
Washington Co	N5GCU	70

West Texas (400)

District 5	KJ5EO	227
Brewster Co	WA5ROE	173

Net Activity

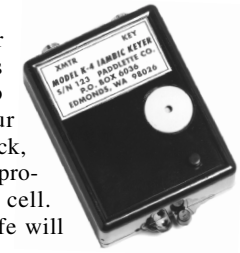
Area/ Net Name	*Net Manager*	*Points*	*(Section total)*
NTS Area and Region Nets			
Second Region Net, Cycle 2	W2MTA	78	
Second Region Net, Cycle 3	W2MTA	67	
Second Region Net, Cycle 4	W2YGW	93	
Atlantic Region Net	W2MTA	21	
Section/Local Nets			
Atlantic Division			
Eastern Pennsylvania			(234)
Chester Co	W3QT	153	
Monroe Co	N3ZQJ	81	
Maryland-DC			(336)
MDD Net	WJ3K	155	
Ann Arundel	N3QXW	80	
Maryland Slow Net	KC3Y	52	
Howard Co	K3EF	49	
Northern New York			(437)
New York Public Operations Net	N2YJZ	218	
NYS/E	WB2QIX	170	
NYS/M	KA2GJV	49	
Southern New Jersey			(239)
Hurricane Floyd Net	KA2YKN	239	
Western New York			(2320)
Western District Net	KB2VVD	736	
OCTEN	KA2ZNZ	400	
New York Public Operations Net	N2YJZ	218	
CNYTN	WA2PUU	182	
NY Phone	N2LTC	179	
NYS/E	WB2QIX	170	
Oneida/Madison Co	K2DYB	80	
CARES	WA2EYH	68	
BRSVN	WB2OFU	56	
NYSPTEN	WB3CUF	56	
NYSEMO	N2AGO	49	
NYS/M	KA2GJV	49	
EBN	WB2IJZ	47	
TIGARDS	W2MTA	19	
NYSCN	W2MTA	11	
Western Pennsylvania			(1535)
South One ARES	N3LWQ	437	
Erie Co	N3HPR	357	
Beaver Co	K3NPX	295	
WPPTN	N3KB	154	
Westmoreland Co	N3HJY	127	
Blair ARES	KA3EJV	88	
GCARA	N3LIF	77	
Central Division			
Illinois			(506)
DuPage ARC	W9DUP	159	
Williamson Co	WA9APQ	130	
Lake Co	W9FUL	124	
DeKalb Co	W9ICU	53	
Radio, Wabash Co	WA9THM	40	
Indiana			(502)
Wabash Valley	N9YNF	189	
St Joseph Co	KB9SDT	122	
Whitley Co	WB9UNL	75	
Owen Co	WD9BKA	47	
Pike Co	WB9NCE	38	
Boone Co	KG9LX	31	
Wisconsin			(53)
Adams Co	WA9SZH	53	
Dakota Division			
Minnesota			(303)
Marshall Em Net	WD0BZU	174	
Stearns Em Net	KB0RRS	58	
N St Louis Co	WD0GUF	54	
RAARA	KA0ISD	17	
Delta Division			
Arkansas			(543)
Arkansas Net	W5ARS	364	
HEARN	N5THS	47	
TSEN	KC5MLC	32	
FSARN	KC5TLW	29	
SWARN	WA5LTA	29	
Hempstead-Nevada	KB5SSW	24	
Clay Co	N5SEB	18	
Mississippi			(433)
MSPN	N5JCG	224	
Pine Belt RA	N5YNY	95	
Laurel ARC	KB5IXI	65	
Hancock Co	WD5HXB	49	
Tennessee			(31)
Carter Co	KD4INB	31	
Great Lakes Division			
Kentucky			(164)
Scott Co	KE4KWR	99	
Purchase Area	KC6GNV	65	
Michigan			(2720)
Oakland Co ARPSC	N8SMV	511	
UP Net	AA8SN	339	
Michigan Net	WB8SIW	212	
SEMTN	WI8K	193	
Alcona Co	WD8OWM	178	
Bay Co ARPSC	KB5TOJ	172	
Lenawee Co	KB8SVA	150	
Jackson Co	K8DAZ	104	
Arenac Co	KC8GZT	94	
Macomb Co	KB8DSC	90	
Ogemaw	K5EKP	91	
Ottawa Co ARES	N8GGO	85	
Iosco Co ARES	KB8ZYY	82	
Newaygo Co 2 M Net	KE8FUV	71	
ICARES	K8ILN	66	
MACSA	W8RNQ	64	
Leelanau	W8WFN	60	
12th Dist	K4JZ	42	
Benzie Co	W8WVY	36	
GLETN		22	
Ontonagon Co	W8UXG	22	
Oceana Co	N8UKH	20	
Hocoan	WA8QNE	16	
Ohio			(2333)
OSSBN	KF8DO	473	
Cen OH Tfc	N8RRB	457	
Richland Co	N8ICH	295	
Shelby Co ARES	NO8C	200	
W Cen OH	KB8UEY	136	
DeForest ARC		126	
Miami Valley	W9GGA	126	
NW OH ARES	N8TNV	114	
Burning River	KB8FE	95	
Fayette Co	WD8PHL	90	
ARES Alert Net	KB5SJK	89	
Clinton Co	N8YMN	62	
HEARS	N8SNG	37	
Loraine Co	KB8ZXV	17	
Jackson Co	WB8LDB	16	
Hudson Division			
Eastern New York			(685)
Hudson Valley Net	N2JBA	248	
New York Public Operations Net	N2YJZ	218	
NYS/E	WB2QIX	170	
NYS/M	KA2GJV	49	
New York City-Long Island			(525)
New York Public Operations Net	N2YJZ	218	
NYS/E	WB2QIX	170	
Huntington	N2NKI	88	
NYS/M	KA2GJV	49	
Northern New Jersey			(96)
NJVHF/Late	N2OPJ	71	
NJ Phone	W2CC	25	
Midwest Division			
Iowa			(111)
Boone Co ARES	K0CY	111	
Kansas			(540)
KS Sideband & Phone	N0KFS	208	
QKS –CW	WB0ZNY	176	
District 2- Zone18	W0PBV	90	
ARES District 4 - Zone 3	KB0WEQ	66	
Nebraska			(161)
EVARC	KD0JE	106	
Buffalo Co	KA0DBK	55	
New England Division			
Connecticut			(921)
BEARS of Manchester		523	
CPN	N1DIO	216	
N CT Emerg	NM1K	182	
Maine			(260)
12 Co Em Net	KA1RFD	214	
Pen Bay Emergency	WA1SAZ	46	
New Hampshire			(104)
N Country ARES	KH6GR	68	
Seacoast Em Net	N1JUX	36	
Western Massachusetts			(62)
Montachusett	NZ1D	62	
Northwestern Division			
Montana			(4)
GFAARC	KD7FMT	4	
Oregon			(537)
Portland	KC7YOC	229	
OR ARES	K7DDI	106	
District 1	AB7ZQ	84	
Washington Co ARES	N7OGM	70	
Linn Co	WB9HZT	48	
Western Washington			(221)
Skagit Co	KJ7SI	78	
Lewis Co	KC7AXW	74	
Auxiliary Em Com	KB7EOW	69	
Pacific Division			
Nevada			(150)
Douglas Co Training	KA7AJQ	150	
Roanoke Division			
North Carolina			(4169)
Guilford Co	KE4IAM	1558	
Four Co ARES	K4NSM	593	
Pitt Co	K4ROK	531	
Triad SKYWARN	KB1G	185	
Tar Heel Em Net	K4CWZ	489	
Metrolina 2M Net	N4YYN	170	
Stanly Co	KD4OZI	126	
Forsyth Co	KF4KYD	103	
Alamance Co ARES Net	N4MIO	91	
Jackson Co	AD4XV	82	
WARA Net	KF4OFP	70	
HARES	N2JLE	68	
CFARS Net	KJ4RV	56	
Currituck ARES	KD4ATK	47	
South Carolina			(100)
Oconee Co ARES	N9GSX	100	
Virginia			(467)
Poquoson	W1CLS	96	
Middle Peninsula	KE4NBX	95	
Mt Empire ARS	K4HRO	67	
Newport News ARES	N4ABV	60	
ESHARES	K4BW	54	
Williamsburg ARES	KC4CMR	49	
Fauquier ARES	WY2V	46	
West Virginia			(601)
NTAN	KB8GDF	549	
Fayette Co ARES	K8NNK	52	
Rocky Mountain Division			
Colorado			(135)
Park Co	WD0WPD	135	
Southeastern Division			
Alabama			(271)
Marshall Co	KC4URL	138	
Shelby Co	KF4NWP	59	
AENJ	WA4JPK	43	
ASN	W4ZJY	31	
Georgia			(90)
Colquitt Co	AA4P	90	
Southwestern Division			
Arizona			(369)
Cochise Co	N7AIK	189	
ARES Regional	KB7USA	180	
Orange			(86)
Riverside	N6FJX	86	
Santa Barbara			(85)
N Santa Barbara	KF6BNC	85	
San Diego			(88)
San Diego Section Net	W6FFF	88	
West Gulf Division			
North Texas			(534)
DFW Late	WA5I	317	
Irving RACES/ARES	KA5OZC	117	
NAC AMT Net	KK5BE	100	
South Texas			(184)
Williamson Co	N0AJP	109	
Sabine Co	W5ZX	75	
West Texas			(73)
Big Bend Emerg	WA5ROE	73	

QST

NEW PRODUCTS

IAMBIC KEYER FROM PADDLETTE

◊ Paddlette Co now offers a miniature Iambic electronic keyer unit—the K-4.



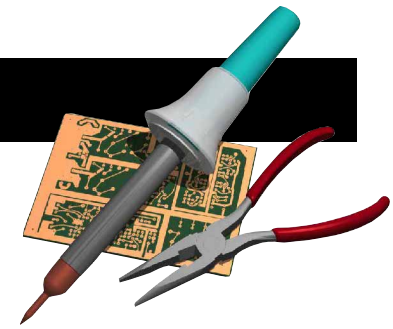
The K-4 is a TiCK-4 based electronic keyer enclosed in a $^3/_4 \times 1^1/_2 \times 2$-inch box that weighs a mere 1 oz. Simply connect a set of paddles to the 3.5 mm **KEY** jack, a jumper from your radio's keying input to the 3.5 mm **XMTR** jack, and you're ready to go—power for the keyer is provided by an internal 3 V/540 mAh lithium cell. Paddlette estimates that the typical battery life will be approximately four years.

The K-4 will key virtually any solid state transceiver. A built-in piezo speaker can provide CW sidetone, if desired.

The Embedded Research TiCK-4 CMOS keyer IC used as the heart of the K-4 provides 2 message memories, Iambic A or B operation, a straight key mode and a beacon mode. The speed, memory contents, mode, paddle sense and sidetone state (on or off) are non-volatile.

Price: $48.95. Shipping and handling by first class mail, $2.25. For additional information contact the Paddlette Co, PO Box 6036, Edmonds, WA 98026; tel 425-743-1429; **bham379627@aol.com**; **http://home.att.net/~goodroe/paddlette**. QST

Next New Product



The Doctor is IN

Q N1AHT asks, "Whenever I send a QSL directly to a DX station I include an SASE and a dollar. Is this the correct procedure?"

A Including an SAE (Self-Addressed Envelope) is always a good idea, but not an SASE (Self-Addressed *Stamped* Envelope). A US stamp is of no use at all to a ham in another country. He has to put his country's stamp on the return envelope.

As for the dollar, opinions on this practice differ. Many US hams include "greenstamps" (US dollars) with their QSLs to pay for the return postage. One US dollar will pay for return airmail postage from most areas of the world. The exceptions appear to be France and Germany where $2 may be necessary, depending on the exchange rates at the time.

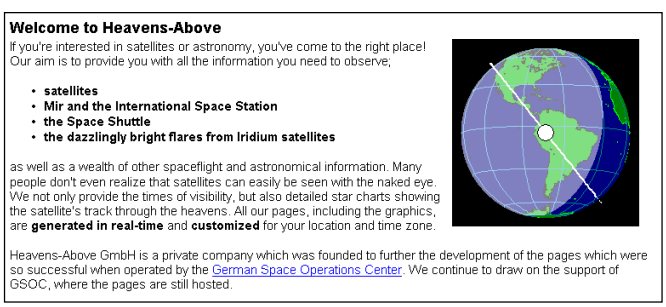
Sending US dollars is an expensive way to QSL, but the advantage is that you will probably have your coveted card much sooner. Going through the QSL bureau system is more cost effective, but you could wait a year or longer to receive the card. It all boils down to how eager you are to have the confirmation in hand.

Be advised that receiving foreign currency is illegal in a few countries. In addition, the postal workers in some countries have become remarkably adept at spotting Amateur Radio correspondence. They know these envelopes could contain money and are not above stealing the contents.

The alternative to the greenstamp is the IRC—International Reply Coupon. By international agreement, these are each valued at one unit of air mail postage at the destination. You'll find IRCs at your local post office.

Q Is there a site on the Web where I can obtain pass predictions for Amateur Radio satellites?

A There is indeed. Point your browser to **http://www.heavens-above.com/**. This fascinating site is primarily devoted to observing objects in the night sky, but it tracks all kinds of satellites, too. It can provide a 24-hour listing of passes for various Amateur Radio satellites.



You can obtain a 24-hour list of Amateur Radio satellite passes for your location on the Web at Heavens Above at: http://www.heavens-above.com/.

Q John, KU4KZ, asks, "I have a Yaesu FT-990 transceiver that I use with a Carolina Windom antenna. Most of the time I use my antenna tuner, but the other day the tuner was accidentally in the bypass mode. I noticed that the tuner's SWR meter was moving as I talked. It seemed to kick up as high as 2:1. I was running about 100 W output. When I brought the antenna tuner into the line, the needle did not move when I transmitted. Can you explain this?"

A Yes, I believe I can. To answer your question, let's briefly discuss what an antenna tuner and an SWR meter do.

Part of the function of an SWR meter is to measure any power that is reflected back to your transceiver that's caused by an impedance mismatch in the antenna system. Most modern rigs are designed to accommodate antenna impedances of 50 Ω. If the impedance at the antenna system input is anything other than 50 Ω, power will be reflected back to the radio. The reflected power needle on your SWR meter will indicate this power. If it reads zero, there is no measurable reflected power.

The job of the antenna tuner is to match the antenna system impedance to that of the transceiver. Note that an antenna tuner doesn't "tune" anything—it matches two dissimilar impedances. The antenna tuner transforms whatever impedance exists at the end of your coax to 50 Ω for the radio. When impedances are matched there is no reflected power and, again, the reflected power needle will read zero.

So, when your antenna tuner was bypassed you were seeing the result of having your transceiver connected directly to the antenna system. The SWR meter indicated that reflected power was present as you spoke. (In SSB, power is generated only when you actually speak.) When you switched your tuner back in, the impedance mismatch was transformed to 50 Ω and the reflected power at the SWR meter dropped to zero.

By the way, don't worry too much about harming your FT-990 this way. Like most transceivers, the FT-990 includes a foldback circuit that senses when there is too much reflected power getting into the radio. The foldback automatically reduces the output to a safe level.

Q Joe, NC4D, asks, "I'm curious about connecting two VHF antennas. Can you use a T connector to connect one feed line from a 6-meter beam, and another from a 2-meter beam, to a single piece of coax going back to the radio? Would this be any different than having multiple dipoles in parallel, all connected to the same feed line?"

A Parallel dipoles work as they do because the antennas that are nonresonant to the frequency of the transmitted signal provide a high impedance at the connection point while the antenna that *is* resonant provides a low (approximately 50 Ω) impedance.

A 6-meter beam may or may not offer sufficiently high impedance to 2-meter RF, and vice versa. Either way, you still have the issue of what happens in the coax. Coax that is terminated in its characteristic impedance will present the same impedance on the other end. Coax that is terminated in a high impedance will present a different impedance on the other end, dependent upon the length. Consider an open coax stub: the far end is about as high an impedance as you could want. If the coax is $^1/_2$ wavelength (or a multiple thereof), the near end will also be a high impedance. However, if the coax is a $^1/_4$ wavelength (or an odd multiple thereof), the near end will be a very low impedance. Lengths in between will give other impedance values.

So, to do what you describe, you would have to adjust the length of the coax going from the **T** to the 6-meter beam in such a way that it offers a high impedance to 2-meter RF. You'll need to meet the opposite condition with the coax that runs between the **T** and the 2-meter beam.

Perhaps an easier alternative would be to purchase a diplexer. These matching/coupling devices are primarily designed to allow multiband VHF/UHF transceivers with single feed line ports to operate on several bands without changing antennas. Feed lines from each antenna connect to the diplexer, then a single coax feed line runs between the diplexer and the radio.

Q Andy, KB1ETK, asks, "I have a question about an HF/VHF SWR/power meter I just purchased. I'm using an ADI AT600HP 2m/70cm hand-held transceiver. It generates 5 W output on the 'high power' setting when I use the 13.6-V battery. When I hook up my home-brew 1/4-wavelength vertical the meter measures an SWR of 1.3:1 and the RF power measurements are correct: 5 W on high, 2 W on medium, 400 mW on low. But when I attach the rubber duck antenna that came with the radio (with the SWR/power meter in between), my measured power output shoots up to close to 10 W on high, 6 W on medium, and 3 W on low. How is this possible?"

A The power reflected at the rubber ducky is re-reflected back down the coax from the transmitter to the antenna. When it reaches the antenna, the power again reflects and the cycle begins again. On each reflection, there is some power lost in the transmission line. However, the net effect is that both the forward and reflected powers will read higher than they actually are. The difference between the forward and reverse power readings is the actual net power. Thus, when the SWR is higher than 1:1, the forward power will rise, but so will the reflected power.

Here's a good case in point. I used to own an HF QRP rig that did not reduce power for high SWRs. Its maximum output was 2W. When I had a schedule with a station very close by and didn't have a tuner handy, I ran a random wire around the room and connected the rig directly to it. The SWR meter said I had 10W forward and 8W reflected. The difference between forward and reverse powers was 10 – 8 = 2 W, just what it should have been.

Rubber ducks are poor antennas in all respects save one—portability. I wouldn't be overly concerned about the high SWR with your rubber duck. VHF/UHF equipment typically transmits into a 3:1 to 4:1 SWR without suffering ill effects. Further, a rubber duck uses the H-T (and the human body holding it) as its "ground plane." Putting a piece of coax between the rubber ducky and the SWR meter doesn't yield the same amount of ground-plane area and the feed-point impedance of the rubber ducky will change from when it is used in a more traditional fashion connected directly to the H-T.

Q Bernard, K8LIX, asks, "The Dovetron stealth antenna uses house wiring as part of the radiating system. I live in a condo with neighbors on both sides. If I use it with my 150-W transmitter, what kind of measurements will I have to make in order to satisfy the FCC RF safety requirements?"

A You can make the same calculations for this as for any antenna. Unless you and your neighbors are on the same circuit, you can probably safely assume that all of the wiring in your unit could be radiating. These types of antennas are *not* very efficient, so a calculation assuming 0-dBi gain is probably reasonable.

At 150 W, with a 40% duty factor and 67% on/off operating times, you have 40 W of average power for the purposes of the safety calculation. Your neighbors would need to be the following distances from any part of your residential electrical wiring:

28 MHz: 6.2 feet
14 MHz: 3.1 feet
7 MHz: 1.5 feet

Assuming the same conditions and 100% on/off time (in 6 minutes), you and your family would have to be:

28 MHz: 3.4 feet
14 MHz: 1.7 feet
7 MHz: 0.8 feet

Q Mike, AA9RH, asks, " I travel often on business and I am considering the idea of operating HF QRP from the various hotels where I stay. However, most of my trips take me to large urban or suburban hotels which offer great height (say 20-30 stories), but definitely confine one to indoor operating. Is it possible to enjoy success from inside one of these large, sealed-up hotels?"

A The answer depends on how you define "success." Doc has been able to make a few QRP contacts from hotel rooms using indoor antennas, but the antennas usually didn't load well. In addition, they tended to pick up a lot of noise from hotel computers, TVs, hair dryers and so on.

Some hotel windows are not completely sealed; they can be opened slightly. If this is the case, you could discreetly drop a long, thin wire. With a good antenna tuner, and a 1/4-wavelength counterpoise wire on the floor, you may be able to load your "stealth antenna" and make some contacts.

If you are fortunate to have a room with a balcony, you might be able to put up a mobile whip and counterpoise. These are not the most efficient antennas, but they may do the job in a temporary hotel-room application.

Q I'd like to set up a 30-meter antenna in my back yard, but I'm really tight on space. I've been told that I can use a technique known as 'linear loading' to reduce the size of a dipole. Can you enlighten me?

A What you've heard is true—linear loading can significantly reduce the required lengths of resonant antennas. For example, it is easy to make a resonant antenna that is 30 to 40% shorter than an ordinary dipole for a given band. The shorter length comes from bending back some of the antenna wire. The increased self-coupling lowers the resonant frequency.

NN0F constructed a linear-loaded dipole using 25-feet of common 450-Ω ladder line and capacitive end hats (see Figure 1). The end hats are simply 6-foot lengths of stiff wire. Both conductors of the ladder line at each end are soldered to the hat wires. At the middle of the antenna (12 feet 6 inches from the ends) you cut through one of the ladder line conductors and attach your 50-Ω coaxial feed line. Cut through the other conductor as well, but leave it open. This antenna should provide a good match (no tuner required) and it fits easily within most back yards.

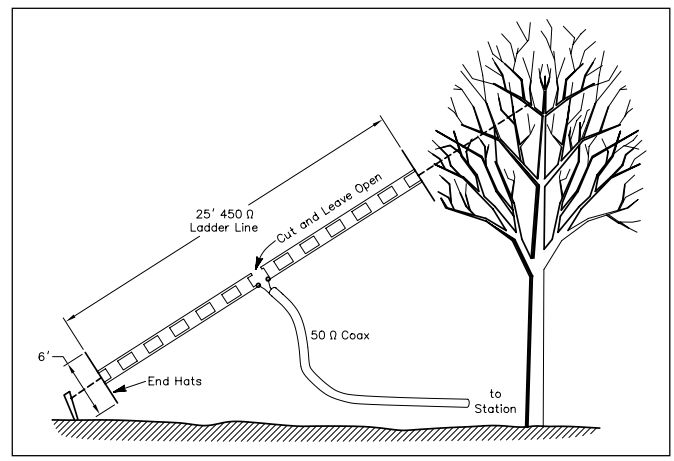
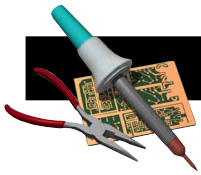


Figure 1—A two-wire linear-loaded antenna for 30 meters using 450-Ω ladder line.

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 Rick Littlefield, K1BQT

Build a Simple SMD Workstation

Tired of chasing surface-mount parts with a toothpick? This "helping hand" is a better solution!

Working with surface-mount devices (SMD) isn't as difficult as you might imagine, especially with the right tools. The handy little workstation described here will help you conquer the most difficult task of all—holding flea-sized parts in place while soldering. It works like a tiny spring-loaded finger that moves on three axes over the circuit board. Want to mount a part? Simply position it with tweezers, place the stylus on top (to hold it) and solder away!

Description

This second-generation workstation features several improvements over my first attempt.[1] By studying Figure 1 you'll see immediately how it works. The stylus arm swings side to side and slides back and forth to cover a 12 1/2 square-inch work area. It also tilts vertically, with a tension spring supplying the downward force needed to hold SMD parts in place. The arm's slide rule-style mechanism was chosen because it provides smooth motion while under spring tension—and that's important for precise stylus control. Small in size, the mini-workstation stores easily in a drawer or toolbox and can be used for SMD repair or prototype construction.

Construction

This was a true junk-box project—I used whatever shop scraps I could find to put it together. Dimensions aren't critical, and your version may be scaled to preference. Most parts were cut from leftover pieces of 1/16-inch aluminum or G-10 circuit board. The base plate is a 5- × 7-inch panel-stock remnant. Its non-skid work surface was trimmed from an old mouse pad. A discarded length of 0.1-inch stainless antenna rod became the stylus. The 90° 4-40 threaded angle brackets that hold the arm onto the tilt bracket were recycled from an old hobby box (also easily made from scrap angle stock).

Assembly is straightforward and much easier to visualize than to explain (see Figure 2). The slider mechanism is the workstation's most critical part. This item, made from three pieces of PC board sandwiched together, rides along the arm mechanism's slot much like a slide rule.

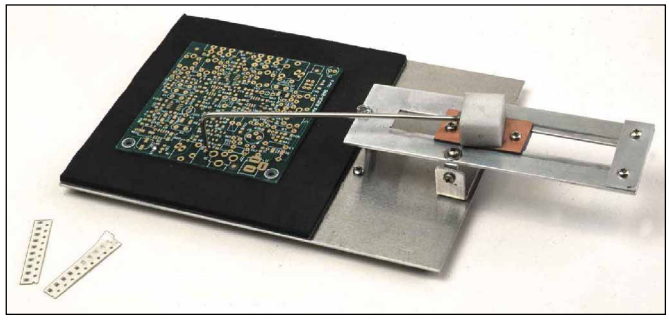
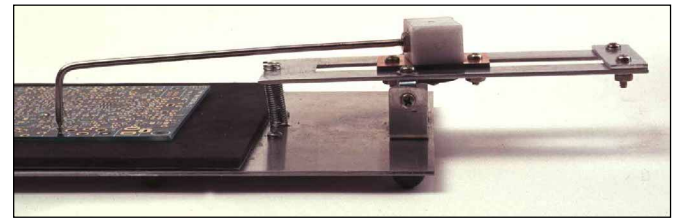
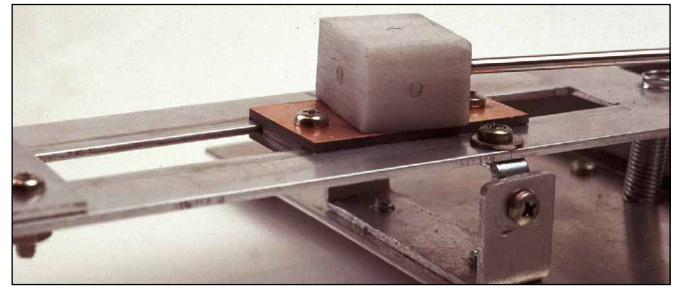


Figure 1— The SMD workstation. The stylus arm swings side to side and slides back and forth to cover a 12 1/2 square-inch work area. It also tilts vertically, with a tension spring supplying the downward force needed to hold SMD parts in place.



Side view of the completed stylus arm assembly.



A close-up view of the pivot-block portion of the stylus arm.

Before assembling, place the slider's spacer plate inside the slot and confirm that it moves from end to end without binding (dress surfaces as needed). Next, install the top and bottom slider plates onto the spacer with the fiberglass surfaces facing each other.

When assembled, install the slider into the arm track, making sure it moves smoothly. Shim the center spacer with a sheet of paper if added vertical clearance is needed to reduce friction.

When installing the pivot block on the slider, do not over tighten its 6-32 mounting screw—this should allow free side-to-side arm movement. By the same token, install the screws attaching the arm to the tilt bracket loosely to permit unrestricted up-and-down arm motion. If needed, secure the threads with Locktite or contact cement to prevent the screws from backing out.

When selecting a compression spring, look for one made with small-gauge wire that has a large number of compacted coils—this will ensure a gentle even pull over the arm's full range of motion. Adjusting stylus pressure may require some trial and error. Too much tension will bind the slider and may cause the stylus to eject parts off the PC board. Too little will allow the SMD part to slide out of position as you feed solder onto the pad. When you find the right compromise, trim off the unused coils.

The foam work pad—a discarded mouse pad given new life—is held in place with contact cement (the non-skid surface should

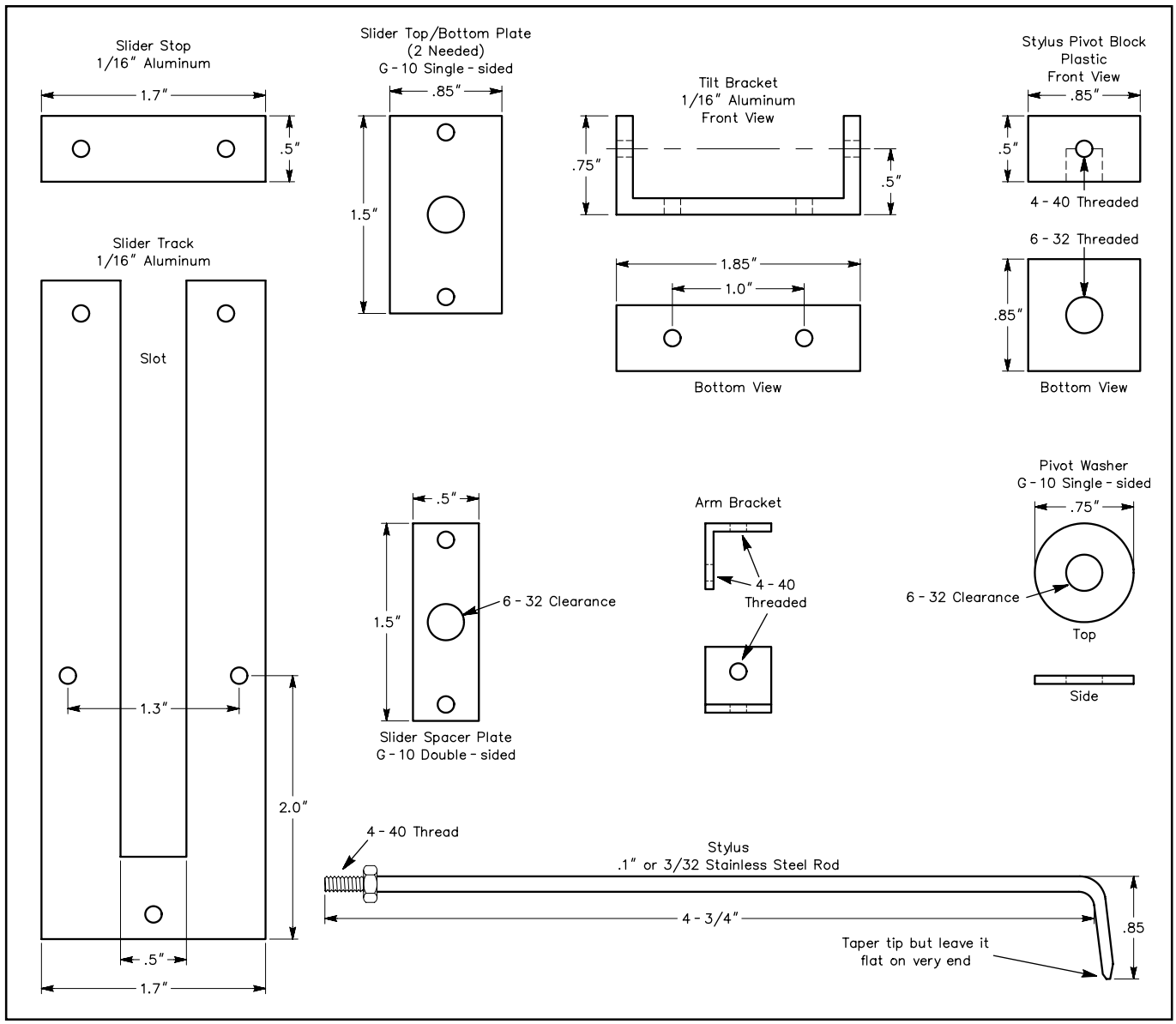


Figure 2—Stylus arm components. Except where noted, holes are drilled for 4-40 clearance. The 6-32 holes are exaggerated in size for clarity—not to scale.

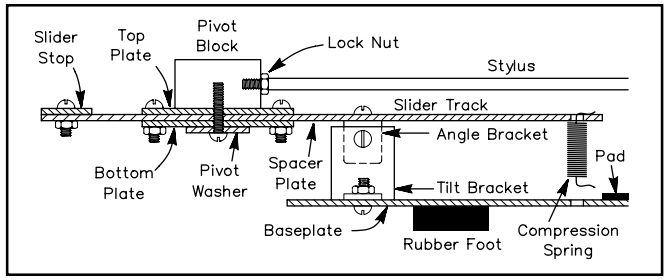


Figure 3—The stylus arm assembly diagram.

face up). Rubber feet keep the base plate stable and protect the bench's work surface from protruding hardware.

Operation

Using the workstation is easy. First, position an SMD part on the PC board using tweezers, then carefully place the stylus on the center of the part to hold it in place. Apply heat to the pad you wish to solder. Once the pad is heated, gently apply solder—allowing the solder to flow onto the pad and onto the component's contact surface. Be careful not to tap the component with the tip or the iron or push the part out of position with still-solid solder. After securing one end of the part (or two leads of an IC) with solder, remove the stylus and complete the remaining connections.

Conclusion

Most seasoned experimenters will tell you that SMD hand construction isn't any slower or more difficult than through-hole methods. To do it successfully, however, you must be able to fully immobilize leadless parts on the PC board while keeping both hands free for soldering. This simple workstation will help you do that. It made my transition to SMD much easier. I hope it will do the same for you!

Notes

[1]R. Littlefield, "A Low-cost Mini-workstation for SMD Construction," *Communications Quarterly*, Spring 1996, pp 56-58.

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Barrington, NH 03825
k1bqt@aol.com

ProLog2K for *Windows*

In the good old days logs consisted of pen or pencil renderings in spiral-bound journals. When personal computers invaded Amateur Radio 20 years ago, the paper logs gradually gave way to software databases. At the time most people assumed that logging software would always stay in the database mold—sort, display, print and so on.

Most people were wrong.

ProLog2K represents the new generation of programs that extend beyond mere data handling. It's probably more accurate to call *ProLog2K* "station automation" software. Some hams blanch at the idea of anything that would automate a station in any way, but reserve your judgement until you've read the full story.

If you want *ProLog2K* to simply log contacts, it will do that. But *ProLog2K* does much more than store data. When you enter a contact, *ProLog2K* immediately serves up a wealth of information (see Figure 1). Unfamiliar with the call sign? *ProLog2K* will tell you which DXCC entity the call sign represents, the distance to the target, the short and long-path bearings (for those with rotatable antennas), the DX station's CQ zone and ITU zone. If you've worked this station before, *ProLog2K* will tell you instantly. You'll also know instantly whether you need the station for DXCC, WAC or other awards. If you've purchased the QSL Manager Database option, *ProLog2K* will flash up the call sign of the DX station's QSL manager (I was particularly impressed with this feature).

ProLog2K provides fields for you to enter the frequency, band, mode (including PSK31, bless their hearts!) and other information. You can indicate whether you are QSLing direct or via the bureau and, when the coveted card arrives, you have the pleasure of marking it as "received." Of course, with its extensive report-generating capabilities *ProLog2K* gives you the ability to review the status of your award pursuits, QSLs sent and received, and more. Printing QSL labels is a snap.

You can create up to 36 different logs in *ProLog2K*, depending on your preferences. You can cross-merge one log with another. You can even merge contest logs created by other software into *ProLog2K*. This is particularly handy if you enjoy using contests to glean contacts for your DXCC or other awards.

Station Automation

I don't know about you, but I'm a busy guy on the home front. Between parenting a 6-year-old daughter and doing endless household chores, I have to squeeze Amateur Radio into whatever free moments I can find. Thanks to *ProLog2K*, I can hunt DX and still keep my child from applying duct tape to the cat. With remarkably little effort you can set up *ProLog2K* to function as a watchdog for your packet TNC or on-line Web cluster. Depending on how you configure the program, *ProLog2K* will dutifully watch the incoming DX data and continually compare it to your log. Since *ProLog2K* "knows" the status of your various awards, it will alert you with an insistent audio beep when a must-have contact is spotted on the air.

If you have *ProLog2K* configured to control your radio, the next step is easy. You examine the nature of the "alert," scratch your chin a bit, then say to yourself, "Yes. I want that contact." With a keystroke your rig zips to the necessary frequency and mode. You're ready for action.

ProLog2K supports computerized rig control for most popular transceivers. Datamatrix also markets the LCU-3, a hardware control interface that directly replaces ICOM's CT-17, Kenwood's IF-232C and Yaesu's FIF-232C at a fraction of the cost.

ProLog2K runs on PCs using *Windows* 95/98/2000/NT. The main program and manual are supplied on CD-ROM, so you'll need a CD drive (and a 3.5-inch floppy drive for the validation diskette).

Manufacturer: Datamatrix, 5560 Jackson Loop NE, Rio Rancho, NM 87124-1504; tel/fax 505-892-5669 (information and tech support); 800-373-6564 (orders); **http://www.qth.com/prolog**. *ProLog2K Logging Program, $49.95; w/QSL Route Database, $64; Upgrade package for existing DOS ProLog Users, $25; QSL Database Update Subscription (6) (sent via e-mail), $36; QSL Database Update Subscription (6) (First Class Mail), $42; IOTA Database, $15. Shipping is additional.*

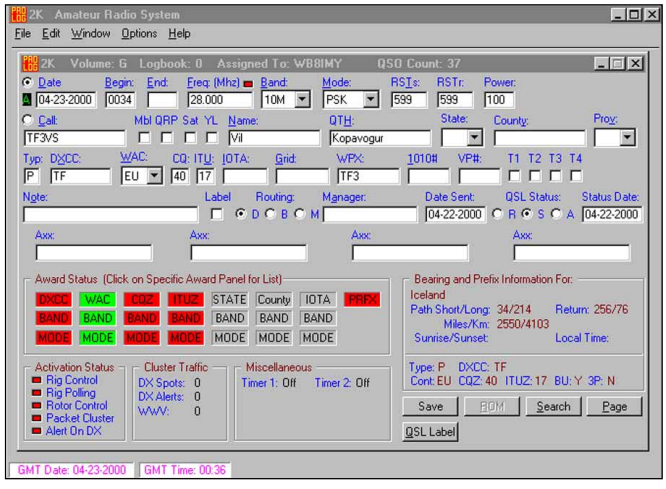
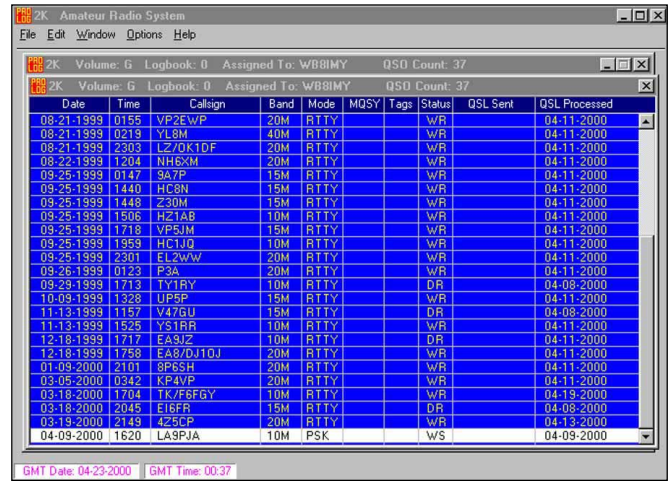
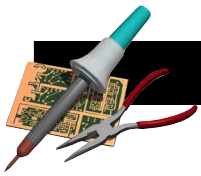


Figure 1—*ProLog2K*'s main logging window. Just plug in a call sign and you're rewarded with helpful information.



Viewing an individual log page by page (in this case, my RTTY log).

Steve Ford, WB8IMY ♦ QST Managing Editor



By H. Ward Silver, N0AX

Test Your Knowledge!

Turn up your "Jargon Power."

Most hobbies have a lingo all their own. Technical hobbies like ham radio have a deep, rich vocabulary that can leave the new ham wondering, "What does *that* mean?" Here are a few samples to increase your ham radio conversation power. Match the jargon with its closest ham synonym.

1. Green Stamp
a. to seal
b. password
c. money
d. endorsement

2. Gimmick
a. capacitor
b. technique
c. fastener
d. to shim

3. Pink Slip
a. exam
b. violation notice
c. QSL card
d. receipt

4. Split
a. to damage
b. undecided
c. offset
d. sideband

5. Buckshot
a. surface-mount
b. spurious emission
c. solder ball
d. static

6. Elmer
a. bull
b. assistant
c. mentor
d. husband

7. Kerchunk
a. activate
b. drop
c. break
d. discard

8. Hash
a. noise
b. food
c. mix
d. generate

9. Scope
a. watch
b. tune
c. troubleshoot
d. explore

10. Come-along
a. advertise
b. call
c. winch
d. lubricant

11. Fork
a. terminal
b. dig
c. change
d. divide

12. Ring
a. oscillate
b. call
c. enclose
d. opera

13. Skyhook
a. tree
b. balloon
c. antenna
d. ionospheric hop

14. Mult
a. to shed
b. adhesive
c. washer
d. contest contact

15. Pot
a. contact
b. container
c. control
d. melt

Bonus: A "Full Gallon" is full of what?

Answers
1. c—Usually refers to sending a dollar bill with a QSL card for return postage
2. a—A gimmick capacitor is made by twisting two insulated wires together
3. b—The FCC's Notices of Violation were once pink and the color became the name
4. c—A station working split transmits and receives on different frequencies
5. b—Buckshot is the in-band emissions that results from voice peak overmodulation of an AM or SSB signal
6. c—Your Elmer is the person that helped you get your license
7. a—When someone keys their FM rig to see if they can activate the repeater, but doesn't ID, the sound on everyone else's rig is "kerchunk".
8. a—Hash refers to general noise, sometimes specifically from a generator or power line
9. c—Short for "oscilloscope", often used as a verb as in "to scope something out".
10. c—Portable chain or cable hoist
11. a—A type of terminal with two separated fingers that straddle the connection point
12. a—The damped oscillations of a tuned circuit or filter
13. c—The ham radio use of this popular term refers to the antenna
14. d—Short for "multiplier" these are the specially targeted contacts for a contest
15. c—Pot is the short form of "potentiometer"—a variable resistor

Bonus: Watts! A full gallon refers to running full legal limit power

Total Your Score!

Give yourself one point for each correct answer.

11—15	A master ham linguist!
6—10	You miss a little, but understand most of it
1—5	Ham buzzwords are over your head

22916 107th Ave SW
Vashon, WA 98070

STRAYS

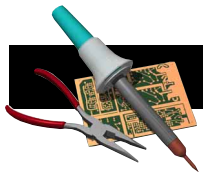
QST CONGRATULATES...

◊ Marc Robins, AD6MI, who recently upgraded to the position of captain with US Airways flying the Airbus A319/A320/A321 series aircraft, and Terry Taylor, W5JFM, who recently upgraded to the position of Boeing 767 captain with Delta Air Lines.

NEED PACKET PROGRAM

◊ I need a packet radio program that I can use on a Tandy Model 102 computer. If you can help, please e-mail N2DVM at: **dmackey@bigfoot.com**.

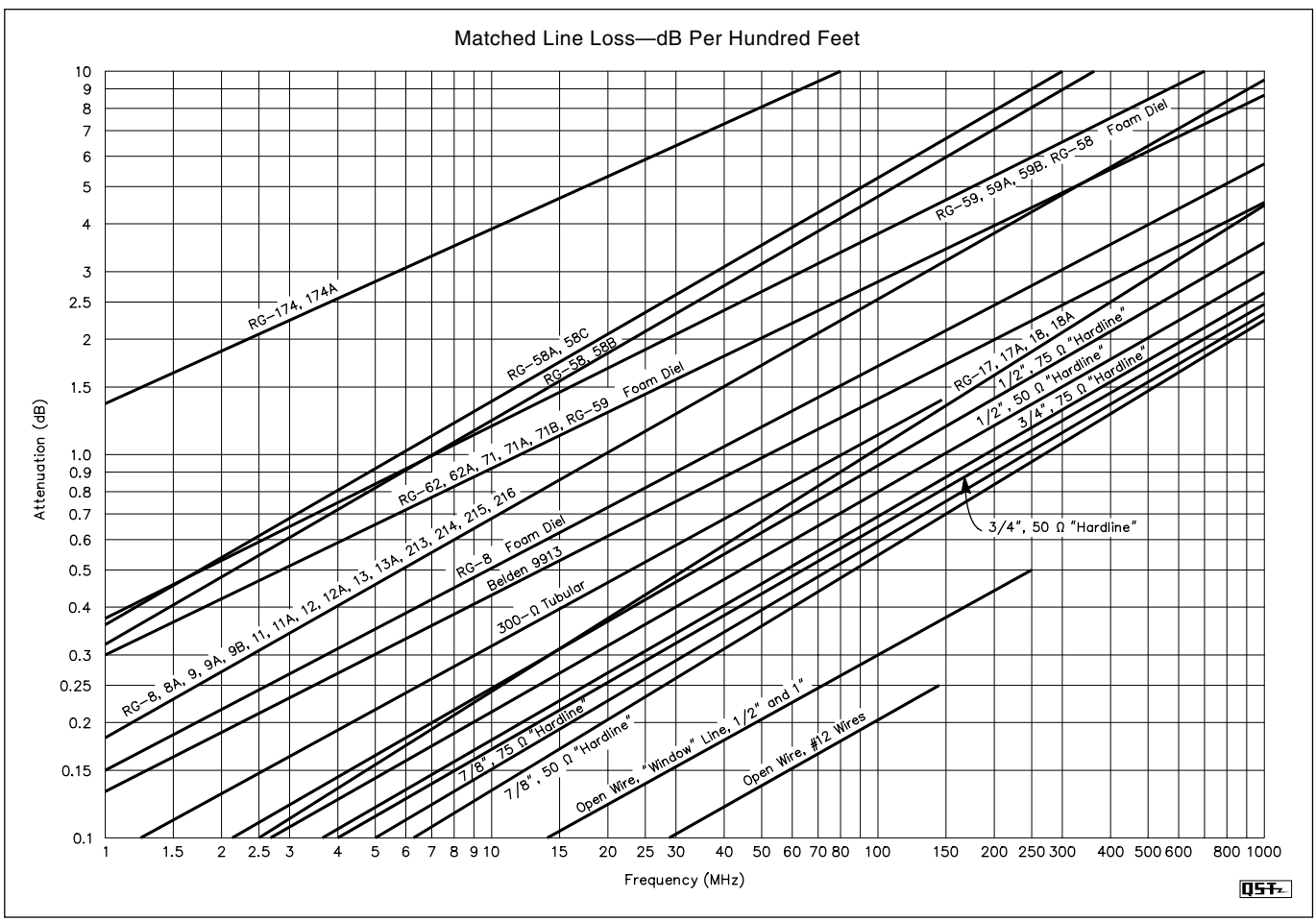
Next Stray



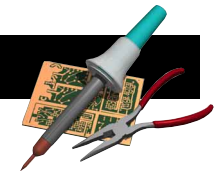
THE HELP DESK

Characteristics of Commonly Used Transmission Lines

RG or Type	Part Number	Z_0 Ω	VF %	Cap. pF/ft
RG-6	Belden 8215	75	66	20.5
RG-8	TMS LMR400	50	85	23.9
RG-8	Belden 9913	50	84	24.6
RG-8	WM CQ102	50	84	24.0
RG-8	DRF-BF	50	84	24.5
RG-8	WM CQ106	50	82	24.5
RG-8	Belden 9914	50	82	24.8
RG-8	Belden 8237	52	66	29.5
RG-8X	TMS LMR240	50	84	24.2
RG-8X	WM CQ118	50	82	25.0
RG-8X	Belden 9258	50	80	25.3
RG-9	Belden 8242	51	66	30.0
RG-11	Belden 8213	75	78	17.3
RG-11	Belden 8238	75	66	20.5
RG-58C	TMS LMR200	50	83	24.5
RG-58	WM CQ124	53.5	66	28.5
RG-58	Belden 8240	53.5	66	28.5
RG-58A	Belden 8219	50	78	26.5
RG-58C	Belden 8262	50	66	30.8
RG-58A	Belden 8259	50	66	30.8
RG-59	Belden 8212	75	78	17.3
RG-59B	Belden 8263	75	66	20.5
RG-62A	Belden 9269	93	84	13.5
RG-62B	Belden 8255	93	84	13.5
RG-63B	Belden 9857	125	84	9.7
RG-142B	Belden 83242	50	69.5	29.2
RG-174	Belden 8216	50	66	30.8
RG-213	Belden 8267	50	66	30.8
RG-214	Belden 8268	50	66	30.8
RG-216	Belden 9850	75	66	20.5
RG-217	M17/79-RG217	50	66	30.8
RG-218	M17/78-RG218	50	66	29.5
RG-223	Belden 9273	50	66	30.8
RG-303	Belden 84303	50	69.5	29.2
RG-316	Belden 84316	50	69.5	29.0
RG-393	M17/127-RG393	50	69.5	29.4
RG-400	M17/128-RG400	50	69.5	29.4
LMR500	TMS LMR500	50	85	23.9
LMR600	TMS LMR600	50	86	23.4
LMR1200	TMS LMR1200	50	88	23.1
Hardline				
1/2″	CATV Hardline	50	81	25.0
1/2″	CATV Hardline	75	81	16.7
7/8″	CATV Hardline	50	81	25.0
7/8″	CATV Hardline	75	81	16.7
LDF4-50A	Heliax – 1/2″	50	88	25.9
LDF5-50A	Heliax — 7/8″	50	88	25.9
LDF6-50A	Heliax – 1 1/4″	50	88	25.9
Parallel Lines				
TV Twinlead		300	80	5.8
Transmitting Tubular		300	80	5.8
Window Line		450	91	4.0
Open Wire Line		600	92	1.1



HINTS & KINKS



FIELD REPAIR OF RIBBON CABLE (KENWOOD TH-79A)

◊ A few weeks ago, I turned on my Kenwood TH-79A dual band H-T for a quick QSO. I was immediately greeted by two disturbing symptoms: a short beep and no receive audio. This had happened before, so I immediately knew the cause—the ribbon cable connecting the front and rear PC boards had one or more broken conductors. I also knew that the replacement part would take several days to arrive, so I was temporarily off the air.

I'm active in ARES, so this kind of failure could mean some serious problems, especially on an extended ARES callup. This particular TH-79A is my H-T, mobile and base station—a complete hamshack in one hand; I needed a quick solution.

A field repair turned out to be simple. It didn't restore the radio completely, but it would work well enough to do the job in an emergency. I opened the radio and removed the ribbon cable, which had four broken wires at one edge near the RF board. Peeling the foil from the cable bared the plastic insulation. I trimmed the damaged end to be as square as possible. To make a connector, I placed the cable on the bench (with the other connector facing upward) and shaved about 1/8 inch of insulation from the upper side of the cut end. This exposes the flat conductors in the cable (see Figure 1). I had to do this twice, but I eventually got a clean square end with all 26 wires exposed.

Next, I inserted the new "connector" into the socket on the RF board. It was a reasonably good fit, but wouldn't stay in the socket or make reliable contact. A shim made from some plastic film and inserted it behind the insulated side of the cable holds the stripped conductors in place against the contacts. I connected the other end at controller board and reassembled the radio. This took about half an hour, most of that spent shaving down the plastic. The only tool I needed was a trusty Swiss Army knife.

This repair restored all VHF functions, and all UHF functions but the S-meter. I received several encouraging signal reports on local repeaters, and everything worked well enough to trust. I recommend such repairs only in serious emergencies when you absolutely *must* get a radio working.—*Bruce Bostwick, KD5BIV, 9504 Oriole Dr, Austin, TX 78753;* **lihan@ccwf.cc.utexas.edu**

This idea can be used with any ribbon cable. If the conductors are stranded, as in Figure 1, be sure that they don't touch each other when inserted into the connector. It's wise to tin the wires or leave a little insulation in place to secure the strands.—KU7G

Figure 1—Standard ribbon cable prepared as described by KD5BIV. This is *not* the flat cable from a TH-79A.

A UNIVERSAL LOGGING COMPUTER INTERFACE

◊ Would you like automatic entry of frequency and mode data to your logging computer even from a rig that's not computer controllable? I have modified the software for Neil Heckt's PIC-based frequency display[1] to provide a serial data port. All you need to do is replace the PIC16C71 chip with my modified version[2] and connect it to your computer via a TTL-to-EIA-232 level converter.

The data port is RB6, pin 12 on the PIC16C71 (see Figure 2, following page). This pin was formerly used for the **ZERO** switch, S1. With the new software, when S1 is closed the counter performs as before; that is, it will count and display. When S1 is open, the counter halts and waits for a serial command. The command can be any character; the software only looks for start and stop bits. On receipt of a command, the counter counts and displays the result, then transmits it to the computer. If the computer sends a command repeatedly, as most logging programs do in automatic mode, the display will be updated regularly. Otherwise, it will display the frequency and mode at the time of the last command or S1 closure. I inserted a 220 Ω resistor between S1 and ground to protect the chip if S1 is closed while it is transmitting.

Table 1—Displayed Mode versus MODE Resistor Value and RA3 Voltage

Mode	*R(kΩ ±5%)*	*V at RA3*
blank	OPEN	5.0
AM	65.0	4.3
FM	27.5	3.7
CW	15.0	3.0
USB	8.8	2.3
LSB	5.0	1.7
FSK	2.5	1.0
FAX	0.0	0.0

The schematic in Figure 2 includes a circuit and PC board layout for a TTL-to-EIA-232 level converter. I built the level converter on a small PC board that can be mounted on the back of Neil's board. The display module is not essential and it may be omitted; the counter will still transmit data to the computer.

Ideally, the counter should be connected to the local oscillator and **MODE** switch of your rig, but I have used it with an antenna to pick up transmitted RF. I have also linked it to my transmission line via a toroidal transformer. The disadvantages of this method are that you must press the logging key while you are actually transmitting and no mode data is available.—*Dave McClafferty, VE1ADH, 28 Balsam Cir, Lower Sackville, NS B4C 1A9, Canada*

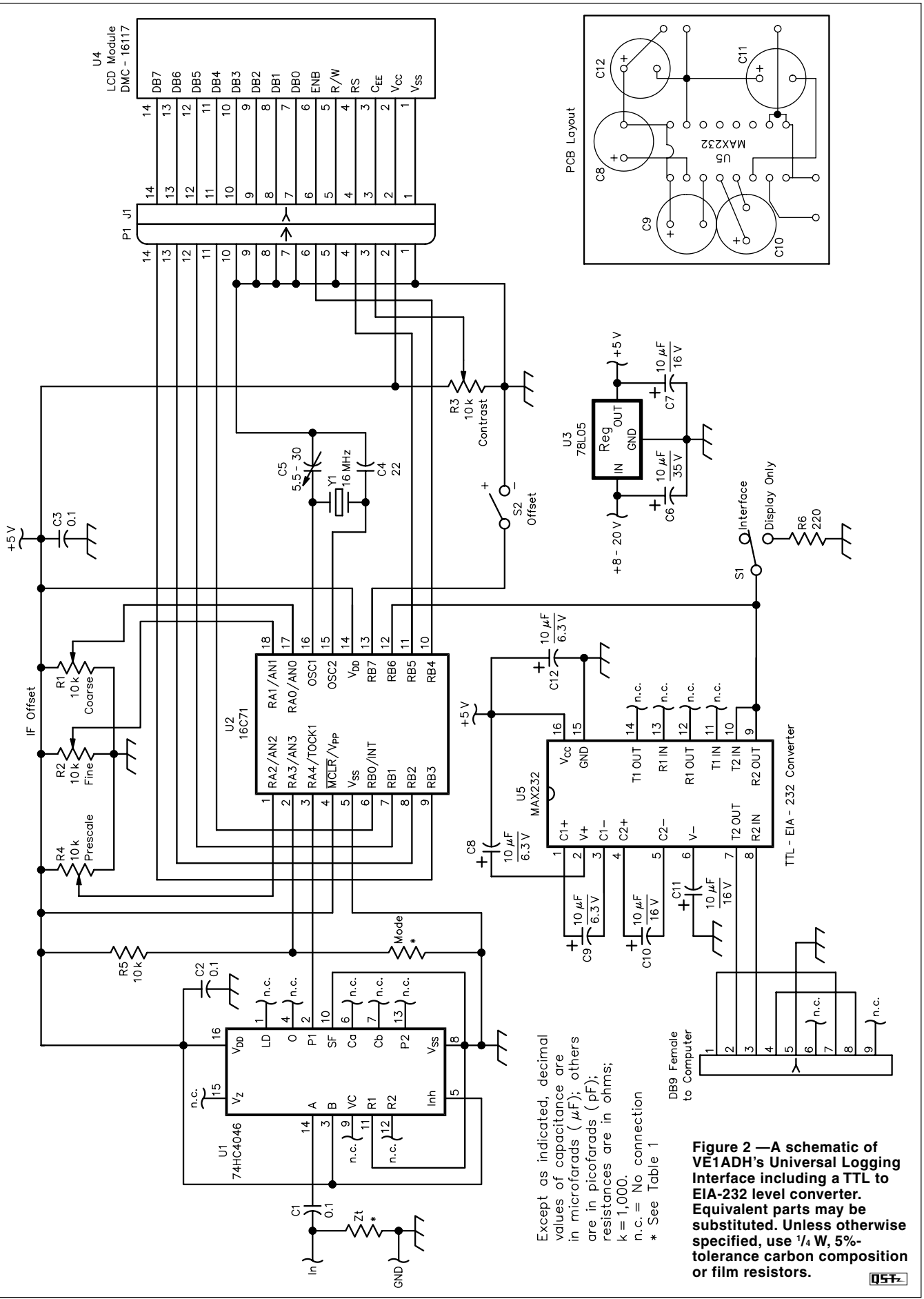
[1]N. Heckt "A PIC-Based Digital Frequency Display," *QST*, May 1997, pp 36-38.

[2]I supply programmed chips for $25 US, contact me by e-mail: **at060@chebucto.ns.ca** by "snail mail "at the address shown on the hint or by telephone at 902-864-0268. Please specify the data rate, 1200 to 9600. I will send the .HEX file via e-mail to anyone wanting to burn their own chip.

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.

Bob Schetgen, KU7G ♦ Senior Assistant Technical Editor



Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k = 1,000.
n.c. = No connection
* See Table 1

Figure 2 —A schematic of VE1ADH's Universal Logging Interface including a TTL to EIA-232 level converter. Equivalent parts may be substituted. Unless otherwise specified, use 1/4 W, 5%-tolerance carbon composition or film resistors.

ICOM IC-718 HF Transceiver

Reviewed by Steve Ford, WB8IMY
QST *Managing Editor*

Anticipating a larger number of HF operators in the wake of license restructuring, many manufacturers are eager to introduce new lower-priced HF transceivers. ICOM's entry in the race is among the first out of the gate: the IC-718.

At approximately 4 × 9 × 9 inches, the IC-718 is a compact desktop rig with a functional "military" appearance. The front panel is dominated by a sizeable amber LCD display, large **VFO** tuning knob and forward-firing speaker. Concentric **AF** and **RF/SQL** gain pots are positioned immediately below the display along with concentric **RIT** and **IF SHIFT** controls. Buttons you are likely to use most often—**MODE**, **FILTER** and **TS** (tuning step)—are prominent and easily accessible above the **VFO** knob. Most of the remaining buttons, including the direct-entry frequency keypad, occupy the right side of the front panel. Although the trend during the past several years has been to use modular microphone jacks and 1/8-inch headphone jacks, the IC-718 reverts to the more traditional 8-pin conventional mike connector and 1/4-inch headphone jack.

The rear panel lineup is refreshingly spartan. There is an SO-239 antenna port, a "standard" 6-pin Molex dc power jack, an antenna tuner control jack (for use with ICOM's external autotuners), and a 13-pin accessory jack. Jacks are also provided for computer control (using ICOM's optional CT-17 CI-V level converter), external speaker and CW key or paddle. There are separate RCA-type **ALC** and **SEND** jacks for controlling linear amplifiers.

The IC-718 provides 100 W on SSB, RTTY and CW and 40 W on AM. The RF power output is continuously variable between approximately 5 and 100 W (from 2 to 40 W on AM).

The No-Manual Test

Like any kid with a new toy, I tend to be more than a little impatient. When I pop open the box and catch the first whiffs of that new-radio fragrance, the last thing I want to do is read documentation. I want to use the radio *now!*

In the time-honored tradition of redefining one's own personality defects as an aptitude for creativity, I've devised the "no-manual" test. Not only is it an expedient way to determine the user friendliness of a radio, the no-manual test satisfies my inability to defer gratification.

The concept is simple: use the manual to hook up the various cables, then toss it aside. The idea is to see how long it takes to get the radio on the air using your own intuition.

I'm an IC-706MKII user, so hooking up the IC-718 was particularly easy. I just unplugged the IC-706MKII cables and swapped them onto the '718. This included the control cable for my ICOM AH-4 remote-controlled antenna tuner. I use this device to feed a 90-foot length of wire strung between my tool shed and a tree in my backyard.

Pressing the front-panel **PWR** button, the IC-718 awoke with a metallic *ka-thunk*. Let's see… if the IC-718 is anything like my IC-706 the front panel **DN/UP** buttons should step me through the band selections. Bingo. I jumped to 10 meters, selected USB, set the **RF/SQL** control to fully clockwise and turned up the audio.

Nothing!

The S meter was twitching madly, but the speaker was utterly dead. Was the control set for maximum squelch? I spun the ring full counterclockwise, which I assumed would be the open-squelch position. Still nothing.

Now what? Was it time to admit defeat and read the manual? After a few more minutes of futile experimentation I decided to resort to the manual.

Sure enough, the answer to the mystery appeared on page 15. I discovered that the default configuration of the ring is to function as an RF gain control between the 7 o'clock and 12 o'clock positions, and a squelch from the 12 o'clock to 5 o'clock positions. I followed the instructions in the manual, set the contol to 12 o'clock and was rewarded with a flood of audio

Subsequent manual reading revealed that you can access the IC-718's menu system and redefine the dual-function ring configuration, choosing to have the ring act strictly as an RF gain or squelch control. I used a set-mode menu to set the ring to function solely as an RF gain adjustment and lived happily ever after.

The IC-718 makes use of two menus—a "quick set" and an "initial set" menu. There are 13 quick set menu selections that include the RF power output level, a three-step display dimmer (high, low or off), mike gain and VOX settings, and a handful of

Bottom Line

The ICOM IC-718 offers a nice collection of the more desirable features that are typically absent from transceivers in its price class.

Joe Bottiglieri, AA1GW ♦ Assistant Technical Editor

choices related to CW and RTTY operation.

The initial set menu includes selections for controlling a peak-hold function for the meter, a mode lockout feature, key beep, CW sidetone level, scan speed and resume condition, **RF/SQL** control behavior, key type and paddle sense, and some additional settings associated with the optional accessories.

The various menu selections are identified with alphanumeric character strings up to 8 characters long, so it's easy to find the specific setting you're looking to change.

Once the mystery of the ring was solved, the rest was easy. I punched the **TUNER** button and my AH-4 dutifully responded, tuning my end-fed wire for a 1.3:1 match on 10 meters. I answered a CQ and received a fine signal report from a station in Spain. On-the-air reports indicated that the supplied hand mike produced clear transmit audio, even when I activated the '718's

Table 1
ICOM IC-718, serial number 001069

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 0.03-30 MHz; transmit, 1.8-2, 3.5-4, 7-7.3, 10.1-10.15, 14-14.35,18.068-18.168, 21-21.45, 24.89-24.99, 28-29.7 MHz.	Receive, as specified[1]; transmit, 1.8-2, 3.4-4, 7.0-7.5, 9.9-10.5, 13.9-14.5. 17.9-18.5, 20.9-21.5, 24.4-25.1, 28-30 MHz.
Power requirement: Receive, 2.0 A; transmit, 20 A (maximum).	Receive, 1.7 A; transmit, 18 A. Tested at 13.8 V.
Modes of operation: SSB, CW, AM, AFSK, FSK.	As specified.
Receiver	*Receiver Dynamic Testing*
SSB/CW sensitivity, bandwidth not specified, 10 dB S/N: 1.8-30 MHz, <0.16 μV.	Noise Floor (mds), 500 Hz filter: *Preamp off* / *Preamp on* 1.0 MHz: –120 dBm / –129 dBm 3.5 MHz: –129 dBm / –137 dBm 14 MHz: –130 dBm / –139 dBm
AM sensitivity, 10 dB S/N: 0.5-1.8 MHz, <13 μV; 1.8-30 MHz, <2 μV.	10 dB (S+N)/N, 1-kHz tone, 30% modulation: *Preamp off* / *Preamp on* 1.0 MHz: 5.4 μV / 1.8 μV 3.8 MHz: 1.8 μV / 0.7 μV
Blocking dynamic range: Not specified.	Blocking dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz: 123 dB* / 121 dB* 14 MHz: 120 dB* / 119 dB*
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range, 500 Hz filter: *Preamp off* / *Preamp on* 3.5 MHz: 88 dB / 87 dB 14 MHz: 87 dB / 85 dB
Third-order intercept: Not specified.	*Preamp off* / *Preamp on* 3.5 MHz: +10.4 dBm / –2.3 dBm 14 MHz: +6.8 dBm / –9.3 dBm
Second-order intercept: Not specified.	Preamp off, +54 dBm; preamp on, +55 dBm.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: preamp off, 149 μV[2]; preamp on, 38 μV.
Squelch sensitivity: SSB, CW, RTTY, <5.6 μV.	At threshold, preamp on: SSB, 6.4 μV.
Receiver audio output: 2 W into 8 Ω at 10% THD.	2.3 W at 10% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW-N (500 Hz filter): 324-849 Hz (525 Hz); CW-W: 182-1980 Hz (1798 Hz); USB-W: 136-2315 Hz (2179 Hz); LSB-W: 178-1988 Hz (1810 Hz); AM: 27-2069 Hz (2042 Hz).
Spurious and image rejection: 70 dB.	First IF rejection, 14 MHz, 92 dB; image rejection, 14 MHz, 93 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: SSB, CW, FM, FSK, 5-100 W; AM, 2-40 W.	CW, SSB, FM, typically , <1-113 W; AM, typically <1-38 W.
Spurious-signal and harmonic suppression: ≥50 dB.	54 dB. Meets FCC requirements for spectral purity.
SSB carrier suppression: ≥40 dB.	As specified. 60 dB.
Undesired sideband suppression: ≥50 dB.	As specified. 64 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figure 1.
CW keyer speed range: Not specified.	6 to 48 WPM.
CW keying characteristics: Not specified.	See Figure 3.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 290 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 12 ms. Unit is not suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figure 2.

Size (hwd): 3.8×9.4×9.3 inches; weight, 8.4 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 shown.
Third-order intercept points were determined using S5 reference.
[1]Sensitivity degrades below 100 kHz. Noise floor at 30 kHz is –53 dBm.
[2]S-meter has a rather narrow range between S1 (7.8 μV) and S7 (17 μV) with a much larger change from S7 to S9 (preamp off figures given).
An expanded test result report for this transceiver is available on the ARRL Members Only Web site. Printed copies are also available for those without Web access.

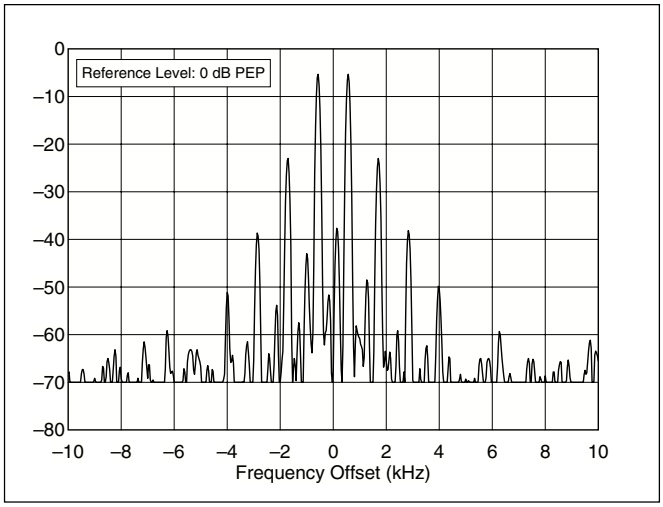


Figure 1—Worst-case spectral display of the IC-718 transmitter during two-tone intermodulation distortion (IMD) testing. The worst-case third-order product is approximately 25 dB below PEP output, and the worst-case fifth-order is approximately 39 dB down. The transmitter was being operated at 100 W output at 7.200 MHz (see text).

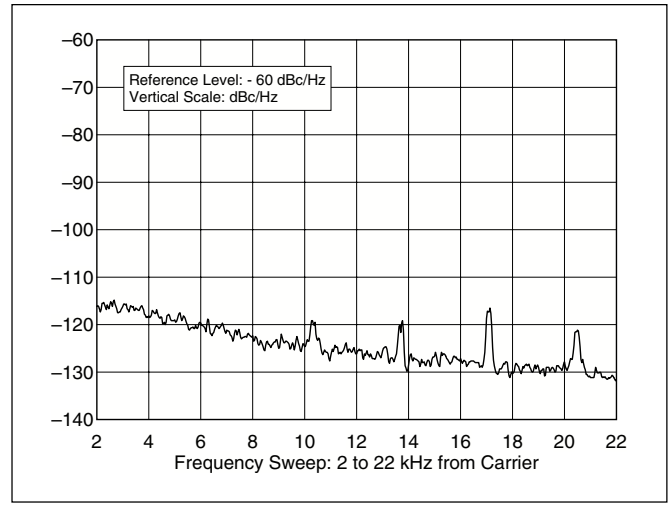


Figure 2—Worst-case spectral display of the IC-718 transmitter output during composite-noise testing at 14 MHz. Power output is 100 W. The carrier, off the left edge of the plot, is not shown. This plot shows composite transmitted noise 2 to 22 kHz from the carrier.

fixed-level speech compressor.

I found that the IC-718 was very easy to operate with a minimum of "manual" intervention.

Those of you who actually do spend time reading manuals will be very pleased with the provided documentation. It is complete, well organized and easy to follow. Separate foldout sheets with detailed schematic and block diagrams are included.

Familiar Features and Characteristics

As an IC-706 user, I found much that was familiar in the IC-718. Other than the fact that the '718 lacks FM capability, or 6 and 2 meters, it performed much like my '706—and shared many of the same features. I found myself wondering if the IC-718 was a direct design descendant of the '706.

Receive performance was very similar, right down to a similar tendency to become overwhelmed when too many signals populate the band. Before you interpret this as a criticism of the '718, bear in mind that this radio, like the IC-706, was never intended to have high-end "competitive" receive characteristics. The selectivity and dynamic range are more than adequate though—just what you would reasonably expect from a radio selling at well under $1000.

The ARRL Lab measurement data presented in Table 1 confirms that the IC-718's receiver performance numbers are very close to those that we reported for the IC-706MKIIG that we reviewed in the July 1999 Product Review column. These numbers compare favorably with—and in some cases slightly surpass—those of the other currently available transceivers in the '718's price class.

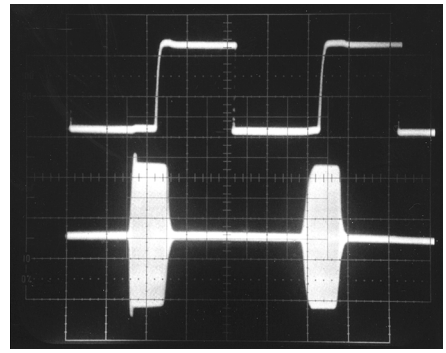


Figure 3—CW keying waveform for the IC-718 showing the first two dits in full-break-in (QSK) mode. The equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 100 W output at 14.2 MHz. Note that both dits are somewhat shortened. Only the first dit is shortened in semi-break-in mode. Also note the higher-power "spike" on the leading edge of the CW waveform (see text).

Another—less desirable—'706-like behavior that is evident in the IC-718 is the existence of a leading-edge high-power "spike" in CW or continuous carrier modes (see Figure 3). A brief power surge might trip protective circuitry or possibly cause damage to some amplifiers. Even with the transceiver's RF power output level throttled back to 25 W, a spike on the order of 50 W was observed.

Our IC-718 had the UT-106 DSP option installed—this is the same accessory unit that's applicable to a number of different ICOM transceiver and receiver models. The DSP board adds an automatic notch filter and a noise reduction feature.

The adjustable noise reduction worked extremely well, doing an outstanding job of cleaning up noise. The automatic notch filter was a pleasure. When you're operating SSB and the inevitable "tune-up" interference appears, you jab the front-panel **ANF** button once and—*poof*—it's gone.

It may have been my imagination, but the IC-718's IF shift seemed to be particularly sharp. With both CW and SSB signals, I was able to manipulate the IF shift to eliminate or reduce interference successfully in many instances.

Getting Around the Bands

As I've already mentioned, selecting a band is as easy as punching the front panel **UP** or **DN** buttons. You can use this method to hop from 160 through 10 meters in no time.

If spinning the VFO is more to your liking, the IC-718 makes it easy with the **TS** function, which allows you to vary the tuning increments to cover a lot of spectrum very quickly. In addition, as you spin the **VFO** knob faster, the tuning speed increases automatically.

If you know exactly at which frequency you wish to operate, just press the **F-INP/ENT** button on the IC-718 keypad, punch in the frequency digits, then press the button again. That's all there is to it.

Of course, the IC-718 has frequency/mode memories—101 of them, in fact. You can store all of your favorite frequencies into memory, then use the **CH** button in combination with the **UP/DN** buttons to step through the channels. Alternatively, you can simply enter a desired memory channel

number into the keypad. Spinning the **VFO** knob allows you to tune above or below the selected memory channel frequency.

The IC-718 supports two VFOs for split-frequency operation and the splits can be stored in memory as well.

Two scanning modes are offered in the IC-718. The memory scan steps through the designated memory channels. There are no provisions however, for locking specific memory channels out of a memory scan operation.

The programmed scan seeks signals between two specific frequencies. With the wide variation between signal strengths and the random noises encountered on the HF bands, programmed scanning can be problematic and, frankly, doesn't work all that well in most HF transceivers.

Digital Operation

Operating RTTY or PSK31 with the IC-718 was a breeze. The audio inputs and outputs, along with the transmit keying lines, are available at the 13-pin accessory jack. The pin designations matched my IC-706 closely enough that I was able to merely plug in my existing cable and go.

Although wiring up a 13-pin connector can be a considerable test of your soldering skills, at least you'll find clear descriptions of the connector pin outs for all of the jacks in the documentation. (Incidentally—a plug for this accessory jack is not packed with the transceiver.)

The fixed-level audio from the '718's accessory output was robust (somewhat stronger than what is available with my '706) and very clean. Working RTTY, the IC-718 kept its cool at full output during long ragchews. The cooling fan vents through the bottom of the enclosure. The noise level produced by the fan was not excessive.

Frequency stability was excellent as well—and there's even an optional high-stability crystal unit available. If you prefer FSK to AFSK RTTY, the IC-718 *does* provide an FSK keying pin at the accessory jack—FSK operation is not offered on the majority of the other low-end transceivers.

The IC-718 performed equally well on PSK31. Using my sound card interface I had no RFI or ground loop problems. According to the reports I received on the air, my signal was clean and stable.

I have some concerns about the performance of the IC-718 on the "burst modes" (PACTOR, G-TOR, AMTOR, Clover). While I was using the transceiver on SSB, I noticed that it seemed to take a while for the receiver to fully recover after releasing the PTT switch on the microphone. While this has little effect on SSB, RTTY or PSK31 operation, fast transmit/receive recovery is critical for the burst modes. The transceiver must be able to transmit a signal burst and switch back to full receive sensitivity within a very short amount of time (measured in milliseconds). If it cannot, it may not receive the beginning of the return burst from the other station and the link will eventually fail.

Lab measurements, taken using the keying connections available at the 13-pin accessory jack, confirmed my suspicions. The transmit/receive turnaround time measured on our review unit was about 290 ms. For proper 'TOR operation, the transmit/receive turnaround time should be less than 35 ms. ICOM reports that they have developed a modification that reduces the turnaround time to 25 ms, which meets the 'TOR requirements. Contact them for details.

CW Operation

The IC-718 will win the hearts of some CW operators with its built-in electronic keyer. The speed is adjustable from about 6 to 60 WPM and you can fudge the weighting as well. The CW pitch is adjustable from 300 to 900 Hz and the sidetone level is continuously variable. ICOM has even included a CW-reverse mode—often a very useful tool for reducing interference from nearby band activity.

You can plug your paddle or straight key into the rear-panel jack, or wire it into an 8-pin microphone plug if you prefer (the manual describes how to do this). You can even use a menu setting to assign paddle functions to the **UP/DN** keys on the hand mike—though effectively using these keys for generating readable code is probably going to take some practice!

Full break-in CW is available and it seemed to work reasonably well—although there is a bit of a racket from the transmit/receive relay. Again, it helps to remember that the IC-718 is designed primarily for casual CW operating.

Several Points Worth Noting

The IC-718 allows you to install one optional IF filter. We installed the 500-Hz filter in our unit and found that it performed well in crowded CW and RTTY conditions. If you're going to be using the transceiver primarily for CW and RTTY, the 500-Hz filter is a worthwhile investment. Alternative optional filters include a 250 Hz CW/RTTY filter and 3.3 kHz, 2.8 kHz and 1.8 kHz SSB filters. An optional AM filter (a desirable item for shortwave and utility listening) is not available.

Although the IC-718 shares many of the same filter choices as their '706 series transceivers, an optional filter installed in the '718 must be soldered into place—push-in sockets are used in the '706s. While the solder-in installation procedure is not particularly difficult, some '706 owners have expressed that they enjoy the flexibility offered by the plug-in arrangement. With the '706 it's a pretty simple operation to pop off the cover and swap in the desired filter for a specific application—SSB, CW, RTTY, etc.

Yes, the IC-718 offers a noise blanker, but this one is *continuously adjustable*—something you don't often see even in the high-end radios. To vary the level you press and hold the **NB** button for one second, then turn the **VFO** knob to select the desired level of noise reduction. In my brief experiments the noise blanker did a good job of suppressing pulse noise—ignition noise in particular.

As is the case with the comparable economy-class HF transceivers by the other manufacturers, the '718 does not include a built-in automatic antenna tuner—two optional external tuners are available.

Unlike some of the others however, this transceiver *does* include built-in SWR metering capability—a very welcome feature in any HF transceiver—and especially in one with dimensions that make it ideal for portable operation.

Phone operators will be pleased to hear that ICOM has included VOX in the '718. This is another example of a feature that is typically absent in HF radios in this price class.

Finally, a voice-synthesizer option is available. We didn't test this feature, but it is worth mentioning for the interest of visually impaired operators. The UT-102 synthesizer announces the operating frequency, mode and the S meter reading.

A Couple of Nits to Pick

The first nit focuses on FM—the lack of it, that is. Ten-meter FM is a more active mode than many believe. Listen to 29.600 MHz or any of the 10-meter repeater output frequencies when the band is open and you'll always hear signals. The IC-718 covers this frequency range, but without FM capability you can't take part in the fun. (The best you can do is switch to the AM mode and slope-detect the signals.) This feature would also be attractive to those that might want to connect the '718 to a trans-verter. While including FM in the IC-718 would have undoubtedly added to the final cost, it would have been nice if ICOM had at least made it available as an optional.

The second nit concerns the automatic gain control (AGC). You cannot vary the AGC setting in the IC-718. The AGC is fixed; there is no way to select fast or slow AGC. This is unfortunate because the ability to choose a fast or slow AGC response can make a substantial difference in received signal quality. You wouldn't expect a continuously variable AGC control in a rig of this type, but the lack of even a fast/slow AGC menu selection is puzzling.

Conclusion

For casual HF operating you don't need

to spend thousands of dollars on a transceiver. Those multi-kilobuck rigs are outstanding for hard-core DXing and contesting, but the casual operator will never use or need most of their advanced features and specs. Instead, all you really need is a radio that is easy to operate and gets the job done at a reasonable price. The IC-718 meets all of those criteria and includes several useful features that are not found in some of the alternative economy-class transceivers.

Manufacturer: ICOM America, 2380 116th Ave NE, Bellevue, WA 98004; 425-454-8155; fax 425-454-1509; **75540.525@compuserve.com**; **http://www.icomamerica.com**. Manufacturer's suggested retail price: $899. Typical current street price, $750. Suggested list pricing on accessories: UT-106 DSP Receive Unit, $166; UT-102 Voice Synthesizer Unit, $74; CR-338 High Stability Crystal Unit, $81; FL-52A 500-Hz CW/RTTY filter, $245 (alternative filters range in price from $190 to $245).

Yaesu FT-1500M 2-Meter FM Mobile Transceiver

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

The Yaesu FT-1500 is a single band 2-meter FM transceiver with an ample selection of the most important features. While it's not quite as fully equipped as Yaesu's alternative 2-meter mobiles—their feature-packed FT-3000M and their well-appointed FT-2600M transceivers—what the FT-1500M might lack in bells and whistles it makes up for in its remarkably compact dimensions and apparent ruggedness.

If you are particularly hard on your mobile transceivers mechanically—if you tend to drop or throw them, or perhaps even run them over with your car occasionally—you'll definitely want to make sure you include a look at the '1500M on your next radio shopping excursion. (This is not to say that we've verified the mechanical durability of this transceiver—ARRL Lab testing does not currently include a regiment of impact and mechanical stress testing. If looks and feel count for anything though, I'm confident that this radio would be up to just about any such tests we could reasonably subject it to.)

A Small Wonder

The FT-1500M is undisputedly the smallest 50 W 2-meter FM Amateur Radio transceiver available today. It is however, somewhat larger than the FT-90R—Yaesu's dualband VHF/UHF FM mobile.

Notable features include 130 memories with 6-character alphanumeric label capability, expanded receive coverage from 137 through 174 MHz (AM aircraft reception is not supported); 1200/9600 bps packet operation; S meter squelch; CTCSS encode, decode and tone scan; automatic repeater offset; a variety of scan modes, a time-out timer and automatic power shut off.

Yaesu has also tossed in their exclusive "Smart Search" feature. Once activated, this system will scan through the band and automatically load any active frequency that it encounters into a dedicated 31-channel memory bank. You can then sort through these manually and memorize any that are of interest into the regular memory positions. The Smart Search memories will be erased when you exit the search though, so you'll want to transfer desired frequencies into the regular memories immediately.

Conspicuously absent from the '1500M are two features that had seemed to become staples on nearly every Yaesu VHF or VHF/UHF transceiver released over the last few years; digital code squelch (*DCS*) and their automatic range transponder system (*ARTS*). While these can be useful capabilities, they are not currently finding wide use. The vast majority of operators will probably never miss them.

The Hard Facts

The body of the transceiver consists of two die-cast aluminum covers that mate together clamshell-style. There are no separate front or rear panel assemblies, these two enclosure sections wrap completely around the internal electronics. The aluminum's thickness appears to be about $^{3}/_{16}$-inch.

A smallish liquid crystal display is recessed into the front panel and presents frequency or alphanumeric information as $^{1}/_{4}$-inch tall characters on a blue background. Icons representing activated features appear along the top and left edges of the display—a 10-segment signal/RF power output meter occupies the bottom edge. The display background illumination intensity can be adjusted to 10 different levels or shut off completely.

Display legibility is good from nearly any angle, but bright lighting can cause problems with glare. For mobile applications, choose your mounting location accordingly.

Two large knobs are positioned to either side of the display window. The knob on the left controls the volume. The right knob—labeled **DIAL**—is used for tuning through frequencies or memories, or for selecting and changing settings when in the set mode.

Five rubberized buttons for controlling the most common operations are positioned

Bottom Line

The FT-1500M is the smallest 2-meter FM mobile transceiver on the market today. Yaesu has squeezed in all of the most important features and has even managed to provide nearly total remote control from the microphone.

Table 2
Yaesu FT-1500, serial number 0E030077

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 137-174; transmit, 144-148 MHz.	Receive and transmit, as specified.
Power requirement: Receive, 0.7 A; transmit, 8 A (high power).	Receive, 0.52 A; transmit, 8.0 A. Tested at 13.8 V.
Modes of operation: FM.	As specified.
Receiver	*Receiver Dynamic Testing*
FM sensitivity, 12 dB SINAD: <0.2μV.	For 12 dB SINAD, 0.17 μV.
FM adjacent channel rejection: Not specified.	20 kHz channel spacing: 77 dB.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz channel spacing: 71 dB; 10 MHz channel spacing: 100 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	82 dB.
S-meter sensitivity: Not specified.	Maximum indication: 5.1 μV.
Squelch sensitivity: Not specified.	At threshold: 0.06 μV.
Receiver audio output: 3.5 W at 10% THD into 4 Ω.	3.4 W at 10% THD into 4 Ω.
Spurious and image rejection: Not specified.	First IF rejection, 102 dB; image rejection, 85 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output (H/L3/L2/L1): 50 / 25 / 10 / 5 W.	50 / 24 / 9.5 / 3.8 W.
Spurious-signal and harmonic suppression: ≥60 dB	68 dB. Meets FCC requirements for spectral purity.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 105 ms.
Receive-transmit turn-around time (tx delay): Not specified.	16 ms.
Bit-error rate (BER), 9600-baud: Not specified.	Receiver: BER at 12-dB SINAD, 2.5×10^{-3}; BER at 16 dB SINAD, 4.4×10^{-5}; BER at –50 dBm, 1.4×10^{-4}; transmitter: BER at 12-dB SINAD, 9.3×10^{-3}; BER at 12-dB SINAD + 30 dB, 3.0×10^{-4}.

Size (hwd): 1.4×5.0×5.0 inches; weight, 2.2 pounds.

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

"keyboard-style" across the front edge of the top cover. These include **MHz/SET**, **REV/DW**, **LOW/A/N**, **D/MR/MW** and the **PWR** buttons. These keys and the two knobs are the only controls on the chassis of the radio. The majority of the more advanced operations—the squelch level, the repeater shift, the tuning steps and various CTCSS settings, for example—are controlled through a set-mode menu.

On the back side of the enclosure you'll find a chassis mounted SO-239 antenna connector, a 1/8-inch external speaker jack and a 6-pin mini DIN data jack. Dc power is connected through a 9-inch cable that's terminated with the conventional T-type Molex connector. A separate 9-foot power cable, with a mating connector and fuses in both leads, is also supplied.

A small internal speaker is mounted inside the top cover.

Microphone Magic

The MH-48 hand microphone supplied with the FT-1500M features a backlit 16-button DTMF keypad, side-mounted **LAMP** and **LOCK** switches, top-mounted **UP** and **DWN** buttons that mimic the operation of the front panel **DIAL** control and, of course, the **PTT** button.

Four additional keys—**P1**, **P2**, **P3** and **P4**—are located just below the 16-button keypad. In their factory-default configurations, **P1** opens the squelch, **P2** activates a "Smart Search," **P3** initiates a CTCSS tone search and **P4** switches the receiver to a preprogrammed band of 10 standard NOAA Weather Broadcast channels. You can reprogram the buttons to provide instant access to any one of these four operations or chose from one of six others—CTCSS tone activation, tone burst, duplex direction, dc voltage indication, display brightness or memory channel skip settings for scanning.

When the radio is in the receive mode, pressing the **number** buttons on the DTMF keypad allows you to enter frequency digits directly. When you enter the 6th digit in the string (or press the **#** key if the desired trailing digits are all 0), the radio will instantly tune to the entered frequency—no additional "enter" button stroke is required. Punch in a memory number followed by the ***** key and the radio will tune to that memory channel.

DTMF keypad entries with the **PTT** button pressed will result in transmitted DTMF tones for repeater control and autopatch applications. There are also 9 autodial memories that can hold up to 16 digits each. The speed of the transmitted string and a start delay setting can be varied with a menu setting.

The MH-48 is very similar to the MH-38B microphones that have been packed with the last few Yaesu transceivers we've looked at, but this one has a few more tricks up its sleeve.

When the radio is in the receive mode, the DTMF **A**, **B**, **C** and **D** buttons will perform the same functions as the keys mounted on the body of the transceiver. This allows control of every operation of the radio—with the exception of the volume level and power on/off—from the microphone.

Nearly all of the buttons on the microphone (and on the radio itself) sound a unique note when pressed. After you become used to their sounds, this confirms that you've pressed the desired key without having to divert your attention to the legends on the buttons or the information on the radio's display. This would certainly be a useful feature for the vision impaired. Unfortunately, a voice synthesizer option is not available.

Hittin' the Road

While many FT-1500Ms will likely end up finding applications in portable and fixed stations operations, this radio's small size and extensive microphone control capabilities should make it a very popular choice for permanent mobile installations.

The included mobile mounting bracket is unique. It consists of a $3 \times 2^3/_4$-inch plate with a pivoting rod system that allows you to adjust the angle of the chassis. You can mount the bracket to the top or the bottom of the transceiver—whichever suits your situation best.

Workin' It

Yaesu provides a small 44-page *Operating Manual* and a folded sheet of paper

with detailed schematic and block diagrams. The step-by-step instructions given in the manual are easy to follow. I didn't run into any difficulties programming or varying the settings on even the most advanced features.

The operations that you use most—selecting the memory, home or VFO mode; adjusting the RF power output level; writing VFO information to a memory; toggling to the input frequency of a repeater; for example—are directly controlled through the keys located on the top of the front panel. Their primary assignments are activated with a quick press. Pressing and holding a key for a second or two brings up its secondary assignment. There's no function button to fumble with.

The duplication of these top panel keys on the microphone's **A, B, C** and **D** buttons is particularly handy for mobile operation. It would have been nice to have them specifically labeled with their functions, but it probably won't take long to commit their assignments to memory.

The radio makes extensive use of a set-mode menu for controlling the more advanced operations. There are a total of 35 selections. All are clearly identified with alphanumeric titles up to 6 characters long and are arranged alphabetically. It certainly makes it much easier to locate the desired selection. Good going Yaesu!

I used the FT-1500M in both mobile and fixed station operation and was generally very pleased with the control configuration and performance.

Transmit audio reports gathered from my usual test group of local audiophiles positioned the FT-1500M's transmit sound quality squarely in the "communications grade" category. While the gang agreed that it didn't sound objectionable, all preferred the fuller range of audio frequencies rendered by my trusty old shack transceiver.

The receive audio—although plenty loud—does suffer the usual consequences of being reproduced through a comparatively small speaker. The '1500M's receive audio clarity benefits greatly from the use of a larger external speaker. With an external speaker connected, the 3½ W audio output is more than sufficient in even the noisiest environments.

What's Cookin'?

The FT-1500M—as is the case with nearly all of the current single band FM mobile transceivers—does not enjoy the luxury of an internal cooling fan. Part of the design philosophy of its die-cast aluminum enclosure is to allow the entire surface area of the radio to act as a heat sink.

Extended periods of relatively high duty cycle operation at full power output can bring the temperature of any transceiver's heat sink (the whole radio in this case) to a pretty significant level.

I spent an evening rag chewing with a couple of the locals. With the RF power output set to the 50 W level, after about a half-hour of exchanging our usual fast-paced witty banter, I noticed that the temperature of the transceiver had risen to a considerable level. Shortly afterward, protective circuitry in the radio recognized the dire implications of such a temperature increase and automatically switched the RF power output to the low setting.

I don't find this particularly alarming, but let me provide a couple of suggestions (incidentally, these are valid for any transceiver). 1) Resist the temptation to mount any transceiver in a location that restricts air movement around the enclosure. (This warning is found in every transceiver's owners manual—save some H-Ts, perhaps.) With a chassis size as small as this, it's difficult to resist mounting it in the small storage compartments prevalent in most modern car interiors. Just don't. 2) Use the minimum amount of RF power output necessary for effective communications. (Now where have we seen this "suggestion" before?)

A particularly nice feature provided on the FT-1500M is the ability to assign one of four RF power output levels—5, 10, 25 or 50 W—to any programmed memory. Repeaters that are located close to your usual stomping grounds can be programmed in with lower power settings. Those further away can be allocated higher settings. Make use of this feature.

Table Scraps

Looking over the data presented in Table 2 reveals a respectable level of performance.

The 10 MHz offset IMD number, typically a good measure of a transceiver's ability to reject interference from nearby VHF commercial communications just to either side of our 2-meter band, came in at 100 dB. This level is well above the running average of the numbers posted by the single band VHF mobile transceivers we've recently reviewed.

The receiver sensitivity, the IF rejection and the image rejection measurements, while not chart topping, all compare favorably with similar units.

Bit Error Rate (*BER*) testing for 9600-baud operation produced results that point to poor performance. It should be noted that we've seen similar problems with the majority of the 9600-baud capable FM-only transceivers that we've tested over the last 5 years. If 9600-baud operation is important to you, please refer to *"9600-Ready" Radios: Ready or Not?* by Jon Bloom, KE3Z, in the May 1995 issue of *QST*.

Wrappin' It Up

The FT-1500M possesses all of the features that are required for the vast majority of the 2-meter FM operation that I typically participate in. Its small dimensions should offer a wider variety of mounting options to those looking to install radio equipment in modern vehicles, and its rugged construction and simple operation makes it an attractive choice for public service and portable applications.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; 562-404-2700; **http://www.yaesu.com**.

Manufacturer's suggested list price: $279. Typical current street price: $200.

NEW PRODUCTS

2000 TECHNICAL BOOK CATALOG FROM PROMPT PUBLICATIONS

◊ Howard J. Sams and Company and Prompt Publications have released the 2000 edition of their *Technical Book Catalog*. The catalog contains over 200 publications listings on a variety of electronics related topics.

This year's edition has been redesigned to feature Prompt's best-selling titles, and divides titles into specific categories—regardless of the publisher—making it much easier to locate titles on a particular area of interest.

Sections include audio, communications, electronics basics, electronics technology, professional reference, projects, test and measurement, troubleshooting and repair, and video technology.

New sections, not provided in previous editions, cover automotive, business and electrical technology.

The 2000 edition features select titles from Butterworth-Heinemann, Macmillan Computer Publishing and IDG Publishing, and videos from the UCANDO Educational series.

To get a free copy of Prompt Publication's *2000 Technical Book Catalog* visit your local participating electronics distributor or contact Howard W. Sams and Company, 2647 Waterfront Pkwy E Dr, Indianapolis, IN 46214; tel 800-428-7267, fax 800-552-3910; **http://www.hwsams.com**.

Next New Product

FEEDBACK

◊ Please refer to Jim Kocsis, WA9PYH, "Improving the Hamtronics R139 VHF Weather-Satellite Receiver Interface," *QST*, May 2000, p 41. The URL in endnote 5 is now **http://www.hffax.de/WX_Satellite/WXSat/wxsat.html**.

Restructuring Generates Application Avalanche

For many amateurs upgrading as a result of the April 15 license restructuring, it's been a bit like the bad old days, when applicants had to wait weeks instead of days for the FCC to grant their new tickets. As of press time in late May, it was taking six weeks or longer between exam session and FCC license grant.

Patience was the byword from ARRL-VEC, which handles the lion's share of volunteer examination sessions. ARRL-VEC Manager Bart Jahnke, W9JJ, was estimating more than 17,000 new Generals and more than 13,000 new Extras would result from applications filed April 15 through May 15.

Despite an infusion of temporary help, the larger Volunteer Examiner Coordinators struggled to process the huge influx of restructuring-related exam session paperwork. To get through the backlog, Jahnke not only added temporary workers but solicited volunteers from among the ARRL Headquarters staff.

Fred Maia, W5YI, cited a similar situation for applications filed via his W5YI-VEC, where he's added a couple of temporary employees. "We've got mail buckets everywhere," he said in mid-May.

ARRL-VEC staffers put in overtime and work weekends in an effort to keep up with the applications—carefully scrutinizing the arriving paperwork, recording session results, keying in individual applications and sending them on electronically to the FCC. Jahnke said the care ARRL-VEC takes in checking VE session paperwork and applications for "completeness, accuracy and integrity" pays off in avoiding potential problems or questions from the FCC down the road. Typically, the FCC grants applications overnight.

The ARRL-VEC served nearly 35,800 applicants between January 1 and April 14. As of late May, it was continuing to work its way through the nearly 16,000 applications logged in from April 15 through April 25, most of them from April 15 test sessions.

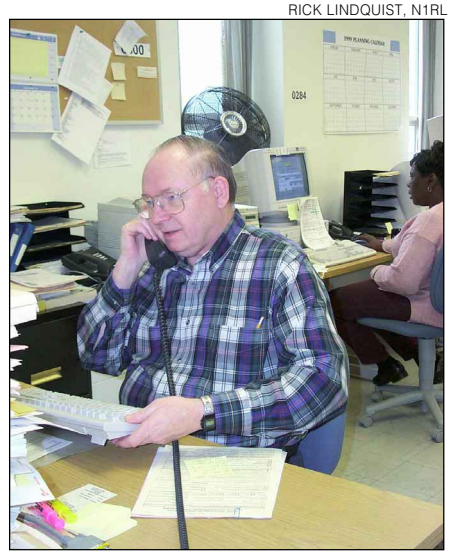
Jahnke says that dealing with telephone inquiries became part of the challenge of handling the huge workload. "Every three to five minute phone inquiry means 10 to 15 license applications that don't get processed," he explained, adding that the people best equipped to answer callers' questions also happen to be best equipped to process applications.

Some of the impatience was chalked up to a desire by licensees either to file a vanity call sign application or to upgrade their Volunteer Examiner status. Neither can be accomplished without a license grant from the FCC reflecting the applicant's upgraded class. In a few cases, applicants were awaiting first-time amateur licenses and did not even have interim operating authority.

RICK LINDQUIST, N1RL

ARRL-VEC staffers Nonie Madone files part of the flood of ARRL-VEC post-restructuring application paperwork. Staff member Lynne Anderson works in the background.

RICK LINDQUIST, N1RL



Assistant to the ARRL-VEC Manager Wayne Irwin, W1KI, follows up by telephone to gather information missing from an applicant's Form NCVEC 605. In the background, temporary ARRL-VEC employee Jane Foy keys in data from an application form.

Questions, Questions

Aside from inquiries dealing with the progress of applications, other burning questions have had to do with operating privileges. Several callers wondered if Technicians who pass the 5 WPM Morse code test (Element 1) under the new rules may operate CW on the Novice bands. The answer is yes. Such licensees no longer get a new license class, but they have the same privileges as current Tech Plus licensees.

While such Element 1 credit provides new privileges for the term of the license, the credit—at least for now—is only good for 365 days for upgrading purposes. The League has petitioned the FCC to make Element 1 credit permanent. At the Dayton Hamvention FCC Forum, Bill Cross, W3TN, of the Commission staff said the FCC has retained a copy of its database "as it existed on April 15," so that the FCC will be able to tell which licensees were Technicians and which were Tech Pluses.

The FCC also made it clear in the wake of restructuring that General class operators may not operate on the Advanced class subbands. Cross reiterated that point in his Dayton talk, in which he urged upgrading licensees to become familiar with the new rules.

Others have wondered if they may use a *Certificate of Successful Completion of Examination—CSCE*—for an "old" amateur examination element under the new rules. In most cases, as long as the CSCE is not older than 365 days, it remains valid for equivalent element credit. An unexpired CSCE for Element 3B is valid for the new Element 3, and unexpired CSCEs for Elements 4A and 4B together confer credit for the new Element 4 (Amateur Extra written).

"On the other hand, an unexpired CSCE for the Advanced Element 4A by itself will earn, at most, a hearty handshake," explained Brennan Price, N4QX, the newest member of ARRL Field and Educational Services. Price, an experienced VE, has been helping to handle the backlog of inquiries. "Element 4A is no good without Element 4B," he said.

FCC Supports Restructuring, Mentoring at Dayton

Noting that exam volume "was up sig-

Rick Lindquist, N1RL ♦ Senior News Editor

RICK LINDQUIST, N1RL

Bill Cross, W3TN, of the FCC, makes a point at the Dayton Hamvention FCC Forum.

RICK LINDQUIST, N1RL

President Haynie discusses "The Big Project" at Dayton.

nificantly," the FCC's Cross urged those attending the Dayton Hamvention FCC Forum to take newcomers under their wing. "It appears Advanced class licensees are upgrading in significant numbers," he said. "So are the Technician Plus class licensees." He recommended that experienced amateurs help newcomers to bridge the gap between their new license classes and their sometimes less-than-fully developed operating skills.

"Just like you, newly minted Generals and Extras want to comply with the rules," Cross said. "Just like you, they have invested a lot in getting that signal on the air, although it may be on the wrong frequency. And just like you, a correction that starts with 'you idiot' isn't going to get the result you want."

Cross also took pains to defend the FCC's restructuring decision that led to the huge influx of upgrade applications. "We believe that an individual's ability to demonstrate increased Morse code proficiency is not necessarily indicative of that individual's ability to contribute to the advancement of the radio art," he said. Noting that no operating privileges were changed by restructuring, Cross said that individual operating choices are dictated by "your idea of fun," not by exams passed.

"We, the FCC, do not regulate what operating activity you choose after you qualify for your license," he said, adding that many hams "choose not to" use CW.

Cross credited the National Conference of Volunteer Examiner Coordinators' Question Pool Committee with "an amazing job" of revising the question pools in very short order. "They *aren't* easy questions," he said. "These exams are not 'dumbed down' by any stretch of the imagination. If anything, they're more difficult because the easy questions are gone."

PRESIDENT HAYNIE PROPOSES "THE BIG PROJECT"

ARRL President Jim Haynie, W5JBP, thinks Amateur Radio is on a roll right now, and he wants to harness some of that momentum to keep the hobby on the crest of the wave in years to come. Enter "The Big Project."

The Big Project—as it's being called for now—is a corporate-education partnership.

"Our school initiative would put Amateur Radio in the middle schools," Haynie explained during a May 5 visit to ARRL Headquarters. "We're in the process of developing the framework for this at the moment."

Haynie also discussed The Big Project during his "Meet the President" forum at Dayton Hamvention. Haynie said in Dayton that he plans to have the program in place by the end of 2001.

The project, now in its early stages and under the guidance of ARRL Vice President Kay Craigie, WT3P, initially would attempt to raise $1 million in corporate and foundation grants and contributions. The idea would be to not only develop a turnkey Amateur Radio curriculum but to provide equipment to bring it to life in the classroom.

The ARRL Board of Directors will hear a progress report on The Big Project when it convenes for its July meeting.

Haynie said the League does not want to reinvent the wheel. The Big Project hopes to borrow from the best of what's already in place in terms of programs that integrate Amateur Radio into the curriculum. In his view, Amateur Radio could play a role in helping to enhance knowledge of geography, math, electricity and electronics, and physics.

"We've consulted with a lot of teachers throughout the United States to help us with the curriculum," he said. The initial pilot project could involve from 300 to 600 middle schools across the US. "It's time to do some bold things," Haynie declared.

Haynie does not expect The Big Project to immediately generate huge numbers of new licensees. He likened the concept to contributing to a retirement plan. "This is long-term," he said. "This is not instant gratification. This is an investment in the future of Amateur Radio."

Haynie said he thinks license restructuring has brightened the overall mood of the Amateur Radio community. "What I see in my travels throughout the country is a resurgence—a revival if you will—of excitement in Amateur Radio, and this is good," he said. "This is something we've needed for a long time."

As Haynie sees it, bringing The Big Project to fruition will continue to fuel the optimism that pervades the hobby. He says the League would be derelict if it did not take advantage of the opportunities The Big Project presents.

"Amateur Radio is on a roll right now," he said. "We want to stay on this roll of success."

ARRL LAUNCHES CONTINUING EDUCATION PILOT PROJECT

The ARRL has launched the developmental phase of a Certification and Continuing Education Program pilot project in emergency communications. Since February, members have been offering comments and suggestions via the Certification and Continuing Education Program's Web-based educational forum **http://www.arrl.org/members-only/forums/w-agora.php3**. Responses showed a need and desire for emergency communications to be the very first—and most important—topic for further study and learning. A special-interest forum was begun in March under the leadership of Pat Lambert, W0IPL.

Dan Miller, K3UFG—who has assumed responsibilities as ARRL Certification Specialist in the new program—says the next step in putting together an emergency communications curriculum will be to pull together all the training material available from various sources.

"If you have a current training plan for any type of public disaster and/or emergency communications, such as SKYWARN, ARES/RACES, NTS-affiliated, or other plan, please share with us so we can share with the world," Miller said. E-mail submittals are preferable, but regular mail also is acceptable. Send submittals to Dan Miller, K3UFG, **k3ufg@arrl.org**, or to ARRL Continuing Education Pilot Program, ATTN Dan

Miller, K3UFG, ARRL, 225 Main St, Newington, CT 06111.

Miller said he hopes to have the emergency communications curriculum in place for the pilot project by summer's end.

LEAGUE CONTINUES OPPOSITION TO EXPERIMENTAL VIDEO PLAN

The ARRL is continuing its opposition to attempts by Los Angeles County, California, to obtain an experimental license permitting airborne microwave TV downlinks (TVDL) in the 2402-2448 MHz range. Amateurs have a primary domestic allocation at 2402-2417 MHz. In a filing with the FCC, the ARRL again asked the Commission to deny the County's application.

The LA County proposal, filed last August 9, seeks FCC authorization to develop a TVDL system for public safety purposes using four 10-MHz channels at 2.4 GHz to transmit video images from helicopter-borne cameras for use by public safety agencies. The ARRL has called the application a "foot in the door" toward gaining a permanent berth in the 2.4 GHz band. The League also has filed a *Petition for Reconsideration* of the granting of a similar experimental application filed by the City of Los Angeles.

In a *Reply to Opposition to Informal Objection* filed in late April, the ARRL reiterated that Los Angeles County has failed to justify its experimental authorization request. The League said the County has not provided any assurance that the TVDL system would not cause harmful interference to amateur users.

Citing ATV repeaters and video links as well as the impending Phase 3D amateur satellite operation, the League said the 2.4 GHz band enjoys significant use by the LA area Amateur Radio community.

A SHACK IN SPACE NEARS REALITY

A new chapter in the history of Amateur Radio will begin later this year when ham gear is installed aboard the International Space Station for the first time. Three major events must happen before the first QSO is made from the ISS, however.

First, the Russian-built *Zvezda* Service Module is scheduled for launch in early to mid-July, providing the living quarters for the first ISS crew. Then, the initial amateur station hardware will be sent up to the ISS aboard shuttle mission STS-106 in August. Finally, the initial crew of US astronaut Bill Shepard, KD5GSL, and Russian Cosmonauts Sergei Krikalev, U5MIR, and Yuri Gaidzenko will be launched in October from Russia aboard a Soyuz spacecraft for what's expected to be a long-duration mission.

Amateur Radio will be available to the first crew members once it's been installed temporarily aboard the *Zarya* Functional Cargo Block module, already in space. Earlier plans had called for the initial station gear—primarily VHF and UHF hand-held transceivers—to be put aboard the Service Module. Launch delays forced the change, however. The amateur gear likely will be transferred to the Service Module next year. The initial station will use existing antennas on the Functional Cargo Block. The system is being adapted to support Amateur Radio operation on 2 meters but not on 70 cm.

ARISS team member Alberto Zagni, I2KBD, explores the ESA's ISS Columbus module mockup during a break at the ARISS team meeting in the Netherlands.

A Russian station license and call sign, RZ3DZR, have been granted for the ISS ham radio station. Long-term plans call for obtaining an international call sign for the ISS station to recognize the cooperative nature of the ARISS project.

"A multinational call sign block is the most desirable route," said ARRL First Vice President Joel Harrison, W5ZN, after a meeting of the ARISS international partners earlier this year in the Netherlands. ARISS team members continue to pursue licenses in their respective countries. A German call sign, DL0ISS, has been issued, and a US call sign has been applied for.

The initial ISS amateur station will provide primarily FM voice and "improved" packet capability on 2 meters and—once aboard the Service Module—on 70 cm using Ericsson hand-held transceivers. It's expected that slow-scan TV, various types of amateur TV, and experimental projects eventually will be added.

A primary goal of ARISS is to continue a schedule of Amateur Radio contacts with schools, so students can interview the astronauts and cosmonauts directly—as a major component of a classroom project. NASA "clearly supports the educational outreach aspects" of the ARISS project, US delegation member Frank Bauer, KA3HDO, told the Netherlands gathering.

Bauer also discussed progress on the ARISS project during the Dayton Hamvention AMSAT Forum.

Section Manager Election Notice

To all ARRL members in the Eastern Massachusetts, Missouri, Nebraska, New York-Long Island, Northern New York, South Carolina, Southern New Jersey, West Central Florida, and Western Pennsylvania Sections. 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 September 8, 2000. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before October 1, 2000, to full members of record as of September 8, 2000, which is the closing date for nominations. Returns will be counted November 21, 2000. Section Managers elected as a result of the above procedure will take office January 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 January 1, 2001. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the October 2000 *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 Vermont Section Manager elections by the deadline of March 10, 2000, nominating petitions are herewith resolicited. See the above details on how to nominate.

FCC DEBUTS ULS INTERNET FILING

Amateurs now can file Universal Licensing System applications via the Web! With little fanfare, the FCC opened ULS to Internet filers on April 29.

ULS users now can file applications and notifications via the Internet for all services previously only available by dial-up connection. To access this capability, visit the ULS home page **http://www.fcc.gov/wtb/uls** and click on "Online Filing." (Users may ignore the on-line survey.) Applicants first must be registered with ULS and use their ULS password to log onto the system.

The ULS—the FCC's interactive on-line licensing application, modification and renewal system for Wireless Telecommunications Bureau services—was deployed for the Amateur Service last August 16. ULS also lets users research the status of applications filed in ULS and licenses issued by the WTB.

WTB Chief Thomas Sugrue said many users had requested Internet access to the ULS. "We now have the technology in place that assures the integrity and security of data transmitted over the Internet along with high speed connectivity," he said.

RICK LINDQUIST, N1RL

The FCC's Steve Linn, N4CAK, discusses the ULS at the Dayton FCC Forum.

Speaking at the Dayton Hamvention, the FCC's Steve Linn, N4CAK, said that ULS registration "protects your call sign within the system" and could prevent it from inadvertently being deleted or reissued due to a filing error. "It will protect your information a little bit better if you register," Linn said.

He also pointed out that amateurs wishing to make a change of address should file an "administrative update" (AU) and not request a "modification." The ULS will not renew an amateur's license unless it is within the 90-day window of expiration or within the two-year grace period after expiration. The same applies for those upgrading their tickets under restructuring.

Linn said the FCC continues to work out the bugs in the ULS. He said that support for the Mac platform and other browsers, such as *Internet Explorer*, would be coming along soon. He advised filers to use the on-line system whenever possible, since it helps users to avoid errors that will not get trapped when filing on paper and could lead to delays or errors in your FCC record.

The FCC will continue to provide dial-up access to the ULS. Visit **http://www.fcc.gov/wtb/uls** for more information or to access the ULS. Those experiencing problems logging onto the ULS should contact ULS Tech Support at 202-414-1250.—*FCC*

Amateur Enforcement News

• **FCC has more questions for W5YI-VEC:** The FCC has posed more questions to Fred Maia, W5YI, of the W5YI-Volunteer Examiner Coordinator as part of a continuing FCC audit of the VEC. The FCC gave Maia 60 days to reply to its latest inquiry. The FCC told Maia May 11 that his April 12 reply to its earlier inquiry didn't go far enough. "Your response is inadequate and does not answer the concerns raised about the integrity of your testing program," FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth said. The FCC has been looking into allegations that licenses and upgrades were sold by W5YI-VEC volunteer examiners and that examination irregularities occurred at W5YI-VEC sessions in Puerto Rico. In its May 11 inquiry, the FCC said it wants to know if Maia's April 12 letter was his "final report" on his fact-finding trip to Puerto Rico that month and his investigation into licensing irregularities there. Among other things, Maia had told the FCC in his reply that he'd uncovered apparent irregularities regarding code tests at a March 18 test session in Salinas, Puerto Rico. He also reported that an applicant listed on the session roster subsequently said she had not taken any examinations at all. The FCC asked if Maia intended to furnish additional session details and documents. Citing a "lack of confidence" in the integrity of his Amateur Radio examination program, Maia in April discontinued the services of all Puerto Rico VEs but the Arecibo Observatory Amateur Radio Club. Maia told the FCC that the W5YI-VEC would put in place "special examination procedures" to ensure integrity. "All VEs would have to be reaccredited and new VE teams re-established," Among other things, the FCC asked if Maia intended to reinstate any VEs decertified in the past. In the May 11 follow-up inquiry, Hollingsworth also enclosed complaints about the W5YI-VEC from amateurs in Texas and Vermont and asked Maia to respond to the individuals. The FCC this spring canceled the licenses of 24 Puerto Rico licensees who had been examined through the W5YI-VEC after the licensees failed to appear for retesting as requested.

• **FCC audits ARRL-VEC exam session:** The FCC is looking into possible irregularities at an ARRL-VEC examination session held last July in North Carolina. On April 26, the Commission wrote Advanced licensee Leo C. Mallard Jr, W4KEM, Extra licensee Ronald J. Knapp, W9EF, and Advanced licensee Edward Gunter, N2VEA, all of Kinston, and Robert E. Jones, KQ4PK, of Dover, North Carolina. All are listed as participating Volunteer Examiners in the July 30, 1999, session in Washington, North Carolina. The ARRL-VEC alerted the FCC to possible discrepancies at the session. The audit focuses on Form 610 packages submitted for three Technician licensees. The FCC asked the VEs for specific information involving erasure marks, check marks—some of which appeared to have been erased—and circles drawn around correct answers on answer sheets for one or more applicants. The FCC also asked each VE to detail his involvement in the VE session.

• **FCC affirms $8000 fines for two Texas amateurs:** The FCC has affirmed $8000 fines levied on two Texas hams for allegedly causing malicious interference with communications on a local repeater and for failing to identify. General licensee Paul E. Holcombe, K4TOF, and Technician licensee Robert L. Meyers, N5WLY, both of Houston, each received a *Forfeiture Order* in May from the FCC's Houston office. The fines followed an FCC investigation last year that involved the use of direction-finding equipment. Last year, the FCC had sent first a *Notice of Violation* and then a *Notice of Apparent Liability* to each licensee. Each responded both times by denying the allegations. The FCC was unconvinced by their assertions and said their denials were contradicted by the observations of the FCC agent. In its *Forfeiture Order* to Meyers, the FCC indicated that Holcombe and Meyers had acted in concert to interfere with the Memorial Emergency Repeater Association's 145.47 repeater in Houston. Both men were given 30 days from the May 3 release of each *Order* to pay.

Nominees Sought for ARRL Board of Directors

If you're a full ARRL member in one of the following five divisions and are interested in playing a part in the League's democratic organization, here's the opportunity. Nominations are open for the offices of director and vice director for the 2001-2003 term in the Central, Hudson, New England, Northwestern and Roanoke divisions.

ARRL Divisions

The policies of the League are established by 15 directors who are elected to the Board on a geographical basis to represent their divisions and constituents (see page 10 of any recent *QST* for a list of the divisions, directors and vice directors). These 15 directors serve for three-year terms, with five standing for election in each.

Just as in national or state politics, ARRL voters/members have the privilege and responsibility to decide that they like the actions of their incumbent representatives and support them actively for reelection or to decide that other representatives could do a better job, and to work for the election of those persons. Vice directors, who succeed to director in the event of a midterm vacancy and serve as director at any Board meeting the director is unable to attend, are elected at the same time.

Call for Nominations

Nominations are open for director and vice director in the five divisions mentioned above for the three-year term beginning January 1, 2001.

How to Nominate

1. *Obtain official nominating petition forms.* This package consists of a cover letter; a reprint of this election announcement; blank Official Nominating Petition forms and Candidate's Questionnaires for the offices of director and vice director; a copy of the ARRL Articles of Association and Bylaws; and an informational pamphlet for candidates.

Any full member residing in a division where there is an election may request an official nominating petition package. You don't need to be a candidate to request the forms. Your request for forms must be received by the Secretary *no later than noon Eastern Time on Friday, August 11, 2000.* There are separate forms for director and vice director nominations.

2. *Submit petition with statement of eligibility and willingness to serve.* Official forms bearing the *signatures of 10 full members of the division* and naming a full member of the division as a candidate for director or vice director, must be submitted, with a statement *signed by the candidate* attesting to his or her eligibility, willingness to run and willingness to assume the office if elected. These documents must be filed with the secretary *no later than noon Eastern Time on Friday, August 18, 2000*. Only original documents can be accepted; *no facsimiles of any kind are acceptable.* On Monday, August 21, 2000, the secretary will notify each candidate of the names and call signs of each other candidate for the same office. Candidates will then have until Friday, September 1, 2000, to submit 300-word statements and photographs, if they desire these to accompany the ballot, in accordance with instructions that will be supplied.

3. *Election Committee to certify eligibility.* In accordance with the Bylaws, an Election Committee, composed of three directors not subject to election this year, is responsible for the conduct of the election. This year, the Election Committee consists of Frank Butler, W4RH, (chair), George Race, WB8BGY, and Coy Day, N5OK.

The nominee must hold at least a Technician amateur license, be at least 21 years of age and have been licensed and a full member of the League for a continuous term of at least four years immediately preceding nomination. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League, by the Board or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates: (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for the ARRL and (3) are free from conflicts of interest.

Balloting Will Follow

If there is only one eligible candidate for an office, he or she will be declared elected by the Election Committee. Otherwise, ballots will be sent to all full members of the League in that division who are in good standing as of September 10, 2000. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1, 2000 and, to be valid, must be received at HQ by noon Eastern Time on Friday, November 17, 2000. A group of nominators can name a candidate for director or vice director, or both, but there are no "slates," as such. Each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Because all the powers of the director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Absentee Ballots

All ARRL members licensed by the FCC, but temporarily residing outside the US, are eligible for full membership. Members overseas who arrange to be listed as full members in an appropriate division prior to September 10, 2000, will be able to vote this year where elections are being held. Members with overseas military addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal addresses. Even within the US, full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the Secretary prior to September 10, 2000, giving their current *QST* address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern or Roanoke division but your *QST* goes elsewhere, let the ARRL Secretary know as soon as possible, but no later than September 10, 2000, so you can receive a ballot from your home division.

The Incumbents

These people presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year:

Central—Ed Metzger, W9PRN, and Howard Huntington, K9KM

Hudson—Frank Fallon, N2FF, and J. P. Kleinhaus, W2XX

New England—Tom Frenaye, K1KI, and Mike Raisbeck, K1TWF

Northwestern—Greg Milnes, W7OZ, and Jim Fenstermaker, K9JF

Roanoke—Dennis Bodson, W4PWF, and Leslie Shattuck, Sr, K4NK

For the Board of Directors:

May 7, 2000

David Sumner, KIZZ
Secretary

Share Your Vision

Those of us who are public-service minded and concerned about our communities in times of disaster are *communication specialists*. We are able to transfer the thoughts of one person to another person, thousands of miles away, so two or more persons can think the same thing. Thoughts from a disaster site are sent to the governor; thoughts of a local Red Cross chapter person go to its nearby offices and divisions all over the US.

I have just described the capability of a ham radio station, but does it really get to the heart of what we can do—or what we should be able to do? Can I communicate the thoughts and needs of my community to another person thousands of miles away? Do I know others who can? Do I care enough to be prepared in advance of a disaster? Does my ARES group have a 2-meter net that meets regularly, and an HF station to communicate outside the range of our repeater? Do the operators know how to surf the NTS network to get messages to their destinations? Do they know how to establish an HF emergency net, be a net control and write a formal message that hams around the world can read, and comprehend the thoughts of the originator? If you are like me, the answer isn't always "yes" because there are not enough prepared HF hams in most states.

In the wake of license restructuring we have many new HF operators. We must welcome them into our nets and ARES groups to enhance our function as communication specialists. Your net and ARES groups are good skeletons that can always stand to have some more meat added! Go after the new HFers, become their Elmers, and *make* more skilled communicators.

Do we want more hams without a specific purpose, or can you and I share our purpose with them? Dare we not? I publicized the call signs of the upgrading hams to my area net and ARES experts and asked them to welcome the new HFers. Please: all public-service minded communication specialists—share your vision.—*Orlan Cook, W0OYH, ARRL Kansas Section Manager*

AWARDS TO AMATEUR EMERGENCY GROUPS

Colorado District Emergency Coordinator Pat Lambert, W0IPL, reports that ARES District 11 was awarded the Citizen Service Citation for exceptional community service by the City of Longmont at its annual awards banquet. The February citation was for having trained communicators for New Year's Eve 1999, and for giving time and effort toward establishing the city's emergency preparedness plan.

A February *ARRLWeb Extra* story reported that the Kentucky governor credited the preparations of three western Kentucky counties for reducing the number of injuries in tornadoes. ARRL Kentucky Section Manager Bill Uschan, K4MIS, stated recently that SEC Ron Dodson, KA4MAP, has been asked to teach a class on the utilization of NTS and ARES. The class will be offered to emergency planning officials from all across Kentucky at the June Governor's Emergency Management Workshop!

Ken Johnson, N4ZEB, received the Life Saving Award in March from the Palm Bay, Florida, police department. Steven Hathaway, WB2CKM, reports that Ken and two other volunteers began night patrol driving by commercial buildings as part of a pilot program to lighten police workload. The route took them on an interstate where they witnessed and reported a motorcycle accident. Positioning his car between traffic and the motorcyclist, Ken directed traffic until police arrived. The motorcyclist was later released from the hospital with minor injuries, but if Ken hadn't acted so quickly the outcome would have been different.

USEFUL WEB SITES

Connecticut District Emergency Coordinator Peter Kemp, KZ1Z, found a Web site at **http://wmdfirstresponders.com/** for first responders to emergencies.

For those interested in mobile command/communication vehicle design, Robert Long, N8UAN, sent this URL: **http://clubs.yahoo.com/clubs/mobilecommpostdesignclub**.

You can sign up for e-mail notification of emergencies from your local and regional government sources. Check The Emergency Email Network at: **http://www.emergencyemailnetwork.com/**. Although this is a helpful service, remember that e-mail isn't super reliable, and shouldn't be used as a primary source of alerting other volunteers.

LEARNING FROM DRESS REHEARSALS

A dress rehearsal for Martin County (Florida) ARES/RACES members was set up in February prior to a simulated nuclear power plant disaster scheduled for a month later. The hams were to set up communications with the St. Lucie County EOC, and felt they had plenty of time to be ready for the simulation. The EOC has a VHF/UHF dual bander, UHF packet, two VHF positions equipped with 140-160 MHz commercial Local Government Radio Systems (LGR), and an HF position.

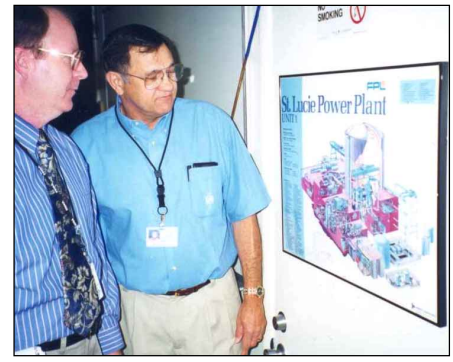
The first call was made on LGR—and was barely heard except on the ARES/RACES frequency! The problem was traced to a tone-squelch decoder front-panel switch. Then an intermittent keying circuit caused by a broken microphone cable was found. Finally, several drill messages and bulletins were passed for the two counties, plus stations in Palm Beach, Indian River and Okechobee Counties. This dress rehearsal resulted in getting the EOC station configured and in business.

A month later came the actual drill for the power plant disaster. The ham group arrived confident, knowing they'd caught all bugs in the rehearsal. Communication was established with St. Lucie County ARES, a formal net was established, and HF communication was tested with local and distant contacts—a total success.—*Ben Givaudan, N4BG*

TORNADOES RIP SOUTHWEST GEORGIA

Stan Halstead, W4GOD, a weather forecaster with a direct feed to NEXRAD radar, and John Kinkaid, KR4OH, had opened a SKYWARN net on the Albany, Georgia repeater, the night of February 13. Knowing the SKYWARN net was opened, Dougherty County Emergency Coordinator William Shipley, N4GPJ, tuned his 2-meter handheld to the repeater, and left the H-T by the bed. After midnight, Stan announced on the repeater that radar indicated a severe storm cell, and

Honored at the awards ceremony are (left to right) Platinum Coast club president Steven Hathaway, WB2CKM, Ken Johnson, N4ZEB and Bill Mercier.



Don Cornell (left), of FEMA Region IV, and Martin County Emergency Planner Mel Baxley, N4ZUZ, look at a diagram of the St. Lucie Power Plant.

Rosalie White, K1STO ♦ Field & Educational Services

that everyone in the area should take immediate cover. Mark Rivers, KC5AWS, mobile in Camilla reported all power appeared out, and a mobile home was in the middle of the highway. John began forwarding reports to the Tallahassee NWS.

William called Charles Freeman, KF4KMO, head of the Georgia Baptist Disaster Relief, and left home to meet the local Red Cross disaster director. Charles arrived at the disaster area quickly, assisting with search and rescue. Stan relayed messages to the sheriff's department. Bob Smith, K4PHE, was asked to operate the Red Cross Albany chapter radio while William met with the EMA director, and shadowed the Red Cross disaster director. Fred and Joyce Jones, KA4AFL and KA4KCC, worked at the Dougherty County Rescue Squad triage bus.

At dawn, the repeater was turned over to disaster relief. A continuous string of ambulances transported the injured from the area hospital to outlying hospitals once patients were in condition to be transported. The only way to keep up with the Red Cross and other agencies was to follow personnel around with an H-T. The EMA director called a meeting to report first damage assessments—a cellular tower had been destroyed. Cell phones were inoperable or marginal; hams needed to provide all communications.

By having a station at the rescue bus near the hospital, at the GEMA command post, the Albany Red Cross chapter, and the Camilla Red Cross shelter, agencies kept in contact.

EC Danny Baer, KA0DBK (left), Bob Mayo, KB0YTO, David Bonger, N0QEC, at an annual three-hour parade in State College, coordinated by Buffalo County (Nebraska) ARES members, and fire, emergency management and law enforcement officials.

Dale Culp, W1BPP, and J.D. Goins, AA4P, began preparing for the arrival of Georgia Baptist Disaster Relief feeding units. Victims were drifting into shelters, and messages were mainly about medicines, supplies and lost family members. As with any disaster, the first day was controlled pandemonium. But overnight, things slowed down, giving relief to the hams.

In the morning as workers arrived, messages awaited them; the flurry of radio communications was constant. By Wednesday, agencies were getting settled in, while traffic between their headquarters and service centers was handled via 2 meters. At 7 PM things slowed down. Thursday, the Red Cross service center was to open to the public, but staff was hesitant because phones were still not operational. Due to the assistance they'd received from the hams, they decided to proceed and rely on hams for their traffic. Friday, phones were still not operational, and hams ran communications between the service center and the headquarters. Finally, by afternoon, phones were set, and hams took their equipment home.

William, N4GPJ, who provided the details for this story, reported: "I cannot begin to state the gratitude all relief agencies bestowed on our operators—especially since the cell phone tower came down and phones weren't in place quickly. Nobody wants disasters, but we cannot overstress how ties were strengthened between the Amateur Radio community and state and local officials. High tech equipment normally works great, but when disaster or overload renders it useless, hams prove the true value of having trained communicators to help, with equipment standing by. Should the need arise, we stand ready."

REGISTER YOUR NET!

It's time to register your net for inclusion in the 2000-2001 edition of the **ARRL Net Directory**. You'll find instructions and a registration form on page 46. QST

Field Organization Reports

Public Service Honor Roll
April 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

1648 AD4IH
900 NM1K
446 W9RCW
423 K9JPS
354 N5JZ
299 K4FQU
267 KJ3E
249 K5NHJ
236 KA2ZNZ
235 NZ4O
229 W7TVA
213 KK3F N2LTC
212 K7VVC
203 W6DOB
209 NN7H
208 WB5ZED
198 KA4FZI N5IKN
194 K7BDU
190 KB2RTZ
189 W4ZJY
186 KF4NFP
185 WA9VND
184 W4CAC
183 N2XOJ
179 N2OPJ KS4DW
175 W4EAT KC5OZT
174 N0KJ W5ZX
173 KT4PM
172 K6YR
170 WB4GM
168 N2AKZ KA2GJV
166 KJ4N
164 WA1JVV
163 WB2UVB
162 K4IWW N5NAV K2UL
161 N5OUJ N2RPI KD4GR
160 N7YSS KS4FB W6QZ
159 KR4MU
158 KB2VVB W3YVQ WB2GTG WA5I W6IVV
157 KC2DAA
156 N2JBA
155 KC2EOT K4SCL
154 N8FWA KC2AHS
153 KB2KLH WD8MIO N2CCN W9YCV NR2F
152 WN0Y K9RTB WN0Y
151 K4YVX KB2VVD KC4ZHF
150 KC4TLG
149 AA0OM WA1TBY
148 NC4ML WX4H
147 W0OYH WA1FNM AF4PU
146 KD1LE
145 AF4GF
143 WO0A WB2ZCM K4RBR
141 AA3GV WB0ZNY N0SU KI4YV W2AKT
140 KA1GWE W0LAW N2KPR

K2GTS
N9BDL
AB4XK
139 WA4DOX
138 K3JL W3CB W2RJL W2MTA W7GB AF4NS WA3HJC W7ZIW KT6A
137 AA3SB N2XJ KO6RZ W7NWP
136 WD4JJ NY2V
135 KE4JHJ NN2H K2DN W2EAG
134 W3VK WB2QIX KK1A K1FP
133 K5IQZ AC4CS
132 W9CBE KB5TCH
131 WA2UKX
130 KB2ETO KF6OIF KC6NBI NZ1D N9MN
129 KA5KLU WD9FLJ WU4C W7LG
128 WA8EYQ
WA0TFC
N1LKJ
KY1B
WB2FGL
127 W0WWR WA4QXT
126 W1JX W5CDX KG2D KB2VRO
125 W1PEX WB4TVY AA2SV
124 K5DPG W7GHT
123 W4NTI KF6UMU
122 W2JHO AG9G
121 N7AIK N4CQR KA4LRM
120 N9TVT KA7AID N7DRP KF4KSN W7MQF
119 W1QU K0PIZ K9GBR W9ZY AF2K K7GXZ
118 W2CS N8DD W4CKS KA2DBD WA2CUW K2PB W5MEN W3OKN KA4UIV KE4IFD
117 K0IBS
WD9HII
N2YJZ
WA2YBM
WI2G
N5GG
116 W3BBQ WD0GUF
115 N3WK KB0DTI N2WDS N3WAV
114 KT4TD
113 KC4VNO W4DGH W4XI KO4OL
112 N3ZKP
110 N3RB
109 WB4ZNB W2PII K6AGD KC5VLW
108 K3CSX KA1OTN N1JBD WA8SSI KA2CQX W2MTO KT4SJ KC6SKK
107 K8JMP W4AUN
106 AA2ED
105 KA2ZKM KA4HHE N1IST WB4PAM WA4EIC KF5A
104 KJ7SI
103 K4AIF
N2WFN
102 AA4YW W1ALE W2FR
101 WA4GLS
100 KG5GE N1LAH
99 W1JTH KE4GYR N9KNJ KE6MIW
98 K5MC KB2WII K5MXQ
97 WB2LEZ KD4HGU KM5VA
96 KJ9J
95 KB3AMO KC4PZA K4WKT W3BL
93 WB4UHC WA1QAA KA1VEC KA2BCE AE4NW
92 KC3Y W2LC KE4DNO
91 KB1CTC KC8HTP
90 W2GUT WA4EYU
89 KC7SGM
88 W7VSE W5AYX
87 KR4MA
86 W4PIM
85 K4MTX K8LEN W4QAT W2CC
84 W7QM
83 KE3FL N1VXP AA4HT
82 AC4ZO
81 W4CC WB9GIU KD6YJB
80 AF4CD KC7SGL K1JPG AA4BN
79 KB4WBY
78 KB5YAM KG4CHW
75 W7EP K4BW KD5AHW
74 KA7TTY W8SZU
73 W0FCL KB2YEN KE0K K1SEC
72 WB7VYH
71 K8SH
70 K5UCQ N2VQA KB2YBM KC2ETU KB2VSR K4BEH K4BG

The following station qualified for PSHR during the month indicated, but was not listed in previous PSHR columns: (March) WB2IJH 71.

Section Traffic Manager Reports
April 2000

The following ARRL section traffic managers reported: AK, AL, AR, AZ, CO, CT, EMA, ENY, EPA, EWA, GA, IA, ID, IL, KS, KY, LA, MDC, ME, MN, MO, MS, MT, NC, NE, NFL, NH, NLI, NNJ, NTX, NV, OH, OK, OR, ORG, SBAR, SC, SD, SDG, SFL, SNJ, STX, SV, TN, VA, WCF, WI, WMA, WNY, WPA, WWA, WY.

Section Emergency Coordinator Reports
April 2000

The following ARRL section emergency coordinators reported: AZ, CT, ENY, EWA, IN, KY, LA, MDC, MI, MN, MO, NLI, OH, SD, SFL, TN, VA, WCF, WMA, WV.

Brass Pounders League
April 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*
WX4H	3	1204	1667	6	2880
KK3F	22	143	1863	48	2076
NM1K	758	381	811	4	1954
KF5A	0	217	1357	1	1575
AD4IH	518	136	579	2	1235
W1PEX	0	99	1044	11	1154
N2LTC	0	514	507	45	1066
N0KJ	26	450	440	36	952
KT6A	0	449	423	0	872
W7AMM	139	309	403	18	869
WB5ZED	21	421	369	19	830
W9IHW	0	396	51	375	822
N5IKN	0	406	128	275	806
WA9VND	6	433	317	22	778
W9RCW	0	3348	37	346	751
W4EAT	3	370	367	4	744
W6DOB	0	229	433	65	727
K9JPS	3	345	3	343	694
W5SEG	46	313	260	0	619
K7VVC	34	274	308	10	616
KA2ZNZ	17	292	210	81	600
WB2GTG	9	219	284	31	543
K7BDU	22	259	247	4	532
KA1VEC	10	231	259	11	511
WX7V	0	238	31	238	509

BPL for 100 or more originations plus deliveries: N5JZ 176, K9GU 150, K5NHJ 142. QST

Tromelin Island

Tromelin (formerly known as *Ile des Sables*) is a small island in the Western Indian Ocean located about 420 kilometers (260 miles) northeast of Madagascar at 15° 52' South and 54° 25' East. It is administered by the French overseas department of Reunion, but is also claimed by Madagascar, Mauritius and Seychelles. This small speck is only 1 square kilometer, which is just a little bigger than the Mall in Washington, DC.

In July 1761 a French naval transportation ship called the *L'Utile* carrying supplies and slaves sank in a bad storm. Most of the crew and slaves survived and made it to the island. The shipwrecked survivors managed to build a boat that would take them to Mauritius, but only the French sailors left the island. The slaves were left behind. Fifteen years later only eight of the original 90 slaves survived. They were rescued and taken to Mauritius, where they were set free.

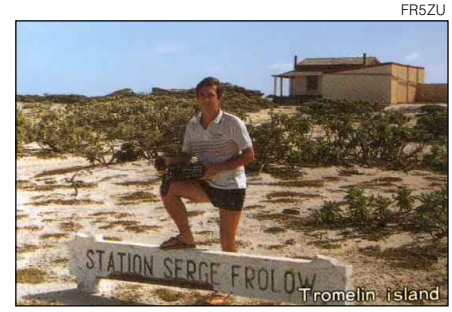
The only current residents on this remote island are French meteorologists who occupy Tromelin all year. The main attractions on the island for sightseers are the unpaved airstrip, which was completed in 1954; the main building called "Bloc Meteo"; the old meteorological station and a few other small buildings.

Landing on Tromelin requires a special permit because it was classified as an "integral natural reserve" on November 18, 1975. Only authorized personnel may access the island, such as scientists (meteorologists and biologists).

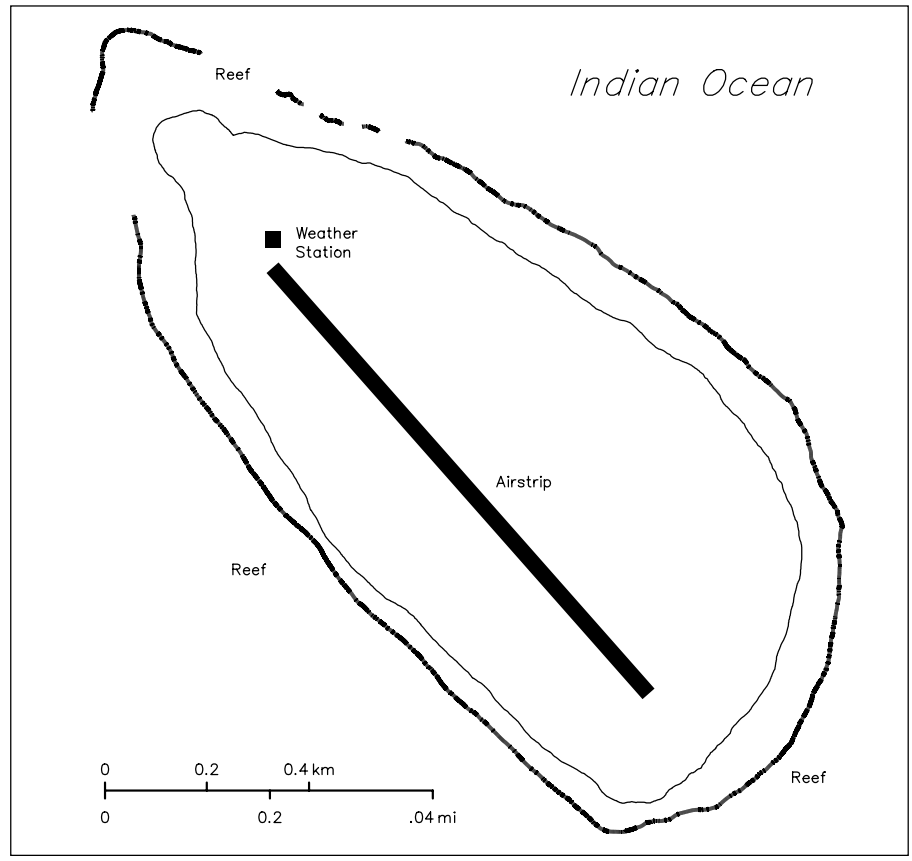
FR5ZU

Not much to see on Tromelin Island.

FR5ZU



Jacques Quillet, FR5ZU, has been active from Juan de Nova, Europa, Glorioso and Tromelin Islands.



Tromelin Island ranked #9 on the 1999 ARRL Most Wanted List. Over the past 10 years or so no major operation has taken place from this island. French meteorologists who have been active on lists and nets have done all past operations. Most of the activity has been on SSB and usually just on a few bands.

Lyon DX Gang

Last summer members of a French DX club called the Lyon DX Gang announced their plans to launch a four-man DXpedition to Glorioso Island, which was ranked #12 on the 1999 ARRL Most Wanted List. However, in January of this year, the group had to make a change to Tromelin Island, which was ranked #9 on the list.

This will be the second major operation undertaken by the Lyon DX Gang in recent years. Most DXers will remember the November 1998 operation of FT5ZH on Amsterdam Island. The team for the July/August 2000 trip to Tromelin will consist of Larry, F5PYI; Eric, F5PXT; Erwann, F6JJX; and Gil, F5NOD.

The group plans to leave France and arrive on Reunion Island on July 29. They expect to leave Reunion and land on Tromelin (FR/T) on July 31, possibly even having one station on the air that evening.

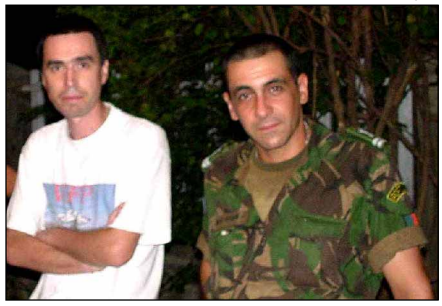
Plans are to have three complete stations on the air through August 16. Look for them to be active on 6 through 160 meters CW, SSB and RTTY. They will be using beams for 6 through 20 meters and Titanex verticals for 30 through 160 meters. At press time no call sign has been assigned, so keep an eye on your favorite DX bulletin. The team expects to be back in France on August 18. A Web site has been set up at **http://perso.easynet.fr/~f6jjx/**.

Bernie McClenney, W3UR ♦ 3025 Hobbs Rd, Glenwood, MD 21738-9728 ♦ w3ur@arrl.org

4W6EB

Dinner at the Burnt Roof Restaurant in Dili. Left to right: 4W/N5KO, 4W/W3UR, 4W6/VK2QF, 4W6UN, 4W6MM and 4W6EB.

4W6EB



East Timor was formerly known as Portuguese Timor until 1975. Here are Portuguese DXers Jose, 4W6EB/CT1EEB and Antonio, 4W6GH/CT1EGH.

EAST TIMOR—4W

Most of you know that East Timor was added to the ARRL DXCC list effective March 1, 2000 and QSL cards may be submitted for DXCC credit after September 30, 2000. I had the pleasure of spending almost two weeks in the new fledgling country as 4W/W3UR, which is currently being administered by the United Nations Transitional Authority for East Timor (UNTAET). You will be able to read more on that in a future issue of *QST*. However, here is some information you may find helpful.

There are several United Nations employees who are Amateur Radio operators and are currently still in 4W. The first licensed was Ross, VK8UN/4W6UN, who mostly operates on 6 meters and on a few HF nets, as he does not like pileups. QSL cards go via Steve, VK3OT. Thor, TF1MM/4W6MM, president of the East Timor Amateur Radio Association (ETARA), operates from both the capital Dili and the city of Baucau. He likes CW mostly, but does some SSB and RTTY. He has big plans to be active on all bands and should have an amplifier soon. QSL cards must go to Thorvaldur Stefansson, PO Box 3699, Darwin, NT 0801, Australia. Don't even think about sending your card to any addresses in Iceland! Jose, CT1EEB/4W6EB, works for WFP and only operates SSB. He really enjoys living in this new nation and knows the hearts of the people from Timor Lorosae. QSL via CT1EEB, Jose Emanuel Ribeiro de Sa, PO Box 79, P-3860 Estarreja, Portugal, or via CT1EEB through the Portuguese bureau. I did not get a chance to meet Antonio, CT1EGH/4W6GH, who arrived a few days before me (Antonio quickly transferred to Liquica, about 30 kilometers east of the capital). He has been one of the most active of the bunch operating on SSB and RTTY on 10 through 80 meters. QSL via CT1EGH, Antonio Alberto Lopes Pereira, R Guerra Junqueiro, 25-A, Vale de Milha, Corroios 2855, Portugal. Pero, 9A4SP/4W6SP, started up in late April and has been active on SSB and CW on the higher bands. QSL via 9A2AA.

I was active from Thor's Baucau location as 4W/W3UR between March 26 and April 2. QSL via OH2BN. Nev, 4W6/VK2QF, arrived a few days later and operated mostly on 6 meters with some HF. QSL cards should go to VK2QF. Trey, N5KO, came from one new DXCC Entity, the Chesterfields, to another to operate as 4W/N5KO on 15 meters CW and RTTY. QSL via OH2BN. So, as you can see, there has been lots of activity from this new one and the Deserving should have plenty more opportunities to work it in the future.

7P8AA—LESOTHO

Lesotho is a kingdom that is an enclave lying within the Republic of South Africa Although it has FR5ZVnever been on the ARRL Most Wanted 100 List, it is somewhat rare because there is little activity among the nationals. Horst, 7P8HH and Rob, 7P8RP are the most active from the South African nation.

A team of German Amateur Radio operators has announced their plans to activate 7P8AA from July 3 to 22. The group will include Jo, DF6VI; Dieter, DJ9ON; Mark, DL1IAN; Jack, DL1YFF; Tom, DL1QW; and Tom, DL4OCM. They plan to operate on all bands from 10 to 160 meters on CW, SSB and RTTY. Three complete stations will be set up with a possibility of 6-meter activity. It will be winter time there and the team plans to concentrate on the low bands. For more information about this trip check out **http://www.qsl.net/7p8aa/**. QSL via DL7VRO.

PY0—ST. PETER AND PAUL ROCKS

The on again off again DXpedition to St. Peter and St. Paul Rocks has once again been postponed. It seems that transportation is the only factor holding up the operation. The two-man team is ready and has the funds. They are just waiting on the Brazilian Navy to take them. The group is now planning to go to this semi-rare location in July and hopes to have some kind of a confirmation by June. They will also have RTTY on this trip. Watch the DX bulletins for the latest update.

CY9—ST. PAUL ISLAND

A group of four Americans has announced its desire to go to The Graveyard of the Gulf of the St. Lawrence in early July. The team will be on St. Paul Island between July 6 and 10 and will include Duane, WV2B; Rick, AI5P; Henry, KE1AC; and Rob, WA4RX. Landing permission has been granted from the Canadian Coast Guard. However, this news is tempered with the new rule that the island housing structures can not be used and liability insurance will be required. They will be active on 6 through 40 meters on CW and SSB. A Web site has been set up at: **http://www.geocities.com/Heartland/Pines/7651/DXpedition.html**.

Suggested frequencies are as follows:

CW—7030, 10130, 14030, 18075, 21030, 24895, 28030

SSB—7185, 14195, 18145, 21295, 24945, 28495

JULY IS IOTA MONTH

Last year I officially proclaimed July as Islands On The Air (IOTA) month. It's time to do it again. The RSGB IOTA Contest will be held on July 29 and 30 and promises to be even better than last year. Serious IOTA chasers can easily work over 200 different counters during this event. IOTA is for those who are just starting out in DXing and those who are at the top of the Honor Roll waiting for the next new one to show up on the air. For more information check out the RSGB's new IOTA Web page at **http://www.rsgbiota.org/**.

WRTC-2000

DXers know one of the quickest ways for a beginning DXer to work countries is during a contest, and that contest DXpeditioners are a DXer's best friend. Both DXers and contesters keep the HF bands alive and active. The World Radio Team Championship 2000 will run during this year's IARU HF World Championship Contest on July 8 and 9. Fifty-three two-man teams will compete in the 3rd WRTC-2000 event, which will be held in Bled, Slovenia. Each team will use special call with unique prefix from S500A-S599Z block. For complete rules, award info and more, check out the WRTC-2000 Web site at **http://wrtc2000.bit.si/**.

PACIFIC NORTHWEST DX CONVENTION

This event is held every summer and rotates between Oregon, Washington and British Columbia. Members of the BC DX Club and the Fraser Valley DX Club will be hosting this year's convention in Vancouver, British Columbia from July 28 to 30. My family and I will be attending this year. (I will be doing the 4W/W3UR presentation.) Afterwards we will be vacationing in VE7 and VE6 land. For more information check out the PNWDXC Web page at **http://www.bcdxc.org/html/DX2000.htm**.

MORE DX CONVENTIONS

Mark your calendars for more DX Conventions. The 48th annual W9DXCC DX Convention will be held in Chicago, IL on September 16. Check out their Web page at **http://www.qth.com/w9dxcc/** for complete details, or contact Bill Smith, W9VA. The Northern California DX Club will host the 52nd annual International DX Convention from April 20 to 22, 2001. They will hold it in Visalia, California. For more information contact George Allan, W6YD, at **W6YD@aol.com**.

KERMADEC DX ASSOCIATION

Ken Holdom, ZL4HU (also ZL2HU), informs us that the new address for the Kermadec DX Association is PO Box 7, Clyde, Central Otago, New Zealand. Anyone still needing QSL cards for ZL8RI or ZL9CI should send them to that address. Ken also reminds everyone that the Kermadec DX Association is planning a DXpedition to ZK3 in 2002.

THIS YEAR IN DX

This year has been an amazing year so far in terms of DX. We have had two new entities added to the DXCC list with plenty of activity from both East Timor and the Chesterfield Islands. This year Pratas Island (#3), Bhutan (#4), Yemen (#6), Macquarie (#11), Mount Athos (#18), Myanmar (#20) and Burundi (#25) have all been on in just the first five months! Later this year expect to see Tromelin (#9), Kingman Reef (#16) and Agalega (#24).

WRAP UP

That's all for this month. Thanks go to 4W6EB, F5NOD, FR5ZU, *The Daily DX*, W6YD and W9VA for making this month's column possible. Until next month, see you in the pileups!—*Bernie, W3UR*

Building A Fine Old Radio Today

In last month's column I talked about the "Around the World Four" receiver by Silver-Marshall. At the end I mentioned that this would be an easy antique to replicate due to its use of standard old parts that can still be found at hamfests. In fact, replicating old radios is a very popular part of collecting. Sooner or later, many collectors build their favorite radio from their own spare parts and, with a little hamfest shopping, they are able to get the rest.

This month's column is about a replicated radio built in 1997 from the 1941 edition of *ARRL How to Become a Radio Amateur*. It was a popular design of the time—a two-tube regenerative receiver with plug-in coils. It could be powered two ways: by ac with an attached power supply, or by dc with batteries. (Remember that in 1941 there were still many rural homes and farms without commercial power, so their radios had to be battery powered.)

The receiver shown here was built by collector and "Master Craftsman" John Kelly, N3GVF (SK). John was well known for his immaculately restored collection, which contained over 300 ham radio receivers and transmitters, hundreds of Morse keys and sounders, as well as microphones and other ham radio accessories. He also had a radio library containing thousands of books, old radio magazines, radio manuals and schematics for most of his collection.

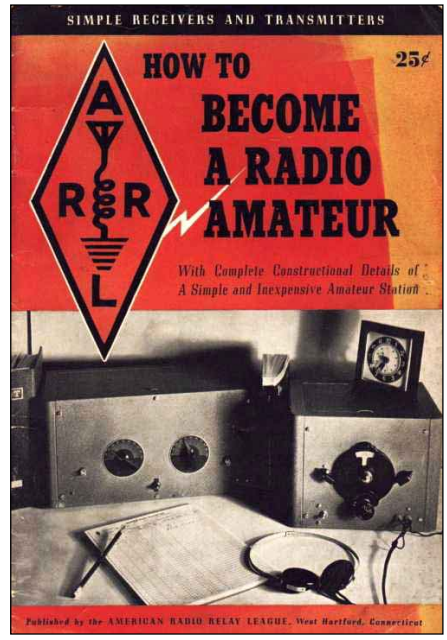
This was last radio that John built. He died unexpectedly just after finishing it, before he could complete the matching transmitter from the same publication. He intended to enter the pair into the Antique Wireless Association's annual contest. I entered this radio for him in 1999, after acquiring it a year earlier from an auction. It won the prestigious AWA "Ellie Craftsman" award for outstanding construction techniques.

The ARRL construction article describes two ways to build it. One approach used a nice metal cabinet and the other, which John decided to build, used a wooden base with an aluminum plate attached to mount the parts. An additional piece of aluminum provided the front panel where the various controls and variable capacitors would mount.

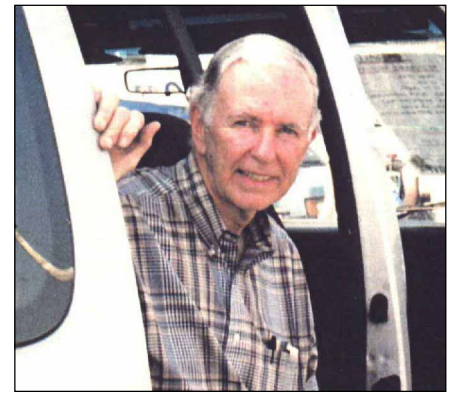
The article is well written with many photos to help you with parts placement. There is an easy-to-follow schematic and a complete parts list. The table with coil data is shown with well-drawn examples on how to construct the five plug-in coils. This radio covers from 1.55 to 33 MHz in five bands. The coils are designed to place the center range of the tuning control in the center of the 160, 80, 40, 20 and 10-meter ham bands.

If you decide to construct one yourself, you won't be sorry. This radio works very well. It will pull in weak stations quite nicely on the lower bands. Match this up with a homebrew single 6L6 transmitter, throw in a nice 40-meter dipole, add an old-fashioned knife switch to change the antenna from receiver to transmitter, and you'll have great starter station that graced many shacks from the late 1930s through the mid 1950s.

During the year there are contests for vintage stations by various groups. This is a fun way to contact others with similar stations. If you know about a vintage or Boat Anchor type contest, please send me the information by e-mail, and I'll place a vintage contest schedule on my Web page.



The 1941 edition of *How to Become a Radio Amateur*.



"Master Craftsman" John Kelly, N3GVF (SK).

John's handsome version of the two-tube regenerative receiver with plug-in coils from *How to Become a Radio Amateur*.

John was well known for his immaculately restored collection, which contained over 300 ham radio receivers and transmitters.

Building It Yourself

With the permission of ARRL, I have scanned the entire 11-page article, which contains the construction portion and the details on how to operate this radio. (There is also information for building the all-metal version there if you so desire.) It is located on my Web site for you to download and print. I have also placed additional photos of John's radio so that you can study his construction techniques. The site URL is: **http://www.eht.com/oldradio/arrl/index.html**. Please let me know how your project turned out!

I'm looking for other nice homebrew radios to feature in this column from time to time. If you have something to share, please let me know. These could be radios your dad built way back when, or something you found in an old *Handbook* or magazine article and built yourself.—*K2TQN* QST

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

A Weather Station In Every Shack

My Uncle Bill was a Heathkit fan. His house was full of assembled and more importantly, working Heathkits, from color televisions to doorbells that played tunes like *America, The Beautiful* on the Fourth of July and *Auld Lang Syne* on New Year's Eve. I always looked forward to visiting Uncle Bill to see what new gadget from Benton Harbor he had added to his collection.

Uncle Bill was not a ham, so he had no Heathkit ham radio equipment, but he did have one Heathkit that I wish I could have added to my ham radio shack: a Heathkit weather station. I don't remember what a Heathkit weather station cost, but I remember that whatever the price, it was too expensive for my budget at that time. Nevertheless, I thought it was fine business to know which way the wind blew without a weatherman, and maybe someday, I'd be able to afford a weather station of my own.

Heathkit is long gone, but weather stations are available from other sources. Still, hams find ways of interfacing their weather stations to their ham radios in order to disseminate local weather data over the air.

Nonetheless, weather-station prices are still high. I do not want to know which way the wind blows *that* badly. The Weather Channel is a lot less expensive than buying a weather station. But, maybe someday…

The $79 WX Station

Someday is here! How does $79 sound for a weather station that measures wind speed, direction and temperature? To measure rainfall, add $49 for a rain gauge. Run one unshielded twisted pair of wires from the weather station outside to your computer inside, and you will know which way the wind blows right outside your door!

The 1-Wire Weather Station WS-1 kit is available now from Dallas Semiconductor (**http://www.ibutton.com/weather/index.html**). The kit requires mechanical assembly, but no soldering of components. Figure 1 shows the assembled weather station.

While the basic station gathers wind, temperature and, optionally, rainfall data, instruments from other sources (like **http://www.pointsix.com/**) can be added to extensions of the twisted pair. Add-ons can measure air pressure, humidity, lightning strikes, water temperature, indoor temperature and soil moisture.

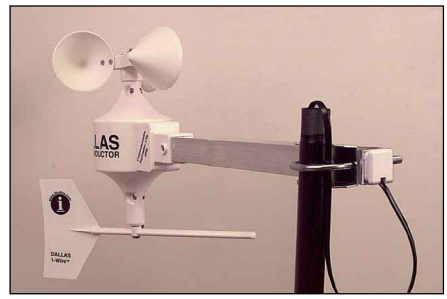


Figure 1—The assembled 1-Wire Weather Station kit.

You may download free *Windows 95/NT* software from the iButton Web site to interface your computer to the weather station. Tools are also provided to write your own software for *Windows* or other platforms (a *Palm OS* weather-station interface program is already available).

So, now that you have an inexpensive weather station up and running, how do you interface it to your ham radio station? (You don't think I'd ask that question unless I already had an answer, do you?)

The $140 WX Station Radio Interface

Tucson Amateur Packet Radio (TAPR) has a solution in the guise of their latest kit, which is called the "T238." This new offering from TAPR interfaces with the 1-Wire Weather Station and assembles the weather data into packets formatted for Automatic Position Reporting System (APRS) for input to a TNC and ultimately, for transmission into the ever-expanding APRS network. In addition, the T238 also displays the weather data on an LCD and permits data logging on a computer. Figure 2 shows the assembled T238, which *does* require soldering components.

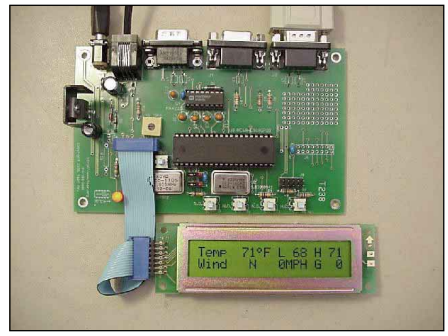


Figure 2—The assembled T-238 weather station interface kit.

The T238 kit costs approximately $140 and should be available about the time you read this, give or take a week or two. Note that the kit does not include a power supply or an enclosure. All that is needed is 8-12 V dc at 300 mA (it should be easy to easily find a wall-transformer that is adequate). The enclosure is left up to your own creative talents.

The T238 is essentially the general-purpose Motorola MC68HC908GP32 microcontroller development board programmed and outfitted for connection to the weather station, computer and TNC. So besides providing an interface to the 1-Wire Weather Station, the T238 includes debugging and programming hardware for developing other applications. Free development software is available from various sources. Go to the TAPR T238 Web page (**http://www.tapr.org/tapr/html/Ft238.html**) for more information.

An Affordable Radio WX Station

Today, for a little over $200, you can have your own weather station and transmit weather data over the air! Now, that's progress.

By the way, there are separate mailing lists for support of the 1-Wire Weather Station and the T238 kits. To join the T238 list, select the link on the TAPR T238 Web page mentioned above. QST

Stan Horzepa, WA1LOU ♦ One Glen Ave, Wolcott, CT 06716-1442 ♦ wa1lou@arrl.net, www.tapr.org/~wa1lou

Hot Fun in the Summertime

Okay, no one officially designated Amateur Radio a winter hobby, but it seems that when the days grow longer, our radio time suffers. What with fishing, boating, ball games, vacations and a host of other diversions, it's tough to get on the air regularly. If you find it difficult to stay radio-active during the summer months, read on. Ham radio doesn't have to be a part-time hobby. After all, even if your family fun schedule is set in stone, you don't have to be sly to squeeze some ham radio into the itinerary.

Public Service

Every year, hams around the world provide communication during times of emergency. Mobile and portable operations provide a vital element to any emergency communications effort. If you are looking for an opportunity to give something back to our great hobby, the Amateur Radio Emergency Service, ARES, is the place to be. The ARES coordinates the efforts of those dedicated hams who provide their time and services, usually working through local clubs. Your involvement in the ARES will give you valuable experience and lots of satisfaction. Even when things are calm, you'll find many groups providing tactical communications at bike races, marathons, festivals and other public events. These activities not only provide the chance to hone your skills, they also provide excellent public relations exposure.

HF

If my mail is any indication, HF mobile operation is gaining new participants every day. Many who write tell me they are about to try mobile HF for the first time. It isn't just new hams; some have been licensed for more than 30 years! If you aren't running mobile HF, have a look at some of the fun you're missing.

Nets

Take an HF rig with you when you travel and you're never alone. An assortment of wide-area nets exist to provide assistance, communication relays and conversation to the mobile ham. The popular daily regional nets are ECARS at 7.255 MHz, SouthCARS at 7.251 and 14.325 MHz and MIDCARS at 7.258 MHz. If you'll be spending time on the water, you'll want to check into the Maritime Mobile Net on 14.300 MHz, operating daily between noon and 9pm Eastern. RV travelers will find a real welcome on the Good Sam RV net on 7.2815 MHz. As you might guess, this is a short list of a multitude of nets that cater to the mobile/portable operator. Consult the *ARRL Net Directory* for a complete listing.

County Hunters

Many hams have dreamed of traveling to rare DX locations to be on the receiving end of those legendary pileups. But if your summer travel destination is somewhat less than exotic, you can still play the role of the fox for those hounds in pursuit of contacts. The game is *County Hunting*, and the premise is simple. Make a contact with someone in each of the 3076 counties in the United States. Because many of those 3000+ counties don't have resident hams, mobile operators are the backbone of the county hunting effort, providing those rare contacts. The "game" is simple. Just dial up 14.336 MHz on your rig and check into the County Hunter's net. Be warned: if you happen to be in a rare county, lots of folks are going to want to talk to you!

PSK31

As a diehard brass pounder, I have always felt that the best (only?) digital mode for mobile/portable operation was CW. A problem-plagued Field Day packet station attempt by our club's resident computer whiz several years ago further served to reinforce that notion. After all, you just can't beat CW for weak-signal communication. Add to that the simplicity and compact nature of the usual QRP CW rig and it's easy to see why it is the mode of choice for the portable operator. But, it seems the times they *are* changing.

Unless you've just returned from an extended stay on Mars, you have probably heard of a new digital mode that is taking the Amateur Radio world by storm—PSK31. Originally developed by Peter Martinez, G3PLX, the beauty of PSK31 is in its simplicity. The real work of this mode is performed by free software, and the hardware requirements are minimal. A sound card-equipped PC and an SSB transceiver are all it takes to be on the air with PSK31. (See the June 2000 *QST* article detailing the new Small Wonder Labs PSK31 transceiver kit.) As if that's not enough, PSK31 is a *phenomenal* weak signal mode. You'll be amazed to watch text scroll across your monitor from signals you *can't hear*. That same weak-signal capability translates to very modest transmit power requirements—just the ticket for hikers, campers and other portable ops. Someone is going to be the first to achieve DXCC using PSK31 portable; it might as well be you!

All This and More

While much of our focus has been on HF operating, there are myriad opportunities for the 50 MHz and up crowd. The ARRL VHF QSO parties and other VHF/UHF/microwave contests lure participants to mountaintops all over the country. Linked repeater systems provide hikers and campers with wide area communication from the most remote locations, using only H-Ts. Lightweight ATV equipment allows you to transmit pictures from almost anywhere—including those beautiful Earth shots from high-altitude balloons. Some hams use ATV to provide a cockpit view of the world from their model aircraft. The possibilities are endless. Ham radio—don't leave home without it!

FEEDBACK

Many have written to detail their successes and challenges of running mobile in late-model autos. If you'd like to share your experiences, please write. I really appreciate all the tips, column suggestions, questions and photos. If you've written, you know I'm a stickler about answering all mail. Unfortunately, the sheer volume I receive makes it impossible to give lengthy, detailed replies to technical questions. As time and space permit, future columns will address the more frequently asked questions. In a similar vein, if you'd like to share photos of your mobile or portable setup, send them to me. I hope to feature some photos of "Readers Rigs" in the future, but space is quite limited and I can't promise when or if they'll be used. Shots of unique, clean and *safe* installations will receive priority. QST

Info-box

http://www.arrl.org/files/infoserve/fsd/netdir99txt: 1999-2000 ARRL Net Directory.
http://www.cq-amateur-radio.com/usacarul.html: Here's where to find details about the USA Counties Award.
http://www.delve.com/ch/marac.htm: Home page of the Mobile Amateur Radio Awards Club
http://www.rvweb.net: Info about the Good Sam and other RV owner's nets.

Roger Burch, WF4N ♦ Box 100, Island, KY 42350 ♦ wf4n@arrl.org

Solar Shock Wave!

There was ample warning of the April 6 shock to the Earth's magnetic field. Two days earlier at 1540 UTC, the Solar and Heliospheric Observatory recorded an unusually large coronal mass ejection (CME). Billions of tons of plasma, composed primarily of energetic electrons and protons, streamed out from the sun at velocities as high as 2000 km/second. That's fast—about 4.5-million miles per hour, but still less than 0.7% the speed of light.

As this high-speed plasma surged outward from the sun, it soon piled up against the slower-moving gases of the normal solar wind, creating a dense shock wave. That shock wave was detected two days later by the Advanced Composition Explorer (ACE) satellite as a sharp rise in solar wind velocity. Just after 1600 on April 6, ACE recorded a jump from 375 km/second to over 600 km/second in just a few minutes.

An hour later, the Earth's magnetic field felt the full brunt of the plasma shock. The magnetic field became deformed and huge amounts of energetic ions poured into the Polar Regions along the magnetic field lines. This triggered a bright aurora that could be seen as far south as the Carolinas after sunset. The most intense aurora storm since March 13, 1989 was in full force.

The geomagnetic K index, graphed in Figure 1, also recorded the sequence of events. The K index had been at 3 (active) for more than a day prior to the shock wave. Sometime after 1500 on April 6, the K index jumped to 6 (major storm), then to 7 during the next three-hour period and hit 8 (severe storm) by 2100, where it remained for at least six hours. The storm gradually subsided over the next twelve hours.

Widespread Aurora

European 6-meter operators reported auroral conditions as early as 1745, which provided some warning for eager North Americans. Within two hours, Canadians had the first indications of aurora, and soon after, 6 and 2-meter stations as far south as Tennessee and Missouri were busy making contacts. By 2100 UTC, both bands were filled with frenzied activity. The aurora continued on 2 meters until at least 0100 in the East and perhaps for another hour in the western states. The remarkable extent of reported 2-meter auroral activity throughout the US—all the way to the Mexican border, is shown in Figure 2.

The southern states rarely experience auroral conditions, so many operators across the South were astonished by what they heard. Russ Holshouser, K4QI, who has been on the VHF bands for more than 40 years, thought "this was the second strongest aurora that I have ever heard on 144 MHz." Among his many contacts from FM06 in southern Virginia was a 1950 km QSO with N5WS (EL09) in southern Texas, one of the longest of the session. Ken Ramirez, N4UK (EM84), wrote that this was "the first time I have heard such an Au opening in the five years I have lived here in South Carolina." Ken worked north to W1REZ (FN55) in Maine, west to Oklahoma and southwest to southern Texas.

Dave Batcho, N5JHV (DM62), heard his second aurora ever on both 6 and 2 meters from southern New Mexico. "Quite a thrill to hear the buzz down here," he quipped. Dave made a pair of contacts on 2 meters into Colorado and had a notable 1500 km hookup with WA7GSK (DN13) in Idaho. Honors for the most southerly station reporting auroral contacts must go to John Butrovich, W5UWB (EL17), on the southern Texas coast. John made at least four contacts on 2 meters, the furthest with W7SAO (DM79) in Colorado, about 1500 km to the northwest.

Even some northern VHFers, for whom aurora is a more common occurrence, were impressed. KB0PYO (EN24) thought the aurora was "interesting," an understatement that perhaps only those in Minnesota could understand, but it is clear he had an exciting afternoon. For him, signals often peaked at

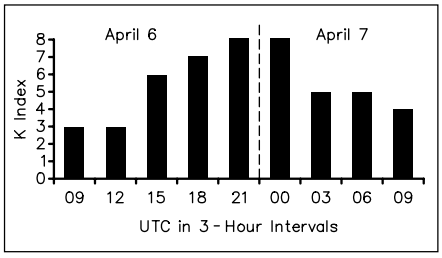


Figure 1—The geomagnetic K index shot up from 3 (active) to 6 (major storm) between 1200 and 1500 on April 6. As the solar-geomagnetic storm intensified, the K index rose to 7 and then to 8 (severe storm) during the next 6 hours. After 0300 on April 7, the storm began to decline.

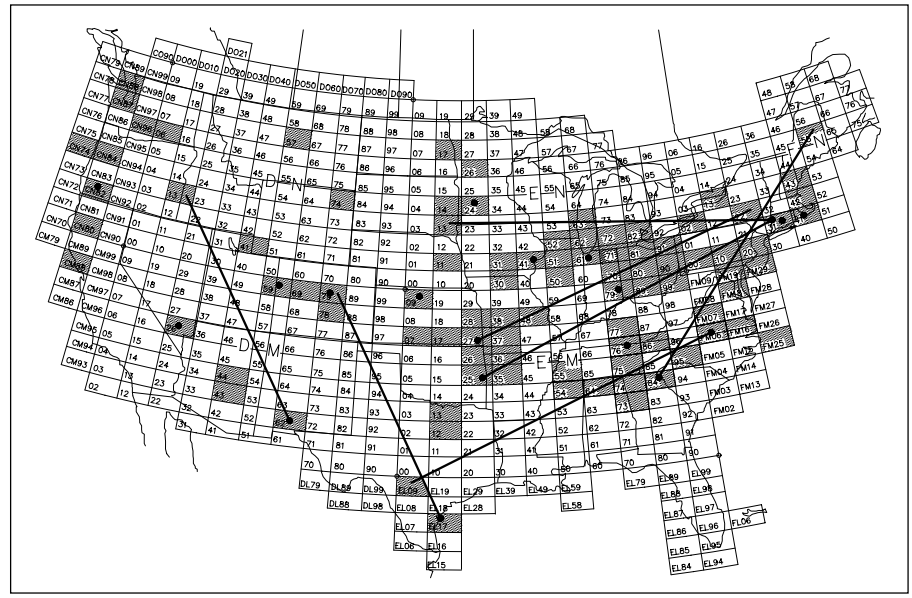


Figure 2—Two-meter auroral propagation during the severe geomagnetic storm of April 6-7, 2000, was possible well into the southern states. The grid locators of 144 MHz stations making aurora contacts are shaded. Large dots show grid locators of reporting stations. Selected contacts in the 1800 to 2100 km range are shown by straight lines.

This Month

July 8-9	CQ World-Wide VHF Contest, 1800-2100
July 17-18	SMIRK 6-Meter Contest, 1800-2400
July 20-22	Central States VHF Society Conference (Winnipeg, Manitoba)

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100°, somewhat south of due east. He worked as far as K4QI in Virginia and heard weak signals from Connecticut stations K1UHF, K1TEO and W3EP (at about 1900 km). K1TEO (FN31), for his part, thought the aurora was "the best I've heard in quite a while" and noted that his beam headings were as far south as 285°, almost due west. His longest contact was with KM0T (EN13) in South Dakota, also about 1900 km distant.

Thanks also to K1JT, K2GAL, WB2AMU, K4AR, W5UWB, K6AAW, K7ICW, N8XA, W9FS and W0ETT.

The Other Bands

Such an intense aurora should have provided tremendous opportunities for 222 and 432 MHz contacts, but few were reported. Larry Lambert, N0LL (EM09) in Kansas, took time off from 6 and 2 meter operating to work W0JRP (EM27), N9LR (EN50) and K0KD (EN31) on 222 MHz. Mark Dabish, K8MD (EN82), logged K9EA (EN71), K4ZOO (FM08), K3AX (FN20) and others on 222 MHz. K4QI noted six stations worked on 222 and two on 432 MHz.

Auroral coverage on 6 meters was as extensive as on 2 meters, but activity appeared to be considerably less. Many operators may have concentrated on the higher bands. Some were perhaps a bit complacent about making 1500 km contacts on 6 meters, because they knew this could be done routinely via sporadic E. More significantly, 6 meters had other things to offer that afternoon and evening.

Six-Meter Auroral E

Auroral E is a sporadic-E like phenomenon closely associated with auroral events. Sometimes auroral signals on 6 meters will lose their distinctive growl and become much stronger, even within the period of a single QSO. This is a good sign that auroral E has taken over. The best time for auroral E is after midnight local. Many operators, especially in northern latitudes, will get up in the early morning just to catch the often-spectacular auroral-E propagation.

Several stations reported afternoon QSOs that switched back and forth between aurora and auroral E. W3EP (FN31) worked KD5HPT (EM32) and KC8FWP (EN73) without distortion at 2331 and 0013. I was surprised around 0120 by the booming signal from VE4/KG0VL (EO26) in northern Manitoba, who went on to work a number of other stations via auroral E from New England to the Midwest.

Lefty Clements, K1TOL (FN44), an avid auroral-E fan, heard clear signals from OX3VHF/b after 0400, but apparently nothing else from the northeast. After 0500, he began hearing 6-meter stations and beacons via auroral E from Wisconsin and Minnesota. Lefty was hoping for KL7, VY1 or at least a few of the VE7s and VE6s who are also close auroral-E watchers, but had no luck that night. W3EP started CQing after 0530 and was rewarded by replies from W7FI and K7HBN (both CN87) in Washington via double-hop auroral E. The distances were in the 4000-km range. Six-meter stations in Alaska and the Canadian West were making single-hop auroral-E contacts simultaneously, but there were no cross-continent hookups.

South Americans on Six

Six-meter operators did not know whether to keep their beams on northerly headings, to work aurora and auroral E, or to turn south to pick up the strong South Americans that came booming through as the aurora was in session. Much of the US east of the Rocky Mountains, from the Great Lakes to the Gulf Coast, reported working as many as a dozen South and Central American stations. Most of the activity was concentrated in the evening between 0000 and 0500 UTC, April 7.

The signals of most South Americans were astonishingly loud, providing many US stations with opportunities to get in on this fun. It was especially heartening to hear the DX stations spread out from 50.100 to at least 50.175 MHz, which made it easier for everyone. Even low-power stations made the grade. Bill Neylans, KF4EHP (EL99), nabbed HC5K, for example, using an MFJ 9406 (about 7 W) and a four-element quad. WB2AMU worked HP3XUG and HK3YJ while running just 10 W and a dipole. Several of the DX stations were not running much more.

Among the Central and South Americans widely reported that evening were HC2FG, HC5K, HC8FG/b, HK3GKE, HK3PDX, HK3PJ, HK3TAS, HK3YH, HK4SAN, HP3XUG, HP2CWB, PP8KWA, PP8BCA, PY2BW, PY2XB, PY5CC, YV1DIG, YV4FZM, YV4RZM, YV4YC, YV5DDK, YV5LIX, TI2CDA, TI5KD and TI2NA. Six-meter operators in the most southerly states seemed to have better conditions to Caribbean stations, including 8P9HW, J87AB, many KP4s, V44KAI/b and ZF1DC.

That was not the end of DX for the evening. As early as 2100, N5JHV, W5UWB and others scattered across the southwest were working New Zealand and other Pacific islanders, including 3D2AG and N0JK/KH8. By 0100, West Coast stations began hearing Australia (VK) and New Zealand (ZL) stations, some with exceedingly loud signals after 0200. K6QXY reported that ZL4AAA was S9 +40 dB around 0230. Some Caribbean stations worked into the Pacific about the same time.

The Next Day—Pitcairn Island and More

That may not have been the end of the effects of the aurora. As early as 1500 UTC the next day (still April 7), much of the country from California to the East Coast found many strong 6-meter stations from Chile (CE), Argentina (LU), Uruguay (CX), Brazil (PY), Columbia (HK) and Venezuela (YV). Such openings had taken place throughout March, but the very strong signals suggested that conditions were unusual.

The biggest surprise must have been the tremendous signal of VP6BR, which made it into much of the eastern half of the US shortly after 1600. Stations over a wide area, from New England to Minnesota and south to Florida and Texas, worked the Pitcairn Island station during the next two hours. Several mobile stations made the grade. Fred Heath, N3XBG (FM19), made contact with VP6BR while driving on I-95. He had a loop antenna and an IC-706. Roman Downer, N4SC (EN72) in southern Michigan, exchanged S9-plus reports with VP6BR, using a halo and an IC-706 IIG.

The summaries of 6-meter DX over the April 6-7 period were based in large part on reports sent to me from N1ZUK, KC2DCD, N4HGZ, WB4WXE, K5SW, KI5GF, KF6GYM. K7TNT, KA9CFD, N9BJG, N9LAG, K0CJ, W9OBG, KB0PE, KB0STN, N0VSB, W0ETT, YV4DDK, YV5LIX and others. Many thanks to all.

ON THE BANDS

The events of April 6-7 would have provided many VHFers with enough excitement for one month, but April had much more to offer. There was plenty of additional 6-meter DX worked from the US and some impressive activity in the rest of the world. Sporadic E got an early start this season with more than a half-dozen openings at the end of the month. There were even some respectable tropospheric-ducting events, one of which took place across the Gulf of Mexico during the height of the aurora! Dates and times are UTC throughout.

Six Meter DX
South and Central America

Six-meter stations throughout much of the US, with the possible exception of the Pacific Northwest, enjoyed several openings into South America during April. The most active days seemed to be April 7, 18, 20-22 and 25-30. Those in the northern half of the country may have been aided by sporadic-E links, especially during the latter days of the month.

LU5EJU, LU6DRV and many others in Argentina, Brazil, Chile and Paraguay continued to make early runs into Europe and the Mediterranean as far east as Poland (SP), Greece (SV), Cyprus (5B) and Israel (4X). South Americans also worked Morocco (CN), Nigeria (5N) and Sudan (ST).

PZ5RA (Suriname) was a welcome catch for 4Z4DX and JY9NX on April 12. Many Central and South Americans also worked across the Pacific, primarily to Australia and New Zealand, including CO2OJ (Cuba), J87AB (St Vincent), TG9NX and TG9AJR (Guatemala), TI5BX (Costa Rica), V31PC (Belize), YN1SW (Nicaragua), ZF1DC (Cayman), along with several KP4, LU, PY, XE and YV stations. Jose Valdes, YV5LIX, lists FK1TK, YC1EHR, YF1OO and YB0HD among his April DX.

South Atlantic

Several rare island DXCC countries in the south Atlantic created quite a stir in April. VP8DBL and VP8CMT (Falklands), ZD7VC (St Helena) and ZD9BV (Tristan da Cunha) worked widely throughout Europe. VP8DBL made it east as far as LZ1AG, YO3APY, and JY9NX on April 12 and worked Europe on several other days. Southern Europeans reported VP8CMT on April 26. The few opportunities for US stations came on April 17 and 18, when VP8DBL logged W5UWB (EL17), WA4LOX and KD4ESC (EL87), WB2QLP (EL96) and likely others.

ZD9BV got into much of Europe on April 5, from the British Isles to Poland and south to Italy. Ted Collins, G4UPS, thought this was the first 6-meter operation ever from Tristan da Cunha. Finally, ZD7VC worked southern Europeans on the 17th, at least.

Africa and the Indian Ocean

Widely scattered African and adjacent Indian Ocean stations made almost daily runs into Europe during April. Among the new and rarer catches were 5H3US (Tanzania), 5N3CPR (Nigeria), 5R8FU (Madagascar), 5X1GS (Uganda), 8Q7YS (Maldives), D3SAF (Angola), FH/TU5AX (Mayotte), FR1GZ (Glorioso) and TU2OJ (Ivory Coast).

The Pacific

The Pacific was the most active region for 6-meter DX in April. US stations in a wide belt from the San Francisco Bay area, across Texas, and on to Florida, continued to work into New Zealand and Australia on at least a dozen occasions during April. 3D2AG (Fiji) came through on at least a half-dozen days. Several stations in the Pacific Northwest also made the grade. W7GJ (DN26) in western Montana, for example, connected with ZL2AGI on April 22.

The opening on April 20 was among the best. Dave Batcho, N5JHV (DM62) in southern New Mexico, ran off more than 40 Australians in VK1, 2, 3, 4 and 7 call areas, many with huge signals beginning around 2200. YJ8UU (Vanuatu) came back to his CQ at 0052 for Dave's 100th DXCC country. Congratulations! Dave also logged YJ0AWR, who was running 10 W to a dipole. Pat Rose, W5OZI (EM00) in southern Texas, thought it was "an incredible opening" and worked 22 stations in VK3, 4, 5 and 7.

Stations in the southwestern US and adjacent Mexico hooked up with other Pacific islanders. Fred Honnold, W6YM (CM98), replied to a CQ from FO0TOH (Marquesas) on April 8 at 2255, the first time any station in the continental US had worked the Marquesas on 6 meters. Many others found FO0TOH for a new country. K6QXY (CM88) nabbed him the next day and N6CA caught up with FO0TOH the day after to complete a long awaited 6-meter DXCC. K6QXY worked TX0DX (Chesterfield) on April 10 for another US 6-meter first. Congratulations all around.

VP6BR found widely distributed US stations on April 5, 10, 21 and 27, in addition to the remarkable opening to the eastern half of the county on April 7. Michael Gisher, N3VOP (also FM19), made his first ever 6-meter DX contact on April 27 with VP6BR using 60 W and a multiband vertical hung in a pine tree. Other interesting contacts included YJ0AWR (Vanuatu) to XE2EED and K6FV on the 16th; FK8FU (New Caledonia) to N6CA on April 16; and FO3BM to XE2EED (French Polynesia) on April 30.

Bob Cooper, ZL4AAA, sent a list of some his notable contacts in April, which he thought was the best month of Cycle 23 so far. In the Americas, he worked HH7PV, KP2AD, several KP4s and LUs, PJ2/WZ8D, PY5CC, TG9NX, V31PC, YV1DIG, YV5LIC, YV4YC and ZF1DC. On April 3, he hooked up with EH9IB (Melilla) about 19,600 km distant, or nearly half way around the world. On April 23, Bob duplicated this feat, but on the slightly longer southern path. On that day, he worked EH7KW (Spain) at 19,600 km and most spectacularly, CN8LI at just under 20,000 km. On the 28th, ZL3AAU, ZL3ADT and ZL3NW made notable contacts with CT3HF (Madeira Islands) at about 18,500 km.

Steve Gregory, VK3OT, also sent a long list of countries worked from a temporary location at Alice Springs (PG66), near the center of Australia. Included among his contacts in the Americas were LU7FA and LU8MB (by long path), PJ2/WZ8D, TG9NX, TI5BX, V31PC, several XEs, YV5AC, YV5LIF and Florida stations AE4RO, W3BTX, and NN4X. Also included were EY8CQ and EY8MM (Tajikistan), along with over 1600 CW and SSB contacts with JAs.

Jon Jones operated with great success as KH8/N0JK in American Samoa from April 2 through 8. Jon's first contact was with PY5CC, which provided the Brazilian DX leader with DXCC country #181. Jon made over 250 QSOs in 36 countries using a three-element Yagi and the back-up 10 W MFJ-9406, after he inadvertently blew out the power circuits in the IC-706 on the first day. The fortunate US stations were K2RTH (EL95), W4RCC, W6JKV/5, W5UWB and K9HMB. Other highlights included contacts with H44PT, 5H3US, JY9NX via the long path, numerous QSOs into South and Central America and running JAs on CW at 100 per hour on the last day.

View from Japan

Japanese stations made contacts throughout the Pacific and across Asia to the Indian Ocean, Africa and the Middle East. Notable contacts into the Pacific included those with 4W6UN (East Timor), 5W1SA (Western Samoa), BQ9P (Pratas Island), T88TV (Belau), FH/TU5AX, FO3BM, KH8/N5OLS, KH8/N0JK, KH0/JE1SYN (Marianas), TX0DX, VP6BR and ZK2XO (Niue).

From the adjacent Asia and the Indian Ocean, Japanese found XW2A (Laos), 4S7YSG (Sri Lanka), 5R8FU, 5X1GS (Uganda), 8Q7YS (Maldives), FR1AN (Reunion); and from Africa, 5H3US, 5X1GS, 9J2BO and Z22JE. Stations from the Middle East included 5B4FL, EY8MM, EY8CQ and JY9NX. JS6CDB worked 7O1YGF (Yemen) on April 18, for the first ever JA-7O contact on 6 meters.

There was a good deal of 6-meter DX to report in April, thanks to KE4SCY, N4HGZ, N4SC, W4WRL, WA4LOX, WA5IYX, KF6GYM, W7XU/0, K7AD, W7ZT, N9LAG, K0CJ, 3C5I, JA1VOK, KH7R, VE7AGG, VK5LP, ZL3TIC, *Internet Six News*, *50 MHz DX Bulletin* and the OH2AQ European Packet Cluster on the Web.

Sporadic E

The spring E-skip season got off to an early start. Six-meter stations widely distributed from the East Coast to South Dakota, Wyoming and Colorado, and south to Cuba were able to get in on some early single-hop openings on April 22, 23 and 25 through 30. Pat Dyer, WA5IYX (EL09), reported several FM broadcast stations higher than 100 MHz on April 30 after 0030. Several of these openings may have provided northern US stations with a sporadic-E link to F-layer propagation into South America. Thanks to W1RMA, WB2AMU, KK4XO, W5UWB and W7XU/0, whose reports made this summary possible.

Tropospheric Ducting

There were some moderate tropospheric openings in widely separated regions of the country during April. K4QI (FM06) worked as far south as the Florida Keys (EM94) on April 2 on 2 meters. Two days later, the band was again open to Florida. Russ found C6AKE (FL16) on both 144 and 432 MHz. The Bahamian station should be quite a popular catch this summer all along the East Coast.

Two meters was open across the Gulf of Mexico on the evening of April 7. Ken Reecy, AC4TO (EM70) in southern Alabama, worked into Louisiana, Arkansas and Texas as far west as W5UWB (EL17). John Butrovich, W5UWB, was busy with the aurora and South Americans on 6 meters, but did manage to find KD4DFO (EL89) in Florida on both 144 and 432 MHz in addition to AC4TO.

From southwestern Kansas, Gary Krenzel, N0KQY (DM98), found conditions on 2 meters pretty good on the morning of April 14. He chatted with K0MQS (EN31) in Iowa, then found AC5SW (DM94) due south, and finally hooked up with XE2OR (DL98) on both 144 and 432 MHz at about 1100 km.

On the morning of the 18th, conditions were also good to the south. Gary worked Texas in grids EM00, 10, 12, 13 and EL09 on 144 MHz, and made it to W3XO/5 (EM00) on 222 and 432 MHz as well. He also hooked up with W5LUA (EM13) on 222, 432 and 1296 MHz. The longest contacts were on 144 MHz with K5VY and KI5GF (both EL09) at about 1000 km.

Microwaves

The 13-cm band is alive and well in some of the most unlikely places. Mike McKay, W4AZR, sent an account of recent 2304 MHz activity from the eastern coast of Florida. Conditions seemed to be good on the morning of April 19 when K0VXM/4 and WA4OFS (who runs just 30 mW) made an easy 65-km contact. When W4AZR got on to join the fun, he heard K0VXM already in QSO with KB4DFO, about 150 km distant, with loud signals. W4AZR had 1 W to a 45-element loop Yagi. KD4DFO ran 20 W—the big gun of the budding microwave group. They would sure welcome some more company, and not just across the Gulf in Texas.

On the morning of April 26, John Maca, AB5SS, was driving to the HamExpo in Belton, Texas, where the first joint meeting of the North Texas Microwave Society and the Roadrunner Microwave Group was scheduled to take place. In addition to 2-meter gear, John also had a 13-cm station in his truck, with 18 W available to a long Yagi. He contacted NQ9Q on 2 meters, as planned, to coordinate a 13-cm contact. Much to their surprise, signals on 2304 MHz were stronger than 144 MHz over the 190-km or so mobile path. NQ9Q was running just 1.5 W, but had an array with at least 24-dB gain. Anyone else been trying microwave mobiling? QST

The QRP Commando Stealth Dipole

This project started innocently enough with a posting by Doug Hendricks, KI6DS, on the QRP-L (**qrp-l@lehigh.edu**) e-mail reflector. Doug decided to build a 20-meter dipole using #26 AWG computer ribbon cable for the dipole legs *and* the feed line. I read Doug's posting and decided to build a half-size G5RV antenna with a parallel feed line.

I dropped by my local RadioShack store and bought two 50-foot lengths of #24 speaker "zip-cord." I measured 27 feet from one end (you need a little "fudge factor" here) and marked that point with a magic marker. Then I started splitting the zip-cord speaker wire, separating the parallel conductors to form the 26-foot dipole legs. This is a s-l-o-w process since the RadioShack speaker wire (especially the smaller diameter wire) is very hard to separate without tearing the insulation. This is where my Leatherman Micra pocket tool came in handy (you *do* have a Leatherman, don't you?). The Micra has a very nice pair of stainless steel scissors, which are well suited to splitting the insulation on speaker wire.

The purpose behind Doug's use of #26 ribbon cable was to fabricate an extremely lightweight backpacking antenna for field use. Since I no longer backpack, I wasn't too worried about keeping the weight down to bare minimum; using the larger, slightly heavier #24 speaker zip-cord didn't really concern me. I know that in my installations I will be locating the rig and tuner more than 23 feet away from the center feed point of the antenna, necessitating additional feed line length. That's where the second 50-foot spool of #24 speaker wire came in. I peeled off about 27 feet of parallel speaker wire and soldered this to the ends of the feed line coming down from the dipole. This gave me a half-size G5RV multiband dipole with 50 feet of parallel conductor feed line (see Figure 1).

Now fold the ends back about 6 inches and either knot them or use small wire tie wraps to form end loops. You can now use monofilament fishing line or light string to tie off the ends of the antenna. A #3 fishing swivel is used at the feed point as a way to suspend the antenna as an inverted **V**. This is affixed using two small wire ties, one around the feed line portion, and the other at right angles to the first one. The swivel is placed on the second tie wrap and snugged down. This makes a nice little "lift point" and insures that the dipole legs don't pull apart.

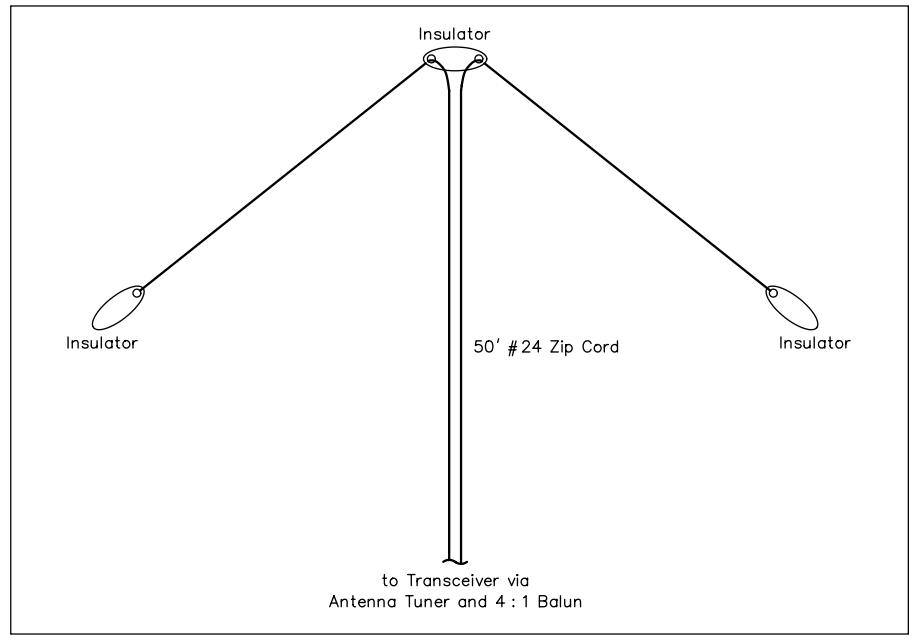

Figure 1—The 20-meter QRP Commando Stealth Dipole antenna.

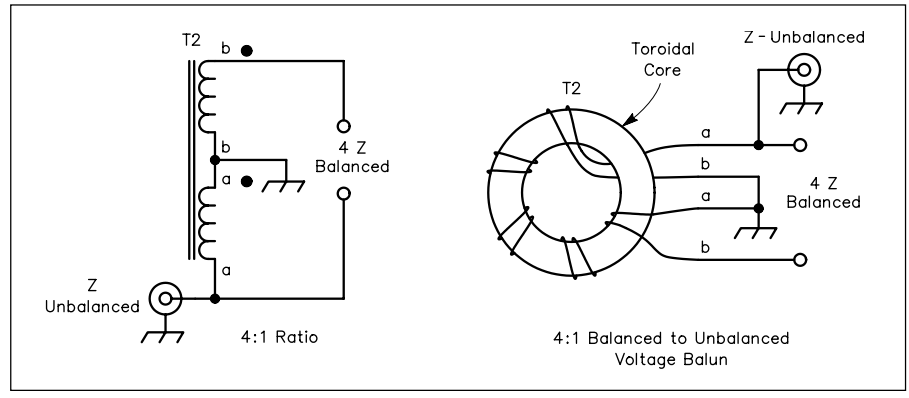

Figure 2—You can purchase a 4:1 balun from a number of *QST* advertisers, or make your own as shown here using a T-50-2 core.

Some of you may argue that the two tiny #24 AWG parallel conductors make a very poor feed line with excessive loss. I agree. However, there are few alternatives when it comes to constructing a portable multiband antenna. Fanned dipole elements fed with RG-174 lightweight coax is one idea, but it adds weight (and there is that little problem with the fanned elements detuning each other). A series of folded dipoles (one for each band) made from lightweight 300-Ω TV twinlead is also an option but this, too, adds weight and bulk. I don't like verticals for portable work because they are difficult to install properly with the associated RF radial system.

The QRP Commando Stealth Dipole uses a balanced feed system that requires an antenna tuner capable of terminating balanced feeders, or an external 4:1 balun (see Figure 2). This small balun can be used with any antenna tuner that terminates unbalanced 50-Ω coaxial lines.

QRP WebSurf

Let your fingers caress the keys and slide on over to **http://www.qrparci.org** and look at the QRP ARCI's Web site. (Don't forget to join!)

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An Amateur Radio Retirement

How many times have you daydreamed at your workstation of that "someday"—perfect retirement? It's easy to imagine the station you'll put together for those easy hours on the air and skeds with your fellow retirees. You'll savor the serendipity of tuning the bands at any hour, day or night, unfettered by deadlines and meetings with the boss. And the cruise you and the spouse have dreamed of will be accompanied by a little transceiver for your first-ever "real" DXpedition. Sounds idyllic, doesn't it?

For many retired hams, this blissful scenario becomes reality, but it's often spiced with activities you might not have envisioned in your reverie. Such as? Well, how about buddies volunteering to teach Amateur Radio classes at the local grade school?

Preparing the next generation of eager youngsters for on-the-air fun (and a little electronics understanding in the process) probably sounds like work, but many retired hams will tell you it's happy work…as most elective passions are. With the help of a Victor C. Youth Incentive Program Grant, school or community youth clubs can get a little financial help to go along with the invaluable teaching efforts of experienced retired hams. (See the photograph of the Morgan [Utah] Elementary School Amateur Radio Club in "Up Front" in this issue.) Picture yourself in that scene down the road…and make a contribution now to boost the VicYIP Fund. It'll be there in the future when you might be the senior advisor to a group of youthful ham wannabes.

Another way retired hams keep active is prowling the Internet newsgroups and meeting in Amateur Radio chat rooms. A lifetime of hamming experiences can find a ready audience and you meet some very interesting folks on the reply-end of a thread. Ragchewing takes on a different form and is entirely cross-generational. It's another forum where you can teach as well as learn.

Amateur Radio has definitely enriched the retirement years of Wes Jones, W0WRY. He's still active at age 97!

The history of our hobby is the passing-on of what we experimenters have learned. When report-writing days are over for you, sitting at the home PC to write-up a favorite construction project may be just your cup of tea. The Internet has not replaced Amateur Radio—it has enhanced its informational reach. So sharing your knowledge with friends half a world away is as possible as helping a blind local ham who can "hear" your same construction piece read to him by his own PC. If he or she writes to comment on your article, you might start a warm exchange that sparks your interest in adaptive equipment for disabled hams. ARRL's Program for the Disabled has worked with many retired hams who now have the time and dedication to help disabled friends enjoy our wonderful hobby. If you're still office-bound, why not make a contribution to the PFTD Fund today and a private promise to Elmer prospective hams with disabilities when you retire?

No one likes to think of the day when we all must meet our maker, and a fair portion of the population puts off estate planning until they retire. But you're never too young to plan for the future you want for your family and assets after you pass on. Many hams are surprised to learn that living benefactors sponsor a number of our scholarships. Other scholarships we administer were provided by bequests that forward-thinking hams had planned in their middle-age years. For many hams, providing an educational award such as a scholarship means the certainty that some young students will continue with their college careers even when tuition costs increase every year. If you'd like to know more about bequests, scholarship sponsoring, or supporting any program of the ARRL Foundation, please call 860-594-0230 or e-mail **foundation@arrl.org**.

HAMFEST DOLLAR DOUBLE PLAY

By now, you've probably visited a fair number of warm-weather hamfests in your area. Your calendar may be marked for a few upcoming autumn ones, too. Did you know that many hamfests sponsor scholarships and other worthwhile efforts out of the admissions charged to hamfest attendees? After settling all costs of putting on the hamfest, many groups specifically earmark a portion of the funds for charitable purposes. So the next time you part with some cash to drool over flea market bargains, or enter the new transceiver raffle, think of the other winners benefiting from your admission dollars! QST

Contributor's Corner

We wish to thank the following for their generous contributions to:

The ARRL Program for the Disabled Fund
Bristol ARC (TN) in fond memory of Robert E. Alexander, AE4BB

The Goldwater Scholarship Fund
Michigan ACS in fond memory of Dan Dreffs, KA8BYK

The Paul and Helen L. Grauer Scholarship Fund
Ken Hoffman, WB0WHB; Stephen R. Schultz; Fred and Nadine Stueve, K0UHF and K0VHF; Mr. and Mrs. L. R. Harding; Russell and Lily Hurd; Kenneth and Alice Peterson; Alice Flower and John Stanesic, W0CEM all in fond memory of Clarence S. Schultz, W0CHJ.

Victor C. Clark Youth Incentive Program Fund
Tom Frenaye, K1KI, and the New England Division Cabinet Members
Harry and Lorene Dover, in fond memory of Robert H. Miller, W4AEY
Bernard Zeigler, in fond memory of Nathan Sinreich, W4PVC

The General Fund
Virginia Bryant in loving memory of John W. "Jay" Bryant, KM4IM
North Jersey DX Assn. (NJ) in fond memory of Joseph H. Painter, W2BHM
C. B. Hackett, N6OST, in fond memory of Robert H. Clark, W6SRQ
Mt. Beacon ARC (NY) in fond memory of Robin Disbrow, WB2ZSO and Joseph Coleman, W2RI
Robert L. Happel, N4LGX, in fond memory of William F. Parker, Jr., N4OXR
Jane Hahn in loving memory of Richard J. Hahn, K4GG
Southern Catskill Radio Society (NY) in fond memory of Frank Szabo, NA2L
Reginald Breedlove
Estate of Paul G. Hearne, WB2GHI
Thomas R. Gettlemen, W9IZO, in fond memory of John Scarvaci, W9GIL
G.W. "Bill" Hellman, NA2M, in fond memory of Harold "Buddy" Robins, W2KN
Douglas W. Hogarth, N7MOK

As received and acknowledged during the months of **March** and **April**.

STRAYS

HOLLINGSWORTH IS "SIDEBANDER OF THE YEAR"

◊ FCC Special Counsel for Amateur Enforcement, Riley Hollingsworth, K4ZDH, was elected South Carolina Single Sideband of the Year for 1999 by the South Carolina Single Sideband Net. The net has been in existence since 1958 and is among the oldest sideband nets in the US. The net convenes each night at 7 PM Eastern on 3.915 MHz.

Next Stray

Mary E. Lau, N7IAL ♦ Secretary, ARRL Foundation, Inc

SILENT KEYS

It is with deep regret that we record the passing of these amateurs.

K1DUV, Albert Febbroriello, Torrington, CT
W1EHV, Richard Varey, Sarasota, FL
KA1HAB, Richard L. Puffer, Westfield, MA
KA1OMJ, Harland A. Muzzey, Hollis, NH
W1PB, Charles N. Baptist, Zephyrhills, FL
NG1R, James R. Splaine, Haymarket, VA
W1TM, William T. Lowe, Great Barrington, MA
WA1URI, Gerald W. Ledger, Feeding Hills, MA
W1YED, Donald L. Knight, Loudon, NH
W2AF, Goyn B. Reinhardt, Port Jervis, NY
N2BGZ, Lewis A. Kirk, Sewell, NJ
W2BHM, Joseph H. Painter, West Chester, PA
KD2DH, David Miller, Tenafly, NJ
N2DL, David W. Lemm, New City, NY
N2DQA, Joseph Loy, South Amboy, NJ
N2FVK, Dana H. Ayers, Elmira, NY
W2GHO, Ralph W. Kirchberger, Kenilworth, NJ
*W2GMY, William L. Haas, Metuchen, NJ
*W2GV, Frederick H. Becker, Pittsford, NY
NP2I, Franklin L. Jaeger, Christiansted, VI
WA2RPR, Nathaniel O. Abelson, New York, NY
W2SR, Harry B. Robinson, Sebring, FL
AA2VX, Mike Pritchett, Apalachin, NY
KC3DP, Warren C. Peake, Baltimore, MD
W3ISR, C. G. Aldrich, Ashville, NY
WU3K, Carl C. Jones, Grove City, PA
W3LII, Jack B. Gunderman, Hagerstown, MD
W3LSM, Edward Macura, North Versailles, PA
W3MZ, Charles A. Harris, Mechanicsburg, PA
K3NPW, H. D. Leiser, Monaca, PA
WW3R, William Frye, Gaithersburg, MD
*W3TYX, Byron O. McCollum, Penns Park, PA
N3XCW, James T. Smith, Ridley Park, PA
KA3YQD, J. A. Myers, Dillsburg, PA
KA4AMP, Henry L. Griffey, Clarksville, TN
*N4ASP, Harold L. Foshee, Birmingham, AL
N4CEE, Thomas H. Strickland, Kingsport, TN
W4EJY, Harold M. Clayton, Saint Petersburg, FL
KD4FML, Richard D. Peterson, Huntsville, AL
AC4FY, Perry M. Roberts, Whispering Pines, NC
KC4HA, Mel Hedges, Louisville, KY
KF4ILP, Arthur L. Price, Montgomery, AL
K4JI, George L. Graveson, Plantation, FL
*WB4LPU, James E. Lucas, Brandon, FL
N4LR, N. L. Ray, Winter Haven, FL
KR4MI, Joseph E. Nunez, Waycross, GA
KM4MJ, Neal K. Nickels, Saint Petersburg, FL
W4NTA, Leona C. Hudgins, Alexandria, VA
KB4PQ, Clarence W. Wandrey, Deltona, FL
KF4QAW, Herman J. Danisch, Roanoke, VA
KR4QP, Jack R. Ashworth, Albertville, AL
W4TW, Clifford Kirby, Riverdale, GA
K4UH, Raymond A. Kempf, Gaithersburg, MD
KN4WA, Burnice N. Montgomery, Gordonsville, TN
KO4WC, Raymond J. Wood, New Port Richey, FL
WG4X, Harold R. Byrd, Fort Walton Beach, FL
W4YZ, James H. McAdams, Huntsville, AL
W4ZEU, Errol K. Parkman, Sebastian, FL
KA5GWA, John E. Berry, Hurley, NM
W5HO, Charles W. Cook, Pollock, LA
W5HYQ, John H. Gann, Santa Fe, NM
KI5IZ, Freeman C. Nickelson, Queen City, TX
N5JOG, Herb Luckritz, Alamogordo, NM
N5LIX, Lloyd Starr, Albuquerque, NM
W5MDG, Garry Owen, Roswell, NM
W5NOB, Earl C. Morrison, Las Cruces, NM
KA5ODU, Joe B. McKnight, Belton, TX
K5RCP, Lloyd D. Reiland, Hamilton, MS
WB5TII, Jacob A. Flick, Fritch, TX
*KB5TJN, Pauline K. Durden, Ruston, LA
KD5VS, Thomas S. Foster, Toledo, WA
W5ZKI, Norman D. Bailey, Borger, TX
KA6CNT, Louis Cortopassi, Madera, CA
KA6EDD, William E. Hannan, Concord, CA
*KH6EXJ, Roy S. Okada, Kahului, HI
KE6GQM, Daniel M. Sutorus, Norco, CA
AA6GR, James O. Shea, Carpinteria, CA
W6HVX, Charles E. Walsh, San Anselmo, CA
KB6II, Richard Ingham, Santa Ana, CA
WB6JBX, Robert E. Bartlett, Upland, CA
KD6KS, Richard J. Hinkle, San Marcos, CA
W6LZL, Roy I. Couzin, Felton, CA
WA6QJP, Ki Negoro, Montebello, CA
K6QK, Joseph L. Reiffin, Sacramento, CA
NR6S, Hugh F. Glasgow, Cerritos, CA
KD6SPN, John A. Blum, San Diego, CA
W7AGE, Marvin W. Alnutt, Bellevue, WA
*W7BI, Howard O. Lorenzen, Redmond, WA
W7EAZ, Joseph R. Connolly, Seattle, WA
KK7EC, Woodford H. Pounds, Highland, CA
AB7FC, Harry A. Brewer, Mesa, AZ
K7FY, Wilbur J. Fahey, Taylorsville, UT
N7HCC, Charles W. Gleysteen, Tacoma, WA
W7SF, Erskine H. Burton, Tacoma, WA
KT7T, Byron G. Rainwater, Eugene, OR
W7TOK, Stan Russell, Everett, WA
WB7WPQ, Lloyd P. Shallenberger, Tacoma, WA
*WA7YSH, Arlen E. Morrill, Butte, MT
WA8AZB, George E. Ward, Free Soil, MI
W8BHP, Ralph Wiebusch, Greenville, OH
K8DSH, Sylvester Deitering, Davison, MI
WD8EKI, Mervin J. Moore, Urbana, OH
*W8HLU, John Sellors, Sarasota, FL
*W8OJW, Alex J. Meleg, Canton, OH
W8OOC, James P. Watkins, Canfield, OH
KF8OP, Joseph W. Funkhouser, Bellaire, OH
W8QMN, Harry S. Gantz, Cincinnati, OH
NB8R, Vincent M. Robel, Midland, MI
W8RRA, Henry E. Engel, Euclid, OH
K8TDF, Robert S. Oldfield, Albion, MI
W8YDE, Vernon E. Griffith, Livonia, MI
N8ZYJ, Doran D. Hershberger, Millersburg, OH
WA9DTW, Garfield E. Walker, Mishawaka, IN
WA9ERN, Norman H. Smith, Muncie, IN
W9GIL, John C. Scarvaci, Grafton, WI
N9GMP, Marie C. Samsal, Sheboygan Falls, WI
W9HMS, James Hatfield, Fort Wayne, IN
W9IQB, Newton E. Loofboro, Janesville, WI
WA9KEC, Roy M. Hawkins, Dousman, WI
W9MCU, Stanley St. Onge, Lac Du Flambeau, WI
N9RP, Joseph R. Perry, Middletown, IN
W9WRJ, Nathan L. Voll, Pekin, IL
*W0CEL, Riley M. Dunn, International Falls, MN
*N0DPF, Si Spisak, Hartford, SD
*KB0DT, David L. Sprague, Bellevue, WA
WB0EPY, John Boisen, Mount Vernon, SD
*KB0KK, Winston W. Kratz, Saint Louis, MO
KA0MGI, Harry L. Campbell, West Des Moines, IA
WI0N, Keith Hedgecock, Cortez, CO
W0SFF, Warren M. Woolery, Crookston, MN
W0WQF, John C. Gedney, Excelsior, MN
KB0ZTB, Janice L. Ziller, Gordon, NE
VE2GKJ, Fred Y. Okimura, Montreal, QC, Canada
VE7BXG, A. K. Thompson, Blaine, WA
VK4DHM, D.H. Mead, Queensland, Australia

*Life Member, ARRL

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

BASIC TECHNOLOGY FOR THE AMATEUR RADIO ENTHUSIAST BOOK AND VIDEO PROGRAM

◊ Alpha Delta Communications has recently released a book and videotape package that is designed to explain the basics of the Amateur Radio hobby and related electronics theory. The material is presented in a format that is appropriate for the non-technical person interested in exploring the hobby or for the licensed operator who wishes to further his or her basic understanding of the technology "behind the dials."

The 102-page spiral-bound soft cover book is divided into 10 chapters that provide an overview of the history and philosophy of Amateur Radio; the various operating pursuits (such as DX, VHF/UHF and repeater and contest operating); basic electronics; propagation; antennas; and transceivers and modulation. A resource guide and glossary are also included.

The companion video tape—just under 24 minutes running time—is narrated and hosted by Klem Birch, who skillfully guides the viewer through simple explanations of voltage, current, power, resistance and RF wave theory. Analogies between electron flow and water flow and examples of how these electrical properties relate to the operation of common everyday devices—such as flashlights, automobile electrical systems and consumer electronics equipment—are used extensively.

Through the magic of video manipulation (and with a level of realism that might make Speilberg envious), Klem is shrunken down to less than half the size of AAA battery and leads the viewer on a walking tour of a typical PC board. In the course of his journey he stops to explain the functions of the various electrical components that he encounters along the way. A chapter in the book provides the entire text of the video's script.

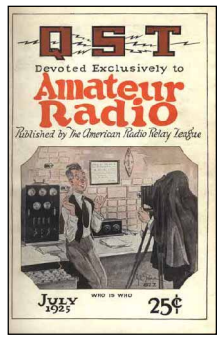
Neither the book nor the video employs mathematics or formulas—just the basics are emphasized—making the package particularly well suited for presentation to youngsters and other non-technical audiences.

The program was authored by Alice Narramore, Training Director for Alpha Delta Communications. Technical consulting was provided by Alpha Delta's President—Don Tyrrell, W8AD—and Toby Carlson.

Price: $39.95. For additional information visit your favorite Amateur Radio products dealer or contact Alpha Delta Communications, PO Box 620, Manchester, KY 40962; tel 888-302-8777/606-598-2029; fax 606-598-4413; **http://www.alphadeltacom.com**. QST

75, 50 AND 25 YEARS AGO

July 1925



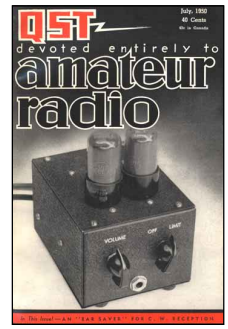
◊ Clyde Darr, 8ZZ, provides the cover art, which shows a ham posing at his station for the cameraman, with the caption "Who is who." The editorial opens with an acknowledgment of the pioneering daytime contact between Australian a2CM and British g2OD, pointing out that radio has truly made hams all over the world into "a big international family"—the International Amateur Radio Union. A second topic of editorial concern is urging American hams to support their local radio clubs.

In the lead article, "Television Arrives," ARRL Atlantic Division Director G. L. Bidwell declares, "MOTION PICTURES BY RADIO ARE HERE! I saw them with my own eyes." The article goes on to describe the electromechanical system first used for TV generation and reception. John Clayton tells about "Shooting Trouble in the Superhet." The call sign WNP will soon be heard on the air again, as the *Bowdoin* and the *Peary* prepare to sail once again to the north "…in an effort to locate that vast Arctic continent which is believed to exist between Alaska and the Pole." The companion article, by Henry Forbes and John Reinartz, describes "The Radio equipment of the Navy-MacMillan Arctic Expedition."

The article "England and Australia Work in Daylight" details the daytime DX feat mentioned in the editorial, with the two hams making contact on 20 meters at 0552 GMT, May 3, for a QSO that lasted until 0715 GMT. The contact ended because g2OD "had to stop to shave and pack up for business!!" On the following day, contact was again made between the two, and messages were passed from the Prime Minister of Australia to the Prime Minister of England, and between the Radio Society of Great Britain and the Wireless Institute of Australia.

Howard Williams discusses "The Hertz Antenna at 20 and 40 Meters." H. A. Joyce opens his article "How Are Short Waves Reflected?" by saying "Inasmuch as no other theory has been able to account for the differences between day and night transmission, the theory based on the phenomena of reflection or refraction of radio waves from the upper atmosphere must be admitted." In "NRRL In Action," by Hoyt Taylor, the seagoing tests of the 39-meter radio station on the USS *Seattle* are described. Early mobile work is described in Oliver Wright's article, "Loops and Fords." Oliver opens by saying, "I recently became the owner of a roadster formerly owned by a Detroit millionaire. It was immediately fixed up as a radio flivver." He goes on to describe the loop antenna, the "trans-ceiver," and the good results they obtained.

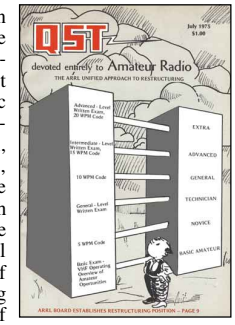
July 1950



◊ The cover photograph shows "an ear-saver for C.W. Reception," described in this issue. The editorial discusses operating mobile on 10 meters, in the mobile window of 29.6 to 29.7 Mc. Another topic covered by the editorial is that of oral arguments on Docket 9295, concerning the proposed introduction of the Amateur Extra Class license and the Technician License.

The lead article, by George Grammar, W1DF, describes "An Accessory for C.W. Reception," an audio peak clipper using two dual triodes to tame loud static crashes, together with audio selectivity to help filter out interfering signals. Warren Andrew, W3AM, discusses "All-Driven Arrays," as he tells about his three-element beam with all driven elements. Leonard Langley, W2CDQ, shows how you can get on the air with break-in CW in "An All-Band Crystal-Controlled Exciter." John Mark Reed, HC2JR, tells about the recent multiop DXpedition to Galapagos Island, HC8GRC. By Goodman, W1DX, presents the first of an ARRL series on amateur operating, in his article "Basic Operating Procedure." In the article "A New Country Calls CQ," By also ventures into the realm of ham fiction with "The Loneliest Ham in the World," an amateur who worked UHF in its early days. It seems that the ham had worked a station on Mars, and, later, a Martian mobile in the Earth's vicinity….

July 1975



◊ The cover cartoon shows a ham wannabe looking up at the Amateur-Radio ladder that progresses from "Basic Amateur" through Novice, Technician, General, Advanced, and Extra, under the heading, "The ARRL Unified Approach to Restructuring." The editorial addresses "…all of the ramifications of the FCC's restructuring proposal, the reactions of ARRL members as revealed by the recent membership survey, and the many alternative responses that the League could make to the Commission proposal."

John Belrose, VE2CV/VE3DRC, discusses "The HF Discone Antenna." Wes Hayward, W7ZOI, presents a thorough look at "Defining and Measuring Receiver Dynamic Range." Robert Tschannen, W9LUO, describes "A Crystal-Controlled SSTV Sync System." —*Al Brogdon, W1AB* QST

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 W6OWP, with K6YR as an alternate. 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

MONTANA STATE CONVENTION

July 14-16, East Glacier

The Montana State Convention, sponsored by the Glacier-Waterton International Peace Park Hamfest Committee, will be held at the Three Forks Campground, 16 miles W of East Glacier on Hwy 2, between milepost 191 and 192. Features include swap/tailgate sales, dealer displays, old equipment auction, meetings (QCWA, annual hamfest), transmitter hunts, contests (high speed CW, QLF), seminars (ARES, ATV, QRP, repeater linking), VE sessions, hamfest pins ($2.50), BBQ supper (Saturday eve, bring your plate, utensils, meat, meal tickets), camping (406-226-4479). Talk-in on 146.52. Admission is $10 in advance, $13 at the door. Contact Frank Phillips, AC7AY, Box 253, Florence, MT 59833, 406-273-2894, **ac7ay@bigsky.net**; **http://www.gwhamfest.org**.

OKLAHOMA STATE CONVENTION

July 28-29, Oklahoma City

The Oklahoma State Convention, sponsored by the Central Oklahoma Radio Amateurs, will be held at the Oklahoma State Fair Park, (Hobbies, Arts and Crafts Building), NE corner of I-40 and I-44. Doors are open Friday 5-8 PM, Saturday 8 AM to 5 PM. Features include flea market, technical and non-technical programs, foxhunt, WAS card-checking, VE sessions. Talk-in on 146.82, 147.21. Admission is $7 in advance, $9 at the door. Tables are $10 in advance, $15 at the door (if available); electrical hookup $5. Contact Harold Miller, KB1ZQ, c/o "Ham Holiday 2000", Box 850771, Yukon, OK 73085-0771, 405-672-7735 or 405-650-9963, **n1lpn@swbell.net**; **http://www.geocities.com/heartland/7332**.

SOUTH TEXAS SECTION CONVENTION

July 28-29, Austin

The South Texas Section Convention, co-sponsored by the Austin ARC, the Austin Repeater Organization, and the Texas VHF-FM Society, will be held at the Hilton Austin North, 6000 Middle Fiskville Rd, in N Austin; at the intersection of IH 35 and US Hwy 290. Features include indoor and outdoor swapfest, dealers, exhibits, forums (ARRL, DX, packet radio, QRP, VHF/UHF FM Repeater), weather-related seminars, Texas VHF-FM Society summer meeting, VE sessions (all classes of licenses). Talk-in on 146.94. Admission is $7 in advance, $9 at the door. Contact Joe Makeever, W5HS, 8609 Tallwood Dr, Austin, TX 78759, 512-345-0800, **w5hs@arrl.net**; **http://www.repeater.org/summerfest/**.

July 7-9
Utah State, Bryce Canyon*

July 8
Georgia State, Gainesville*
Central Division, Indianapolis, IN*

August 20
Colorado Section, Golden

August 26
Missouri State, Columbia
West Virginia State, Weston

August 26-27
New England Division, Boxboro, MA
New Mexico State, Rio Rancho

August 27
Kansas State, Salina

September 9
Kentucky State, Louisville

*** See June *QST* for details.**

ARIZONA STATE CONVENTION

July 28-30, Flagstaff/Ft Tuthill

The Arizona State Convention, sponsored by the Amateur Radio Council of Arizona, will be held at the Fort Tuthill Fairgrounds, 3 miles S of Flagstaff on I-17, Airport Exit 337. Tailgate hours are Friday and Saturday dawn to dusk, Sunday dawn to 2 PM; Exhibit Hall hours are Friday noon to 5 PM, Saturday 9 AM to 5 PM, Sunday 9 AM to 2 PM. Features include swapfest, tailgating, commercial vendors, major manufacturers, dealers, seminars and forums (ARRL, AMSAT, APRS, and more), ARRL representation including special guest ARRL President Jim Haynie, W5JBP, other guest speakers (Gordon West, WB6NOA; Dan Miller, K3UFG; Robert Syms, KO6ZL; Bill Pasternak, WA6ITF), meetings, junque sale (Sunday, 8-9 AM), VE sessions (Saturday, 9 AM to noon; Rick, W7RAP, 520-544-8791), camping, Saturday eve barbeque. Talk-in on 146.98 (100 Hz). Admission is free. Contact Norm Martin, K7OLD, 1633 W Placita Montuoso, Oro Valley, AZ 85737-3677, 520-297-9562, **arcathill@aol.com**; **http://www.hamsrus.com/tuthill.html**.

EASTERN WASHINGTON SECTION CONVENTION

August 5-6, Spokane

The Eastern Washington Section Convention, co-sponsored by the Kamiak Butte Amateur Repeater Assn, the Spokane Radio Amateurs, the NW Tri-State ARO, the Palouse Hills ARC, and the Inland Empire VHF Club, will be held at University High School, 10212 E 9th Ave; Exit 287 off I-90. Doors are open for commercial setup on Friday 6-9 PM; public Saturday 9 AM to 5 PM, Sunday 8 AM to noon. Features include Open Cry Auction for Ham/Electronic gear (Sunday, 9 AM), seminars and forums, Special Event Station, famous steak dinner (Saturday, 5 PM, $7), foxhunt, VE sessions, free testing of all HTs, off-street parking for cars and RVs, refreshments. Talk-in on 147.24, 146.52. Admission is $5, under 12 free. Commercial table space is $10; non-commercial table space is $7.50 in advance (by Jul 5), $10 at the door (plus admission; tables available while they last). Contact Betsy Ashleman, N7WRQ, 3903 E 48th Ave, Spokane, WA 99223-7866, 509-448-5821, **n7wrq@aol.com**; **http://www.users.uswest.net/~dholten/**.

Attention Hamfest and Convention Sponsors:

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You're encouraged to register your event with HQ as far in advance as your planning permits. Hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register. Registering dates with ARRL HQ doesn't constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your division director. For conventions, approval must be made by your director and by the executive committee. Application forms can be obtained by writing to or calling the ARRL convention program manager, tel 860-594-0262.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

HAMFEST CALENDAR

Attention: The deadline for receipt of items for this column is the **1st of the second month preceding publication date**. For example, your information must arrive at HQ by **July 1** to be listed in the **September** 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.)

Arizona (Flagstaff/Ft Tuthill)—Jul 28-30, Arizona State Convention. See "Coming Conventions."

British Columbia (Vancouver)—Jul 28-30. Dave Johnson, VE7VR, 604-438-8715.

†**Colorado (Loveland)—Jul 15,** 9 AM to 4 PM. *Spr:* Northern Colorado ARC. Larimer County Fairgrounds, McMillian Building, 700 S Railroad St; I-25 N to Exit 257, W on Hwy 34 to Cleveland, turn left, S to 1st St, right to RR St, turn left, go 2 blocks to site. Commercial exhibits, technical sessions, computer and radio goodies, VE sessions. *TI:* 145.115 (100 Hz), 146.52. *Adm:* $3. Tables: $10 each. Rod Cerkoney, N0RC, 5000 Boardwalk, No 39, Ft Collins, CO 80525, 970-225-0117 or 970-898-9285, **ncarc@qsl.net**; **http://www.info2000.com/~ncarc**.

†**Florida (Milton)—Jul 21-22.** *Spr:* Milton ARC. Santa Rosa County Auditorium, Old Bagdad Hwy and Avalon Blvd; I-10, Exit 7, go N for 5 miles, auditorium on right. VE sessions. *TI:* 145.49. *Adm:* $3. Tables: $8. Bill Couch, W4VY, 24 Easy St, Milton, FL 32570, 850-623-0592, **billcouch@sprintmail.com**; **http://home.att.net/~k4ozl/marc.htm**.

†**Illinois (Sugar Grove)—Jul 23;** set up Saturday 7 PM, Sunday 6-8 AM; public 8 AM. *Spr:* Fox River Radio League. Waubonsee Community College, Rte 47 at Harter Rd, 5 miles NW of Aurora. Flea market, commercial dealers, computer vendors, VE sessions (10 AM, bring original and copy of license, photo ID, $6.65), free paved parking, refreshments. *TI:* 147.21 (103.5/107.2 Hz). *Adm:* advance $4, door $5. Tables: $12 (8-ft). Maurice Schietecatte, W9CEO, c/o FRRL, Box 673, Batavia, IL 60510, 815-786-2860, **w9ceo@arrl.net**; **http://www.frrl.org/hamfest.html**.

Indiana (Angola)—Aug 6. Bill Brown, WD9DSN,

†ARRL Hamfest

Gail Iannone ♦ Convention Program Manager

219-475-5897.

†**Maine (Union)—Jul 8;** set up 6 AM; public 8 AM to 2 PM. *Spr:* Pen-Bay ARC. Union Fairgrounds, Common Rd, off Rte 17; Rte 17, E to Union from I-95, Rte 1 E to Rte 235 to Common Rd, left to Fairgrounds. Vendors, VE sessions (all classes), weekend camping ($10 per night), refreshments. *TI:* 147.06, 145.49, 146.52. *Adm:* $5, under 12 free with adult. Tables: $4 each; inside 10x10 vendor space $10 (includes 1 table). Paul Gregory, N1ZR, Box 937, Jefferson, ME 04348, 207-549-3072, **n1zr@excite.com**; **http://www.northtrack.com**.

†**Maryland (Timonium)—Jul 30,** 8 AM to 4 PM. *Spr:* Baltimore RA Television Society. Timonium Fairgrounds, York Rd; take I-695 (Baltimore Beltway) to Exit 24 (I-83 N); from I-83 take Exit 17 (Padonia Rd) E, turn right onto York Rd, (MD Rte 45), continue S on York Rd to Fairgrounds entrance. Hamfest/Computerfest, giant flea market (opens 6 AM), vendors, electronics, equipment, antennas, tailgating ($10 per space, no advanced reservations), VE sessions (check in 8:30 AM, free exams 9 AM; pre-registration required), handicapped accessible, free parking, refreshments. *TI:* 147.03, 448.325. *Adm:* $5, under 12 free. Tables: $60 each (in air-conditioned Main Exhibit Hall). Mayer Zimmerman, W3GXK, c/o BRATS, Box 5915, Baltimore, MD 21282-5915, 410-786-6839 or 410-461-0086, **hamfest@bratsatv.org**; **http://www.bratsatv.org**.

Massachusetts (Cambridge)—Jul 16. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Michigan (Escanaba)—Aug 5,** 8 AM to 3 PM. *Spr:* Delta County ARS. Bay de Noc Community College, 2001 N Lincoln Rd; N side of Escanaba on US Rtes 2 and 41, turn W at Danforth Rd. *TI:* 147.15, 444.3. *Adm:* $4. Tables: full table $5, half table $3. John Anderson, WD8RTH, Box 923, Escanaba, MI 49829-0923, 906-789-6950; **wd8rth@arrl.net**.

Michigan (Fairview)—Jul 15. Gerry Crawford, K8GER, 517-848-5996 or 517-826-8131.

†**Michigan (Tawas)—Aug 5,** 8 AM to 2 PM. *Spr:* Iosco County AR Enthusiasts. Tawas Area High School, 255 M-55; US 23 to M-55, M-55 W for 1.4 miles. Trunk sales ($3), VE sessions. *TI:* 146.64. *Adm:* advance $4, door $5. Tables: $7. John Hanley, KA8AIP, 489 S Towerline Rd, Whittemore, MI 48770, 517-756-2845, **ka8aip@centurytel.net**; **http://www.oscoda.net/icare/**.

†**Missouri (Springfield)—Aug 5.** *Spr:* Southwest Missouri ARC. University Plaza Trade Center, 625 E St Louis St; from I-44 go S on Glenstone, W on St Louis St. Forums, VE sessions, free club tables. *TI:* 146.61 (162.2 Hz). *Adm:* $5. Tables: $20 (first table), $10 (each additional table, includes 1 admission). Woodie Moore, W0ODY, 1905 E Wheat Ridge Dr, Springfield, MO 65803, 417-833-2248, **w0ody@arrl.net**; **http://www.smarc.org**.

†**Missouri (Washington)—Jul 16,** 6 AM to 2 PM. *Spr:* Zero Beaters ARC. Missouri City Park, off Grand Ave; Hwy 100 W from Washington, N on Pottery Rd, left on 5th St, right on Grand Ave. Flea market, vendors, exhibits, VE sessions, technical sessions, refreshments. *TI:* 147.24. *Adm:* Free. Tables: $20 (covered area, advance reservation required), $5 (flea market, no reservations). Keith Wilson, K0ZH, 1100 North Commercial, St Clair, MO 63077, 636-629-2264, **jwpubl@fidnet.com**; **http://zbarc.usmo.com/**.

Montana (East Glacier)—Jul 14-16, Montana State Convention. See "Coming Conventions."

†**Nevada (Reno)—Jul 29;** set up 6 AM; public 8 AM to 3 PM. *Spr:* Sierra Nevada ARS. International Game Technology, 9295 Prototype Dr; US 395 to S Meadows Parkway, E to Double R Blvd, N to Prototype Dr/Diamond Way, W on Prototype Dr to IGT. VE sessions (9 AM, all licensed elements, pre-registration requested; call Jess, N7BIP, 775-826-0329; walk-ins accepted). *TI:* 146.61 (123.0 Hz). *Adm:* $1, under 16 free. Tables: vendors and sellers furnish their own; $10 per space. Bill Massie, K7NHP, 775-246-3756; **k7nhp@arrl.net**.

†**New Jersey (Augusta)—Jul 16,** 8 AM. *Spr:* Sussex County ARC. Sussex County Fairgrounds, Plains Rd; Rte 80 W to Rte 15, Rte 15 turns into Rte 206, turn right onto Plains Rd. Unlimited tailgate space ($10 per space), handicapped accessible. *TI:* 147.3. *Adm:* $5. Tables: $15 (at the door per space). Dan Carter, N2ERH, 8 Carter Ln, Branchville, NJ 07826, 973-948-6999; **n2erh@email.com**; **http://www.scarcnj.org**.

†**New Mexico (Roswell)—Aug 5,** 8 AM to 4 PM. *Spr:* Pecos Valley ARC. Roswell Civic Center, 912 N Main St (Hwy 285). Vendors, seminars, speakers, demonstrations, special guests. *TI:* 147.18. *Adm:* $5. Tables: $8 (first table), $5 (each additional table); all with electricity. Vernetta Verasso, KC5WKA, 1604 Tulane Dr, Roswell, NM 88201, 505-627-7777, **kc5wka@dfn.com**; **http://www.pvarc.com**.

†**New York (Batavia)—Jul 16,** 6 AM. *Spr:* Genesee Radio Amateurs. Batavia Downs Race Track, 8315 Park Rd; NYS Thruway (I-90) to Exit 48 (Batavia), take Park Rd to Batavia Downs, turn left, just past Richmond Ave. Flea market, vendors, Chicken BBQ (11 AM). *TI:* 147.285. *Adm:* $5, under 12 free. Tables: $10 (indoor vendors), $2 (outdoor flea market space). Randy Boyle, K2RLB, 3427 Batavia-Oakfield Town Line Rd, Batavia, NY 14020, 716-948-9679, **racboyle@iinc.com**; **http://www.majordomo@hamgate1.sunyerie.edu/~gram/**.

†**New York (Frankfort/Utica)—Jul 22;** set up 6 AM; public 8 AM to 2 PM. *Spr:* Utica ARC. Herkimer County Fairgrounds, Cemetery St; NYS Thruway to Exit 30 (Herkimer), left at exit, go over bridge, take ramp for NYS 5S W, follow 5S W for 5 miles to Frankfort Fairgrounds. Flea market, VE sessions, refreshments. *TI:* 145.45. *Adm:* $4. Tables: $4 (plus indoor space rental). Bob Decker, AA2CU, 4 Forest Rd, Utica, NY 13501, 315-797-6614; **ktrnd@borg.com**.

†**New York (Ithaca)—Aug 5,** 7:30 AM to 2:30 PM. *Spr:* Tompkins County ARC. Tompkins County Airport, 72 Brown Rd; from I-81 take Cortland Exit, follow signs to Rte 13 and Ithaca, turn right on Warren Rd, follow Airport signs. Indoor vendors, paved flea market, VE sessions, airplane rides and aviation displays, paved parking, refreshments. *TI:* 146.97. *Adm:* advance $4 (until Jul 15), door $5, under 18 free. Tables: $10 (inside), $2 (per outdoor space). Dave Flinn, W2CFP, 866 Ridge Rd, Lansing, NY 14882, 607-533-4797, **dave@starflinn.com**; **http://www.compcenter.com/~tcarc**.

†**North Carolina (Cary)—Jul 15,** 8 AM. *Spr:* Cary ARC. Cary Community Center, 404 North Academy; Exit 290 off I-40, turn W onto Hwy 54, go 2.1 miles, take left onto N Academy, Community Center is on left. VE sessions. *TI:* 145.39. *Adm:* advance $4, door $5. Tables: 6-ft $10 each. Herb Lacey, W3HL, 1022 Medlin Dr, Cary, NC 27511-4365, 919-467-9608, **infomanag@aol.com**; **http://www.ipass.net/~falynch/carc/carc.html**.

†**North Carolina (Waynesville)—Jul 29,** 8 AM to 4 PM. *Spr:* Western Carolina ARS. Haywood County Fairgrounds, near Waynesville and Lake Junaluska; approximately 25 miles W of Asheville; I-40 to Exit 24, S on Hwy 209 for 3 miles. Covered flea market, dealers, tailgating, VE sessions (2 PM, Haywood Community College), free parking. *TI:* 146.91 (91.5 Hz). *Adm:* advance $4, door $5. Tables: $5. Pat Kelsey, AB5RB, Box 16858, Asheville, NC 28816, 828-236-0181, **ab5rb@bellsouth.net**; **http://www.wcars.org/hamfest2000**.

North Dakota (Dunseith)/Manitoba (Boissevan)—Jul 7-9. Dave Snydal, VE4XN, 204-728-2463.

†**Ohio (Cincinnati)—Jul 22,** 7 AM to 2 PM. *Spr:* OH-KY-IN ARS. Diamond Oaks Career Development Campus, 6375 Harrison Ave, just E of I-275 and I-74; take I-74 to the Rybolt Rd/Harrison Ave Exit (Exit 11), go E on Harrison Ave; Campus is located on the right side (S side of Harrison), less than 1 mile from the I-74 Exit. Special seminars, transmitter hunts, indoor vendors, outdoor flea market (first 2 spaces free with admission, additional spaces $3 each), VE sessions (8 AM, walk-ins accepted), free parking, handicapped parking available, refreshments. *TI:* 146.67, 146.925. *Adm:* advance $4, door $5, under 13 free. Tables: $8 (6 ft, indoor with electricity). Lynn Ernst, WD8JAW, 10650 Aspen Place, Union, KY 41091-7665, 606-657-6161, **wd8jaw@arrl.net**; **http://www.qsl.net/k8sch**.

†**Ohio (Columbus)—Aug 5,** 8 AM. *Spr:* Voice of Aladdin ARC. Aladdin Shrine Temple, 3850 Stelzer Rd; I-270, W on Morse Rd, S on Stelzer Rd. Forums (Ham from Space, weather spotting, ARES, SSTV), foxhunt, VE sessions. *TI:* 147.24. *Adm:* $5. James Morton, KB8KPJ, 6070 Northgap Dr, Columbus, OH 43229-1945, 614-846-7790; **kb8kpj@cs.com**.

†**Ohio (Randolph)—Jul 30,** 8 AM to 4 PM. *Spr:* Portage ARC. Portage County Fairgrounds, between Akron and Youngstown on State Rte 44, 4 miles S of I-76. Flea market, VE sessions, ARRL officials, unlimited free parking, restaurant on grounds. *TI:* 145.39. *Adm:* advance $4, door $5. Tables: $10. Joanne Solak, KJ3O, 9971 Diagonal Rd, Mantua, OH 44255, 330-274-8240, **ljsolak@apk.net**; **http://parc.portage.oh.us**.

†**Ohio (Van Wert)—Jul 16,** 8 AM to 3 PM. *Spr:* Van Wert ARC. Van Wert County Fairgrounds, US Rte 127 S. Radios, computers, software, new and used electronic parts, trunk sales (12 ft × 24 ft area, $5 plus admission), VE sessions (must preregister by Jul 10, Bob High, KA8IAF, 12838 Tomlinson Rd, Rockford, OH 45882; 419-795-5763), free parking, overnight parking ($10), refreshments. *TI:* 146.85. *Adm:* $5. Tables: $10 (8-ft, includes 1 free ticket). Bob Barnes, WD8LPY, 411 N Walnut St, Van Wert, OH 45891, 419-238-1877, **barnesrl@bright.net**; **http://www.bright.net/~barnesrl/w8fy.html**.

†**Ohio (Wellington)—Jul 15,** 8 AM to 2 PM. *Spr:* Northern Ohio ARS. Lorain County Fairgrounds, 23000 Fairgrounds Rd; 1 mile W of Rte 58 on Rte 18. Huge outdoor flea market area ($5 per 8-ft space), ample indoor commercial space (reservations required), dealers, overnight parking for RVs and campers (no hookups), VE sessions (walk-ins, register 8-9 AM, exams 9 AM), DXCC card checking (cards in by 11 AM). *TI:* 146.7 (110.9 Hz). *Adm:* $5, under 12 free. Tables: $15 (8 ft, plus admission). John Schaaf, KC8AOX, Box 432, Elyria, OH 44036-0432, 216-696-5709, **kc8aox@qsl.net**; **http://www.apk.net/noars/noarsfe.htm**.

Oklahoma (Oklahoma City)—Jul 28-29, Oklahoma State Convention. See "Coming Conventions."

†**Oregon (Bandon)—Jul 29,** 9 AM to 3 PM. *Spr:* Coos County RC. Bandon Community Center, 1100 W 11th St; off Hwy 101; going N on 101 turn left at first light; going S on 101 turn right at second light. Speakers, VE sessions, refreshments. *TI:* 146.61. *Adm:* advance $4, door $5. Tables: $10. Brian Howard, W7MLT, 1107 Roseburg Rd, Myrtle Point, OR 97458; 541-572-5623; **w7mlt@usa.net**.

†**Pennsylvania (Berwick)—Jul 15.** *Spr:* Jonestown Mountain Repeater Assn. Beach Haven Carnival; S on US 11, go 6 miles to Salem Twp Fire Dept; N on US 11, 3 miles from intersection of SR 93 at Berwick. VE sessions. *TI:* 145.13 (77.0 Hz), 146.52. *Adm:* $5. Charles Hooker, AD3L, Box 23, Huntington Mills, PA 18622, 570-864-2571.

†**Pennsylvania (Kimberton/Valley Forge)—Jul 16;** sellers 7 AM, buyers 8 AM. *Spr:* Mid-Atlantic ARC. Kimberton Fire Company Fairgrounds, Rte 113, S of intersection with Rte 23. Computers and electronics, tailgating ($5, no reserved tailgate space), refreshments. *TI:* 146.835, 443.8 (131.8 Hz). *Adm:* $5, nonham spouse and children free. Tables: with electricity $10 each (1-4 tables), $8 each (5 or more tables), plus admission. MARC, Box 2154, Southeastern, PA 19399-2154; or call Bill Owen, W3KRB, 610-325-3995, **hamfest-info@marc-radio.org**; **http://www.marc-radio.org/hamfest.html**.

†**Tennessee (Dayton)—Jul 22 (rain date Jul 29),** 8 AM. *Spr:* Rhea County ARS. Cedar Point Park, E of the intersection of US Hwy 27 and TN Hwy 30. Tailgating, equipment test bench, VE sessions. *TI:* 147.39, 442.075. *Adm:* Free. Tables: Bring your own. Ron Branam, KT4IW, 484 S Pine St, Dayton, TN 37321, 423-775-4661, **kt4iw@arrl.net**; **http://www.volstate.net/~ko4sy**.

Texas (Austin)—Jul 28-29, South Texas Section Convention. See "Coming Conventions."

†**Texas (Denison/Sherman)—Jul 15;** set up Friday 9-11 PM, Saturday 6-8 AM; public 8 AM to 4 PM. *Spr:* North Texas Hamfest Committee. Silver Wings Club, Grayson County Airport; from Hwy 75 N or S, take Exit 65 (FM 691), go W on Hwy 691 to Airport entrance, follow signs to Hamfest. VE sessions (11 AM, all license classes; Jerry Newcomb, KJ5I, 903-892-0454, **kc5lry@gte.net**), NTX section meeting. *TI:* 147.0. *Adm:* advance $5 (by Jul 10), door $7, under 13 free when accompanied by parent. Tables: advance $8 (by Jul 10), door $10. Gene Hodge, K5DPS, 211 N Brinkley, Sherman, TX 75092, 903-893-6082, **kc5aft@gte.net**; **http://home1.gte.net/wb5dcu/nortex00.html**.

Texas (Sulphur Springs)—Jul 1. Steve Heller, WA0CPP, 903-945-3659.

†**Texas (Texas City)—Jul 15,** 8 AM to 3 PM. *Spr:* Tidelands ARS. Nessler Center, 2010 5th Ave N; from Houston on I-45, take Exit 16 to Texas City, go 6.1 miles, turn right onto 21st St at Jack in the Box, left onto 5th Ave, go 1 block to Nessler Center. VE sessions. *TI:* 147.14. *Adm:* advance $3, door $4. Tables: $5. Joe Wileman, AA5OP, 1010 24th Ave N, Texas City, TX 77590, 409-945-6794; aa5op@aol.com.

†**Virginia (Berryville)—Aug 6,** 6 AM. *Spr:* Shenandoah Valley ARC. Clarke County Ruritan Fairgrounds, 1 mile W of Berryville on Rte 7. "50th Anniversary Winchester Hamfest and Computer Show", electronics flea market, vendors, tailgating ($7 per space), VE sessions (Cooley School, across from hamfest; registration begins at noon, exams 1 PM promptly; all classes, walk-ins welcomed), QSL contest, Ruritan's famous chicken and beef barbecue, refreshments. *TI:* 146.82. *Adm:* $5, under 16 free. Tables: $12, $15, and $20. Irvin Barb, W4DHU, 2549 Senseny Rd, Berryville, VA 22611, 540-955-1745, ibarb@visuallink.com.

Virginia (Vinton)—Aug 5. Floyd Ponton, KB4WYW, fponton@worldnet.att.net.

Washington (Spokane)—Aug 5-6, Eastern Washington Section Convention. See "Coming Conventions."

Wisconsin (Marshfield)—Aug 6. Guy Boucher, KF9XX, 715-384-4323.

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

SPECIAL EVENTS

Los Alamos, NM: Los Alamos ARC, W5PDO, 1800 to 2200Z **July 1**, from Fenton Hill Observatory, the Earthwatch Institute's Student Challenge Awards Program. 14.250 21.350 28.450. Certificate. Don Casperson, AA5PA, 984 Nambe Loop, Los Alamos, NM 87544.

DeSmet, SD: Lake Area Radio Klub/Huron Amateur Radio Club, W0WTN, 1700Z **July 1** to 2200Z **July 2**, to honor Laura Ingalls Wilder and *Little House on the Prairie*. 7.265 14.265 28.465 50.165. Certificate. LARK, Box 642, Watertown, SD 57201.

Jersey City, NJ: United States Power Squadron Amateur Radio Net, N2B, 1300Z **July 1** to 2200Z **July 4**, celebrating OP Sail 2000 and Safe Boating through Education. 7.257 14.257 21.357 28.357. Certificate. Donald Stark, N3HOW, 65 Stark Spur, Eighty Four, PA 15330.

Grimeton, Sweden: Telemuseum, SA6Q, 0900-1500Z **July 2**, for the 75th anniversary of station SAQ at Grimeton—the only working alternating-current transmitter in the world. 14.035 14.215 21.205 28.415. QSL. Telia AB, Radio Station Grimeton, Pl 3118, 430 16 Rolfstorp, Sweden.

Thompson, OH: Lake County Amateur Radio Association, N8GB, 1400-2300Z **July 4**, celebrating Independence Day. 7.246 28.465. George Bair, 386 Cedarbrook Dr, Painesville, OH 44077-2849.

Independence Rock, WY: AF7E, 0000-2359Z **July 4**, commemorating the 138th anniversary of the first recorded meeting of Masons in Wyoming. 80-10 meters. Certificate. William Wright AF7E, 1304 E Sheridan, Laramie, WY 82070.

Trenton, MI: Motor City Radio Club, W8MRM, 1300Z **July 7** to 2300Z **July 9**, during the 25th annual Trenton Mid-Summer Festival. 7.044 7.244 14.044 14.244. Certificate. Motor City Radio Club, Inc, Trenton Mid-Summer Festival, PO Box 337, Wyandotte, MI 48192.

Lupton, MI: Michigan ARRL Section, W8C, 1500 to 2330Z **July 8**, for the second annual Michigan Section Family Outing. 3.932. Certificate. John Freeman, 1106 Park Road, Alger, MI 48610.

Bryce Canyon, UT: Utah Hamfest 2000, K7H, 1400Z **July 8** to 0000Z **July 9**. 7.260 14.260 21.260 28.460. Certificate. Utah Hamfest, PO Box 0382, Bountiful, UT 84011.

Alexandria, VA: Alexandria Radio Club, W4HFH, 1300Z **July 8** to 0200Z **July 10**, celebrating the 251st birthday of the City of Alexandria. Certificate. Alexandria Radio Club, PO Box 30721, Alexandria, VA 22310.

Baraboo to Milwaukee, WI: K9ZZ/Milwaukee Co AREC Inc, W9G, 1300Z **July 8** to 2200Z **July 10**, from the Great Circus Train from Baraboo to Milwaukee hauling 60 restored circus wagons. 7.240 14.240 21.340 146.55. Certificate. Jim Romelfanger, 412 1/2 Ash St, Baraboo, WI 53913.

Austin, TX: Naturist Amateur Radio Club, NU5DE, 0000Z **July 10** to 2400Z **July 16**, during the 25th annual North American Nude Awareness Celebration. 7.265 14.265 21.365 28.465. Certificate. Naturist Amateur Radio Club, PO Box 200812, Austin, TX, 78720.

Milwaukee, WI: West Allis Radio Amateur Club, W9C, 1800Z **July 12** to 0200Z **July 16**, during the Great Circus parade and show. 7.240 14.240 21.340 28.400. Certificate. W9C, 5436 Scenery Rd, Waterford, WI 53185.

New London, CT: Southeastern Connecticut Chapter of the American Red Cross, K1ARC, 1700Z **July 13** to 2200Z **July 15**, during OP Sail 2000. 3.915 7.255 14.255. QSL. American Red Cross, 150 Eugene O'Neill Dr, New London, CT 06320.

Kane, PA: Kane Amateur Radio Operators, AA3GM, 2200Z **July 14** to 2000Z **July 16**, celebrating the annual Kane Black Cherry Festival. 7.255 14.255 21.355 28.355. Certificate. Kenneth T. Frankenbery, 5111 Glenwall Dr, Aliquippa, PA 15001.

Dayton, TN: Rhea County Amateur Radio Society, K4DPD, 1200 to 2359Z **July 15**, to commemorate the 75th anniversary of the Scopes Trial—the first major trial broadcast by radio in the US. 14.250 21.260 28.405 147.390. QSL. Tommy Mize, 433 Magnolia Ave, Dayton, TN 37321.

Portland, OR: Idaho-Oregon DX Group, W7P, 1330Z **July 15** to 1900Z **July 16**, operating from the sternwheel tug *Portland* during the Museum Ships Special Event. 3.895 7.230 14.230 14.080. Certificate. Vince Van Der Hyde, Box 12941, Salem, OR 97309.

Quincy, MA: USS *Salem* Radio Club, K1USN, 1330Z **July 15** to 1900Z **July 16**, during the Museum Ships Special Event. 7.260 14.260 21.360 28.360. Certificate. Robert Callahan, 56 Acorn St, Scituate, MA 02066.

Langhorne, PA: Penn Wireless Association, W3SK, 1700 to 1900Z **July 16**, for the annual club picnic. 14.250. QSL. Penn Wireless Association, 514 Oxford Valley Rd, #319, Fairless Hills, PA 19030.

Gainesville, TX: Cooke County ARC/National Science Foundation, N5G, 1700Z **July 17** to 2000Z **July 21**, during the Youth Summer Ham Program at North Central Texas College. 14.250 21.350. Certificate. Jim Innis, K5SP, 1005 Kent Dr, Gainesville, TX 76240.

Fremont, MI: Newago County Radio Amateurs, W1B, 1500Z **July 18** to 1900Z **July 22**, for the National Baby Food Festival. 7.250 14.250 21.350 28.350. Certificate. Leo Woodard, WD8DCA, 304 N Stone Rd, Fremont, MI 49412.

Fort Ashby, WV: Mineral County ARES/RACES Group, K8AUS, 1300 to 0100Z **July 21**, during the Mineral County Fair. 3.865 147.390 444.125. Certificate. James H. Smith, PO Box 165, Fort Ashby, WV 26719.

Canton, OH: Canton Amateur Radio Club, W8AL, 1300Z **July 21** to 2400Z **July 23,** during the annual Pro Football Hall of Fame festival and 80th anniversary of the National Football League. 7.265 14.265 21.350 28.350. Certificate. Conald E Perry, WQ8J, 968 Culverne Ave NW, Massillon, OH 44647.

Wapakoneta, OH: Reservoir Amateur Radio Association, K8QYL, 1300 to 2200Z **July 22**, during the Neil Armstrong Air and Space Museum Festival of Flight. 7.250 14.250 21.250 28.400. Certificate. Rich Spencer, 15101 Townline-Lossuth Rd, St. Marys, OH 45885.

Belfast, ME: Waldo County Amateur Radio Association, N1TN, 1300 to 2200Z **July 22**, celebrating the Belfast Bay Festival 2000. 3.880 7.280 14.280 28.480. Certificate. Steve Curry, KD1O, RR 1 Box 2825, Thorndike, ME 04986.

Mercer, PA: Mercer County Amateur Radio Club, W3LIF, 1200Z **July 22** to 0000Z **Aug 12**, celebrating 200 Years of Mercer County, PA. 7.250 14.250 21.350 28.450. QSL. MCARC Special Event, PO Box 996, Sharon, PA 16146.

Stratford, NY: Fulton County Dr Mahlon Loomis Committee, W2ZZJ, 1300-2300Z **July 23**, commemorating the 174th anniversary of the birth of Dr. Loomis, an American radio pioneer. 80-2 meters. Certificate. George P. Sadlon, W2ZZJ, 5738 St Hwy 29A, Stratford, NY 13470.

Long Barn, CA: Santa Clara County Council, Boy Scouts of America, K6BSA, 1600Z **July 24** to 0000Z **July 29**, during the International Rendezvous at Camp Hi Sierra (Boy Scout Camp). 28.350 21.360 18.140 14.290. QSL. Larry Laskowski, WB6JSO, R2K, 1459 Luning Dr, San Jose, CA 95118.

Kissimmee, FL: REACT International Inc, K4EOC, 1300Z **July 26** to 0400Z **July 29**, during REACT International Convention 2000 "Transmitting Into 21st Century." 28.335. Certificate. 2000 RI Convention QSL, PO Box 260292, Melbourne, FL, 32936.

Oshkosh, WI: Rox Cities ARC, W9ZL, 1400-2100Z **July 28** to **July 30**, Operating from the world's biggest fly-in: EAA Airventure 2000 at Wittman Regional Airport. 7.260 14.260 21.360 28.460. Certificate. Wayne Pennings, WD9FLJ, 913 N. Mason, Appleton, WI 54914.

Fairplay, CO: Park County RC Inc, K0UEM, 1600-2100Z **July 30**, during the 52nd annual World Championship Pack Burro Race. 7.250 14.307 21.375 28.465. Certificate. PCRC, PO Box 16, Bailey, CO 80421.

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to 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

2000 ARRL UHF Contest Rules

By Dan Henderson, N1ND
Contest Branch Manager

1. Object: To work as many amateur stations in as many 2° × 1° grid squares as possible using authorized amateur frequencies above 222 MHz and all authorized modes of emission.

2. Date and Contest Period: First full weekend of August. Begins 1800 UTC Saturday, ends 1800 UTC Sunday (**August 5-6, 2000**). Entrants may use as much of this time as they wish.

3. Entry Categories:

3.1. Single Operator – Low Power

3.1.1. For Single Operator - Low Power, RF output may not exceed the following:
50 MHz and 144 MHz—200 W PEP
222 MHz and 432 MHz—100 W PEP
902 MHz and above—10 W PEP

3.2 Single Operator – High Power

3.3. Rover

3.3. Multioperator

4. Exchange: Grid-square locator (see April 1994 *QST*, page 86, or check on-line at **http://www.arr.org/locate/gridinfo.html**.)

4.1. Exchange of signal report is optional.

5. Scoring:

5.1. QSO points:

5.1.1. Count three points for each complete 222- or 432-MHz QSO.

5.1.2. Count six points for each complete 902- or 1296-MHz QSO.

5.1.3. Count 12 points for each 2.3-GHz (or higher) QSO.

5.2. Multiplier: The total number of different grid squares worked per band. Each 2° ×1° grid square counts as one multiplier on each band it is worked.

5.3. Final score: Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: W1AW works W3CCX in FN20 on 222, 432 and 1296 MHz. This gives W1AW 12 QSO points (3 + 3 + 6) and also three grid-square multipliers. Final score is 12 QSO points × 3 multipliers, or 36.

5.4. Rovers only: The final score consists of the total number of QSO points from all bands times the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in) plus one additional multiplier for every grid square activated (made a contact from).

5.4.1. Rovers are listed in the contest score listings under the Division from which the most QSOs were made.

6. Miscellaneous:

6.1. Partial QSOs do not count. Both call signs, full exchanges and acknowledgment must be sent and received.

6.2. A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations). The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

6.3. All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

6.4. Contacts made by re-transmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

7. Awards: Certificates will be awarded in the following categories:

7.1. Top single-operator High and Low power score in each ARRL Division.

7.2. Top single operator High and Low power score on each band (222, 432, 902, 1296 and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if K2SMN has the highest single-operator multi-band score in the Atlantic Division and his 432-MHz score is higher than any other Atlantic Division single-operator's, he will earn both a certificate for being the single-operator Division leader and an endorsement sticker for 432 MHz.

7.3. Top multi-operator score in each ARRL Division where significant effort or competition is evidenced. (Multioperator entries are not eligible for single-band awards.)

7.4. Additional certificates may be awarded where significant effort or competition is evidenced.

8. Submission: Deadline for submission of entries for this contest is **Tuesday September 5, 2000**. Logs and properly completed summary sheets should either be e-mailed to **AugustUHF@arrl.org** or should be mailed August UHF Contest, ARRL. 225 Main St, Newington, CT 06111. Entries postmarked or e-mail dated after the deadline will only be considered checklogs. **If log files are generated using a computer, the entrant is to submit the proper log files to the Contest Branch in acceptable electronic format.**

9. Other: See "General Rules for All ARRL Contests" and "General Rules for ARRL Contests on bands above 50 MHz (VHF)" November 1999 QST. These are also available at the Contest Branch Web site at: **http://www.arrl.org/contests**. Questions regarding this contest should be e-mailed to **n1nd@arrl.org**. Only use the contest-name e-mail for submission of entries. All contest forms and rules may be downloaded at: **http://www.arrl.org/contests/forms/**. QST

Contest Pins!

Looking for a unique award you can easily qualify for during the Year 2000? Anyone making at least five contacts during the August UHF may purchase the official 2000 August UHF contest pin. This popular piece of memorabilia features a microwave dish and the year 2000 incorporated into the design. They are $5 each. To order the pin, attach your check to your official summary sheet when you mail in your entry. For those submitting entries via e-mail, you may order your pins by sending a copy of your summary sheet along with your check to: UHF Contest Pins, ARRL, 225 Main St, Newington, CT 06111. Participation pins will be shipped out after your contacts have been verified into the database and the results prepared for publication in *QST*.

What Will Y2K Hold For UHF and Microwave Enthusiasts?

In 1999 we saw a resurgence of interest in the August UHF contest. The number of entries received increased significantly—up 50% from 1998. To continue to encourage interest and experimentation in the UHF and microwave bands, the ARRL Technical Information Service has assembled an excellent Web page of resources and links.

Whether you are an experienced microwave operator, or just curious about how to get involved in this expanding interest area, the UHF/Microwave Equipment and Components page on the ARRL Web has something to meet your needs. From this page you can download selected articles of general interest, find interesting projects, follow links to several equipment suppliers, and browse links to other information resources. Just visit **http://www.arrl.org/tis/info/microwave.html** you'll find tools to help you explore this fascinating aspect of our hobby.

STRAYS

HELP FOR A 6-METER GONSET

◊ Among my souvenirs is a 6-meter Gonset Communicator III and a solid-state VFO. Unfortunately, I can't seem to make the VFO work with the rig. Any assistance will be much appreciated. Len Frank, K2TLW, PO Box 4442, North Hollywood, CA 91617; **k2tlw@juno.com**.

Next Stray

By Dan Henderson, N1ND
Contest Branch Manager

ARRL 10-GHz And Up Cumulative Contest Rules

1. Object: North American amateurs work as many amateur stations in as many different locations as possible in North America on bands from 10-GHz through light.

2. Date and Contest Period: Third full weekend of August and September. For 2000, the dates are **August 19-20 and September 16-17**. Operations may take place for 24 hours total on each contest weekend. Each weekend begins at 6:00 AM local Saturday and runs through 12:00 midnight local Sunday. Listening times counts as operating time. Times off must be clearly indicated in the log.

3. Entry Categories:

3.1. 10 GHz only.

3.2. 10 GHz and up.

4. Exchange: Six-character Maidenhead Locator (see April 1994 *QST*, p 86).

4.1. Signal report is optional.

5. Miscellaneous:

5.1. Scheduling contacts is both permissible and encouraged.

5.2. Stations are encouraged to operate from more than a single location. For purposes of the contest, a change of location is defined as a move of at least 16 km (10 miles). A station may be reworked on each band for additional credit by either end of the contact moving to a new location.

5.3. Contacts may not be duplicated on the second weekend (that is, at least one end of the QSO must be from a different location).

5.4. Contacts must be made over a minimum distance of 1 km.

5.5. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period. The intent of this rule is to prohibit "manufactured" contacts.

5.6. Contacts with aeronautical mobiles do not count.

6. Scoring:

6.1. Distance points: The distance in km between stations for each successfully completed QSO is calculated. Distance = distance in km.

6.2. QSO points: Count 100 QSO points for each unique call sign worked per band. Portable indicators added to a call sign are not considered as making the call sign unique.

6.3. Total Score: Equals distance points plus QSO points.

6.4. There are no multipliers.

6.5. In making the distance calculations, a string (or ruler) and map may be used. However, calculations by computer program are preferred. Several such programs are available in the commercial market, including a basic program listing in *The ARRL World Grid Locator Atlas* ($5). For purposes of making calculations, stations are defined as being located in the center of the 6-character locator sub-square (most computer programs make this assumption).

6.6. Scoring example: On the first weekend, W9JJ operating from Mt Greylock, Massachusetts works W1VD (distance 97 km) and W1LJ/1 (distance 107 km) on 10 GHz; and W1LJ/1 (distance 107 km) on 24 GHz. On the second weekend, W9JJ operating from Pack Monadnock, New Hampshire works the following stations: W1VD (154 km), W1VT (205 km), W1LJ (157 km), and K1RO (147 km) on 10 GHz; and K1RO (147 km) on 24 GHz.

Distance points = 97 + 107 + 107 + 154 + 205 + 157 + 147 + 147= 1121

QSO points = 100 × 6 = 600 (10 GHz: W1VD, W1LJ, W1VT, K1RO; 24 GHz: W1LJ, K1RO)

Final Score = 1121 + 600 = 1721

7. Schedules:

7.1. Schedules may be set up by use of the HF calling frequency of 3818 kHz on the evenings of Tuesday, Wednesday and Thursday before the contest weekends starting at 7 PM local. Also, 144.230 and 146.55 MHz can be monitored during the contest to arrange schedules with other stations. Paired stations should move off these frequencies once contact has been made.

8. Reporting:

8.1 Official forms are available at the ARRL Contest Web Page at: **http://www.arrl.org/contests**.

8.2. Electronic entries consist of the required ARRL summary sheet completely filled out and log file indicating band, date, time, call sign, the exchange information plus distance of contacts in km.

8.3. Logs must be submitted no later than 30 days after the end of the contest (October 17, 2000.) Paper logs may be mailed to ARRL Contest Branch, 225 Main St, Newington, CT 06111. Electronic logs should be emailed to: **10GHZ@arrl.org**. Incomplete or late logs will be classified as "check log."

8. Awards: Suitable awards will be presented.

9. Other: See "General Rules for All ARRL Contests" and "Rules for ARRL Contests above 50 MHz" in November, 1999 *QST* or at **http://www.arrl.org/contests**. QST

STRAYS

Word Puzzle!

◊ Can you find the following words in this table? Here's a hint: Words can appear vertically, horizontally, diagonally and backward.
—Karen Isakson, ARRL Headquarters

S	B	E	S	N	E	C	I	L	E	A	L	L	M
A	E	H	R	E	T	E	M	M	S	M	P	O	N
P	E	V	R	A	C	Y	C	L	A	A	S	O	X
L	H	E	E	R	D	L	D	H	F	T	P	G	C
Y	I	A	O	N	A	I	R	L	Q	E	B	M	N
C	R	D	X	S	T	E	O	C	R	U	N	G	C
N	A	Y	S	E	T	Y	T	A	R	R	I	O	J
E	M	C	J	A	Q	S	T	N	Q	S	R	L	M
U	S	T	E	E	W	O	S	H	L	I	F	A	R
Q	S	P	A	R	R	L	G	L	R	L	X	C	E
E	E	L	R	H	J	K	A	L	K	E	D	C	M
R	D	S	B	U	L	C	W	N	M	N	E	X	Y
F	S	Q	W	C	O	N	T	E	S	T	S	D	T

AMATEUR
ARRL
CALL SIGN
(Extra) CLASS
CLUBS
CONTESTS
DXCC
EXAM
FREQUENCY
HAM
HIRAM
LICENSE
LOG
METER
NCJ
OPERATOR
QEX
QSL
QST
RADIO
REPEATER
SEVENTY THREE
SILENT (KEY)

By Dan Henderson, N1ND
Contest Branch Manager

1999 ARRL November Sweepstakes Phone Results

There are few things as elegant as a thoroughbred horse race. Whether it's the Kentucky Derby in Louisville, the Travers Stakes at Saratoga or another race at one of the many tracks around the country, we come to appreciate the beauty of the champion. Tradition says all champion horses trace their heritage back to the great sire Eclipse. The names of the great horses are learned by schoolchildren across our land: Man O'War, Whirlaway, Secretariat, Seattle Slew, Alydar, War Admiral; a few more could be added. The legendary are a small, select group of extraordinary competitors.

Not too long ago the ARRL November Sweepstakes was described to me as "the closest thing to a horse race we have in Amateur Radio." Over the years we have witnessed our own "photo finishes" where a few additional QSOs or a busted multiplier meant the difference between winning and finishing back in the pack. And time and again the great ones rise to the occasion. Their calls are legendary. But while American thoroughbred racehorses can trace their heritage to a common ancestor, contesters become thoroughbreds by many paths.

Most of the icons of the sport have been around for quite a while. Most will have a wide variety of contests in their background. You will usually find in their backgrounds a stint at one of the big-gun contest multi-op stations. Their call signs will be associated with some of the high profile DXpeditions. But what ever their path to the "Top of the Box" you will find one common "gene" in their genetic make-up: the desire to push themselves to the limit and challenge their skills.

Whether an operator is striving to take overall honors, improve previous standings, or get on-the-air to make enough QSOs to qualify for the November SS pin or Clean Sweep cup, they all rise to the challenge. At this time in the sunspot cycle, special challenges arise because so many operators participate. In fact, the mean number of QSOs in the 1999 ARRL November Sweepstakes Phone logs was 406.4—the first time that the average has been above 400. After log checking, a total of 413 entries—28.5%—had worked a Clean Sweep. This is the highest percentage of sweeps in the past six years of the Phone SS contest.

Everyone has a system when looking to wager on a winner. It is hard to pick against a horse that has a strong track record. You also look at the entire field. Sometimes the finishes are almost too close to call—a couple of QSOs dictate the outcome. Occasionally a champion will clearly outdistance the field. That's the fun of contesting (and horse racing.) Conditions, propagation, planning, and Murphy can make or break your chances.

Many look to the Single Op High Power category as the "Kentucky Derby" of SS. Win it, and you make a name for yourself. In 1999 we have a "horse" who not only dominated an excellent field, but also scored the "daily double," as Rich, KE3Q, operating at WP3R posted victories in this category in both the 1999 Phone and CW November Sweepstakes. Rich finished ahead of another veteran and seasoned champion Mike, KH6ND, who manned the KH7R station. To hit the trifecta in this category, you should have placed your money on Dan, W7WA, to finish a respectable third. While several ops came close, there were no overall or division records set in this category this year.

If they are looking for a "sure thing" the handicappers would be hard pressed to overlook Bob, VE4GV, in the Single Op Low Power entry division. After finishing second in 1996 and 1997, Bob broke through with a category record setting effort in 1998. How did he fair in 1999? He simply took the category to yet another level, breaking his year-old record with a score of 277,606 (also a new Canadian record). It was the only overall scoring record set during the Phone SS contest. Finishing a few lengths behind in the category were Bill, K4XS, and Stan, K8MJZ (operator at WP2Z), in a photo

Brennan, KU4WJ, isn't serving as an on-the-air referee of the Phone Sweeps. He had just arrived at the W4AQL multi-op station after officiating a local football game and was put to work spotting multipliers on packet!

Phone Top Ten

Single Operator, QRP

N7VY	139,620
VE4VV	128,928
N6MU (at N6NB)	104,280
KX9X	100,330
N0UR	78,600
KD2TT	72,996
N5XJ	65,412
KI0MB	64,622
WE9V	64,148
N9NE	62,216

Single Operator, Low Power

VE4GV	277,606
K4XS	240,552
WP2Z (K8MJZ,op)	239,212
K4WX	234,156
K5KA	218,988
K7QQ	217,724
VE5SF	214,248
N0KK (at N0AT)	211,692
K0UK	210,614
KZ1M	192,602

Single Operator, High Power

WP3R (KE3Q,op)	407,956
KH7R (KH6ND,op)	342,702
W7WA	321,846
K6LL	319,792
VE6JY (VE5MX,op)	315,052
W0SD (WD0T,op)	312,840
K5TR (at W5KFT)	308,258
WC4E (K9PG,op)	289,930
W6AX (at W6GO, N6IG,op)	273,656
AI6V	271,602

Single Operator, Unlimited

K7BV	269,706
W4MYA	236,526
NR5M	234,630
K6AW (atN6RO)	232.892
K6NO	221,832
AA8U	213,300
K6RIM	186,914
K6ANP	186,282
K5KG	184,860
KE3DX	179,868

Multioperator

KL7Y	325,322
K9NS	288,824
K7IR	276,026
KT0R	263,070
W6YX	262,122
W6UE	252,326
W4MR (at AA4NC)	248,376
NA5B	243,636
AB0S	243,478
K5MR	241,424

School Club Winners:

College / University Division
W7ASU 141,094
Arizona State University

Technical School Division
WB4TOP 25,350
Wake (NC) Technical College

Secondary/Other Schools Division
KC7KFF 82,852
Carl Hayden Community High School

Region Boxes

Boxes list call sign, score and class (Q = QRP, A = Low Power, B = High Power, U = Single Unlimited, M = Multoperator)

Northeast Region (New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)			Southeast Region (Delta, Roanoke and Southeastern Divisions)			Central Region (Central and Great Lakes Divisions; Ontario Section)			Midwest Region (Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)			West Coast Region (Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)		
KD2TT	72,996	Q	W2CS	60,988	Q	KX9X	100,330	Q	VE4VV	128,928	Q	N7VY	139,620	Q
W2AZK	39,672	Q	NA4CW	60,216	Q	WE9V	64,148	Q	N0UR	78,600	Q	N6MU (at N6NB)	104,280	Q
AA2VK	33,880	Q	W9WI	49,608	Q	N9NE	62,216	Q	N5XJ	65,412	Q	W6TKV	54,208	Q
WZ2T	31,382	Q	KC3N	29,920	Q	WA8RJF	50,560	Q	KI0MB	64,622	Q	KO6CX	31,666	Q
			KW4E	29,252	Q	WA8RCN	43,200	Q	WA8ZBT	58,500	Q	W6CN	27,334	Q
KZ1M	192,602	A	K4XS	240,552	A	KU8E	184,228	A	VE4GV	277,606	A	K7QQ	217,724	A
K1SD	169,534	A	WP2Z (K8MJZ,op)	239,212	A	W8MJ	176,486	A	K5KA	218,988	A	K6RO	182,806	A
K1VUT	157,210	A	K4WX	234,156	A	KK9A	174,590	A	VE5SF	214,248	A	VE7NF	166,848	A
K1EP	144,570	A	W4OC	174,116	A	N4OKX	163,688	A	N0KK (at N0AT)	211,692	A	N7LOX	163,688	A
N1DD	141,410	A	K5OY	165,110	A	W8DD	152,154	A	K0UK	210,614	A	VE7IN	159,900	A
WB1GQR (W1SJ,op)	262,122	B	WP3R (KE3Q,op)	407,956	B	WB9Z	237,948	B	W0SD (WD0T,op)	312,840	B	KH7R (KH6ND,op)	342,702	B
			WC4E (K9PG,op)	289,930	B	K8DX	237,790	B	K5TR (at W5KFT)	308,258	B	W7WA	321,846	B
K3CR (KB3AFT,op)	257,382	B	W5WMU	244,110	B	K9LU	205,452	B	K2EI	250,746	B	K6LL	319,792	B
			K4VUD	227,678	B	K9BGL	204,610	B	KG0ZI	228,536	B	VE6JY (VE5MX,op)	315,052	B
K3MM	251,852	B	N4BP	226,414	B	K8CC	201,924	B	N0IJ	216,618	B			
W1WEF	240,160	B										W6AX (at W6GO, N6IG,op)	273,656	B
W2GG	233,998	B												
K5KG	184,860	U	W4MYA	236,526	U	AA8U	213,300	U	NR5M	234,630	U	K7BV	269,706	U
KE2DX	179,868	U	N2QT	165,426	U	N8SNM	154,596	U	W5GN	169,692	U	K6AW (atN6RO)	232,892	U
N1XS (atKB1H)	161,950	U	W4RM	118,184	U	WE9A	77,736	U	N5QQ	112,180	U	K6NO	221.832	U
W2PS	156.736	U	WQ5L	57,986	U	ND5S	67,466	U	N5TY	104,754	U	K6RIM	186,914	U
K3WW	155,156	U	N6SLX	42,818	U	KB9MDL	57,750	U	WA0SXV	98,750	U	K6ANP	186,282	U
W3GH	238,422	M	W4MR (at AA4NC)	248,376	M	K9NS	288,824	M	KT0R	263,070	M	KL7Y	325,322	M
KI1G	237,000	M	W4WA	214,090	M	KE9I	199,396	M	NA5B	243,636	M	K7IR	276,026	M
KY2J	227,678	M	W4ATC	185,016	M	WB9JBF	183,912	M	AB0S	243,478	M	W6YX	262,122	M
K2NNY	208,402	M	W4AQL	179,488	M	WZ8P	169,218	M	K5MR	241,424	M	W6UE	252,326	M
K2KV	200,502	M	W5DDX	162,708	M	W8SH	158,652	M	W7CT	232,418	M	N6KI	234,788	M

Plaque Winners

Only plaques which show a sponsor will be awarded. If you have won an unsponsored plaque, you may purchase it for $60. If you, your club or business is interested in sponsoring any of the unsponsored categories, call Dan Henderson N1ND at ARRL HQ. Winners denoted with an asterisk (*) are second place Division finishers have been awarded the Division plaque where the Division winner have won their overall category in the contest.

Category	*Winner*	*Sponsor*
Overall High Power	WP3R (KE3Q,op)	Carl Cook AI6V
Overall Low Power	VE4GV	Ken Adams K5KA
Overall QRP	N7VY	QRP Amateur Radio Club International
Overall Single Unlimited	K7BV	ARRL Contest Branch
Overall School Club College Div	W7ASU	Mark Smith KD4JLC Memorial
Overall Multi-Op	KL7Y	Central Texas DX & Contest Club
Atlantic Div High Power	K3CR (KB3AFT,op)	North Coast Contesters
Atlantic Div Low Power	K1HTV	
Atlantic Div QRP	WZ2T	
Atlantic Div Single Unlimited	K3WW	
Atlantic Div Multi-Op	W3GH	Mark Sickmeyer, KB3GJ, Memorial
Central Div High Power	WB9Z	Society of Midwest Contesters
Central Div Low Power	KK9A	Society of Midwest Contesters
Central Div QRP	KX9X	Don Haney, W9WW
Central Div Single Unlimited	WE9A	
Central Div Multi-Op	K9NS	Don Haney, W9WW
Dakota Div High Power	W0SD (WD0T,op)	Minnesota Wireless Association
Dakota Div Low Power	N0KK (at N0AT)	Minnesota Wireless Association
Dakota Div QRP	N0UR	Tod Olson, K0TO
Dakota Div Single Unlimited	K0COM	Minnesota Wireless Association
Dakota Div Multi-Operator	KT0R	Minnesota Wireless Association
Delta Div High Power	W5WMU	
Delta Div Low Power	K4WX	
Delta Div QRP	W9WI	
Delta Div Single Unlimited	WQ5L	
Delta Div Multi-Operator	W5DDX	
Great Lakes Div High Power	K8DX	North Coast Contesters
Great Lakes Div Low Power	KU8E	
Great Lakes Div QRP	WA8RJF	
Great Lakes Div Single Unlimited	AA8U	
Great Lakes Div Multi-Operator	WZ8Pr	
Hudson Div High Power	W2RE	
Hudson Div Low Power	W2ENY	Troy ARA, N2TY
Hudson Div QRP	KD2TT	
Hudson Div Single Unlimited	K5KG	
Hudson Div Multi-Operator	KY2J	
Midwest Div High Power	K0OU	
Midwest Div Low Power	W0MW	
Midwest Div QRP	KI0MB	
Midwest Div Single Unlimited	WA0SXV	
Midwest Div Multi-Operator	AB0S	
New England Div High Power	WB1GQR (W1SJ,op)	Ed Parsons K1TR
New England Div Low Power	KZ1M	
New England Div QRP	W1XV	QRP Club of New England
New England Div Single Unlimited	N1XS (at KB1H)	
New England Div Multi-Operator	KI1G	
Northwestern Div High Power	W7WA	
Northwestern Div Low Power	K7QQ	
Northwestern Div QRP	K7ED (WA0RJY,op)	
Northwestern Div Single Unlimited	KL1V	
Northwestern Div Multi-Operator	K7IR	
Pacific Div High Power	KH7R (KH6ND,op)	
Pacific Div Low Power	N6CY	Jim Hollenback, NK6L
Pacific Div QRP	N6MU (at N6NB)	
Pacific Div Single Unlimited	K6AW (at N6RO)	
Pacific Div Multi-Operator	W6YX	
Roanoke Div High Power	K1GG	
Roanoke Div Low Power	W4OC	Jim Stevens, K4MA
Roanoke Div QRP	W2CS	
Roanoke Div Single Unlimited	W4MYA	
Roanoke Div Multi-Operator	W4MR (at AA4NC)	Shenandoah Valley ARC
Rocky Mountain Div High Power	K2EI	
Rocky Mountain Div Low Power	K0UK	
Rocky Mountain Div QRP	KI0II	
Rocky Mountain Div Single Unlimited	K8EI	
Rocky Mountain Div Multi-Operator	W7CT	
Southeastern Div High Power	WC4E (K9PG,op)	
Southeastern Div Low Power	K4XS	
Southeastern Div QRP	NA4CW	
Southeastern Div Single Unlimited	W4ZW	
Southeastern Div Multi-Operator	W4WA	
Southwestern Div High Power	K6LL	
Southwestern Div Low Power	K6RO	
Southwestern Div QRP	W6TKX	Ray & Donna Day, N6HE & N6HTH
Southwestern Div Single Unlimited	no winner	
Southwestern Div Multi-Operator	W6UE	
West Gulf Div High Power	K5TR (at W5KFT)	
West Gulf Div Low Power	K5KA	
West Gulf Div QRP	N5XJ	
West Gulf Div Single Unlimited	NR5M	
West Gulf Div Multi-Operator	NA5B	Oklahoma DX Association
Canada High Power	VE6JY (VE5MX,op)	
Canada Low Power	VE5SF	
Canada QRP	VE4VV	
Canada Single Unlimited	no winner	
Canada Multi-Operator	VE6AO	

finishes for the place and show slots in the category. No new division records were set in ARRL divisions in this category.

Breaking out of the pack in the homestretch of the Single Op QRP category was Gordon, N7VY, who finished in front of Derrick, VE4VV and John, N6MU (guest jockey at N6NB). The 139,629 points posted by Gordon provided a comfortable margin of victory over Derrick's new Canadian record of 128,928. Again, no new ARRL division records were set for this category.

All of the division winners in the new Single Op Unlimited category established division records in this first-year category. Emerging as the first-time champion in the category is Dennis, K7BV, with 269,706 points. The place horse in the category was Bob, W4MYA, with George, NR5M, finishing a close third by about a neck. The experts predict some good competition in this race in years to come.

It's hard to compare a multiop entry to a single thoroughbred. Perhaps a better analogy might be to compare it to the Pony Express. Taking turns and riding their horse to victory in this category were the ops at KL7Y. Their score of 325,322 brings them home a couple of lengths ahead of the team at K9NS (who set a new Central Division record in this category, the only multi-op records set this year.) The win by KL7Y and WA2GO is the first time that an Alaska station has won any category of SS, and beats the old AK record of AL7CQ by nearly 100,000 points! Finishing hard on the rail were the ops at K7IR for a strong third place showing.

Thirteen schools participated in the School Club category. Winning the Mark Smith, KD4JLC, Memorial as the top scoring School Club, College Division entry, were the ops at W7ASU at the Arizona State University. (The plaque will be awarded annually to the top scoring School Club College Division entry.) The Technical School Division category was won by WB4TOP from the Wake (North Carolina) Technical College. The top-scoring Secondary/Other School Division were the ops at KC7KFF at the Carl Hayden Community High School. The School Club category ARRL Sweepstakes is for stations that are operated exclusively by the students and faculty/staff at the institution. Congratulations to these outstanding students and their faculty and staff.

No winning thoroughbred achieves its stature in isolation. We have heard of Calumet Farms, Darby Dan Farms and other championship stables in Kentucky. In Sweepstakes, we look to the championship "stables" of operators—the contesting clubs. The champion Unlimited Category stable in the 1999 November Sweepstakes is the outstanding Northern California Contest Club. They edged out the Potomac Valley Radio Club by a combined CW and Phone score of 11,713,328 to 11, 611,242. Every log can make a difference in the club competition. The 139 logs credited to the PVRC were the most submitted for club competition credit and contributed to the close finish. In an equally close finish, the fabled Society of Midwest Contesters edged out the Southern California Contest Club in the Medium Club category by a score of 5,093,584 to 4,916,236. The Hudson Valley Contesters and DXers continued their streak of fine finishes by winning the Local Category Competition with a combined score of 1,144,978. Congratulations to the 70 clubs—totaling 1120 log submissions!

If you would like to receive a copy of your log checking summary, send an e-mail to **N6TR@arrl.org**. Be sure to include in the subject line your call sign and "1999 SS Phone report request." Many thanks to the log checkers for all of their hard work.

The 2000 ARRL November Sweepstakes will be as challenging as ever. Already the big-gun stations are planning and prepping while the smaller pistols explore new ways to improve their skills and standings. One thing is certain: Horses train year round and so do contesters. One new wrinkle this November will be that the Cabrillo file format will be required for *all electronically generated logs*. Don't wait until the last minute to upgrade and explore your logging software. Make certain your software will output the Cabrillo file format. This format is designed to allow electronic entries to be entered into the contest database by machine, instead of by hand. It will reduce the number of errors caused by manual data entry and help improve the Contest Branch's service to the participants.

Clinching a Clean Sweep becomes a bit more difficult this fall. The new West Central Florida ARRL section, created this past January, becomes the 80th section required for the Clean Sweep. Make certain your logging software has the most up-to-date section lists. If you are still logging in paper, remember to obtain the most recent official entry summary sheets. One of the biggest problems in processing logs for our contests are hand-written entries that are illegible or do not include all of the required information on the summary sheet. Help us give you the most accurate results possible by using current forms. You can obtain complete up-to-date forms either by downloading them from the Contest Branch Web page at **http://www.arrl.org/contests/forms**, or by sending an SASE with a note requesting the forms to the Contest Branch at ARRL Headquarters. (Send the request for forms before the contest date. If you wait until afterward, your request may be delayed because of the large number of paper entries received after the contest.)

The flags are set to go on the starting gates for the 2000 ARRL November Sweepstakes Phone Sweepstakes. The "Call to the Post" will sound on November 18-20. The complete rules will appear in the October issue of *QST*. Get your station prepared for our version of the annual "run for the roses."

Affiliated Club Competition

	Score	Entries
Unlimited Category		
Northern California Contest Club	11,713,328	119
Potomac Valley Radio Club	11,611,242	139
Yankee Clipper Contest Club	6,421,482	79
Minnesota Wireless Assn	5,052,038	63
Frankford Radio Club	2,756,184	34
Medium Category		
Society of Midwest Contesters	5,093,584	48
Southern California Contest Club	4,916,236	38
North Texas Contest Club	3,730,958	36
Tennessee Contest Group	3,411,670	42
Mad River Radio Club	2,652,394	33
Florida Contest Group	2,508,672	21
Western Washington DX Club	2,243,162	25
South East Contest Club	1,897,096	20
River City Contesters	1,895,792	11
Texas DX Society	1,843,204	15
North Coast Contesters	1,626,914	20
Oklahoma DX Assn	1,254,742	12
Motor City Radio Club	1,138,378	36
Rochester (NY) DX Assn	1,080,128	18
Central Texas DX and Contest Club	1,018,996	7
Kentucky Contest Group	759,904	9
Rip Van Winkle ARS	713,944	17
Willamette Valley DX Club	693,274	7
Eastern Iowa DX Assn	647,826	9
Grand Mesa Contesters	583,512	7
Mile High DX Assn	566,216	8
Central Arizona DX Assn	529,482	8
Order of Boiled Owls of New York	509,674	5
Lincoln ARC	507,042	7
Kansas City DX Club	489,590	3
Salt City DX Assn	462,566	4
Radio Amateurs of Northern Vermont	461,866	4
South Jersey Radio Assn	452,524	12
Woodbridge Wireless	414,534	10
AK-SAR-BEN	411,096	8
Kankakee Area Radio Society	377,408	4
Hazel Park ARC	377,032	17
Schenectady ARA	372,468	7
Western New York DX Assn	315,840	6
Northern Arizona DX Assn	301,094	7
Central Michigan ARC	228,622	8
Twin City Ham Club	204,498	4
Murgas ARC	182,474	6
Radio Club of Tacoma	125,542	5
Carolina DX Assn	116,492	6
Mother Lode DX/Contest Club	115,586	4
Franklin County ARC	66,808	3
Local Category		
Hudson Valley Contesters and DXers	1,144,978	8
Federation of Amateur Radio	696,626	9
Utah Contest Club	607,868	4
Ozark Contest Club	555,364	9
Southwest Idaho Contest Club	488,586	5
Central Oregon DX Club	305,934	3
Eastern Connecticut ARA	292,926	3
Great Falls Area ARC	288,140	3
Bergen ARA	283,834	6
Magnolia DX Assn	246,976	3
Vicksburg ARC	220,734	3
Green River Valley ARS	209,160	5
Hamfesters Radio Club	183,890	10
West Park Radiops	163,228	6
Northern New York Contest Club	153,834	5
Loudoun ARG	150,352	3
Sussex County ARC	127,616	3
Baton Rouge ARC	127,396	4
West Essex ARC	126,002	3
Meriden ARC	112,498	4
Williamsburg Area ARC	112,178	3
Great South Bay ARC	111,236	4
Sterling Park ARC	37,920	3

Can we guess from the big smile and the broom what Dick, K6HRT, is celebrating?

SOAPBOX

How about a new precedence "J" next year for "I'll only use packet to find Jay, VY1JA, after panic sets in?" (K5VG)… Saturday morning I was still assembling the new beam so I started 2 hours late and the amp died 6 hours into the contest, but I still managed to get my first sweep! (K6EP)… Wow! What a difference a few sunspots make! (K6TSG)… First SS and had a ball. Found out that a Clean Sweep is not all that easy to come by. Could have made more contacts and points but was looking for the last two sections to get the coffee mug. Oh well, already looking forward to next year. (K7SAM)… Weird conditions—would work a west coast section and then the next contact would be with a contiguous state (K8KFJ)… First time we have swept 'em… and Alaska called us! (KE0BX)… Great fun, even though I missed a Sweeps "hat trick" (three sweeps in a row) by one multiplier (KE4OAR)… Wow! What an experience for my first contest. Only single band, 10 meters, but I had a blast (KF4MFQ)… This is the first time I spent this much time in a SSB contest. Thanks to all who waited while I tried to figure out how to type and talk at the same time. Now I know what a voice keyer is for (KU7Y)… While I was calling VY1BE for the last section to make a Clean Sweep, my foot pedal came apart and made the transmitter stick. I jumped out of the chair and picked it up to find that one of the screws disengaged and the spring popped out. I was able to key the transmitter using my finger stuck inside the pedal. I was VY1BE's last contact for NWT and a Clean Sweep! (KW4DA)… .Endless runs. Awesome! (N0AH)… First year in many on phone. First year ever for QRP. Enjoyed both immensely. Great to hear the voices of so many old friends who are still operating in the sweepstakes. Good operators this year (N0SS)… New QTH + New computer + New logging program = confused operator. Just wait 'til I get this all sorted out (N2NFG)… Great fun! Used search and pounce to my best showing in SS SSB! Loved 80m on a dipole (N4EL)… Conditions were good but penetrating the continental US on 10 meters with a dipole was very difficult, especially when DX stations in Europe were calling to work me in KP4 land (N6VUY)… The CW SS was "CATs" only, W4 and K0. However, in the SSB weekend, immediately after signing off with K0CAT, I was called by K9ARF (N6ZFO)… My 14-year-old daughter Crystal, W9IOU, and I had a great time contesting together. 78 out of 79 sections. Next year we *will* be using packet spots (N9IO)… We've been doing this contest since 1992, and this was the fastest we ever worked the Clean Sweep (10 1/2 hours)! The band conditions were excellent this year (NO2X)… Good contest! Sure miss my beam (W0EBA)… Operated from the W3LPL super-station. It's nice to have friends with aluminum in high places! (W2GG)… Very hard for stations to hear my 3 W from inside the Grand Canyon, but it was fun anyway (W4IM)… This contest was the first operation of W7ASU since its recent reorganization. Our goal for the contest was to reach 1000 QSOs. With a lot of effort, (and perhaps all that caffeine), we were able to achieve our goal just before our time expired. (KC7EFP)… A very fun event for the budding contesters. There was a minor riot in the shack when SC section went into the log for a sweep. The boys are all looking forward to their Clean Sweep mugs (W7DX)… We had a blast; it was our first contest ever as a club! The goal was to get on the air and have fun and we did (W8DYY)… There was a Saturday night thunderstorm—a rare thing in November. This caused enough discharge to melt the ladder line to the dipole (WB1GQR)… My first contest after having my ticket for 26 years! A whole new adventure in ham radio (WB5TVI)… Finally a sweep (WD2K)… As seen in November *QST*, I used N3FJP's free SS logging program and will never use a pencil again (WI9B)… Was better than ever (WI9M)…

Scores

CW scores are listed first, followed by phone. Within each Section, scores are listed in descending order by entry category, with single ops followed by multi-operators. Line scores list call sign, score QSOs, multipliers, hours, class (Q = QRP, A = Low Power, B = High Power, U = Single Unlimited, M = Multioperator, S = School Club).

PHONE

1

Connecticut

N1TM	16,390	149	55	24	Q
W1CTN	141,252	894	79	24	A
W1RPG	76,314	483	79	20	A
WA1LJD	65,570	415	79	13	A
KA1MWX	65,364	419	78	19	A
NX1Q	57,828	366	79	10	A
N1VIM	32,400	225	72	15	A
WA1ZEK	30,888	198	78	17	A
WB8IMY	23,868	153	79	9	A
W1SAM	19,468	157	62	7	A
KE1AU	17,080	122	70	24	A
W1XF	16,986	149	57	15	A
W1ECH	16,368	124	66	2	A
K1RO	9,506	97	49	2	A
N1KLB	3,816	53	36	24	A
N1GNV	3,528	49	36	4	A
WB1CZX	800	25	16	4	A
W1WEF	240,160	1520	79	24	B
N1XS (atKB1H)	161,950	1025	79	24	U
W1QK	112,812	714	79	11	U
N1NQD	87,690	555	79	23	U
K1JN	52,772	334	79	15	U
W1AW (W1VT,op)	39,578	257	77	9	U
KE1IH	38,376	246	78	16	U
W1NRG	38,760	255	76	22	M
K1LEE (+KB1DNC)	29,240	215	68	15	M
WS1F (+WA1PMA)	20,850	139	75	11	M

Eastern Massachusetts

K1VUT	157,210	995	79	24	A
K1EP	144,570	915	79	24	A
N1DD	141,410	895	79	24	A
K1HT	78,624	504	78	10	A
KC1SQ	51,012	327	78	11	A
K1GU	48,640	320	76	14	A
W1MA	38,106	261	73	7	A
W1TI	15,498	123	63	9	A
WA1OLV	14,592	128	57	5	A
W1SR	7,480	85	44	3	A
W1TUM/MM	3,200	50	32	2	A
WA1WFH	2,106	39	27	5	A
K1UCA	128	8	8	1	A
KA1UQ	149,626	947	79	21	B
W1OHM	63,080	415	76	14	B
K5MA	46,644	338	69	5	B
K1TH	42,980	307	70	11	B
K1SM	16,740	155	54	24	B
K1JE	50,244	318	79	14	U
AE1M	44,928	288	78	22	U
K1NU	29,704	188	79	12	U
K1OA	12,482	79	79	24	U
K1FV	1,020	30	17	2	U
W1MX (KT1D,KB1CGZ,W1GSL,ops)	128,928	816	79	24	M
W1AF (K1XQ,N1EXG,N1QZY,ops)	74,100	475	78	18	M
N1OEF (+logger)	22,400	175	64	14	M

Maine

NY1S	54,444	349	78	18	A
K1YCS	39,300	262	75	8	A
W1LIC	28,400	200	71	10	A
N1MHB	21,780	165	66	9	A
KB1CKQ	18,360	135	68	24	A
KD1O	15,344	137	56	24	A
KA1OQ	12,500	125	50	5	A
KD1OG	6,800	85	40	10	A
W1AO	125,136	792	79	11	B
KT4NT (+KF4IHS)	52,704	366	72	24	M
N1NUA (+W1DLC)	51,282	333	77	19	M

New Hampshire

W1XV	26,554	187	71	12	Q
WB1GEX	105,070	665	79	23	A
KZ1O	68,248	449	76	24	A
W1VL	46,956	301	78	24	A
AE1T	41,184	264	78	7	A
WB1EDI	41,040	270	76	22	A
WA1T	12,482	79	79	12	A
N1HKO	147,576	946	78	14	B
K1DG	75,366	477	79	5	B
NM1W	49,454	313	79	24	U
KC1F	48,664	308	79	4	U
WA1ZYX	24,150	175	69	6	U
KD1LZ	16,324	106	77	24	U
AF1T (+WA1VKO)	152,470	965	79	19	M
WK1P (+WA1ZYX, WA1WJE, N1KWF)	92,246	599	77	18	M

Rhode Island

K1SD	169,534	1073	79	22	A
K1VSJ	98,098	637	77	18	A
K2MN	46,800	312	75	13	A
AA1RI	10,400	104	50	16	A
W1OP (K1PLX,op)	89,680	590	76	24	B
KI1G (+WF1B,NB1U)	237,000	1500	79	22	M
AA1II (+KE1JA,N1IVB,N1KRU)	77,688	498	78	21	M

Vermont

N0ICI	115,972	734	79	23	A
AA1SU	110,916	702	79	21	A
W1ZN	19,734	143	69	8	A
WX1O	15,132	97	78	24	A
K1GAP (W1SA,op)	14,734	139	53	3	A
N1BCL	6,396	82	39	12	A
WB1GQR (W1SJ,op)	262,122	1659	79	24	B
KK1L	204,768	1296	79	24	B
K1HD	133,536	856	78	19	B
W1US (+K1LOM)	93,694	593	79	24	M

Western Massachusetts

KZ1M	192,602	1219	79	24	A
KX1X	78,936	506	78	18	A
K5ZD	41,192	271	76	4	A
W1TO	39,150	261	75	10	A
K1DNX	23,182	173	67	24	A
K1KBU	17,160	130	66	13	A
N1BFF	16,432	104	79	10	A
W1JK	55,142	349	79	8	B
W1YK (K1GRS,N1PFC,N2YHK,N3VUN,N8YXR,ops)	80,264	508	79	15	M
NC1I (+W1QA,N1DPM)	74,328	489	76	7	M
W1MBT (+K1TS, N1ZXL)	2	1	1	24	M

2

Eastern New York

WV2N	20,160	160	63	24	Q
KG2H	2,752	43	32	4	Q
W2ENY	123,556	782	79	23	A
K2UF	84,056	532	79	21	A
AA2QR	83,296	548	76	16	A
N2SA	77,736	492	79	19	A
KA2VBI	66,672	463	72	24	A
KF2SC	44,506	289	77	24	A
N2KN	42,000	280	75	24	A
N2MTG	38,340	270	71	12	A
WB2SPN	36,210	255	71	13	A
WD2K	32,760	210	78	24	A
WB2BTJ	31,416	204	77	24	A
K2RI	29,394	213	69	10	A
KB2SSZ	27,060	205	66	19	A
WT2JG	26,270	185	71	13	A
WB2KHE	18,998	161	59	11	A
W2WC	13,776	123	56	24	A
WK2S	11,766	111	53	6	A
KE2WO	10,400	100	52	4	A
W2YK	8,096	88	46	3	A
KC2AGM	7,392	84	44	11	A
WA2FTI	7,200	80	45	10	A
W1NXB	3,654	63	29	16	A
N2XPW	2,430	45	27	3	A
W2NRD	1,856	32	29	4	A
KC2CRO	1,428	34	21	2	A
W2WHO	782	23	17	4	A
W2RE	225,624	1428	79	24	B
N2LH	141,252	894	79	22	B
W2GDJ	31,512	202	78	24	B
KM2E	22,862	161	71	24	B
KE2DX	179,868	1153	78	24	U
W2PS	156,736	992	79	22	U
N2DVQ	125,664	816	77	24	U
K2WG	35,720	235	76	18	U
KY2J (+WA2JQK)	227,678	1441	79	24	M
N2POS (+N2PEN,WB2FOB,KC2DZB)	145,992	924	79	24	M
N2SQW (+KC2DMI)	78,078	507	77	22	M
NO2X (+NN2V)	72,048	456	79	15	M
KB2KDY (+KB2SRC)	29,536	208	71	19	M
WB2TCV (+ops)	26,130	195	67	24	M
WA2UMX (KG2H,AA2PS,ops)	3,264	48	34	2	M

Northern New Jersey

W2AZK	39,672	261	76	19	Q
K2WA	61,620	395	78	20	A
NA2AA	52,416	336	78	14	A
WB3CRB	49,200	328	75	12	A
WA2LXE	47,804	323	74	21	A
KB2D	34,040	230	74	24	A
W2FMB	30,800	200	77	14	A
K2BOG	28,282	179	79	11	A
N2LK	27,604	206	67	13	A
N2XR	12,600	100	63	6	A
W2UDT	12,480	104	60	10	A
WB2IDV	9,592	109	44	10	A
WA2ASQ	5,800	100	29	2	A
WB2AZE	4,810	65	37	5	A
W2VU	4,480	64	35	3	A
WA2QHL	4,012	59	34	14	A
N2NYP	3,348	54	31	8	A
WQ2M	166,848	1056	79	24	B
W2HCA	62,884	398	79	12	B
K1QQ	22,910	145	79	19	B
K5KG	184,860	1170	79	21	U
N2KJM	100,172	634	79	17	U
KZ2A	29,072	184	79	14	U
AD2P	21,140	151	70	13	U
N2NHN	2,200	50	22	1	U
N2ED (+AA3JV)	117,394	743	79	13	M
AB2DE (N2KPB,KC2AVE,KB2IZB,ops)	64,500	430	75	22	M
N2TTT (+N2NHN,KC2DLD)	63,200	400	79	23	M
N2WM (+N2ATE,KB2LHH)	62,216	404	77	22	M
K2GQ (WA2JSB,KC2DUW,N2WKS, N2LMU,N2AMQ,KC2FHK,ops)	44,400	296	75	24	M
N3RB (+KC2EXL)	10,560	110	48	8	M
NN2T (+NO2T)	5,978	61	49	20	M

Northern New York

WZ2T	31,382	221	71	15	Q
N2JNZ	4,830	69	35	10	Q
N2USN	48,528	337	72	24	A
NG2C	42,920	290	74	19	A
WB2BAU	11,342	107	53	9	A
K2NNY (K2CS,N2TWI,AF2K,AE2T,K2DB, ops)	208,402	1319	79	24	M

NYC-Long Island

KD2TT	72,996	474	77	22	Q
AA2VK	33,880	242	70	19	Q
N2TO	7,200	90	40	6	Q
N2NB	117,236	742	79	18	A
KA2D	49,452	317	78	17	A
WB2AYQ	42,744	274	78	18	A
WB2LOS	14,112	112	63	13	A
N2KYP	12,870	117	55	6	A
WA2RXS	11,128	107	52	9	A
N2MUN	12,482	79	79	10	B
N2FF	48,672	312	78	15	U
K2QMF	35,420	230	77	10	U
K2KV (+KS2G,W2LK)	200,502	1269	79	24	M
WM2V (+K2DO,N2GA)	200,148	1283	78	24	M
W2IW (+N2OX,AB2GB,KC2BPS, KC2ACL,KC2EPU)	81,744	524	78	24	M
N1XL (+K2GH)	61,778	391	79	18	M

Southern New Jersey

W2ORA	40,650	271	75	13	A
W2TV	40,040	260	77	9	A
KC2AZU	39,900	266	75	20	A
W2FGY	25,760	184	70	17	A
KB2MMI	25,080	190	66	10	A
KD2P	24,150	175	69	5	A
KU4SX	8,924	97	46	8	A
K2MK	5,796	69	42	2	A
NJ2DX	1,806	43	21	3	A
N2MM	204,452	1294	79	22	B
N2SCJ	8,372	91	46	24	U
N2RM (+N2NC)	93,632	608	77	24	M
K2VS (+K2VT)	47,272	311	76	24	M

Western New York

NQ2RP (WB2VUO,op)	18,270	145	63	24	Q
N2VPK	8,554	91	47	24	Q
W2KA	71,100	450	79	14	A
WB2ABD	53,088	336	79	10	A
NA2A	48,020	343	70	14	A
K2YW	44,840	295	76	16	A
W2FE	40,256	272	74	13	A
KF2VX	39,600	264	75	15	A
N2CU	36,314	271	67	4	A
K2CF	32,802	231	71	20	A
N2CK	28,968	213	68	24	A
N2LQQ	27,048	196	69	10	A
N2DM	13,400	134	50	11	A
WA2RZJ	13,328	136	49	24	A
KA2CNG	12,100	121	50	6	A
W1TY	12,000	80	75	10	A
WB2LWM	4,550	65	35	3	A
KG2NO	1,682	29	29	4	A
N2MF	215,196	1362	79	24	B
W2RW	85,316	554	77	10	B
N2XT	84,846	537	79	22	B
WB2OSM	56,628	363	78	24	B
WR2V	37,650	251	75	13	B
W2EZ	28,280	202	70	13	B
KC2TR	23,700	150	79	17	B
K2FR	17,568	144	61	3	B
AA2MU	139,830	885	79	22	U
K2ZT	116,446	737	79	24	U
NG2P	83,898	531	79	14	U
K2FU	71,574	453	79	20	U
WB2WPM	10,608	104	51	24	U
W2SEX	64,526	419	77	24	M
KV2W (+KG2BW,WA2RZG)	25,988	178	73	21	M
K2IWR (KB2FAF,KB2LUV,KB2NCW, K2DN,N2MRE,ops)	11,128	107	52	24	M

3

Delaware

N8NA	58,672	386	76	9	A
KA3ZHM	30,562	259	59	14	A
W3GL	23,232	176	66	10	A
W3DA	12,482	79	79	12	A
KC3AJ	18	1	9	24	A
W3PP	196,868	1246	79	21	B
NY3C	58,656	376	78	9	B
N3KW	127,664	808	79	24	U
K3DOV (KA3JCA,N3KRX,N3FZP, N3BUH,KB3EAI,KB3DGL,N3WCB,ops)	75,972	487	78	18	M

Eastern Pennsylvania

N3RN	9,936	108	46	24	Q
KG2FH	40,404	273	74	24	A
N8LXR	38,500	275	70	12	A
WB3IZF	35,074	247	71	12	A
W3SSS	26,390	203	65	11	A
W3NTD	26,004	197	66	8	A
N3RM	23,716	154	77	6	A
KE3TC	23,100	165	70	10	A
W3DWH	22,654	241	47	9	A
W3DZH	19,872	144	69	4	A
N3WL	19,180	137	70	15	A
WT3P	12,992	116	56	4	A
K3CKO	10,918	103	53	11	A
W3KM	10,560	110	48	24	A
W3SD	10,120	110	46	3	A
AG3G	4,104	57	36	4	A
K3TEM	240	12	10	1	A
KY3ORK (KC3TL,op)	153,418	971	79	15	B
N3FA	96,380	610	79	15	B
K3ZA	75,504	484	78	5	B
AA3TT	36,708	266	69	9	B
K3TUF	22,752	158	72	24	B
WA2POW	20,382	129	79	11	B
N3TA	3,344	44	38	4	B
K3WW	155,156	982	79	24	U
W3IZ	95,760	630	76	24	U
K3SV	47,084	298	79	24	U
K3II	28,424	187	76	24	U
WY3T (+W3MEL,W3DSX)	133,036	842	79	20	M
W3AJ (AC3V,AA2KV,KB3DDV,ops)	16,128	126	64	12	S

Maryland-DC

WD3P	280	14	10	1	Q
K1HTV	137,592	882	78	19	A
W3SY	115,656	732	79	24	A
N1WR	113,602	719	79	23	A
W3UJ	94,010	595	79	20	A
K1RZ	83,100	554	75	11	A
N3II	77,262	489	79	24	A
KE3FB	73,628	466	79	24	A
N3YUG	50,312	331	76	15	A
WD3A	42,486	291	73	24	A
KF3BN	36,480	240	76	17	A
K3HH	36,450	243	75	9	A
K3DSP	36,210	255	71	18	A
N3EYB	33,120	230	72	17	A
W3CP	27,876	202	69	12	A

W3DAD 15,748 127 62 7 A
W3EE 14,514 123 59 24 A
N3ZPL 10,980 122 45 12 A
WB4FDT 10,170 113 45 5 A
KA3UIH 7,878 101 39 7 A
N3WIZ 4,032 63 32 10 A
W3FQE 3,300 50 33 15 A
K3MM 251,852 1594 79 24 B
W2GG 233,998 1481 79 24 B
K3ZO 231,154 1463 79 24 B
K2PLF 200,502 1269 79 24 B
N3HBX 149,400 996 75 24 B
K3SA 115,340 730 79 16 B
KF3BE 77,420 490 79 24 B
N3AM 44,548 301 74 6 B
W3ZZ 32,100 214 75 24 B
W3INK 31,222 233 67 9 B
W3GN 2,100 42 25 3 B
K3DI 105,860 670 79 23 U
AJ3M 76,788 486 79 24 U
N3HUV 59,724 378 79 14 U
W3YD 50,232 322 78 13 U
K3IXD 39,000 260 75 11 U
WR3L (+K3FT,AA3SC,N3WJA) 154,840 980 79 20 M
W3LJ (+K3NCO) 50,820 330 77 18 M
N3FJP (+KA3SEQ) 25,754 163 79 24 M

Western Pennsylvania

WA3HAE 111,232 704 79 17 A
WA3SES 83,314 541 77 15 A
W7LPF/3 58,982 383 77 17 A
AA3LX 43,608 276 79 18 A
WB3AVD 28,408 212 67 12 A
KE3KD 21,912 166 66 24 A
AA3II 15,480 129 60 24 A
K3TG 13,664 112 61 4 A
N3KEJ 10,578 123 43 13 A
N3ZGT 2,600 50 26 5 A
K3CR (KB3AFT,op) 257,382 1629 79 24 B
K3MD 48,048 312 77 10 B
KA3WIK 11,232 108 52 7 B
WW3S 11,400 75 76 6 U
W3GH (+N3PUR, K3MD, W9XR) 238,422 1509 79 24 M
W3KWH (W3RJM,N3ZEN,W3SDV, KA3JKS,ops) 29,240 215 68 14 M

4

Alabama

W4DEC 25,024 184 68 13 Q
W4NTI 96,252 617 78 19 A
KC4TEO 61,908 402 77 14 A
W4DWS 51,792 332 78 15 A
K4OE 25,800 172 75 16 A
W5DLM 15,840 120 66 9 A
KA0ZPP/4 286 13 11 3 A
K4WI 219,936 1392 79 23 B
KU4BL (+KF4BEE,KF4HFF) 18,886 133 71 15 M

Georgia

KW4E 29,252 206 71 12 Q
KU4OH 75,366 477 79 24 A
K4OGG 65,570 415 79 24 A
N4NFI 51,744 336 77 18 A
K4PK 51,636 331 78 15 A
WX8V 46,332 297 78 18 A
AE4SS 39,024 271 72 10 A
AA4LR 33,696 234 72 7 A
WB4AYN 25,564 166 77 9 A
K9AY 19,520 160 61 5 A
N4VMD 11,232 104 54 24 A
K4BAI 163,530 1035 79 20 B
N4MNA 39,888 277 72 15 B
W4WA (+K4IDX) 214,090 1355 79 24 M
W4AQL (KE4QLI, N3NGG, WJ2RM, KU4WJ, W4ATL, ops) 179,488 1136 79 24 M
K0HT (K4BEK,N0JTX,ops) 14,000 100 70 16 M

Kentucky

N4OKX 163,688 1036 79 24 A
AC4PY 71,100 450 79 22 A
W4LC 46,332 297 78 11 A
AE4GH 36,036 234 77 18 A
KF8VS 26,364 169 78 20 A
WA4YJB 25,718 167 77 24 A
K4PXW 19,080 159 60 14 A
KD4PYR 15,792 141 56 24 A
KA0ZIA/4 4,964 73 34 8 A
KC4WQ 242 11 11 1 A
K4AO 139,062 903 77 24 B
K4IU 18,542 127 73 24 B
N4XM 9,506 97 49 3 B
KD4SN 53,562 339 79 22 U
KT4ZX (+WB4OSS, KG4BIG, KU4A, KQ4MG) 126,558 801 79 24 M
KF4BAR (+ops) 10,608 104 51 24 M

North Carolina

W2CS 60,988 386 79 14 Q
KO4PY 10,272 107 48 4 Q
N4ZAK 5,440 85 32 12 Q
N2NFG 119,606 757 79 24 A
KW4DA 92,272 584 79 24 A
K4QPL 76,472 484 79 16 A
N4MO 74,024 487 76 12 A
W4QA 47,874 303 79 12 A
KZ2I 46,354 301 77 11 A
AD4IE 40,200 268 75 11 A
N2BT 23,892 181 66 5 A
KF4OAD 23,288 164 71 14 A
K4WES 16,352 146 56 11 A
AE4EC 15,200 152 50 10 A
KT4EM 14,514 123 59 10 A
NZ4DX 14,260 115 62 24 A
WS4I 10,656 111 48 5 A
KS4S 6,240 78 40 5 A
W2VMX 6,160 70 44 3 A
N4VHK 4,760 85 28 1 A
KV4CN 2,968 53 28 6 A
K4MA 192,602 1219 79 24 B
N4AF 165,742 1049 79 17 B
AA4S 133,984 848 79 18 B
K3KO 40,404 273 74 5 B
K2AV 39,130 301 65 24 B
W4YDY 23,530 181 65 7 B
W4FPJ 10,290 105 49 24 B
NT4D 42,818 271 79 9 U
W4MR (atAA4NC) (KI7WX,AA4NC, K4HA,NX9T,KS4XG,ops) 248,376 1572 79 24 M
W4ATC (N3QYE,KF4ARS,ops) 185,016 1186 78 24 M
W4WS (at N4VHK) (+KU4BO) 12,482 79 79 11 M
WB4TOP (W4FMN, KB4VTJ, WD4BMA, KG4DPW, ops) 25,350 195 65 19 S

Northern Florida

K4XS 240,552 1542 78 24 A
WB4OMM 150,100 950 79 24 A
KB4N 76,000 500 76 16 A
W0EBA 38,250 255 75 12 A
KA4HHM 33,600 240 70 24 A
WB4IHI 20,160 140 72 9 A
WA8NAZ 16,132 109 74 9 A
WW4DM 14,012 113 62 12 A
WC4E (K9PG,op) 289,930 1835 79 24 B
K4VUD 227,678 1441 79 20 B

Puerto Rico

KP4/N6VUY 3,696 56 33 24 A
WP3R (KE3Q,op) 407,956 2582 79 24 B

South Carolina

W4OC 174,116 1102 79 20 A
N1CC 49,704 327 76 8 A
WA8OJR 17,810 137 65 5 A
W8PC 12,482 79 79 11 A
K0COP/4 12,480 120 52 12 B
N3KK 12,482 79 79 7 U

Southern Florida

NA4CW 60,216 386 78 16 Q
N3DIE 18,720 144 65 14 Q
N9TMU 30,912 224 69 17 A
KR4ZA 29,550 197 75 18 A
WA2CPP 16,896 128 66 23 A
K1PJ 16,470 135 61 6 A
N2EGO 15,372 122 63 8 A
N4CU 11,500 115 50 7 A
K4RFK 11,200 112 50 24 A
WX0G 9,792 96 51 7 A
W8RTU 9,546 111 43 24 A
K1TO 2 1 1 1 A
N4BP 226,414 1433 79 16 B
K2OY 45,240 290 78 14 B
W4ZW 40,800 300 68 24 U
K4LQ 21,600 144 75 11 U

Tennessee

W9WI 49,608 318 78 24 Q
N5NW 128 8 8 1 Q
K4WX 234,156 1482 79 24 A
NY4T 119,496 766 78 24 A
NA4K 115,340 730 79 13 A
WO4O 80,896 512 79 24 A
KE4OAR 57,876 371 78 24 A
AK4ST 46,916 317 74 14 A
W4TDB 38,766 273 71 24 A
W4DAN 27,690 213 65 10 A
W4NZ 23,660 169 70 6 A
W4NI 23,048 172 67 8 A
KT4OR 12,320 110 56 5 A
KA4MRR 10,710 119 45 8 A
AD4F 10,062 117 43 6 A
W4YGE 7,600 76 50 10 A
K0EJ 170,482 1079 79 16 B
WD4K 102,180 655 78 21 B
KF4ZR 94,848 608 78 16 B
K4LTA 58,188 373 78 24 B
N4PQV 57,368 404 71 24 B
K4JNY 35,496 261 68 4 B
K4AMC 29,944 197 76 24 B
K4RO 23,310 185 63 24 B
W4PA 23,040 180 64 24 B
W4OGG 3,000 50 30 2 B
N6SLX 42,818 271 79 24 U
W4CAT (K1KY, KQ6ID, KG4ENY, K3CQ,ops) 149,310 945 79 24 M
N4DW (+logger) 45,448 299 76 7 M
KA4OTB (+KF4BBH) 40,194 261 77 24 M
WB4PHW (+op) 15,264 144 53 24 M

Virgin Islands

WP2Z (K8MJZ,op) 239,212 1514 79 24 A
KP2D (KP2N,KP2CM,NP2E,NP2M, NP2W,NP2DJ,ops+logger) 140,088 898 78 24 M

Virginia

W3MGL 1,620 30 27 24 Q
W4YE 72,996 462 79 14 A
W4VG 55,902 363 77 17 A
K4YT 54,352 344 79 24 A
N4MM 52,614 333 79 19 A
AD4DG 48,248 326 74 14 A
K4FPF 40,132 254 79 10 A
KU4FP 36,176 238 76 24 A
K4RET 35,926 253 71 17 A
W4VC 31,828 218 73 10 A
N4EL 30,816 214 72 24 A
KE4MIL 29,862 189 79 17 A
WA4TMJ 23,736 172 69 24 A
W6IHG 18,492 134 69 24 A
NA4MA 15,768 146 54 10 A
AF4MO 12,636 117 54 9 A
KC1YC 11,660 106 55 7 A
WA0DYJ 11,200 112 50 9 A
AA4KD 11,100 75 74 19 A
W4SD 10,908 101 54 4 A
W4ZYT 9,592 109 44 3 A
W4XP 6,720 80 42 5 A
KR4KF 6,560 80 41 6 A
WB4BLJ 3,886 67 29 10 A
N3BOR 3,120 52 30 24 A
KS4JB 2,494 43 29 3 A
K4ORD 1,722 41 21 3 A
K1GG 198,290 1255 79 24 B
K4IQ 140,462 889 79 15 B
N4GU 105,860 670 79 13 B
W4NYY 74,382 483 77 24 B
W4DC 68,256 432 79 16 B
KE4VA 62,308 421 74 18 B
K5VG 46,610 295 79 10 B
W4YCZ 37,128 238 78 9 B
K4HR 19,650 131 75 24 B
N6MW 11,704 77 76 8 B
KF4MFQ 7,410 95 39 24 B
W4MYA 236,526 1497 79 24 U
N2QT 165,426 1047 79 24 U
W4RM 118,184 748 79 14 U
N3RC 39,812 269 74 24 U
N4SR 34,286 217 79 9 U
WA4QDM 33,338 211 79 10 U
K3SW (+N3DMJ) 161,950 1025 79 24 M
W4FCR (K4ORD,K4UK,KE4APX, N4HVW,W4TLM,ops) 39,816 252 79 16 M
KC4GIA (+KR4DQ,KF4LGS) 33,970 215 79 24 M
WA4RS (NB3O,N3NVF,ops) 14,768 104 71 24 M

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Arkansas

K5OY 165,110 1045 79 22 A
N5EPU 118,184 748 79 23 A
WA5ZKE 61,754 401 77 20 A
KG5NE 45,188 286 79 16 A
KA5QOF 26,400 176 75 18 A
KJ5WX 20,414 173 59 7 A
K5JH 18,240 160 57 9 A
KM5G 10,976 112 49 4 A
N5ZIV 9,310 133 35 9 A
AB5SE (at N5ZS) 217,408 1376 79 23 B
W5HUQ 73,312 464 79 11 B
W5KL 756 21 18 1 B
W5YM (KB5ZYC+ops) 138,882 879 79 24 M
N5ZM (+AB5RQ) 91,482 579 79 24 M

Louisiana

KC3N 29,920 220 68 10 Q
N5IB 13,090 119 55 10 Q
N5MYH 66,518 421 79 22 A
N5SMQ 49,126 319 77 9 A
K5JRY 47,272 311 76 21 A
K5JMR 13,632 142 48 13 A
N0KWA 10,368 96 54 6 A
W5WZ 640 20 16 1 A
W5WMU 244,110 1545 79 24 B
AE5T 125,452 794 79 21 B
W5DDX (WM9M,K1DW,WD8LLR,ops) 162,708 1043 78 22 M
W5GAD (AC5TM,KD5BPR,N5OGW, N5TEK,N5ZI,WA5RT,W5CTV, WB9VTN,ops) 75,366 477 79 24 M
KI5EE (+KC5FGO) 44,676 306 73 13 M

Mississippi

KB5FET 47,124 306 77 24 A
W5EHM 47,084 298 79 16 A
W5KWB 5,904 302 76 24 A
KJ5RC 24,024 154 78 16 A
KK5PM 14,884 122 61 9 A
N5PU 10,710 105 51 24 A
WA5OYU 157,052 994 79 24 B
WQ5L 57,986 367 79 24 U
N5KKG (+N5LEF, KB5VLA, KM5NQ, KC5QZW, KC5WGA) 47,242 299 79 14 M
N5ZJ (K5EME,KD5EZN,ops) 41,652 267 78 21 M

New Mexico

K5OI 10,864 97 56 24 Q
W5IV 50,876 322 79 22 A
K5TEE 41,300 295 70 24 A
NA5S 38,688 248 78 15 A
KD5FKX 31,536 219 72 24 A
W5GZ 28,800 192 75 17 A
K5TQ 4,902 57 43 24 A
K2EI 250,746 1587 79 24 B
N6ZZ 21,200 200 53 2 B
W5JOV 12,654 111 57 4 B
K5AM 7,980 114 35 1 B
KA5BAT (+ops) 25,872 196 66 7 M
KK5OV (+KB5ZSK) 25,326 189 67 15 M
W5GB 60,496 398 76 24 S

North Texas

WA8ZBT 58,500 390 75 23 Q
N4ELM 17,688 134 66 9 Q
N1QXV 8,964 83 54 24 Q
WD5K 169,534 1073 79 24 A
K5OT 169,060 1070 79 24 A
W5MYA 103,174 653 79 10 A
WK5K 59,280 380 78 24 A
KY5N 51,504 348 74 24 A
KR5V 49,928 316 79 6 A
NN5T 46,816 304 77 11 A
K5RA 38,624 272 71 8 A
N5LFE 36,036 234 77 15 A
KC5NT 34,310 235 73 9 A
W5WB 30,030 195 77 24 A
KC5KDM 27,186 197 69 8 A
KB5VKJ 21,912 166 66 16 A
KK5WT 21,328 172 62 12 A
WN5D 18,704 167 56 9 A
WA5VKS 17,784 171 52 13 A
WA5SAJ 13,570 115 59 7 A
K6AZA 13,132 134 49 5 A
KD5HKS 10,904 116 47 13 A
N5NJ 9,600 96 50 2 A
KC5OZT 9,568 104 46 10 A
WA5MS 9,116 106 43 5 A
K5RX 194,340 1230 79 17 B
WX0B 116,446 737 79 24 B
AA5NT 113,602 719 79 20 B
N5TY 104,754 663 79 24 B
W5FO 99,372 637 78 16 B
N5KB 61,778 391 79 13 B
WB5TVI 27,738 201 69 12 B
N8SM 8,428 98 43 5 B
W5GN 169,692 1074 79 21 U
N5QQ 112,180 710 79 17 U
N5TJ 69,836 442 79 8 U
N5KM 19,656 126 78 8 U
W5ZQ 12,482 79 79 21 U
K5MR (+N5NJ,W5WW) 241,424 1528 79 24 M
N5YA (+N5KR, K5WO) 174,906 1107 79 24 M
WA5BU (KC5QYO+ops) 58,904 398 74 24 S

Oklahoma

K5AAR 27,010 185 73 24 Q
KE5TC 14,606 109 67 16 Q
K5KA 218,988 1386 79 23 A
N5RXF 86,136 582 74 24 A
AB5UA 18,090 135 67 5 A
N5NA 17,052 147 58 4 A
N5PMP 14,960 136 55 8 A
N5OT 952 28 17 1 A
KB5BOB 97,032 622 78 12 B
K2BA 27,064 199 68 4 B
K5HP 34,164 219 78 24 U
NA5B (+W5AO) 243,636 1542 79 24 M
WD0GTY (+WB0ZNW) 79,158 501 79 21 M
N5SAM (+KB5RBX,KB5WQR) 44,840 295 76 19 M
KB1ZQ (+N1LPN) 32,984 217 76 24 M
NJ5S (+KA7GLA,KC5GUD) 26,048 176 74 10 M

South Texas

N5XJ 65,412 414 79 17 Q
WA8GHZ 392 14 14 2 Q
KZ5MM 126,048 808 78 20 A
K5OE 76,472 484 79 23 A
WA5IYX 54,756 351 78 23 A
KK5LO 49,770 315 79 24 A
K4NR 45,448 299 76 9 A
KK5KX 45,300 302 75 24 A
N5TU 33,864 249 68 24 A
AJ4F 31,244 214 73 9 A
N5AF 18,012 158 57 7 A
N5KAE 17,222 109 79 13 A
N5RBC 15,694 133 59 10 A
WA5AA 11,550 75 77 17 A
K0RDS 8,820 105 42 4 A
K5TR (at W5KFT) 308,258 1951 79 24 B
W5ASP 182,174 1153 79 24 B
W5RQ 172,378 1091 79 24 B
W5XD 21,168 168 63 24 B
N5OVS 11,628 102 57 6 B
NR5M 234,630 1485 79 24 U
K5IX 29,172 187 78 8 U
N5XU (KT5I,W5JLP,KB5LBN,KM5FA,ops) 199,870 1265 79 24 M
K5NZ (+NX5M,KK5GJ) 113,602 719 79 24 M
W5SB (+KJ5X,KF5SB,W5IDX,KK5LD) 104,052 667 78 24 M
KF9RX (+KB5NST,KB5ZZS,KD5BVC, KD5FZZ) 25,074 199 63 18 M
KK5CA (+KD5GUY) 11,322 111 51 8 M
NN5AA (K5NA,K5DU,ops) 6,708 78 43 3 M

West Texas

KE5OG 104,280 660 79 24 A
AE5B 72,996 462 79 24 A
N5RZ 186,756 1182 79 13 B
N5ZC 140,304 888 79 13 B
N5DO (+K5FD) 193,076 1222 79 24 M
N5ZMP (+N5XXD) 20,020 130 77 24 M

6

East Bay

K6XV 86,424 554 78 15 A
N6JS 81,312 528 77 17 A
KF6RIP 71,760 460 78 24 A
K6AUC 70,668 453 78 23 A
N6GRJ 38,700 258 75 14 A
W6ABC 22,360 172 65 11 A
KE6NCX 16,536 156 53 10 A
K6DF 13,520 130 52 5 A
KE6QR 9,588 102 47 8 A
WB6DSV 4,836 62 39 3 A
W6BSY 158,184 1014 78 24 B
W6DI 149,626 947 79 15 B
WX6M 116,288 736 79 10 B
N6UUG 67,488 444 76 24 B
K6SRZ 52,416 364 72 8 B
K6AW (at N6RO) 232,892 1474 79 24 U
W6RGG 151,364 958 79 24 U
N6RO (+K3EST,KX7M) 202,240 1280 79 20 M
K6ZM (K6WG,WA6O,ops) 172,694 1093 79 24 M
W6ATV (+KD6KQW, N6MON, N6MQQ) 38,868 246 79 24 M

Los Angeles

K6RO 182,806 1157 79 24 A
W6KC 135,408 868 78 23 A
KO6QW 77,700 518 75 15 A
K6ZCL 50,954 349 73 21 A
WB6NFO 36,024 237 76 17 A
N6OPR 29,792 196 76 23 A
W6G (WA6BIL,op) 26,268 199 66 24 A
KC6G 23,808 186 64 24 A
N6TW 14,278 121 59 24 A
N6TCZ 2,600 50 26 4 A
WB6CYP 1,972 34 29 9 A
N6ED 269,232 1704 79 24 B
K6LA 249,166 1577 79 24 B
N5BF 90,288 594 76 24 B
K6AY 11,232 108 52 3 B
W6UE (W4EZ, N6VI, N7UE, 4Z9GHI, KA6SAR, KN6JU, VU2DXC, ops) 252,326 1597 79 24 M
N6XTT (+N6RMJ,KE6CTI,N6ZII,KQ6Y, KF6RDO) 142,200 900 79 24 M
KB6ATT (+KB6WKT) 37,800 270 70 24 M

Orange

W6TKV 54,208 352 77 20 Q
WA6JZQ 26,880 210 64 14 Q
AA6PW 124,956 801 78 19 A
N4EA/6 92,508 593 78 24 A
KD6KHJ 45,000 300 75 20 A
WA6GFR 27,470 205 67 13 A
N6RT 12,482 79 79 24 A
N6IGI 5,568 58 48 24 A
KF6I 4,056 52 39 3 A
WA6DLM 3,888 54 36 24 A
N6HC 203,346 1287 79 21 B
K6HRT 142,358 901 79 24 B
N6ER 30,256 244 62 24 B
W6HT 10,988 134 41 5 B
W6EEN (+K6XC,W6AQ,W6ORD) 196,092 1257 78 22 M
K6TSG (W6KAT,K6TOS,WA6SNG, WB6JBL,ops) 25,632 178 72 19 M

Pacific

KH6GMP 53,676 378 71 24 A
WH6DGA 43,594 307 71 24 A
KH7FX 16,592 136 61 6 A
KH6/KI0HZ 72 6 6 2 A
KH7R (KH6ND,op) 342,702 2169 79 24 B

Sacramento Valley

KO6CX 31,666 223 71 24 Q
WT6P 17,160 156 55 11 Q
KU6J 79,316 502 79 22 A
W6QEU 78,694 511 77 24 A
K6JJ 27,462 199 69 9 A
W6RKC 23,296 182 64 24 A
K6KAY 11,186 119 47 5 A
WO3B 800 25 16 2 A
W6AX (at W6GO, N6IG,op) 273,656 1732 79 24 B
AI6V 271,602 1719 79 24 B
K6KM (WX6V,op) 232,418 1471 79 24 B
KI6CG 153,972 987 78 23 B
W6IXP 120,900 775 78 23 B
KS6A 50,718 321 79 15 B
KI6T 46,452 294 79 9 B
K6NO 221,832 1404 79 24 U
K6SG 77,154 501 77 17 U
N6ZS (+N6SNO) 227,994 1443 79 24 M
K6RJ (+K6RC,K6GV) 194,656 1264 77 24 M
W6UT (+N6AFI,KN6OX) 188,652 1194 79 24 M

San Diego

W6CN 27,334 173 79 21 Q
WN6K 142,358 901 79 24 A
K6VWL 29,882 223 67 19 A
AA6EE 27,648 192 72 8 A
W6YOO 13,688 116 59 6 A
K6NOF 13,224 114 58 8 A
N6IDU 8,428 86 49 17 A
W6MVW 1,400 28 25 1 A
AK6R 171,444 1099 78 21 B
N6VH 59,280 390 76 15 B
N6KI (+K6AM) 234,788 1486 79 24 M

San Francisco

K6UM 100,448 636 79 15 A
N6ZFO 72,960 480 76 15 A
N6OJ 29,056 227 64 5 A
WA6QCL 22,814 187 61 10 A
W6ESJ 11,250 75 75 14 A
K6CTA 125,136 792 79 24 B
KC6AWX 10,400 104 50 5 B
K6RIM 186,914 1183 79 23 U
K6ANP 186,282 1179 79 19 U
K6LRN 32,232 237 68 5 U

San Joaquin Valley

N6MU (at N6NB) 104,280 660 79 20 Q
K6MI 312 12 13 5 Q
N6KT 71,568 497 72 8 A
N6YMM 51,012 327 78 14 A
N6IFW 30,800 220 70 22 A
K6CSL 25,090 193 65 18 A
KI6PG 19,440 135 72 12 A
KE6JTH 14,688 102 72 19 A
WC6H 194,024 1228 79 24 B
W6UDX 21,504 168 64 9 B
KG6F 352 16 11 2 B
KR6RF (N6EE, W6XK,ops) 228,626 1447 79 24 M
N6TNW (+N6TNX) 63,648 408 78 14 M

Santa Barbara

WA6FGV 113,918 721 79 17 A
KQ6NO 5,880 70 42 24 A
W6TK 154,366 977 79 24 B
W6NK 133,826 847 79 24 B
W7CB 19,256 166 58 24 B
W6DBM (KF6KQL,W6GL,ops) 73,154 463 79 18 M

Santa Clara Valley

N6CY 137,934 873 79 24 A
N6NF 103,964 658 79 15 A
N6TU 88,164 558 79 10 A
W6PLJ 65,886 417 79 21 A
W6WS 43,216 296 73 24 A
W6RYI 26,624 208 64 5 A
K6RFM 20,992 164 64 24 A
N6YD 10,900 109 50 24 A
WA2MIH 8,888 101 44 8 A
KR6CO 6,708 78 43 8 A
N2ALE 3,774 51 37 9 A
N6NZ 1,408 32 22 24 A
NU6S 88,452 567 78 24 A
AD6ID 640 20 16 3 A
W0YK 206,664 1308 79 21 B
AE6Y 184,228 1166 79 21 B
AB6WM 175,064 1108 79 20 B
K6PUD (at W6RN) 146,150 925 79 23 B
AD6E (DL4JLM,op) 135,408 868 78 24 B
K6GT 133,668 846 79 20 B
W6ISO 122,450 775 79 17 B
K6RB 114,076 722 79 13 B
W6NL 113,602 719 79 10 B
K6HNZ 92,352 624 74 11 B
K6EP 77,894 493 79 22 B
AA6W 70,000 500 70 12 B
AD6A 63,992 421 76 11 B
N6BZA 56,940 390 73 5 B
NR3Y 48,990 355 69 8 B
AJ6V 19,080 159 60 4 B
W6CF 10,120 110 46 1 B
K6GL 9,984 96 52 6 B
W6RN 9,024 96 47 4 B
NI6T 177,908 1126 79 24 U
AK6L 131,930 835 79 24 U
W6OAT 106,334 673 79 24 U
K6XX 82,634 523 79 24 U
K6III 56,518 367 77 11 U
W6ISQ 52,456 332 79 8 U
W6YX (N6DE, W6LD, N7MH,ops) 262,122 1659 79 24 M

N6IJ (AE0M,N0BBS,ops)
162,266 1027 79 20 M
N6XI (+W6CT) 86,136 582 74 9 M

7

Alaska

KL7FAP 72,072 468 77 13 A
KL7WP 35,400 236 75 24 A
KL1V 152,154 963 79 13 U
KL7Y (+WA2GO)
325,322 2059 79 24 M
AL7R (+KL7J,KL7VIC)
29,328 188 78 24 M

Arizona

N7VY 139,620 895 78 24 Q
NQ7X 23,904 166 72 21 Q
W0YHE 19,398 159 61 9 Q
N7JXS 11,040 115 48 10 Q
N7XJW 10,400 100 52 24 Q
W4IM/7 8 2 2 24 Q
WA0KDS 126,400 800 79 22 A
NF7E 82,056 526 78 21 A
W7ZMD 72,900 486 75 17 A
K7TR 59,760 415 72 24 A
N7RAT 42,772 289 74 21 A
W7YS 35,190 255 69 11 A
K7HP 32,494 211 77 19 A
KK6IF 27,440 196 70 24 A
W7ZT 22,984 169 68 15 A
KC5AC 21,600 150 72 12 A
AA9MX 10,094 103 49 7 A
N7VBN 6,570 73 45 8 A
K6LL 319,792 2024 79 24 B
W7WW 218,040 1380 79 24 B
K7LY 104,988 673 78 21 B
K6TIM 20,540 130 79 16 B
KI7LS 5,628 67 42 14 B
N7LR (+KC7FWM,W9CF)
56,160 360 78 12 M
K7MPM (+K7RFM)
38,250 255 75 22 M
W7ON (+N7NFX)
22,680 162 70 10 M
KC7X (+logger) 14,700 147 50 5 M
W7ASU (KC7EFP, KC7MOD, KC7MOC, KC7WJE, KC7RZR, ops)
141,094 893 79 24 S
KC7KFF (N7UJJ, +ops)
82,852 538 77 21 S

Eastern Washington

WS7V 139,464 894 78 24 A
WS7I 44,714 283 79 24 A
W7WMO 38,036 257 74 9 A
W7WKB 35,424 246 72 24 A
W7AVA 24,156 183 66 24 A
KC7WUE 7,832 89 44 24 A
KI7AO 53,438 347 77 23 B
K7IR (+K7XH,K7XS,W7AGV)
276,026 1747 79 24 M
W3AS (+ops) 75,306 489 77 9 M

Idaho

K7ZO 93,016 604 77 13 A
N7UVH 74,740 505 74 12 A
WO7Y 68,530 445 77 24 A
KW7N 67,488 444 76 22 A
KK7A 32,706 237 69 24 A
KJ7TH 28,282 179 79 24 A
W7ZRC 196,552 1244 79 24 B
K0IP 34,632 222 78 12 B
KG7H 30,338 197 77 11 B
AB7YB (+KD7DIG,KI7RO)
86,426 547 79 23 M
W7ISU (N7LQY,N7LB,KD7FHK, KD7CMT,KD7BZO,W7II,ops)
74,734 473 79 17 S

Montana

K7SAM 49,896 324 77 23 A
KG7VQ 49,876 337 74 23 A
KC7UED 41,496 364 57 14 A
KC7NY 31,878 253 63 12 A
KC7MZT 25,452 202 63 17 A
KC7NX 21,060 162 65 7 A
KS7T 145,834 923 79 21 B
W7WK 83,266 527 79 24 B
WC7CW 52,114 367 71 3 B
KC7WMD (AB7CE,WA7FBJ,AA7LU,ops)
37,872 263 72 19 M

Nevada

AL1VE 77,088 528 73 20 A
K7NV 61,776 396 78 24 A
N7WL 5,180 70 37 9 A
KU7Y 4,872 58 42 24 A
K7BV 269,706 1707 79 24 U
K6GNX 105,070 665 79 9 U
WA7UTM 20,482 133 77 24 U
W7UNR (KC7RLV,KK7HE,K7VY, W7PW,ops) 27,202 203 67 23 S

Oregon

K7KJ 159,264 1008 79 24 A
N7OU 107,700 718 75 12 A
W7YAQ 64,584 414 78 7 A
KC7Q 35,266 229 77 21 A
N7NS 32,916 211 78 11 A
KB7KLT 24,168 228 53 24 A
KK1A 22,110 165 67 5 A
N7TL 20,400 150 68 18 A
N7EMC 15,080 130 58 19 A
KC7ZFP 10,780 110 49 17 A
KJ7CY 9,900 110 45 5 A
K4XU 468 18 13 1 A
W7MT 210,140 1330 79 24 B
K7VIT 26,718 183 73 8 B
W7IMP 12,168 78 78 18 B
K5ZM (at K7ZUM)
97,482 633 77 24 U
K7FD 15,914 109 73 16 U
W7IG (+W7MIP)
45,430 295 77 18 M
W7SIR (+W7PAT)
40,964 266 77 20 M
N7SG (+K7FD)
19,750 125 79 10 M
KA7AGH (+KA7IUG)
19,456 152 64 12 M
W7BJB (+KD7DNS)
14,190 129 55 8 M
N7XP (KD7EYL, KD7EYI, KC7SDX, NX9C, ops) 24,684 187 66 24 S

Utah

W7HS 25,530 185 69 20 A
K7UB (AA7TR,op)
17,520 146 60 16 A
KB7PNI 12,096 108 56 9 A
AL7CC 10,000 100 50 15 A
WX7L 9,310 95 49 6 A
KC7CNA 2,200 100 11 6 A
KO7X 76,946 487 79 24 B
KI7KA 33,580 230 73 24 B
K8EI 91,322 593 77 17 U
W7CT (+NG7M)
232,418 1471 79 24 M
W0YSE (+logger)
3,762 57 33 8 M

Western Washington

K7ED (WA0RJY,op)
7,252 74 49 12 Q
N7RVD 2,688 48 28 16 Q
W7/JR1NKN 1,200 30 20 10 Q
K7QQ 217,724 1378 79 24 A
N7LOX 163,688 1036 79 23 A
W7QN 123,046 799 77 18 A
N6HR 51,800 350 74 10 A
W7AVM (AD7U,op)
41,292 279 74 24 A
K1LKR 39,732 258 77 16 A
KB7PKC 35,234 223 79 20 A
KF7QZ 35,234 223 79 24 A
AA7VT 30,096 209 72 17 A
N7OZN 27,200 200 68 9 A
N7ETC 25,320 211 60 6 A
KE7SW 23,256 153 76 18 A
NR7RR 22,932 147 78 21 A
N7UX 22,356 162 69 24 A
NA7R 19,592 158 62 24 A
KD7LJ 18,408 156 59 8 A
KA7DNK 16,402 139 59 7 A
KC7WDL 15,344 137 56 9 A
W7LKG 12,768 114 56 4 A
N7WA 10,088 97 52 24 A
AA2DL 6,300 70 45 15 A
AE7EE 836 22 19 1 A
W7WA 321,846 2037 79 24 B
K7RI (K7ST,op)
259,594 1643 79 24 B
W7RM (K1TA,op)
255,486 1617 79 24 B
N7TT 233,208 1476 79 24 B
K6KR 57,038 361 79 11 B
N7DOE 16,120 155 52 2 B
N7VGO 10,192 98 52 24 B
W7OM 127,190 805 79 24 U
N7PP (W7BUN,KA2YMZ,N7DOE, KC7UFY,ops)
181,542 1149 79 24 M
W7DX (N0AX, KD7BUQ, KD7DQO, KD7FWQ, KD7FYX,ops)
79,948 506 79 24 M
K7PAR (KD7E,N7UK,N7VOF,KJ7BP,ops)
47,586 309 77 24 M
W7NWA (AJ7R,KA7KUZ,K7BUD, KB7ZDR,KC7CBN,KB7QOP,ops)
34,080 240 71 21 M
AB7RW (+KC7KQI)
26,572 182 73 17 M

Wyoming

WB0TCZ 43,384 319 68 12 A
N7QAX 42,632 292 73 24 A
N0AH 177,118 1121 79 24 B
KJ7IM 101,910 645 79 23 B
N7JT 40,448 256 79 16 B
KK7UG 12,138 119 51 12 B

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Michigan

K8LJQ 40,584 267 76 22 Q
W8RP (K1ND,op)
19,032 183 52 8 Q
AA8SN 11,544 111 52 4 Q
W8MJ 176,486 1117 79 24 A
K8SB 123,556 782 79 24 A
K8RDJ 100,804 638 79 22 A
KC8KAK 90,090 585 77 21 A
K8IR 73,476 471 78 18 A
WA8FRD 53,196 341 78 17 A
K8GT 47,874 303 79 18 A
N8NX 46,816 304 77 24 A
KC8KAM 46,208 304 76 24 A
AB8CI 44,252 299 74 17 A
NX8K 42,912 298 72 23 A
AA8YC 38,100 254 75 16 A
WB8GUS 37,444 253 74 20 A
WA8YPY 35,550 237 75 16 A
K8CV 34,160 244 70 24 A
W8KZM 33,142 227 73 13 A
KK8G 32,976 229 72 16 A
KE8UM 30,968 196 79 19 A
K8GA 29,212 218 67 11 A
W8EGI 29,200 200 73 10 A
AA8KR 25,134 177 71 9 A
K8EO 24,332 158 77 12 A
K8RWG 24,236 166 73 24 A
WB8AFO 23,660 182 65 13 A
N8PKN 23,226 147 79 15 A
W8TJQ 23,184 168 69 9 A
KA8NDY 22,192 146 76 10 A
K8SIA 21,754 149 73 7 A
W8EO 21,672 172 63 4 A
N8KZG 21,228 174 61 14 A
K8JN 20,002 137 73 20 A
W8IMP 19,936 178 56 18 A
N8VEN 19,890 153 65 11 A
KE8FO 18,290 155 59 9 A
W8WQ 18,096 156 58 13 A
W8PDI 17,290 133 65 24 A
KC8JUZ 16,864 136 62 10 A
AA8UU 12,272 118 52 5 A
W8DBH 11,400 75 76 9 A
N8UUS 11,236 106 53 7 A
W8UE 10,752 112 48 3 A
WB8L 10,200 102 50 10 A
N8EN 9,306 99 47 5 A
KA8KGW 8,880 111 40 12 A
KC8GMT 8,554 91 47 8 A
KB8TXZ 8,132 107 38 24 A
W8DOT 6,408 89 36 5 A
WA8OLD 4,800 60 40 5 A
K8REN 3,600 50 36 2 A
KC8LTL 3,136 56 28 4 A
W8RU 3,008 47 32 24 A
WA8YLZ 900 25 18 3 A
AA8LB 532 19 14 2 A
KC8DDL 162 9 9 3 A
WB8RFB 2 1 1 24 A
K8CC (WD8S,op)
201,924 1278 79 24 B
KE8GG 181,226 1147 79 24 B
KB8VCK 148,362 939 79 24 B
AA8PA 82,160 520 79 24 B
N8KR 64,148 406 79 7 B
K8MM 63,910 415 77 11 B
KG8OU 45,084 289 78 17 B
WB8CLX 43,992 282 78 9 B
KT8X 10,160 127 40 2 B
AA8U 213,300 1350 79 22 U
N8SNM 154,596 991 77 22 U
ND5S 67,466 427 79 13 U
WX3M 34,958 227 77 13 U
KD8FS 30,336 192 79 13 U
K8ZZU 15,958 101 79 24 U
W8SH (KB8LUV, KB8ZGL, KB8RWQ, K8MAS, KB8ZQZ, ops)
158,652 1017 78 23 M
NT8V (+AC8W, K8DD, KB8WMW, N8CQA, W8XI)
147,256 932 79 24 M
N8MR (+KC8NAH)
46,508 302 77 21 M
K8AE (+KC8FVS)
40,880 280 73 16 M
N8WTH (+N8DEF,N8FZ)
39,072 264 74 19 M
KC8ELY (N8MMF,N8YXP,N8ZDW, N8NJE,ops) 36,288 252 72 20 M
KI8GR (+KD4DLA,WD8KZP)
28,428 206 69 14 M
K8TEM (+KC8JAE)
27,324 198 69 17 M
KC8JMX (+KC8LBH)
26,832 172 78 24 M
K8CHR (AA8GR,KI8BU,N8HEE,N8MCZ, KB8TIL,KB8SXS,KB8SGP,WD8DJB)
26,130 195 67 12 M
N8ZFH (+KC8MGE)
23,936 176 68 18 M

Ohio

WA8RJF 50,560 320 79 12 Q
WA8RCN 43,200 300 72 15 Q
N8IE 40,588 278 73 24 Q
K8QUA 7,210 103 35 6 Q
KU8E 184,228 1166 79 24 A
W8DD 152,154 963 79 23 A
ND8DX 142,990 905 79 22 A
N8PCN 101,556 651 78 24 A
W8UPH 74,880 480 78 18 A
N8FWA 62,726 397 79 24 A
WD8BMP 58,930 415 71 24 A
AF8C 54,150 361 75 12 A
K8CI 47,880 315 76 10 A
KB8SHE 43,650 291 75 24 A
W8TTS 36,600 244 75 24 A
N8ATT 35,234 223 79 12 A
KJ8F 33,596 227 74 7 A
KB8YBE 32,390 205 79 14 A
W8XS 32,340 210 77 17 A
KA8C 30,552 201 76 20 A
KF8TY 30,044 203 74 8 A
K8VUS 25,594 191 67 9 A
KF7CG 21,150 141 75 24 A
WD8B 20,670 159 65 24 A
N8FSP 20,150 155 65 24 A
W8VE 18,972 153 62 6 A
WA8TWM 18,744 142 66 14 A
K8KR 18,724 151 62 4 A
W8NHO 18,666 183 51 17 A
AA8HH 18,328 116 79 15 A
AA8QQ 17,854 113 79 18 A
N8JP 17,408 136 64 10 A
KG8QL 17,380 110 79 5 A
K8IG 17,250 125 69 8 A
W8IDM 16,560 115 72 9 A
AF8A 15,950 145 55 4 A
AA8BV 14,946 141 53 4 A
N8RVR 14,040 130 54 13 A
W8DYF 13,054 107 61 6 A
K8JT 12,654 111 57 13 A
NS8O 11,716 101 58 24 A
KB8WDX 10,528 112 47 7 A
N8RPA 9,718 113 43 9 A
W8IT 9,180 85 54 24 A
KC8JNC 8,778 133 33 24 A
W8KH 8,526 87 49 24 A
KD8UC 5,796 69 42 9 A
KE8QM/M 476 17 14 4 A
KC8MNS 476 17 14 2 A
K8DX 237,790 1505 79 24 B
N8BJQ 136,670 865 79 18 B
K1OU 125,452 794 79 15 B
W8KEN 67,606 439 77 24 B
K8LN 44,784 311 72 24 B
K8NIA 23,384 148 79 18 B
W9OBQ 22,176 154 72 24 B
N2DPF 14,100 150 47 12 B
N8ET 56,406 357 79 24 U
N8BC (K8BL,op)
47,580 305 78 7 U
WT8C 34,352 226 76 8 U
K8BL 12,482 79 79 5 U
N8TR 11,552 76 76 7 U
WZ8P (+KE8YP,N8OFK,WN8C,N8WCU, KG8CZ,KC8BEW,WX8J)
169,218 1071 79 24 M
K8EE (+KB8CQ,KC8IOO,N8JR)
109,336 692 79 24 M
W8NP (KC8IHR,KF8UN,KC8LYG,ops)
47,586 309 77 23 M
K8SCH 41,496 266 78 15 M
W8FT (N8ET, AA8KJ, AA8IV, N8RMT, ops) 29,488 194 76 24 M
W8QYY (KC8LUU,N8IPO,N8DNG, WB8RXI,N8SSE,KA8QAY,ops)
11,590 95 61 24 M
KA8IFC (+KA8HOK)
4,524 58 39 24 M

West Virginia

K5IID 92,588 586 79 16 A
WA8WV 57,720 390 74 8 A
N8II 192,128 1216 79 19 B
K3JT 160,054 1013 79 19 B
W8ZA (K3DNE,op)
152,154 963 79 24 B
N4ZR 62,752 424 74 24 B
K2UOP 61,446 399 77 24 B
WS8L 43,928 289 76 19 B
K8KFJ 18,880 160 59 6 B
WA8ZDL 22,120 140 79 20 U

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Illinois

KX9X 100,330 635 79 24 Q
NZ9M 19,530 155 63 8 Q
AA9KH 11,448 106 54 12 Q
NN9K 11,130 105 53 3 Q
KK9A 174,590 1105 79 24 A
WD9CIR 96,096 616 78 19 A
WA9Z 78,078 507 77 24 A
K9JE 73,628 466 79 15 A
N9MSG 63,180 405 78 24 A
K9GH 60,236 405 74 19 A
KG9AV 60,152 412 73 24 A
N9NT 41,964 269 78 24 A
K9CS 41,184 286 72 10 A
KC9MZ 41,118 267 77 17 A
KG9JP 34,222 241 71 24 A
W9FGH 33,592 221 76 16 A
WA9CCQ 31,360 224 70 24 A
W9HL 30,784 208 74 24 A
WD9HBC 30,192 204 74 18 A
NW9V 30,178 191 79 16 A
KB9CYL 29,614 221 67 24 A
W9BZP 23,800 170 70 20 A
W9LNQ 23,700 150 79 8 A
N9IJ 21,760 160 68 24 A
KG9GK 21,528 156 69 24 A
N9JF 21,360 178 60 5 A
K9MS 20,916 166 63 8 A
KG9PQ 20,130 165 61 8 A
K9MMS 19,968 128 78 15 A
W0HED 16,632 108 77 22 A
WD9EJK 15,444 117 66 6 A
WI9B 13,580 97 70 15 A
N9MBK 11,988 162 37 24 A
N9KCS 11,960 115 52 8 A
K9KJ 10,584 108 49 24 A
W9MYY 9,476 103 46 10 A
K9NA 6,240 78 40 4 A
N9ALC 3,200 50 32 4 A
N9TUQ 2,880 48 30 4 A
KB9ORA 32 4 4 1 A
WB9Z 237,948 1506 79 24 B
K9LU 205,452 1317 78 24 B
K9BGL 204,610 1295 79 24 B
WA9PTQ 198,132 1254 79 24 B
W9GIG 53,878 341 79 19 B
AA9VR 41,020 293 70 7 B
WA9DRE 33,872 232 73 24 B
N9YCT 19,564 146 67 19 B
K9UQN 10,560 110 48 3 B
WE9A 77,736 492 79 24 U
KB9MDL 57,750 375 77 19 U
KG9N 20,636 134 77 24 U
K9NS (K9PW,W9RM,WV9T,ops)
288,824 1828 79 24 M
K9NR (+KF9IF)
152,628 966 79 24 M
N9PD (W9YK,KF9ZZ,KG9ML,ops)
144,412 914 79 24 M
N9STL (+K9HUH)
135,564 858 79 24 M
K9MOT (K9SGR,N9MUC,N4SIZ,K9RR, K9QI,N9KNS,K9RJZ,AA9AE,N9EP, N9NA,ops) 115,182 729 79 24 M
W9GKA (+K9ZA)
65,676 421 78 21 M
W9EM (+KB9LPM,AA9QT,W9RRR)
65,360 430 76 24 M
N9IO (+W9IOU)
63,602 413 77 23 M
N9GH (+N9WJJ,N9YFL,KB9JWG, N9LJY) 47,736 306 78 19 M
N5UWY (+KB5TFX)
35,700 238 75 18 M
W9DA (KC5OEF,W9YO,ops)
18,240 152 60 9 M
W9UIH (W0TPO, op)
37,814 259 73 17 S

Indiana

N9DHX 23,400 180 65 15 Q
W9JBD 5,320 76 35 7 Q
W9AU 119,606 757 79 21 A
K9WX 70,626 447 79 18 A
W9HLY 60,060 385 78 18 A
K9MI 54,036 342 79 14 A
WT9U 35,376 268 66 24 A
KJ9C 28,490 185 77 24 A
WB9LRK 27,008 211 64 8 A
WA0JTL 26,640 185 72 11 A
KC9FC 23,360 160 73 13 A
KB9OZA 20,034 159 63 11 A
KG9HG 15,330 105 73 24 A
KB9ORH 13,572 117 58 10 A
WM9U 10,200 102 50 24 A
N8HSN 140 10 7 1 A
W9BS 183,456 1176 78 24 B
W9LZ 35,816 242 74 24 B
K9RU 55,286 359 77 12 U
KE9I (+N9QX)
199,396 1262 79 22 M
W9REG (KF9UP,KB9JDE,WB9NIF, N9PGH,KB9SSS,ops)
54,194 343 79 24 M
W9PU (KB9MWE, N9VHM, KE9R,ops)
24,120 180 67 16 S

Wisconsin

WE9V 64,148 406 79 24 Q
N9NE 62,216 404 77 19 Q
AF9J 24,304 196 62 16 Q
WA1UJU 149,136 956 78 24 A
KA9FOX 53,196 341 78 5 A
W9XT 34,648 244 71 24 A
K9ARF 32,760 210 78 17 A
WI9M 30,418 227 67 24 A
K9OSH 27,600 200 69 6 A
KB9KEG 16,560 115 72 6 A
WB9BWP 16,048 136 59 5 A
W9FBC 8,232 84 49 9 A
K0SN 41,238 261 79 24 B
KF9YR 23,998 169 71 24 B
K9KR 8,372 91 46 18 B
N9PQU 16,274 103 79 24 U
WB9JBF (N9FH, WB9UAI, KA9WXN, N9SD, N9VA, ops)
183,912 1164 79 24 M
KC9GG (+KE9NJ)
128,454 813 79 23 M
NE9U (+KB9TTO)
76,314 483 79 13 M

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Colorado

KI0II 40,176 279 72 17 Q
W0HEP 35,568 228 78 18 Q
WB0HZL 11,220 110 51 6 Q
K0UK 210,614 1333 79 23 A
K0RI 84,708 543 78 13 A
W0ZA 60,532 409 74 24 A
KI0ND 51,000 340 75 20 A
WD0X 49,928 316 79 10 A
W0RSR 30,108 193 78 11 A
KI0IJ 23,552 184 64 7 A
W6NIZ 20,066 127 79 14 A
KF0XD 16,800 150 56 9 A
W0CBH 15,982 131 61 24 A
KR0U 9,996 102 49 2 A
KG0ZI 228,536 1484 77 22 B
K0GAS 71,258 451 79 24 B
W0OSK 47,304 324 73 4 B
KF0LA 16,432 104 79 12 B

Iowa

N0RKX 73,476 471 78 24 A
NU0Q 73,164 469 78 24 A
N0HD 49,950 333 75 24 A
NE0P 33,596 227 74 21 A
KA5NWB 30,520 218 70 12 A
N2BTJ 24,800 200 62 10 A
W0BVR 20,856 132 79 16 A
WB0B 16,368 124 66 6 A
N0IXY 11,628 114 51 7 A
AB0HF 2,100 50 21 7 A
WN0G 650 25 13 1 A
N0AC (at WA0ROI)
113,918 721 79 14 B
K0FG 90,850 575 79 24 B
W0PPF 32,292 234 69 20 B
W0VFO 24,768 172 72 24 B
KE0BX (+N0JPZ)
94,692 607 78 16 M
KE0FT (+KB9SKP)
61,308 393 78 16 M

Kansas

W0MW 136,500 875 78 20 A
WW0H 66,202 419 79 15 A
WB0YJT 49,400 325 76 18 A
KC0GL 34,632 234 74 12 A
K0RY 31,500 225 70 13 A
W0ZC 29,394 213 69 13 A
N0JK 20,174 131 77 24 A
KA0EIC 13,230 105 63 11 A
N0ZCU 9,212 94 49 7 A
KC0ADP 5,610 85 33 5 A
AB0S (+K0WA,W0CEM)
243,478 1541 79 24 M
K0FJ (+K0BJ, KB0LGX, KG0PI, KB0WPY, KB0YFN)
171,912 1102 78 24 M
N0NB (+KK0SS, KC0DQ)
171,430 1085 79 21 M
W0MI (KA0RID,KG0MT,AC0E,ops)
81,900 525 78 23 M
WX0U (+KB0NZO)
37,380 267 70 11 M
KA0BHO (+KA0BAT)
9,600 96 50 7 M

Minnesota

N0UR 78,600 524 75 20 Q
WA0VBW 55,632 366 76 21 Q
N0KK (at N0AT)
211,692 1357 78 24 A
WR0DK 136,670 865 79 24 A
W0UC 105,336 684 77 14 A
WJ0M 81,900 546 75 16 A
AC0W 75,348 483 78 12 A
N0HJZ 64,526 419 77 7 A
K0TG 58,368 384 76 12 A
WA0RBW 58,200 388 75 12 A
W0ZQ 54,824 356 77 9 A
K3WT 52,852 362 73 8 A
K0QB 47,424 312 76 24 A
NA0N 26,240 205 64 4 A
WA0WWW 24,924 186 67 5 A
N0LXX 18,300 150 61 24 A
AA0GP (N0HJZ,op)
17,040 142 60 3 A
K0SV 16,750 125 67 8 A
N0BM 15,000 125 60 4 A
K0DMR 14,148 131 54 10 A
N0PFY 13,824 144 48 8 A
WA0WOV 9,690 95 51 5 A
N0IJ 216,618 1371 79 23 B
K0HB 180,594 1143 79 23 B
KF0GV 158,474 1003 79 19 B
K0AD 121,368 778 78 13 B
N0XB 93,478 607 77 24 B
K0CAT 73,568 484 76 8 B
K0BUD 57,132 414 69 7 B
NY0C 51,192 324 79 7 B
WA2HFI 24,310 187 65 9 B
KB0VCV 10,800 108 50 24 B
K0XQ 7,680 80 48 24 B
K0COM 43,924 278 79 24 U
KT0R (+K0OB,K0MX)
263,070 1665 79 24 M
KR0B (+N0BKG,KS0T,KN0B,N0RA, KB0KQA) 210,456 1332 79 24 M
KI0F (+KB9S,KF0UK)
164,952 1044 79 24 M
K0NY (+KB0SAA,N0WE,KB0YJU, KB0THN) 94,010 595 79 23 M
K0JE (+K0JA) 49,284 333 74 24 M
N0MWH (+N0HJZ)
33,592 247 68 5 M
W0EF (K0BUD,N0NFU,WG0M,ops)
12,954 127 51 5 M
W0/IK1IYX (+N0HJZ)
7,380 82 45 4 M
N1JJ (N0MAJ, N0MJ, W0PRJ, KC0FZR, W0GJ,ops) 71,416 452 79 20 S

Missouri

KI0MB 64,622 409 79 16 Q
N0SS 49,920 320 78 10 Q
K0HW 133,984 848 79 20 A
N0EA 83,424 528 79 18 A
KI0HA 45,448 299 76 19 A
KK2G 37,848 249 76 9 A
N9HDE 37,800 270 70 15 A
K0HOF 34,894 239 73 15 A
AA0RT 21,576 174 62 24 A
K0DAT 16,820 145 58 8 A
N5RUN 16,006 151 53 9 A
WB0QLU 15,000 125 60 8 A
N0YKN 6,402 97 33 24 A
K0LWV 3,100 50 31 4 A
K0OU 189,758 1201 79 24 B
K0DEQ 172,852 1094 79 17 B
KI9A (at K0LIR)
150,732 954 79 21 B
K0JPL 8,712 66 66 10 B
WA0SXV 98,750 625 79 14 U
AA0A 8,742 93 47 3 U

W0EEE (KB0QQF, KI0MI, KB0VLG, KC9UMR, KI0QB, KI0PX, KA0MEK, op)	173,326	1097	79	24	M
KC0CWU (+KC0CZG,KC0CZH)	47,424	304	78	21	M
W5CBC (KB1AHR, KC0DKL, KB9NIQ, ops)	9,408	96	49	7	S

Nebraska

W0DB	110,136	706	78	19	A
K0IL	92,114	583	79	18	A
KK0DX	80,264	508	79	16	A
K0PFV	65,052	417	78	20	A
KA0T	38,982	267	73	17	A
KB0WHY	38,500	275	70	15	A
W0UVC	15,756	101	78	17	A
KC0FUD	15,750	125	63	11	A
N0OFR	13,356	159	42	11	A
KA0TKU	10,952	74	74	11	A
K0DI	2,132	41	26	2	B
K0GND (+WD0EGK,KC0FYT,K0NC,WA0WRI)	145,676	922	79	24	M
N0GVK (+KE0BZ,KC0CDQ)	140,936	892	79	24	M

North Dakota

AF9T/0	116,604	738	79	19	A
KB0IXX	40,612	286	71	20	A
KC0FDK	13,260	130	51	15	A
WQ0J	7,738	73	53	6	A
ND0DX	41,700	278	75	24	U
N0FW (+KE0A,KC0BUD,KC0CRU)	228,942	1449	79	24	M

South Dakota

WB0ULX	14,734	139	53	16	A
KC0DKA	9,660	105	46	24	A
KA0VME	9,288	108	43	8	A
KE0Z	680	20	17	1	A
W0SD (WD0T,op)	312,840	1980	79	24	B

CANADA

Maritime-Newfoundland

VE9WH	27,832	196	71	24	A
VE9MY	75,848	499	76	16	B
VE9FX	43,650	291	75	24	B

Newfoundland-Labrador

VO1HE	58,934	373	79	9	A
VO1GO	58,302	369	79	17	A
VO1MP	167,322	1059	79	15	B
VO1WET	60,736	416	73	24	B

Quebec

VE2AWR	99,060	635	78	24	A
VE2GWL	25,594	191	67	23	A
VE2HLW	25,476	193	66	19	A
VE2LHP	2,220	37	30	6	A
VE2PIJ	1,334	29	23	9	A
VE2MAB (VE2ESP,VE2BRT,VE2MPD, VE2SHW,VE2HAX,ops)	24,080	280	43	23	M

Ontario

VE3WMB	672	21	16	24	Q
VE3XN	150,416	952	79	20	A
VA3UZ	79,248	508	78	16	A
VE3BUC	68,796	441	78	24	A
VA3SWG	68,250	455	75	16	A
VE3STT	66,300	425	78	14	A
VE3GD	36,408	246	74	17	A
VE3UZ	24,480	180	68	6	A
VA3GGF	14,364	126	57	10	A
VE3SYB	13,020	105	62	24	A
VA3TPV	8,742	93	47	24	A
VE3MQW	8,680	124	35	6	A
VE3WZ	5,600	70	40	3	A
VE3IC	128,296	812	79	19	B

Manitoba

VE4VV	128,928	816	79	19	Q
VE4GV	277,606	1757	79	24	A
VE4YU	22,302	177	63	6	A
VE4HAZ	11,264	128	44	8	A

Saskatchewan

VE5SF	214,248	1356	79	24	A
VE5GC	37,814	259	73	11	A
VE5CPU	169,104	1084	78	22	B

Alberta

VE6BF	364	14	13	1	Q
VE6EX	117,810	765	77	15	A
VE6FU	34,780	235	74	24	A
VE6JY (VE5MX,op)	315,052	1994	79	24	B
VE6AO (+ops)	226,730	1435	79	24	M
VE6II (+VE6NN)	30,732	197	78	15	M

British Columbia

VE7NF	166,848	1056	79	21	A
VE7IN	159,900	1025	78	24	A
VE7RCN (VE7CYT,op)	131,456	832	79	23	A
VE7DUG	73,150	475	77	24	A
VE7XB	40,128	264	76	9	A
VE6BIR/7	12,482	79	79	13	A
VE7NA (VE7GDE,VE7NEW,VE7BGP, VE7JLO,VE7LVD,VE7FCO,ops)	36,500	250	73	23	M

Northwest Territories

VE8JR (KL7JR,op)	93,294	657	71	19	A
VY1JA	205,400	1300	79	24	B

QST

CONTEST CORRAL

W1AW Qualifying Runs are 10 PM EDT Friday, July 7, and 9 AM EDT Monday, July 24. The K6YR West Coast Qualifying Run will be at 9 PM PDT on Wednesday, July 5. Check the W1AW schedule for details.

July

1

Canada Day Contest, sponsored by the Radio Amateurs of Canada (RAC). 0000 to 2359 UTC July 1. 160, 80, 40, 20, 15, 10, 6 and 2 meters; CW and phone (SSB, FM, AM, etc.). Stations in Canada send RS(T) and province or territory. VE0s and stations outside Canada send RS(T) and a serial number. Contacts with stations in Canada or VE0s are worth 10 points. Contacts with stations outside Canada are worth 2 points. Contacts with RAC official stations are worth 20 points. RAC official stations are: VA2RAC, VA3RAC, VE1RAC, VE4RAC, VE5RAC, VE6RAC, VE7RAC, VE8RAC, VE9RAC, VO1RAC, VO2RAC, VY1RAC and VY2RAC. Multipliers: Canada's 10 provinces and two territories, and may be counted once on each mode on each of the eight contest bands. Final score = Total QSO points × total multiplier points. Categories: Single Operator, all bands; Single Operator low power (max. 100 W output); Single Operator QRP (max. 5 W output); Single Operator single band; Multioperator. Send entries to Radio Amateurs of Canada, 720 Belfast Road, Suite 217, Ottawa, Ontario K1G 0Z5 Canada by July 31. For more information see **http://www.rac.ca/CANDAY.htm**.

8-9

IARU HF World Championship. see April *QST* page 106.

QRP ARCI Summer Homebrew Sprint, sponsored by QRP ARC International 2000-2400Z July 9, CW only. Entries may be single band, all band, high band or low band. Work stations once per band. Exchange signal report, state/province/country, and QRP ARCI number if member. 2/pts for nonmembers same continent, 4/pts for nonmembers different continent. Bonus points awarded for using homebrew (HB) equipment. 2000/pts for HB transmitter, 3000/pts for HB receiver, 5000/pts for HB transceiver. Final score is total of QSO points multiplied by total of states/provinces/countries × power multiplier (>5 W output, × 1; <5 W output, × 7; <1 W output, × 10; < 250 mW output, × 15) plus bonus points. Send QRP ARCI contest entries within 30 days of contest date to: Randy Foltz, K7TQ, ATTN: Spring QSO Party, 809 Leith St, Moscow, ID 83843; **rfoltz@turbonet.com**; **http://www.qrparci.org/**.

CQ WW VHF Contest, sponsored by *CQ Magazine*, from 1800Z July 8 until 2100Z July 9. 6 and 2 meters, Single op all band and single band, multi-op, Rover, QRP (<25 W). Send grid square. Score 1 pt/QSO on 50 MHz; 2 pts/QSO on 144 MHz. Work stations once/band, regardless of mode. Do not transmit on 146.52 MHz simplex or on repeaters to either make or solicit contacts. Final score is QSO pts × grid squares worked/band. Awards. Send logs by Aug 31 to CQ VHF Contest, *CQ Magazine*, 25 Newbridge Rd, Hicksville, NY 11801. You may submit your electronic log via e-mail to **cqvhf@kkn.net**. Questions may be sent to **questions@cqww.com**; **http://www.cq-amateur-radio.com/vhfcontest.html**.

15-16

Six Club Six-Meter Sprint, sponsored by the Six Club, 2300Z July 15 to 0400Z July 16, 6 meters only. Count 1 point/QSO within your country; 2 points/QSO outside of your country (KH6 and KL7 count as countries). Final score is the total QSO points times the number of different grid squares worked. Awards. Mail logs before August 17 to Six Club, PO Box 307, Hatfield, AR 71945; **sixclub@6mt.com**; **http://6mt.com/contest.htm**.

Pacific 160-Meter Contest, sponsored by the Wireless Institute of Australia, 0700-2330Z July 15, 160 meters phone and CW. World works P2, ZL and VK only. Single operator and SWL. CW and SSB. 1825-1850 kHz. Exchange RST and serial number. Count 5 points for each P2, ZL or VK QSO. Multipliers are P2, ZL and VK call areas. Final score is total QSO points times total multipliers. To avoid QRM between modes stations are asked to operate in 15 minute blocks - CW on the hour and hour + 30 minutes; SSB on the hour + 15 minutes and hour + 45 minutes. Send logs by Aug 31 to Ian Godsil, VK3DID, 57 Nepean Highway, Aspendale, 3195, Australia; **vk3did@eudoramail.com**

North American QSO Party, RTTY, sponsored by the National Contest Journal. 1800Z July 15 to 0600Z July 16. Single op and multi-two. Single Operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log. Mode: RTTY only. 80, 40, 20, 15 and 10 meters only. You may work a station once per band. Exchange operator name and station location (state, province or country). One point for each valid contact. Multipliers include US states, including KH6 and KL7, Canadian Provinces and other North American countries. Do not count USA, Canada, KH6 or KL7 as countries. Non-North American countries do not count as multipliers, but may be worked for QSO credit. Scoring: Multiply total valid contacts by the total number of multipliers worked on each band. Send logs to Ron Stailey, K5DJ, 504 Dove Haven Dr, Round Rock, TX 78664-5926; **rttynaqp@ncjweb.com**; **http://www.ncjweb.com/**.

22-23

Georgia QSO Party, sponsored by SECC and SEDXC. Two periods: from 1800Z July 22 to 0359Z July 23 and 1400Z July 23 to 2359Z July 23. All stations may operate the full 20 hours. Phone and CW. 80 40 20 15 10 meters. Single Op, Multi-single, multi-multi, rover and Novice/Technician in each of three power levels: QRP, low power (150 W or less) and high power (more than 150 W). Rover requires operation from at least 6 Georgia counties. Mobiles and portables must move their complete stations, including antennas, at least 100 yards to change counties—no county line operations. Rovers submit logs and summary sheets for each county plus an overall summary sheet. Work stations once per band and per mode. Multipliers count on each mode. Exchange RST and Georgia county, state, province or "DX". Count 1 point per phone QSO; 2 points per CW QSO. Multipliers are Georgia counties (159 per mode); for Georgia stations multipliers are 50 US states, 11 VE provinces on each mode. Awards. Mail logs by August 22 to Neal Sulmeyer, K4EA, 530 Old Doss Dr, Canton, GA 30114-8057; **k4ea@contesting.com**; **http://secc.contesting.com/**.

29-30

RSGB Islands-On-The-Air Contest, sponsored by the RSGB, 1200Z July 29 to 1200Z July 30. 80 40 20 15 10 meters, phone and CW. Single op, phone/CW/mixed; single op limited, phone/CW/mixed; multi-single island stations. Single op limited stations may operate 12 hours max. Send RS(T), serial number and IOTA reference number. If applicable, island stations may send IOTA number. Work stations once per band and mode. Score 2 pts/QSO w/own country or IOTA reference, 15 pts/QSO w/IOTA stations, and 5 pts/QSO w/others. Final score is QSO points × IOTA numbers worked per band/mode. Awards. Send logs by August 31 to RSGB IOTA Contest, PO Box 9, Potters Bar, Herts EN6 3RH, England; **iota.hf.contests@rsgb.org.uk**; **http://www.g4tsh.demon.co.uk/HFCC/Rules-2000/iota.htm**.

Flight of the Bumblebees QRP Contest, sponsored by Adventure Radio Society, CW only, July 30 1800-2200Z. Operate all 4 hours. Five W or less on 40, 20, 15 and 10 meters, both home-based and portable operations are encouraged. Group operation is welcome in the Flight of the Bumblebees. You may operate under a single call and report a single score, or under multiple calls and report multiple scores. You are limited to operating a single transmitter at a time. If you are a Bumblebee, your exchange is RST, state/province/country and your Bumblebee number. If you are home based, your exchange is RST, state/province/country and your power. Contacts on 40 meters are 1 point each; contacts on 20, 15 and 10 meters are worth two points. Contacts with Bumblebees count ×3. Work stations once per band. Send your log to Russ Carpenter AA7QU, 47227 Goodpasture Rd, Vida, OR 97488; **russ@natworld.com**; **http://www.natworld.com/ars/pages/bumblebees/bb_rules.html**.

QST

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SECTION NEWS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Randall Carlson, WB0JJX—Many thanks to Hal Frantz, KA3TWG, and the members of the Penn-Del Amateur Radio Club for their efforts in hosting the ARRL Delaware State Convention. This year's event was as successful as it has been in the past. The ARRL and club leadership forum conducted by Vice President Kay Craige, WT3P, was an hour of stimulating discussion about the future directions of ARRL as well as a discussion of some of the problems with conducting club activities in cyberspace. Many thanks to all that attended and participated in the discussions. Thanks also go to the exam teams from the FSARC and the AWARE club, (as well as any others they drafted) for conducting an exam session at the convention. This was the first testing event in Delaware after the new licensing rules took effect, and it was well attended. Congratulations to all who upgrade or received their first license. Tfc (Apr): DTN: QNI 162 QTC 16 in 20 sess., DEPN: QNI 36 QTC 0 in 5 sess, SEN: QNI 36 QTC 2 in 4 sess, KCARC: QNI 58 QTC 2 in 5 sess, K3JL 33. 73, Randall.

EASTERN PENNSYLVANIA: SM, Allen R. Breiner, W3TI—SEC: Eric Olena, WB3FPL. ACC: Steve Masllin, N3ORH. OOC: Alan Maslin, N3EA. STM: Paul Craig, N3YSI. SGL: Allen Breiner, W3ZRQ. ASMs: Ron Creitz, KB3CFV, Paul Craig, N3YSI, Vince Banville, WB2YGA, Dave Heller, K3TX, George Law, N3KYZ, J. Yogi Bear, WB3FQY, Harry Thomas, W3KOD. A computer glitch omitted eighteen lines from the May report and are reprinted at this point. Regarding a health and welfare report following our heart surgery, we are beginning to recover quite well. We're gaining strength and able to hike around the block again. Our plans are to attend as many hamfests as possible this summer, so stop by the big Red Banner and say hello. Thanks for your cards, telephone calls and well wishes. Upon the resignation of Paul Hild, KD3L, Donald Skinner, KA3TQQ, was appointed EC for Pike County. Thanks, Paul, for a job well done. Michael Patton, W3MJP, was appointed Emergency Coordinator for Bucks County and Jeffrey Poltanis, KA3ZHA, picked up as the EC appointment for Wayne County. Daniel Amoroso, NM3S, is the newly appointed Emergency Coordinator for Delaware County. Following the resignation of N3YMX, EC for Berks County was taken over by Mark Marello, N3TVQ. If anyone recently applied for an appointment for Technical Specialist and have not received their certificate or information, please contact the Section Manager as soon as possible. We apologize for the delay. The National Traffic System added NS3W and KB3CKD as an ORS appointment. While on the subject of NTS, one of the rules of origination of a Field Day message being sent to the SM is run on the honor system. In order to qualify for those bonus points, the message must be written in NTS format and should be sent via NTS traffic nets. A Field Day message sent via e-mail or US Postal Service does not qualify for the extra points. The SM has always been active and participates in the Eastern Pennsylvania Traffic Net every evening. The list of candidates reported by VE examiners who have upgraded on April 15 is enormous and much too long to give credit in this column. However, we wish to pass our congratulations and kudos to all those upgrades. Don't stop now. Keep going right to the top for Extra Class. Arrangements for the Eastern Pennsylvania Section's Annual Family Picnic are complete and will be held rain or shine Saturday, July 8, in the Christian Youth Center picnic grove at New Ringgold, PA. It is not an amusement park, and there is no registration fee and no concessions available to purchase food. There is a hiking trail for the outdoors person, playground equipment for the younger tykes and a volleyball area for the more active group. Pack a picnic lunch basket and join us with your Amateur friends for a day of fun and fellowship. Tfc (Apr): N3YSI 344, W3IPX 244, W3HK 217, N3EFW 204, K3AEB 131, W3NNL 95, W3UAQ 86, W3IVS 70, N3SW 66, W3JKX 29, KB3CVO27, W3DP 19, W3DAB 18, N3HR 17, W3TWV 14, KA3LVP 12, N3ZXE 11, N3AO 10, N3KYZ 10, W3ZQN 10, N3IRN 9, KB3CEZ 8, W3TI 8, AD3X 7, KB3BBR 7, K3ARR 6, W3BNR 5, W3KOD 5, KB3DDL 4, N3WWE 4, N3AS 1. Net Reports EPAEP&T 233, PFN 56, PTTN 47, SEPPTN 20, LCARES 12, MARCTN 10, D4ARES 3 MCOES 2.

MARYLAND/DC: SM, Bill Howard, WB3V, 410-551-6775, **wb3v@arrl.org**. MDC Section Web homepage **www.erols.com/wb3v/mdc/. CARR** EC N3JIA reports 64 members, 4 sessions of the CARET (Carroll Amateur Radio Emergency Team) Net. This net is conducted on 145.410 MHz with liaison to MEPN, MDD and MSN by KE3FL, and to BTN, WVPN, DTN, MEPN, Central Region Net and Western Region Net by KG6TU. OES reports received from: KE3FL WX3F N3JIA N3TOT and N3SOK. **HOWA** EC K3EF reports 22 members, 4 sessions of the HOWA ARES/RACES net on 147.135 MHz, with liaison to MEPN and BTN; and two Public Service Events: March of Dimes walk, and MS walk. HOWA RO WA1QAA reports that ARES/RACES members participated in an exercise to familiarize us with the location and assessment of the river rise step gauges located throughout HOWA. Monitoring of the gauges during flooding situations by RACES is one of the duties specified in the HOWA Emergency Operations Plan. Participants in this exercise were: WB3GNO, K3EF, N3JKK, N3ZPL, W3CCI, and WA1QAA. **FRED** EC N8AAY reports 10 members, 5 sessions of the Frederick County ARES net on 146.640 MHz, in lieu of 147.06 which is still off the air, and 1 Public Service Event: Multiple Sclerosis Walk-a-thon on April 9th. **WASH** EC KD3JK reports 39 members, 4 sessions of the Tuesday evening WASH ARES/RACE Net on 146.940 MHz and 4 sessions of the Thursday evening Four States Net on 147.090 MHz. Bob reports a Skywarn training class was held on April 27 with 14 in attendance.

ANAR EC N3QXW reports 38 members, 3 sessions of the ANAR ARES Net on 147.805 with liaison to EPA, NCAC, MEPN, WVA, BTN and MDD, one packet exercise and participation in the monthly RACES COMEX. Brian attended the Severe Storm Training session at MEMA on 27 April. **GARR** EC K3JW reports 7 members, 4 sessions of the Garrett County ARES Net on 147.105 with liaison to MEPN. **ALLE** EC N3TDM reports 65 members, an increase of 5 since last report; 4 sessions of the Mountain Amateur Radio Club Tri State Two Meter Net on 146.88 with an average of 15 check ins. 73 - Bill WB3V and with the nets: Net/NM/QND/QTC/QNI: MSN/KC3Y/30/56/269, MDD/WJ3K/59/407/748, MDD Top Brass: KJ3E 199, AA3GV 162, K3JL 181. BTN/AA3LN/29/71/367. Tfc: KK3F 2076, KJ3E 632, AA3GV 244, KB3AMO 184, AA3SB 177, N3KGM 112, N3DE 103, W3CB 95, W3YVQ 88, N3WK 68, KC3Y 53, W3YD 37, WA1QAA 33, N3EGF 18, K3CSX 13, N3ZKP 12, W3VK 11, KE3FL 2. PSHR: KJ3E 267, KK3F 213, W3YVQ 158, AA3GV 141, W3CB 138, AA3SB 137, W3VK 134, N3WK 115, N3ZKP 112, K3CSX 108, KB3AMO 95, WA1QAA 93, KC3Y 92, KE3FL 83.

NORTHERN NEW YORK: SM, Thomas A. Dick, KF2GC **http://www.northnet.org/nnyham.** E-mail: **kf2gc@arrl.org.** ASMs: KD2AJ, WB2KLD, N2ZMS, WA2RLW. ACC: WZ2T. BM: KA2JXI. OOC: N2MX. PIC: N2SZK. SEC: WN2F. STM: N2ZGN. TC: N2JKG. We had a regular meeting of the NNYARA on May 6th at the Schhoharie Co EOC in attendence were myself, WB2KLD – Tom Valosin, N2JJV – Ken King, KC2CBX – Pat Shelly, KB2ZJI – Jerry Zink, KG2QG – Cody Zink, KC2BJB – Dave Nichols, KB2LML- Al Hagget and WA2JPM – Ed Stiles. We talked about having check ins on HF on Saturday mornings at 9:00 AM on 3.955 since HF has been a most reliable way to communicate especially for emergency preparedness in the North Country. All stations in NNY are invited to join into the net. We also set in motion to pursue the possibility of holding a hamfest in the year 2001. All in attendance at our NNYARA meeting were in agreement. Next, meeting of the NNYARA will be Aug 26th in Lake Placid, NY at 11 AM. Thanks to Judi Cary the Emergency Manager – Schoharie Co who was the guest speaker at the meeting and made us feel welcome and appreciated for all our Amateur Radio Services in NNY.

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. ATTN all hams who are lighthouse lovers. Ntl Lighthouse week (Aug 5-6) and Intl Lighthouse week (19-20) August. Last year 200 lighthouses and 4000 hams took part. Various activities take place during the year. For more info contact Jim, K2JXW, **weidner@waterw.com** or **http://qsy.to/lighthouses**. Again a bill has been introduced into the Assembly Transportation Committee to put Amateur Radio on our license plates. Please write to the Committee Chairman and members of committee. Then write to the individual Assemblymen/women asking approval of bill A-1593 and moving it to the Senate. If you want to get into traffic handling, contact me and get signed up as an official relay station and feel rewarded. NJ Net Late AG2R QNI 211 NJ Net Early AG2R QNI 197 NJ Slow Net K2PB QNI 118 NJ Morning WA2OPY QNI 153 SJVN WB2UVB QNI 375 Tfc: WA2CUW 168, AA2SV 130, WB2UVB 103, KB2RTZ 87, K2UL 53, K2UL-4 48, N2VQA 37, W2AZ 29, N2WFN 12, KA2CQX 9, N2ZMI 7, K2KID 4, KB2VSR KC2ETU KB2YBM 1 each.

WESTERN NEW YORK: SM, Scott Bauer, W2LC—Please welcome new appointees: Bob, N2PWP, new OO and amateur auxiliary member, and Scott, KB2TRQ, new OES. Congratulations to new Volunteer Council member Denis, N2HP. It is very nice to see new volunteers here to help others. With many upgrading and receiving HF privileges, I bet it is a good time to sell that HF gear you want to get rid of. Maybe you can sell the old stuff and upgrade to a new transceiver yourself. WNY has a great selection of hamfests. HAMFESTS: July 16 Batavia at Batavia Downs; July 22 Utica at Frankfort; Aug 5 Ithaca Hamfest, at Tompkins Cty Airport; Aug 12 Rome Hamfest, at Westmoreland; Aug 13, Greater Buffalo Summer Hamfest, at Depew; Sept 17, Auburn at Emerson Park on Owasco Lake; Sept 23, Buffalo at Erie Cty fairgrounds; Sept 23, Margaretville; Sept 30, Elmira at Chemung Cty fairgrounds, Horseheads. Net Summaries:

Net	*NM*	*Sess*	*QNI*	*QSP*	*Net*	*NM*	*Sess*	*QNI*	*QSP*
BRVSN	WB2OFU	30	262	1	CHN	W2EAG	30	154	33
CNYTN	WA2PUU	30	303	63	EBN	WB2IJZ	20	444	0
ESS	W2WSS	00	000	00	NYPhone	N2LTC	26	206	312
NYPON	N2YJZ	30	352	154	NYS/E	WB2QIX	30	355	234
NYS/L	W2YGW	30	241	215	NYS/M	KA2GJV	30	209	76
NYSCN	W2MTA	5	17	2	NYSPTEN	KD2V	30	312	34
OARCN	N2KPR	4	30	5	OMEN	K2DYB	2	13	1
OCTEN/L	KA2ZNZ	30	560	215	OCTEN/E	KA2ZNZ	30	1621	234
STAR	N2NCB	30	350	18	STTHN	N2WDS	8	35	13
VHF THIN	KB2VVD	11	51	1	WDN/E	N2JRS	30	605	132
WDN/L	W2GUT	30	509	45	WDN/M	KB2VVD	30	543	91
TIGARDS	W2MTA	5	30	5					

Tfc (Apr 00), * indicates PSHR, # for BPL: N2LTC*# 1066, KA2ZNZ*# 600, W2MTA* 401, KA2GJV* 381, NN2H* 287, WB2QIX* 212, WI2G* 167, N2KPR* 137, KB2VVD* 103, KC2EOT* 93, W2FR* 86, W2PII* 77, W2LC* 75, NY2V* 70, KG2D* 69, KA2DBD* 62, N2CCN* 60, K2GTS* 56, W2GUT* 52, AF2K* 42, KB2ETO* 33, AA2ED* 26, N2WDS* 26, K2DN* 20, KA2BCE* 19, KB2WII* 19, WA2UKX* 17. Digital; Stn Rx/Tx: N2LTC 238/105, KA2GJV 25/1, K2DN 3/2, NY2V 0/6. New Broome EC KB2YEN made PSHR with a total of 73, congratulations Jack! Congratulations to the following Atlantic Division award winners! Amateur of the Year - Riley Hollingsworth K4ZDH; Grand Ole Ham - Bill Thompson W2MTA; Technical Achievement - Frank Bauer KA3HDO. My sincere thanks to these outstanding individuals for their contributions to Amateur Radio.

WESTERN PENNSYLVANIA: SM, John Rodgers, N3MSE. ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. ASM-Youth & Education: KE3EE. 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. At the recent Atlantic Division cabinet meeting, we had a discussion on an aspect that is very high on my personal list of priorities. That is to involve youth in Amateur Radio and importantly to involve the scouting program with Amateur Radio. I would like to ask each of the clubs and also individuals within the section to make an effort to partner with an area scouting group and show them the fun and enjoyment of the hobby. I would also like to hear about your efforts in the endeavor. Please help give a special gift to others, introduce someone to Amateur Radio. Invite them to field day and get involved in the J.O.T.A. program. Summer will soon be upon us, and with the summer season will also be many public service events. I would encourage you to participate in these events when asked to volunteer. It is just one of the many ways with which we can show others the fine service that Amateur Radio operators perform for the agencies. I would also like to ask for individuals that are willing to volunteer for the many field service appointments that we have within the Western Pennsylvania Section. There is a need for an affiliated club coordinator, technical specialists, volunteer examiners, public information officers, official relay stations, official emergency stations and also a bulletin manager. We have several counties that are in need of someone to step up and serve as the emergency coordinator for that county. If you are interested please let me know. 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 Six Meter Club of Chicago has received a request from the local ESDA for communication assistance July 13-16 during Brookfest. The club is also working up a simplified version of the constitution to replace the existing one. SMCC is conducting a 6 meter roundtable each Tuesday evening at 8 PM on 50.130 MHz USB. The club also operates an InfoLine 24 hours a day at 708-442-4961. Callers to the InfoLine can get up-to-date news about club events. The Fulton County ARC newsletter reports that the Davenport RAC, which sponsors the event, has moved the hamfest to the Iowa National Guard Armory at Mt. Joy airport, which is located north of Davenport, IA. DRAC will hold its first hamfest at the new location on Sunday, November 5. FCARC is looking into getting new club caps and shirts. The club also reported a number of upgrades following the recent license restructuring in April. Kane Co. ARES EC WB9PPK reports the group is planning to work on a bike-a-than in June. At the April meeting of the Hamfesters RC members enjoyed a video taken last year of the U-505 during the Submarines on the Air special event. The September HRC meeting has been changed to the second Friday at the Crestwood Civic Center at 7:30 PM. Many VE test sessions witnessed an increase in the number of persons taking exams before the change in license structuring. During a recent test session at Oak Forest High School HRC member AA9BV reported that 36 individuals were on hand to take exams. York RC had 14 examines at their March session. The YRC is making plans to provide communications for a number of community events including Walk America, Tour De Foot, Lilac Parade, and the Memorial Day Parade. YRC operates a ten meter net each Monday at 7:30 PM on 28.430 MHz. According to the Kishwaukee ARC newsletter, WA9Z reports the voter repeater is ready to have antennas installed. Remote sites are to be located in Kirkland, Genoa, Sycamore, Hinkley, and Compton. The club voted to purchase the antennas needed for the Hinkley site. Metro Amateur Radio Club (MAC) operates a Slow Speed Code Net on at 7:00 PM on the 2nd, 3rd and 4. Wednesdays of the month. The purpose of the net is to help improve telegraphy skills with on the air practice (and fun). The net meets at 21.115 MHz. Net control is K9PL. Williamson Co. ARES EC WA9APQ reports the annual River-to-River Relay Race was held April 29 with more than 50 Amateurs participating. April traffic: K9CNP 219, W9HLX-58, NN9M-42, WB9TVD-35, NC9T-18, KA9IMX-15, W9FIF-11, WA9RUM 6. 9RN report de KF4UBX session held 60, number of traffic handled 225, average per session 3.75, rate of traffic 3.83, section represented 90% w9hlx nn9m n9plm wb9mjn nn9f ns9m. ISN report de WB9TVD QNI-199, QTC-107, Sessions-30. W9VEY Memorial Net report de K9AXS 6 with 209 check-ins.

INDIANA: SM, Peggy Coulter, W9JUJ—SEC: K9ZBM. ASEC: WA9ZCE. STM: N9ZZD. OOC: KC9V. SGL: WA9VQO. TC: W9MWY: BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Keys, 4/10, Howard D. Ferguson, Sr., K9DDM, Frankfort; 4/13, Paul Rice, WA9BYZ, Evansville; 4/19, John E. Dingle, W9IFW, Indianapolis; 4/22, E. William Easterday, N9YGY, South Whitley; 4/27, William T. Elliott, W9ZSK, Martinsville; and 5/5 Arthur R. Taylor, W9FYC, Muncie. They will be missed. The Lake County ARC

Continued on page 112.

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440 Tiny HT 2Mtr Tiny HT

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(DJ-S41T shown)

DJ-C5T

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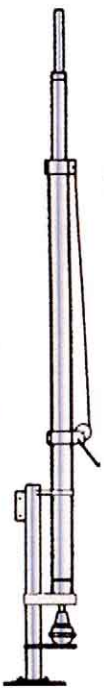

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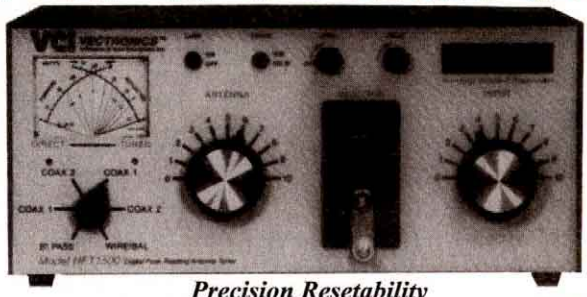

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Two *heavy duty* 4.5 kV transmitting variable capacitors and a massive *high current* roller inductor gives you arc-free operation up to 2 kW PEP SSB.

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A sturdy hand cranked roller inductor lets you quickly *fly* from band to band. A precision 5-digit *gear* driven turns counter lets you accurately return to your previous settings.

Large comfortable knobs and smooth vernier drives on the variable capacitors make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

***You** can tune your SWR down to absolute minimum!*

Why? Because *all* three matching network components, the roller inductor and both variable capacitors, are *fully* adjustable.

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You can tune any real antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc . . .

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VECTRONICS' exclusive 21 segment bargraph display lets you visually follow your instantaneous voice peaks. Has level and delay controls.

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A *shielded* directional coupler and backlit Cross-Needle meter displays *accurate* SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

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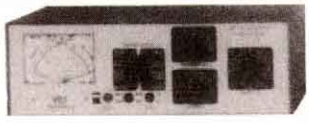

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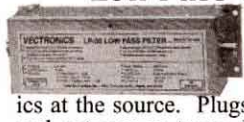

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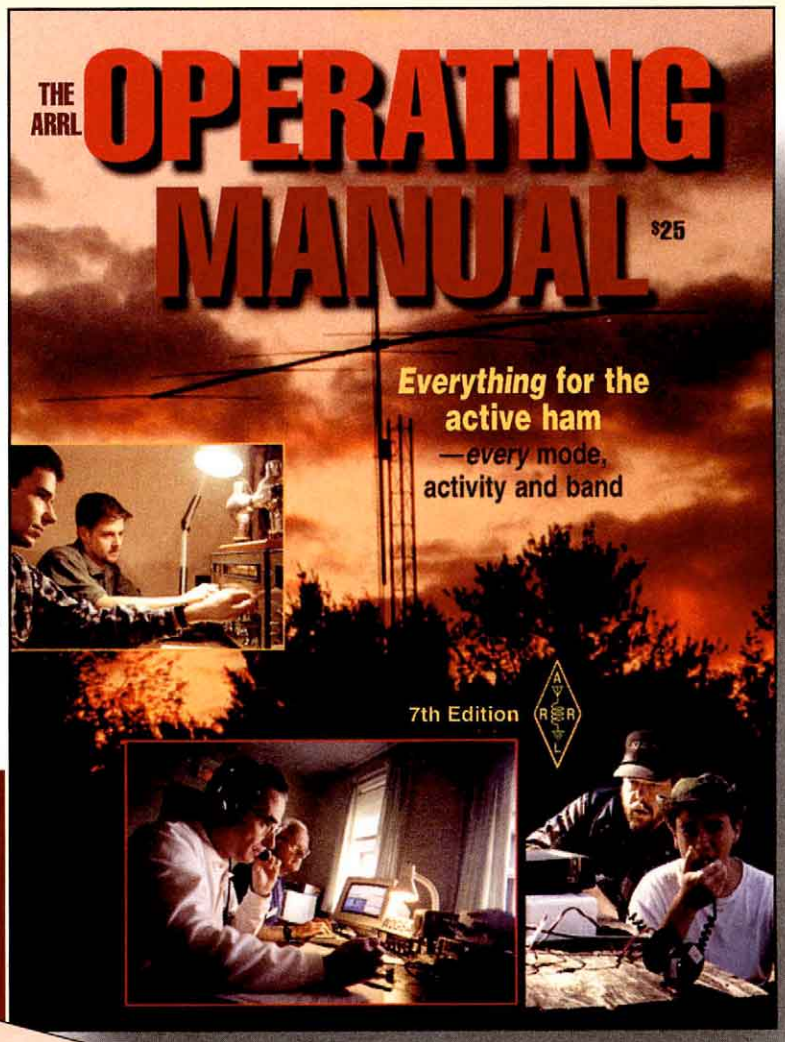

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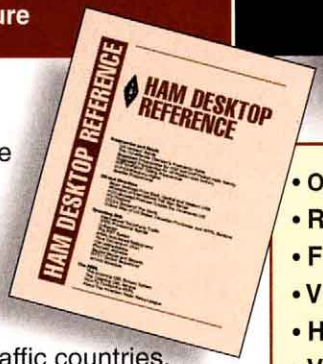

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provided communications for WALKAMERICA. Those helping were KF9EX, WN9Z, W9GAB, W9ZRO, WB9VRG, W9IA, W9JEA, KB9ODN, and KB9THY. There were 5 public service events reporting 153 man-hours. 15 members of the Porter County ARES provided communications for the March of Dimes Walkathon with 90 man-hours of service. There was a Hoosier Ham Workshop held at the University of Indpls with 35 attending. Some interesting points to improve membership and activities were to improve meeting places and include food. Have more banquets and awards locally. Create more club activities and include young people. Focus on member appreciation. Have speakers at meetings. Use older hams to be mentors and speakers on special interest topics. Interactive club participation with other surrounding clubs. Maybe your club would like to have a work shop to compare and exchange ideas with others. Are you on the Internet? Check out the new Web site for the IN Section. You can find it at www.inarrl.org . If you see something missing or want to add something contact Chuck Crist, W9IH, and let him know. Congratulations to the Kokomo ARC for 50 years as an Affiliated club. The Wabash Valley ARA helped make the MS Walk 2000 a great success. Thanks to K9ERE, N9YRX, WB9WVG, N9YNF, KB9HYH, KB9RUP, WD9EYB, K9YAJ, KB9TVF, KB9VBN, KB9QWM, KG9GS and KB9IXS. NM's ITN/W9ZY, QIN/N9PF, ICN/K8LEN, WN/AB9AA, VHF/N9ZZD.

Net	*Freq*	*Time/Daily/UTC*	*QNI*	*QTC*	*QTR*	*Sess*
ITN	3910	1330/2130/2300	2475	572	1984	90
QIN	3656	1430/0000	61	25	192	22
ICN	3705	2315	106	16	348	21
IWN	3910	1310	2182	—	300	30
IWN VHF Bloomington			505	—	450	30
IWN VHF Kokomo			676	—	150	30
IWN VHF Northeast			1496	—	600	30
Hoosier VHF nets (10 nets)			548	61	804	39

D9RN total QTC 225 in 60 sessions IN represented 88 % by WB9QPA, W9UEM, K9GBR, KB9NPU, K9KMJ, KA9UBY, and KA9QFL. 9RN total QTC 356 in 60 sessions IN represented by KJ9J, KO9D, K9PUI, AA9HN, N9PF, WB9UYU and W9FC. Tfc: W9FC 412, W9ZY 120, W9UEM 93, K9GBR 84, WB9QPA 81, N9ZZD 77, K9PUI 58, AB9AA 58, W9JUJ 46, KB9NPU 34, KA9EIV 30, N9PF 29, KJ9J 20, K8LEN 16, K9ZBM 9, W9EHY 8, K9RPZ 6, WB9NCE 5, K9CUN 4, AB9A 4, WB9OFG 4, K9SXM 3, K9OUP 2.

WISCONSIN: SM, Don Michalski, W9IXG—. SEC: WB9RQR. STM: K9LGU. ACC: KF9ZU. SGL: AD9X. OOC: W9RCW. PIC: K9ZZ. TC: K9GDF. ASM: K9UTQ, W9RCW, W9CBE. BM: WB9NRK. It is with deep regret that I inform you of the following Silent Keys: Don Glaubitz, WA9SZV, and Raymond Sunderland, K9ANV. There are many recent upgrades and we welcome them all to the new frontiers in HF. I would like to receive from ***every*** VE team the list of those who upgrade by October 17. I wish to send non-members the ARRL rebate offer for joining ARRL or renewing. Let's get these folks tuned into the ARRL!!! Mail to: Don Michalski, 4214 Mohawk Dr., Madison, WI, 53711. I, also, accept electronic files via email. Coming soon to the Web—Richard Regent's revised **Technical Specialist** manual!! This is a super manual and a must-read for ***all*** TSs. 9RN April report, again, shows 100% participation from the Wisconsin gang!! Congratulations to Michael Placek, KB9SCH, on winning $500 from the Edmund Metzger Scholarship! Please send me anyone you feel worthy of receiving these ARRL awards. Thanks go to the MRAC for an enjoyable evening at their meeting on my 32nd wedding anniversary. Last checked, I'm still married! ;-) ARRL executive V.P. Dave Sumner, K1ZZ, attended the AES Superfest and Madison hamfest. Let's hope for a return visit, next year. Want to add some spice to your club gatherings? Try rotating your meetings to different restaurants. A change in scenery could be refreshing and provide food for thought on new club activities. Organizations, e.g., Lions, Kiwanis, Rotary, Chamber of Commerce are looking for speakers. Club members can speak on behalf of Amateur Radio to these groups. Go for it! Check: **w9ixg.eboard.com** 73, Don W9IXG. Tfc: W9IHW 822, W9RCW 751, K9JPS 694, WZ7V 509, W9CBE 468, W9YPY 435, K9GU 333, N9CK 157, K9FHI 116, K9LGU 113, N9BDL 107, W9YCV 103, W9UW 98, K9RTB 57, KE9VU 55, KG9B 52, AG9G 51, N9KHD 42, KB9ROB 42, KA9FVX 35, W9BHL 32, N9TVT 32, WB9ICH 27, W9ODV 25, K9HDF 23, AA9BB 18, WD9FLJ 12, N9JIY 7, W9PVD 1.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, N0FKU—One of my goals as SM has been finding a means of communicating information to the ARRL membership in Minnesota, and, the entire Amateur Radio community for that matter. The challenge is finding the vehicle(s) to do that. Everyone has different ways to access information whether it be via club newsletter, monitoring local nets or the ARRL Section Net (HF), or Internet e-mail, just to name a few. Not everyone has all these flavors their disposal and no matter how hard I might try to get information to everyone, someone isn't always going to get it. A new feature has been added to the ARRL members online who subscribe to the ARRL Web site and receive the usual bulletins (i.e. ARRL Letter) that are sent out. If you sign in on the ARRL Web site, go to your members data page, you can now check the box which will subscribe you to any Division/Section newsletters that are generated. This feature will be utilized, and I encourage all of you who have ARRL members-only access online to check that box. I also urge those interested in being a central point for relaying news/information at a local level to consider the Official Bulletin Station (OBS) appt. Does your club have an ARRL appointed OBS who can volunteer? Does your club newsletter editor have a way to collect ARRL section info? I'd like to build on whatever network is effective to forward news to you, but I can only rely on those of you who can help me with that task. Last month was deadline for nominations for MN Section Manager. I do not know the results, but I do hope you, the ARRL members, exercised your member privilege to nominate a candidate. I'm happy to report that Sen Rod Grams has agreed to co-sponsor S.2183, the senates version of the Amateur Radio Spectrum Protection Act. 73. Web page: **http://www.pclink.com/rwendel**. Tfc: WA0TFC, WO0A, W0LAW, KB0OHI, W0GRW, KB0AII, K0PIZ, W3FAF, W0HPD, KB0AIJ,

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NORTH DAKOTA: SM, Bill Kurtti, WC0M—Peace Garden Hamfest July 7-9, Enjoy the fellowship of visiting with your fellow Hams & their families in the Turtle Mts All the usual activities are planned including A tailgate swap fest, dealers, meetings, Saturday night dance with a live band, Sunday morning breakfast, women's & kids activities & much more. Sorry to report that W0HNW is a Silent Key. Lee was active in the Cando & Starkweather area for many years before moving to Garrison. Congratulations to 8 year old Rebekah Shields on passing her Novice test. Also Congratulations to KB0ZAA on being voted the 1999 CDARC SKYWARN Spotter of the year. Well deserved, Kevin, with over 100 hours of SKYWARN activity during the last 3 years. Fargo Hams provided communications for the 2000 Crop Walk in which 300 walkers took part. Sess/QNI/QTC/NM: Goose River, 1895 kc 8:30 AM Sun 5/59 /0 KE0XT. DATA 3937 kc 6:30 PM daily 30/727/28 KE0XT Wx Nets 3937 kc 8:30 AM 12:30 PM 25/679/25 KE0XT. Storm Net 3937 kc. Continuous as needed during storms.

SOUTH DAKOTA: SM, R. L. Cory, W0YMB—On a trip to Rapid City, I had the opportunity to visit the Black Hills ARC club house. It is truly ham heaven. When in Rapid City, be sure to make arrangements to see it. On their test session on April 22, 26 people tested resulting in 11 Extra Class, 10 General Class, 3 Tech Class and 2 others got credits. This was their largest session ever. they will test again on Nov 18; contact NU0F. Hot Springs will test Oct 14; contact WS0F. Black Hills ARC is working on a bus trip to Dayton in 2001. If interested, contact Frank, NU0F. K0ROG reports Sioux Empire ARC at Sioux Falls assisted with the MS Walk April 9 which was their largest ever with the most money raised. WB0TML, EC for Minnehaha Count reports they have an officer at Red Cross HQ in Sioux Falls for use in an emergency. Half of the Huron ARC upgraded to General with the new rules change. 7 upgraded to Extra. S Dakota has the 3rd smallest ham population in the nation with 1469 hams on March 1 for 47th place. N Dakota 48th, Wyo 49th and Delaware 50th. Total traffic reported for April was 491.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail **n5qs@arrl.org**—As I write this, I am getting ready for my first trip to Dayton and you are probably just finishing up Field Day while reading this. This is a good time to look at the activities of the Field Day weekend and see what we will need the next time a real disaster strikes. I know from Jan 21, 1999, that a large percentage of the equipment that our local club normally uses for only for Field Day, school club roundup, Steamboat Days, and other demonstrations was put to use during the real thing. Look at your equipment and update your lists and see what you can do to make the setup easier and everything you have needed easier to locate when there is no time to spare. While evaluating your radio equipment, don't forget your personal survival kit for emergency responses which should include anything you will need for the first hours (days) on a disaster scene. Now is also a good time to approach your local schools, and try to get into their program for the fall semester and do demonstrations. Talk to the teachers and administrators in your community, these are the people who make school clubs work. Tfc: (Apr): K7ZQR 161, K5BOC 144, KC5TMU 106, AB5AU 32, AB5ZU 22, W9YCE 17, K5DEL 14, W5LRA 10, N5SAN 8, KB5SQA 7, KC5UEW 6, W5RXU 5, ARN 110, APN 23, AMN 18, OZK 15.

LOUISIANA: SM, Mickey Cox, K5MC—Many thanks to Al K5DPG for his great service to our section these past 8 years as SM and for continuing to serve as our section webmaster. Check out Al's handiwork at **www.aisp.net/k5dpg/**. Al has also been a big help to me these past few months as I learn my new duties. I want to thank Chuck KG5GE, Ron WB5CXJ, Mark N5MYH, Leon WB5ZED, and Frank W4DLZ, for continuing to serve as STM, OOC, SEC, LTN NM, and LCW NM, respectively. Bob Dunn, K5IQ, is our new PIC and Jim Morris, AC5JU, has once again agreed to serve as the Union Parish EC. We still have several vacancies in our leadership roster. If interested please let me know. Mark your calendars for the upcoming LA QSO Party on September 30. Thanks to the Twin City Ham Club for sponsoring the contest, the first such contest in our section in many years. Visit www.tchams.org for complete contest rules. Congratulations to the Westside Amateur Radio Club in Marrero for becoming ARRL affiliated. N5MYH and yours truly attended the National Hurricane Conference in New Orleans, which included a training session on the role of amateur radio in hurricane communications. Mark presented a good overview of amateur radio operations in LA at the conference. All LA stations are encouraged to participate in our section traffic nets to learn the basics of message handling. Both LTN and LCW particularly need stations from the Baton Rouge area. Please be sure to make all new hams welcome to our great hobby and recruit new ARRL members to help make our national organization stronger. Tfc: WB5ZED 830 (BPL), W5CDX 497, K5IQZ 216, K5MC 117, KG5GE 44, K5DPG 24, K5WOD 8.

MISSISSIPPI: SM, Malcolm Keown, W5XX—Field Day is here already! Are you prepared for the humidity, dust, mud, mosquitoes, mustard sandwiches for breakfast, and no sleep? The Hattiesburg (2A) and Vicksburg (3A) ARCs have pretty well dominated the big scores in Mississippi for the past few years. Can anybody take them out? W5XX was invited to make a presentation on "Amateur Radio Emergency Operations in Mississippi" at the annual National Hurricane Conference in New Orleans. Twenty-plus enthusiastic hams met in Forest on April 29 to start laying the groundwork for a statewide VHF Emergency Communications Systems. AB5WF will head up a short term effort to efficiently link our current Two Meter Resources. In the long term, KA5SBK will design a 440 backbone system. Thanks to KI5FW, N5XXX, and KC5BCO for organizing the Meeting. Regret to report the passing of KC5RIB, XYL of past SM W5OXA. PIO Report: W5KWB. EC Reports: KD5CKP, WB5OCD, N5ZNT. Net Reports: sessions/QNI/QTC. MSPN 30/2828/60, MTN 31/110/46, MSN 30/985/12, PBRA 30/834/65, Jackson Co ARES/RACES 30/458/30, MSSN 20/70/2, Hancock Co ARES 13/150/4, Stone Co ARES 5/59/0, MAEN 4/64/0, Lowndes Co ARES 4/64/0, NW Miss Skywarn 4/42/0, LARCEN 4/45/0, MCARA 4/40/0 MBHN 3/18/0. PSHR: N5XGI 157, KB5W 144,

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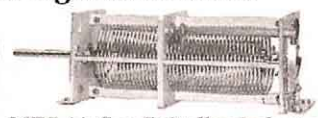

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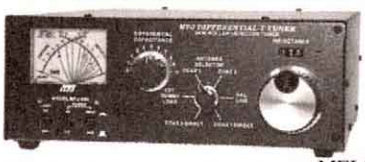

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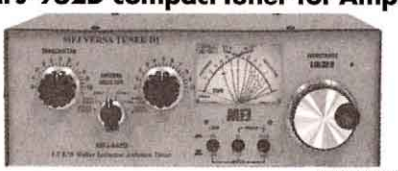

MFJ-962D **$269.95**

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 Ameritroní 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 **$119.95**

The *most for your money!* Handles 300 Watts PEP, covers 1.8-30 MHz, *lighted* Cross-Needle SWR/Wattmeter, 8 position antenna switch, 4:1 balun, 1000 volt capacitors, Lexan front panel. Sleek 10½Wx2½Hx7D in.

MFJ-945E HF+6 Meter mobile Tuner

MFJ-945E **$109.95**

Extends your mobile antenna bandwidth so you doní 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**

MFJí 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 MFJí s reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 6 Meter Tuners

MFJ-906 **$79.95**

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903,** $49.95, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 VHF/UHF Tuners

MFJ-921 or MFJ-924 **$69.95**

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922 **$79.95**

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 artificial RF Ground

MFJ-931 **$79.95**

Creates artificial RF ground. Also electrically places a far away RF ground directly at your rig by tuning out reactance of connecting wire. Eliminates RF hot spots, RF feedback, TVI/RFI, weak signals caused by poor RF grounding. **MFJ-934, $169.95,** Artificial ground/300 Watt Tuner/Cross-Needle SWR/Wattmeter.

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• 1 Year *No Matter What*™ warranty • 30 day money back guarantee (less s/h) on orders direct from MFJ

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FAX: (662) 323-6551; **Add s/h**
Tech Help: (662) 323-0549

N5JCG 139, K5VV 129, K5DMC 108, W5XX 90. Tfc: KB5W 526, K5DMC 141, N5XGI 135, N5JCG 41, K5VV 22, W5XX 13.

TENNESSEE: SM, O. D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. PIC: KE4CES. SEC: WD4JJ. STM: WA4HKU. TC: KB4LJV. UCARS meets on 3rd Mon of the 3rd month of each quarter at 7 PM. Officers are Lucy, KF4LW, pres, Doug, KE4URW, vp & activity dir, Bob, KS4NG, sec/treas & editor. Thanks go out to RACK members KF4VMJ, KC4TRY, KF4YUZ & KG4BLO for handling communications for the Calhoun's 10-miler. April RACK Panels reported 29 were successful in passing license exams. Testing were K0CSJ, KA4LBD, KA4LBE, AE4IJ, ND4F, N4GRC and in support were K4IBP, W8DIT, W4HZD, W4CPA, N4OQJ, WA4PGV & WD4ANL. The following NARC members participated in the Channel 8 telethon and the Middle TN Chapter of the National Multiple Sclerosis Society walk-a-thon: KC4ZOA, K5LKT, N9GRW, KC4TMV, N4BHO, KE4TQO, KF4WME, KM4CA, WB4ZCQ, N4ULR, KE4JWS, N4GWE, KC4TCR, N4VHM, K4ANH, Mrs Ford and Carolyn Humphreys. Thanks to all. Johnson City hams responded to a fire. Carter County ARES members EC KD4INB, KC4PLC, KB4ZVA, WU4W, WS4Z, KE4DOA, KF4YAV, KE4WFT, KF4ZPA, KF4ZPB, KG4FBD, KE4UJS & W4IOJ. MARC News reported that members participated in the Maury Co Bike Ride. DARC member Terry Cox, KB4KA, has been recommended for an ARRL DXCC checker. The recommendation was made by TN SM WA4GLS. For most TN clubs, the big news is the VE exams before April 15, and club dues are due. Now that April 15 is past, pay up your dues and attend all club functions. You'll enjoy it. DRN-5 rpt 62 sess, 1029 msg, TN rep 81% by K4WWQ, KE4GYR & W4OGG. Net Sess/QTC/QNI: TMPN 30/27/2005; TNCWN 24/29/145; TEMPN 20/37/637; TEPN 25/159/2128; TSCWN 22/6/6. Tfc: NZ4O 335, KE4GYR 88, N4PU 77, W4SQE 67, WA4HKU 62, WB4DYJ 43, W4SYE 16, WA4GLS 15, WD4JJ 9, KI4V 6.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—Upcoming Hamfests: August 20, 2000, Centeral Ky Hamfest in Lexington, KY, September 9, 2000, Greater Louisville Hamfest in Bullit County. No word on any others as of yet. It is with deep regret that we mention that Garry Petch, N4XMB, became a SK in April. On April 25, 2000, Boyle Co EC, Dave Spanyer, KD4POZ, and Mercer Co EC, James Tewmey, KE4LZP, with other Hams spent more that 24 hours with other Hams, responding to a chemical fire in a box car. Additional info may be found in the No. 18 issue of the ARRL Letter, in the "In Brief" section. Great job to all of you! May 6, the place was Louisa, Kentucky for the Big Sandy ARC Hamfest. A forum was held and well attended. Speakers attending were ASM, K4LID, Tom Lykins; SM, K4MIS, Bill Uschan; ASM for SE OHIO Section, Connie Hamilton; WD4MIO; and West Virginia SM, Ollie Rhinehart, WD8V. Many thanks to those that attended and for their support. Two Certificates of Merit were presented, one to Gerry Caudill, KB4SQI, and the other was Fred Jones, WA4SWF. These Certificates were presented for the many years of outstanding work and support for their communities and Amateur Radio. Net/QN/QTC: KRN 652/20/20. KTN 2325/73/62. KSN 190/43/28. TSTMN 465/22/30. CARN 265/21/25. 4ARES 478/38/3. Tfc: K4AVX 51, WD4JAW 12, N4GD 21, K4YKI 3, AE4NW 64, WD4ZDU 21, KO4OL 33.

MICHIGAN: SM, Dick Mondro, W8FQT (**w8fqt@arrl.org**)—We need to innovate, to break out of old habits and procedures, and move Amateur Radio into the 21st century with improvements in processes, procedures, technology and efficiency to meet our goals of serving the public. The next step is to market, or sell, our service to the general public. We do a poor job of marketing Amateur Radio to a public that is largely ignorant of our diverse interests and the high tech nature of our hobby and service. Recent press reports have described ham radio using phrases like "dying culture" or "antiquated". News stories describing the last commercial use of Morse code for maritime communications noted that ham radio operators were the last to use what was described as an "old technology". Without question, this is how much of the public views us, as a group of hobbyists enjoying antiquated technology. Yet, as most ham operators know, there is a lot more to ham radio than this meager view. We have only ourselves to blame for not positioning and marketing, literally, SELLING the Amateur Radio service to the general public. Ham radio is an amazingly diversified field ranging from HF and VHF/UHF communications, to the use of wireless data networks, satellite communications, and emergency communications systems. Our hobby has many attributes, ranging from the old to the state of the art. Unfortunately, when we demonstrate our hobby in public, we tend to focus on the things that have little appeal to today's public. When we demonstrate our hobby, we typically focus on things that appeal to us but which lack appeal to our "customers". The emergency communications capabilities of the Amateur Radio Service are appealing to the general public and should always be exemplified at any public display. Thanks to all the consumer marketing flooding the local newspapers and airwaves, everyone has been trained to tune in when they hear that magic word "DIGITAL". So why not leverage all that attention to DIGITAL? Focus on digital communications technology or interfacing computers and radio technology. Do something that clearly represents the high tech nature of our hobby and demonstrates use of modern, advanced technology. It is entirely within our power to make ham radio a dynamic and successful hobby for the 21st century, combining communications, computing, experimentation and discovery. But we can do so only if we step up to the challenge of modernizing our practices and actively marketing ourselves to our potential "customers". One we have made the "sale" we can concentrate on other areas. What do you think? Tfc: KB8ZYY 294, W8RTN 275, AA8PI 260, N8FPN 163, WX8Y 162, K8LJG 109, K8AE 71, N8JGS 59, AA8SN 50, K8GA 49, K3UWO 41, W8RNQ 39, WI8K 37, K8UPE 31, WA8DHB 31, K8KV 30, KC8GMT 25, N8OSC 22, K8ZJU 22, N8TDE 13, KI8GR 12, K8AI 11, KB8EIW 9, N8EXS 3.

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12)—For active DXers and others who collect QSL cards and use the services of the ARRL QSL bureau; there have been a few adjustments about the operation which should please you. As Great Lakes Division Director George

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 . . .

MFJís new adjustable voltage switching power supplies do it all! Power your HF or 2M/440 MHz radio and accessories.

MFJís *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.

MFJís 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- thatís *5 times lighter* than an equivalent conventional power supply. MFJís 45 Amp is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . . Your buddies wonít 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

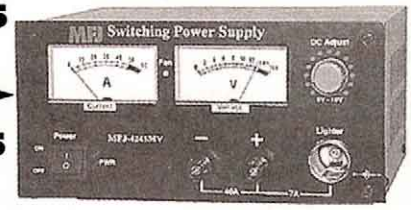
You wonít burn up our power supplies!

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. 5½Wx2½Hx10¼D 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

MFJís 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.

Itís highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- itís 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
$44.95
plus s&h

MFJ-1118, $74.95. This is MFJís 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 transceiverís 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 ìONî 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 ìONî 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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and Nearest Dealer . . . 800-647-1800

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ï 1 Year *No Matter What*™ warranty ï 30 day money back guarantee (less s/h) on orders direct from MFJ

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All are protected by MFJís famous No Matter What™ one year limited warranty.

Race, WB8BGY, has stated, please take the time to read all of the information about Bureau operation on the new Web Site. The site is accessible from the Great Lakes Division Web Site of **http://www.mrrace.com/ARRL/**. Just click on the button next to the "ARRL 8th Area QSL Bureau." Try it; you'll like it. If you want your newsletter considered for the 9th Annual Ohio Ham Radio newsletter contest, get in contact now with PIC Scott Yonally, KC8SS, of Mansfield. . If you have news for the Section, get in touch with ASM Ron Griffin, N8AEH, of Findlay, who is editor of the Ohio Section Journal. There is plenty to do in this Section. You can help your local newsletter editor, participate in marathons and charity events communications for public service events, pass traffic on the nets both in daily nets run at the city level and regional nets like the highly rated Ohio Single Side Band Net (OSSBN) and work with keeping the frequencies as clear of interference as possible. Plus active clubs in every city, EVEN MORE IMPORTANT, every small city of this state. And we just finished Field Day activities. Lots to do with much variety. OHIO SECTION CONGRATS TO: (A) Connie Hamilton, WD8MIO of Marietta who just added net manager of the OSSBN to her Assistant Section Manager for SE Ohio chores, (B) Ohio hams who participated this year in SKYWARN programs throughout the state as weather spotters and/or members of various WARN programs, and (C) Tom Copeland, N8MAV, and Kathy Copeland, N8MAW, who both were named Ham of the Year in Toledo by the Lucas County ARES program. Remember September 16 for the Annual Ohio Section Conference at the State EMA Center (Columbus). All are invited to participate. July Ohio hamfests are; (9) Bowling Green at Wood County fairgrounds; (15) Northern Ohio ARS hamfest at Wellington; and (22) OHKYIN ARS hamfest at Diamond Oaks School, Cincinnati. de K8QOE. Now for our April traffic reports:

Net	*QNI*	*QTC*	*QTR*	*Sess*	*Time*	*Freq*	*Mgr*
BN (E)	155	48	261	30	1845	3.577	WD8KFN
BN (L)	185	81	300	30	2200	3.577	NY8V
BNR					1800	3.605	W8LDQ
OSN	152	60	583	30	1810	3.708	WB8KQJ
OSSBN	1913	508	3125	90	1030, 1615, 1845	3.9725	KF8DO
OH Section ARES Net					1700 Sun	3.875	WD8IHP

Tfc: WB8KFN 232, KD8HB 146, N8DD 130, N8FWA 1238, KF8DO 125, KC8HJL 115, N8YWX 104, WA8HED 80, WA8SSI 68, WA8EYQ 63, N8POV 59, N8TNV 59, N8CW 55, W8BO 50, NS8C 48, K3RC 46, KD9K 41, KC8DWM 40, N8RRB 40, KA8VWE 40, KI8IM 34, KC8HPR 33, WD8KBW 33, NY8V 28, N8IBR 27, KI8O 27, KC8HPT 26, K8JMP 25, KC4IYG 24, KA8SBK 24, N8GOB 19, W8RG 18, W8PMG 18, KB8RGY 14, WA8RLB 14, KB8TIA 14, K8OUA 13, N8YXL 12, KC8JKE 11, N8RAK 11, W8WLE 10, N8GP 9, WD8MIO 9, W8RPS 9, W8DYF 7, KC8KYP 7, W8GDQ 6, KC8HFV 6, K8QIP 4, KE8FK 3, K8WC 3, N8HIA 2. (Mar) N8POV 51, K8OUA 44, NY8V 29.

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 (April 2000) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 38/2 CDN 342/175 HVN 507/230 SDN 406/165 NYPHONE 206/637 NYPON 352/308 NYS/E 355/480 NYS/M 209/152 NYS/L 241/449. Section News: Now is the time to start thinking about next year's club programs! Let me know if I can help. Please write your state legislators in support of A.9947 and S.7324. Have you thought about running a ham radio class this summer? ARRL can help! PSHR: N2YJZ 177, KC2DAA 157, N2JBA 156, WB2ZCM 143, W2AKT 141, W2JHO 122, WA2YBM 117. Tfc: N2YJZ 396, KC2DAA 78, N2JBA 74, WB2ZCM 48, N2TWN 46, W2JHO 34, W2AKT 31, WA2YBM 20, W2CJO 19, K2AVV 9, WA2BSS 2, KL7JCQ 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. Thanks to outgoing ACC Steve Fook, K2EJ, for his years of service! The new Affiliated Club Coordinator is Phil Lewis, N2MUN (**n2mun@optonline.net**). Next HRU 2001 planning meeting is July 17 at Babylon Town Hall, contact Phil for more info. Please write or e-mail your NY State Assemblyman to support A9947 and Senator to support S7324, the NY State PRB-1 Bill. Hudson Division Awards dinner is Fri. Sept 15 in New Rochelle, NY. Contact W2XX to submit a nomination for Amateur of the Year, Grand Ole Ham or Technical Achievement. Convention is Sat. Sept 16 at Westchester County CTR in White Plains. Please check-in to the new Suffolk County traffic net on 145.21 at 8 PM. Check the NLI Webpage 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 516-499-2214; 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,

MFJ *tunable* super DSP filter

Only MFJ gives you tunable and programmable "brick wall" DSP filters

U.S. Patent D374,010

MFJ-784B

$249.95

NEW!

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 phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57dB 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.**

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 milli-seconds. 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 tunable manual notch can be used when a 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 auto- matic 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.

NEW! 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 frequencies 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. 4½x2½x5in.

DSP for *your* MFJ-1278/B

MFJ-780

$99.95

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.

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Nearest Dealer . . . 800-647-1800

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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 543, N2AKZ 196, KB2KLH 89, W2RJL 78, N2XOJ 37, WA2YOW 22.

NORTHERN NEW JERSEY: Jeffrey Friedman, K3JF—Traffic report submitted by STM WB2FTX.

Net	*NM*	*Sess*	*QNI*	*QTC*	*QSP*
NJM	WA2OPY	30	153	63	57
NJPN	W2CC	35	149	23	22
NJN/E	AG2R	30	197	111	82
NJN/L	AG2R	30	211	71	61
CJTN	N3RB	30	255	74	43
NJVN/E	N2RPI	30	326	56	42
NJVN/L	N2OPJ	30	286	41	38

Tfc: N2XJ 162, N2OPJ 70, W2MTO 62, KC2AHS 60, K2PB 40, N2RPI 39, KB2VRO 35, N3RB 27, W2CC 16, N2TTT 7.

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL—ASM: N0LDD—SEC: NA0R. ACC: N0IJP@KE0BX. BM: K0IIR @ W0CXX. SGL: K0KD. There is a new antenna on the W0LAC repeater and is reported much improved. FMARC had their annual cookout at KU0P. NIARC had an excellent program for the April meeting. K0AL, keys, and telegraph history. May was the Ten Tec Pegasus. Those should have been very good meetings. I received a multi-club report from Dan, KB0JUL. He reports spotter training by the Story Co club with 27 attending. Iowa QRP is reported to be growing. They have a net on 7110 kHz on Wednesday at 1900. Cyclone ARC participated in the VEISHEA display and activities. OARC is doing exams and breakfast but not in that order. The breakfast is fun and then they go to work! Looks like almost everyone is starting to prepare for RAGBRAI. I hope to get in on some of the work. I received a nice e-mail picture of the TSARC van. They seem to be planning their usual summer activities. Looks like lots of activities planned for the summer months. Hamfests, bunny hunts, FD, antenna parties, fund raisers, new gear, and lots else. Maybe throw in a little time for upgrading and family and it looks like the summer is full! How about helping a friend to get licensed, or upgrade, or join the league. Try a new mode. Re-learn something you have forgotten or learn something new. It's time to do something. 73 de N0JL. Newsletters were received from IIARC, FMARC, NIARC, OARC, SEITS, DMRAA. Tfc: N0JL 40, WB0B 4.

KANSAS: SM, Orlan Cook, W0OYH—ARRL KS State Convention August 27 at Salina and Ron Trembly has given us the ok on a Kansas Section meeting room from 10 AM to noon like last year. I talked to Wendel, W0TQ, today and he says votes are now coming in for KS Amateur of the year which he will pre- sent about 10 AM. I appreciate the club newsletters that I receive. Thanks and keep them coming. I have received no word from any ham of the Parsons tornado. There was no HF activity. A tornado passed just 7 miles north of me last night and put on a brilliant light show. I am sorry to say, there doesn't seem to be an increase in HF ham activity with all of the up-grades. I don't find the HF rig sales up. Maybe this will be a slow migration from local communications to Section, Regional and Area wide. Mar Kansas Nets: sessions/QNI/QTC, KSBN31/1240/100. KPN 22/310/32. KMWN31/606/528. KWN 31/1028/729. CSTN 27/1894/ 102. QKS 57/316/78. QKS-SS 13/23/8. SEC 45/513/13.QNS KB0AMY N0BTH WD0DVM/mgr AA0IQ N0LJK KF4LM W0PBV WA0SSR KB0WEQ. TEN 594 msgs 62 sessions Kansas 66% KB0DTI AC0E AA0OF KX0I K0PY NB0Z WB0ZNY W0SS mgr. BBS reports: W1AWBul/Per /NTS AA0HJ 7/312/6 N0OMB 35/281/6. Ks Stns Tfc: N0JK 952, AA0OM 163, WB0ZNY 97, W0WWR 87 W0OYH 48, KX0I 38, KB0DTI 22, N0RZ 18, KF4LM 16, K0RY 11, N0ZIZ 9, W0FCL 7, AC0E 6, K0BJ 2, PIC/PIO KC0DYA, PIO KB0DTI reports w/published news clips.

MISSOURI: SM, Dale Bagley, K0KY—ASM: John Seals, WR0R. 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. The Lebanon Hamfest was quite successful. Thanks to the LARC membership, President Herb Maddox, KB0YBZ, and Will Clark, W0NMM. Bud Loar, K0MLH, Lead the VE testing session at the Hamfest. SEC, Patrick Boyle, K0JPB, and STM, Charles Boyd, KE0K, and I attended the Event. The Joplin ARCs Hamfest fell on April 15 and they had over 100 individuals upgrading and tested at their VE session. There was a large turnout of amateurs and vendors. The Hamfest was well organized by Jim Scott, WB0IYC, with the assistance of Ray Brown, KB0STN, the JARC Pres. Bruce Frahm, K0BJ, V-Director Midwest Division and I presented a forum at the Hamfest. The number of ARRL affiliated clubs in the MO Section keeps increasing. The Section is now up to 55 clubs affiliated and more in the process of applying for affiliation. Radio Clubs and their newsletters are vital to the promotion and growth of Amateur Radio. I will be looking forward to visiting with the Amateur Radio Operators at the Washington Hamfest on July 16th. The event is sponsored by the Zero Beaters ARC. Dale Bagley, K0KY, ARRL MO SM, P.O. Box 13 Macon, MO 63552. Nets Sess/QNI/QTC/NM: WAARCI 5/136/0/KB0VZP; MTN 30/486/45/K0IPM. Paul Revere 5/49/0/N0IWA. Macon ARES 4/49/0/K0KY. AUDRAIN ARC 4/32/2/WB0SEN. Rollabillboard 29/75/2/NA0V. Jackson Co ARES 7/75/0/K0UAA. Tfc: KE0K 28, KG0IV 7, PSHR: KE0K 73, KG0IV 72.

NEBRASKA: SM, Bill McCollum, KE0XQ—ASMs: W0KVM, N0MT, WY0F, WB0ULH & WB0YWO. It is with deep regret to inform you that Otis, W0BFN, became a Silent Key on March 27. He was a regular on Nebraska HF Nets. On April 15th, the Heartland DX Association sponsored a VE session and tailgate flea market. 104 amateurs stood in line to upgrade in a 3-hour period. Congratulations to Andy Halbert, KI0AU, for being the recipient of the K2TEO, Martin J. Green Memorial $1000 Scholarship. The AK-SAR-BEN ARC had an excellent display of Amateur Radio equipment at the premier of "Fre-

MFJ Contest Voice Keyer

Brand New design . . . Microprocessor controlled

Transformer-coupled -- No RFI, hum or feedback . . . 75 seconds total, 5-messages . . . Can be computer-controlled by CT, NA, etc . . . Records received audio . . .

Let this *new* microprocessor controlled MFJ *Contest Voice Keyer*™ call CQ, send your call and do contest exchanges for you in your own voice!

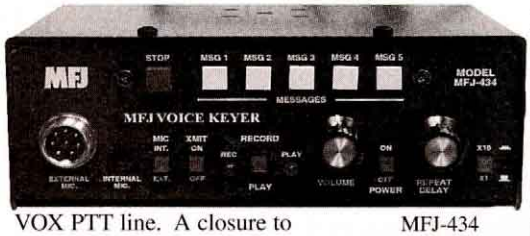
Store frequently used phrases like "CQ Contest this is AA5MT", "You're 59" . . . "Qth is Mississippi" and more! Contest by pressing a few buttons and save your voice.

You can record and play back five natural sounding messages in a total of 75 seconds. EEPROM technology keeps messages stored for up to 100 years -- no battery backup needed.

Repeat messages continuously and vary the repeat delay from 3 to 500 seconds. Makes calling CQ so easy and it's also a great voice beacon.

A receive audio jack lets you record and play back off-the-air signals -- great help if you didn't get it right the first time! No more "*Please repeat*".

A playing message can be halted by pressing the *Stop Button*, your PTT mic button or by your



VOX PTT line. A closure to ground via remote control or computer can also halt messages.

Has jack for remote or computer control (using CT, NA or other program and its interface). Lets you select, play and cancel messages.

The MFJ-434 is transparent to your microphone -- your mic's audio characteristics do not change when your MFJ-434 is installed. Dual controls make it easy to tailor audio level to match your voice.

MFJ-434
$179.95
plus s&h

All audio lines are RF filtered to eliminate RFI, audio feedback and distortion. An audio isolation transformer totally eliminates hum and distortion caused by ground loops.

It's easy to use -- just plug in your 8 pin microphone cable and plug the MFJ-434 shielded cable into your transceiver's mic connector. Internal jumpers let you customize it to Kenwood, Icom, Yaesu, Alinco or Radio Shack rigs. Use your station or built-in microphone for recording.

Built-in speaker-amplifier lets you monitor stored messages. 3.5 mm speaker/headphone jack. SMT technology. Use 9 Volt battery, 9-15 VDC or 110 VAC with optional MFJ-1312B, $14.95. 6½Wx2½Hx6½D inches.

MFJ-73, $29.95. Remote Control Head with cable for MFJ-434.

MFJ *Professional grade* Boom Mic Headphones

For marathon contesting, DXing, traffic nets, ragchewing . . . These lightweight, fully padded Boom Mic Headphones make operating superbly comfortable! Flexible gooseneck microphone boom and speech frequency tailored microphone cuts through noise and QRM!

This *professional grade* MFJ Boom-Mic Headphones set is designed for contesting, DXing and traffic nets. Features *total comfort* design with leatherette padding for operating long hours.

Superb 3/4 inch thick padding on each ear and headband lets you wear your headset all day long! So super lightweight, you won't even know they're there! Headband adjusts for a perfect fit to keep out external noise.

The headphones' frequency response is enhnanced for communications to bring out speech fidelity that you never knew existed. Signals never sounded so crystal clear.

The flexible microphone boom lets you position the mic comfortably at an optimum distance to minimize silibant sounds.

MFJ's frequency tailored microphone element lets you bust through noise and QRM!

Extra-long 9⅔ feet of cable lets you move about your ham shack!

Has standard 1/4 inch jack for headphones and 3.5 mm jack for microphone. Build your own adaptor or use MFJ's pre-wired adaptors to match your transceiver. **Order** MFJ-5396 Y/K/I (YAESU, KENWOOD, ICOM respectively). $15.95 each.

Even casual operators will appreciate the advantages of MFJ's superbly crafted Boom-Mic headphones for *hands-free* operating at an incredibly low price.

MFJ-392, $19.95. Communication Headphones only. Great for ham radio, shortwave listening -- all modes, SSB/FM/AM/ Data/CW.

Each phone has individual volume and speech enhancement control. Superb leatherette padding.

Both MFJ-392 and MFJ-396 have MFJ *No Matter What*™ one year limited warranty.

MFJ Communications Speaker

MFJ-281
$12.95
Ship Code A

SSB, FM, AM, and CW never sounded so crystal clear! Plug in this MFJ-281 *ClearTone*™ speaker and bring out communication speech fidelity that you never knew existed. Restores the smooth sinewave sound that CW naturally generates and makes copying easier. It was carefully designed to improve intelligibility of speech in the frequency range of 600 to 4000 Hz while reducing undesirable noise, static and hum. A top grade 3" Mylar cone speaker is mounted in a well designed baffle. Its fine mesh metal grille allows sound to radiate without muffling. 8 Watts, 8 Ohms. Six foot cord. 3.5 mm mono plug. 3¾x3x2¼ inches.

MFJ 12/24 Hour *DXers Watch*

MFJ-181
$39.95
plus $6 s&h

This *MFJ DXers Watch* lets you quickly check 12 hour local time and 24 hour time in time zones around the world. By noting day and night areas around its rotatable bezel, you can estimate which bands are open each hour to different parts of the world. You can even estimate best times of gray line propagation. It features a highly accurate *Japanese* quartz movement. Turn out the lights . . . *NiteGlo*™ hour, minute and second hands show up in the dark! Has date display. Well-known world cities encircle it's attractive world map face to indicate time zones. A durable stainless steel band adjusts to fit. Attractive giftbox has felt padding. A great gift!!!

MFJ 12/24 Hour LCD Clock

MFJ-108B
$19.95
plus $6 s&h

Dual Clock with separate 24 hour UTC and 12 hour local time displays. Large 5/8 inch LCD numerals, heavy brushed aluminum frame, sloped face, battery included. Synchronizable to WWV. 4½x1x2 in.

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quency" at several Omaha area theatres. Demonstrations included HF, APRS and slow scan television. Some of the non-ham attendees got a chance to get on the air. This is a good way to promote our hobby to the public. Thanks to K0NSA & W0NSA for making this a success. Net reports: MARES: QTC 270, QNI 2 & 5 sessions. NE 40 meter net: QNI 437, QTC 7 & 28 sessions. Eastern NE ARES net: QNI 430, QTC 2 & 30 sessions. W0IRZ Memorial Net: QNI 85, QTC 2 & 4 sessions. NCHN: QNI 240, QTC 24 & 25 sessions. Tfc: K0PTK 116, W0AP 36, KE0XQ 30, W0RWA 26, WD0BFO 16, W0WHY 4, N0UUZ 2, WC0O 2, W0UJI 2, KB0MTT 2. PSHR: KB0YTO 50, KA0DBK 123, KB0YTM 20.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC—BM: KD1YV. OOC: WA1TJT. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. Some of us got together and surprised Pete, KZ1Z, with a small party at the BEARS Club celebrating his retirement from the Bethel Middle School after 30 years of service. Pete has also served as Connecticut Section Manager two different times. Rosalie, K1STO, Field and Educational Services Manager attended the event where some of Pete's friends gave him his own copy of the ARRL 2000 Handbook, the special edition with his name and call sign embossed. He sure was surprised! Pete taught Amateur Radio to over 675 students during the last 28 years and started the Bethel Education Amateur Radio Society which has been in existence since 1972. They were the first school to ever have made contacts with both the US Space Shuttle AND the Soviet Space lab MIR. BTW, the QSO number on the packet contact with MIR was 73! Two Hiram Percy Maxim Award winners came from the BEARS Club: Chris, KD1OX and Michelle, N1PNT. Michelle just received word that she is a FARA Scholarship winner-congrats! Our deepest sympathy to Mark, WA1ZEK President of the Middlesex ARS on the loss of his wife Lori. She was only 36 years old. Contributions can be sent to the Lupus Foundation of America, Connecticut Chapter Inc., 45 South Main Street, Room 111, West Hartford, Connecticut 06107-2402. Good luck on your Field Day efforts-have fun and enjoy learning! Will try to get to see some of you. 73. Net Sess/QNI/QTC/NM: WESCON 30/284/88/KA1GWE; NVTN 30/148/186/KB1CTC; ECTN 30/253/38/WA4QXT; CPN 30/207/72/N1DIO; CN 26/86/26/N1AEH. Tfc: NM1K 1954, KA1VEC 511, KB1CTC 327, KA1GWE 169, K1STM 83, WA4QXT 52,N1VXP35, KB1ETO 20.

EASTERN MASSACHUSETTS: SM, Joel Magid, WU1F—Information submitted by STM Bill Wornham, NZ1D.

Net	*Sess*	*QTC*	*QNI*	*QTR*	*NM*
EMRI	60	202	221	671	K1SEC
EMRIPN	30	90	173	513	WA1FNM
EM2MN	30	136	300	492	N1LKJ
HHTN	30	113	273	466	N1IST
CITN	30	75	326	557	N1SGL
WARPSN	5	20	74	NA	K1BZD
NEEPN	4	4	14	NA	WA1FNM
*CHN	30	33	154	325	W2EAG

*Clearinghouse Net

Tfc: WA1TBY 356, W2EAG 285, NZ1D 219, N1LKJ 114, NG1A 114, KY1B 109, WA1FNM77, K1SEC 73, K1BZD 70, N1LAH 53, KD1LE 50, KB1EB 39, N1TDF 35, N1IST 29, N1TPU 28, K8SH 28, WA1LPM 18, N1BNG 14, N1XQC 10, WA1VRB 6.

MAINE: SM, Bill Woodhead, N1KAT—ASMs: WA1YNZ, KA1TKS. STM: NX1A. BM: W1JTH. SGL: W1AO. ACC: KA1RFD. OOC: KA1WRC. PIC: KD1OW. SEC: N1KGS. Asst Dirs: W1KX, KA1TKS, K1NIT. Web Site: N1WFO. Hams statewide deserve a pat on the back and a hearty, "Well done!," for keeping our hobby in the public's eye from walk-a-thons to river races. From Skowhegan the hams are: N1STL, N1STK, N1URL, N1NX, NR1W. From Machias: K1DPD, KE1LP, W1LH, N1WTQ, N1UKC, N1UKD, K3FP. From Portland ARC: KA1AIF, K1GAX, N1XP, N1GRO, NX1A, N1NCC, KA1VQQ, W9WBA, N1BBY, KA1KIX, KE1KH, K1VRQ, KC1UX, W1ZW. From Piscataquis ARC: WA1JMM, N1ZMN, AA1PN, N1RCU, N1PGW, N1OJH, KB1EIW, KB1EIX, KD1YW, WA1AKV, N1WZL, W1XR, N1BUG, N1KGS. From Androcsoggin ARC: N1OXA, N1WFO, WA1SCQ, N1SVB, N1ZRL. From Oxford: AA1US, KB1SUY, KB1ECN, KB1EJI, KB1EWW, KB1ENK, KA1VCC, N1GZB, N1SDG, N1SMP, N1TOF, N1VHJ, N1WFP. 73, Bill, N1KAT.

NEW HAMPSHIRE: SM, Mike Graham, K7CTW—ASMs: WW1Y, WB1ASL, W1NH. TC: WA1HOG. STM: WA1JVV. PIC: KA1GOZ. OOC: WS1E. SGL: K1KM. BM: KH6GR. ACC: AA1QD. SEC (acting): WW1Y. Bill Dodge, K1BD, reports that ARES folks from the Seacoast area participated in the Annual Tour de Cure, in which 889 bike riders raised over $148,000 for the American Diabetes Association. Congrats to Bill and crew. I am pleased to announce that Ms. New Hampshire DX, Ann Santos, WA1S, has been appointed DXCC QSL Field Checker. Be on the lookout for her at various events throughout the state, and at Boxborough to get your new DXCC QSL cards validated. Work is also underway to get more DXCC Field Checkers for the State. More news on that front as it becomes available. As I write this, the sun is shining brightly—significant because it is Hoss Traders weekend at Rochester. I hope everyone gets all the hardware needed for those summer antenna projects. Now is the time to finish them, before the hurricane season. And hopefully this year illness will not spoil plans to visit Field Day sites. I plan to see all of you that weekend. For now, best 73. Net NM/Sess/QNI/QTC: GSFM N1RCQ 30/269/46/415; GSPN WB1GXM 27/96/49/287; VTNH WA1JVV 30/163/172/483. Tfc: W1PEX 1154, WA1JVV 185, W1ALE 51, WB1GXM 36, N1NH 34, KA1OTN 19, N1CPX 12.

RHODE ISLAND: SM, Armand Lambert, K1FLD—Once again radio operators provided communications for this year's Narragansett Bike-a-thon for the Diabetes Foundation. The event raised funds in excess of $45,000. Due to extremely hot 90 degree weather for this time of the year, radio communication was critical to the safety of participants. The 25K, 50K, and the 100K events exhausted the supply of bottled water and field operators alerted net control of the shortage enabling to event committee to bring in local supplies just in

10 Bands -- 1 MFJ Antenna!

Full size performance . . . No ground or radials

Operate 10 bands: 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with one antenna Separate full size radiators . . . End loading . . . Elevated top feed . . . Low Radiation Angle . . . Very wide bandwidth . . . Highest performance no ground vertical ever . . .

Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters with this MFJ-1798 vertical antenna and get *full size performance* with no ground or radials!

Full size performance gives high efficiency for more power radiated. Results? Stronger signals and more Q-5 QSOs.

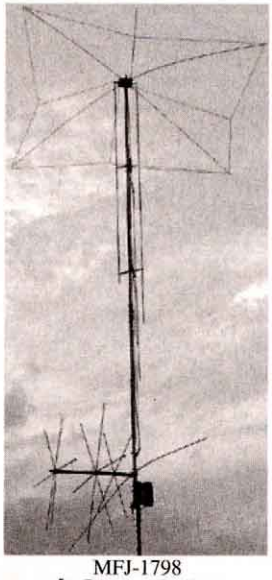
Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

Full size performance is achieved using separate full size radiators for 2-20 Meters and highly efficient end loading for 30, 40, 75/80 Meters.

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

MFJ's unique *Elevated Top Feed*™ elevates the feedpoint *all the way to the top* of the antenna. It puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

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



MFJ-1798
$269.95
Ship Code F

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- small lots, backyards, apartments, condos, roofs, tower mounts.

Separate Full Size Radiators

Separate *full size* quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave radiator.

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

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

Radiator stubs provide automatic bandswitching -- absolutely *no loss* due to loading coils or traps.

End Loading

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

MFJ's unique *Frequency Adaptive L-Network*™ provides automatic impedance matching for lowest SWR on these low bands.

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

No Ground or Radials Needed

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

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

No Feedline Radiation to Waste Power

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

Built to Last

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

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant *Teflon*® covered wire.

MFJ's Super High-Q Loop™ Antennas

MFJ-1786
$379.95
Ship Code F

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

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

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

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

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

All welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts, large 1.050 inch diameter round radiator -- not a lossy thin flat-strip -- *gives you highest possible efficiency.*

Each plate in MFJ's tuning capacitor is welded for low loss and polished to prevent high voltage arcing, welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches, continuous no-step DC motor -- gives smooth precision tuning.

Heavy duty thick ABS plastic housing has ultraviolet inhibitor protection.

NEW! **MFJ-1788, $429.95.** Same as MFJ-1786 but covers 40 Meters-15 Meters continuous. Includes super remote control.

MFJ-1782, $339.95. Like MFJ-1786 but control has only fast/slow tune buttons.

MFJ-1780, $249.95. *Box Fan* Portable Loop is about the same size (2x2 foot) as a box fan, complete with handle. Covers 14-30 MHz. Control has fast/slow tunes.

MFJ Portable Antenna

MFJ-1621 **$79.95** Ship Code A

MFJ-1621 lets you operate in most any electrically free area -- apartment, campsite, hotel, the beach, etc. DXCC, WAZ, WAC, WAS have been won with MFJ-1621! Work 40, 30, 20, 17, 15, 12 and 10 Meters with a telescopic whip that extends to 54 inches. Mounted on a sturdy 6x3x6 inch cabinet. Built-in antenna tuner, field strength meter, and 50 feet of RG-58 coax cable. Handles 200 Watts.

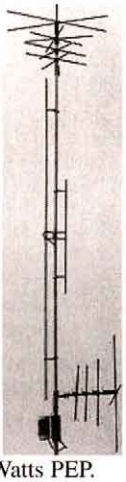
MFJ's G5RV Antenna

MFJ-1778, Ship Code A **$34.95**

Covers all bands, 160-10 Meters with antenna tuner. 102 feet long, shorter than 80 Meter dipole. Use as inverted vee or sloper to be more compact. Use on 160 Meters as Marconi with tuner and ground. Handles full legal limit power. Add coax feedline and some rope or other nonconductor and you're *on the air!*

MFJ halfwave vertical

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



MFJ-1796
$199.95
Ship Code F

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

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

MFJ-1792, $159.95. Full size 1/4 wave radiator for 40 Meters. 33 feet, handles 1500 Watts PEP. Requires guying and radials.

MFJ-1793, $179.95. Like MFJ-1792 but has full size 20 Meter 1/4 wave also.

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time. Credit is due to many of the BVARC members Mark, N2PGD, Craig, N1XAC, Dick, N1DO, Ginny, N1WWG, Bob WB1P, Bob, N1BU, as well as Bill, WA1RI, who rounded up the operators while Armand, K1FLD, orchestrated net control. Gratitude was expressed by the officials by feeding us very well. On another note, it was a great honor and privilege to present the 60-year ARRL affiliation plaque to Warren Nelson, W1LWB, of Hope, RI.! Meanwhile to promote amateur radio to the general public, the FARC has ordered ARRL Amateur Radio handbooks to deliver to local libraries in their served area. When you meet longtime operators, you might want to thank them for keeping the bands active so that we, and the next generations, can enjoy this great hobby/service. See you at Boxboro in August. 73 de Armand, K1FLD.

VERMONT: SM, Bob DeVarney, WE1U—Well, it's May here in the North Country, and thunderstorm and severe weather season is here. With the thunderstorm(s) of the year on May 10-11, we received almost our whole months' rain overnight. That had road crews, and utility workers scrambling to get services back up and running. The Red Cross also had a callout to the Groton area for high winds that damaged a home and some of the infrastructure there. It highlighted the need for Amateur Radio communications. I strongly urge you to contact your local DEC or nearest Red Cross chapter to lend any assistance that you able to provide. There are SKYWARN classes held throughout the year to train weather spotters and as refresher courses, too.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, **w1ud@arrl.org**—ASM: N1NZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. Our bands are producing many new DX contacts. Add to this the influx of people upgrading and getting into the DX chase. The end result will be more people qualifying for DXCC. By the time you read this, we in WMA will have our first authorized card checker. Irv, W6IS, of Longmeadow, met all the qualifications and has graciously volunteered for the position. Now you will not have to send your cards to the League or travel into EMA to have them checked. Thanks, Irv! A group from MARA is planning to go to the Hamvention at Dayton. One of these years, I plan to make the trip, but not this year. Now is the time to get organized for Field Day. Make plans to incorporate the public. FD is a great opportunity to demonstrate to the public and media what we are capable of doing in an emergency. Find the hams in your area that are inactive. Inform them of the changes in licensing. Many dropped out because of the 13 wpm code requirement. With a little help and encouragement, we can get them active and upgraded to General or Extra. 73. Tfc: N1ISB 22, W1ZPB 163, KD1SM 9, N1RLX 12, K1TMA 317, W1BMK 5, W1SJV 16, W1UD 221.

NORTHWESTERN DIVISION

ALASKA: SM, Kent Petty, KL5T — Welcome new Field Organization members: Kenai Peninsula Borough ASM Ed Cole (AL7EB), Sitka DEC Dave Lewis (KL7DL), Kenai Peninsula Borough DEC Frank Henrikson (KLØSW), Alaska ARES NM Mike Borer (WL7CKB), and Section APRS TS Paul Spatzek (WL7BF). Ed Cole (AL7EB) spearheading Challenger Alaska project —program to allow Alaska students to communicate with the International Space Station, MIR, and the Space Shuttle over amateur VHF/UHF. Contact Rob Wilson (AL7KK) for input to state PRB-1 effort. Encourage section-wide check-in to HF nets: Sniper's Net 3920 daily 1800 AST, bush Net 7093 daily 2000 AST, Motley Group 3933 daily 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. Traffic: AL7N, Jan-3, Feb-5, Mar-14, Apr-16. PSHR: AL7N, Jan-38, Feb-40, Mar-49, Apr-51.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—At first the proposal to restructure the Amateur rules had hams grumbling on the air about how ham radio would be compromised. Following the April 15th changeover date many newly upgraded hams are now on HF, and I have heard nothing but positive congratulatory remarks ever since. Many of the new up-grades are bringing years of experience and operating skills from VHF to HF. In Memoriam: Michael Julian-Lewis KC7I, Silent Key on March 12 in the Goldendale area. Mid-Columbia ARC hams were asked to help with the Earth Day Bike Tour on April 22. 10 out of 12 OO stations reported monitoring activity in April. STM Don W7GB made DXCC Honor Roll with 324/338 confirmed. Congratulations Don! Net Activity: WSN: QNI 797, tfc 243; Noontime Net: QNI 8301, tfc 312; WARTS: QNI 3179, tfc 108. Tfc: K7GXZ 287, W7GB 190, KA7EKL 57, K7BFL 43, KK7T 31. PSHR: W7GB 138, K7GXZ 119.

IDAHO: SM, M.P. Elliott, K7BOI—OOC: N7GHV, SEC: AA7VR. STM: W7GHT. Once again the HP club will provide communications for the 11th annual HP Laser Jet Women's Challenge bike race. Billed as one of the toughest races on the professional circuit, the race draws competitors from as far away as Lithuania and Australia. This year's race will cover 625 miles over an 11-day period and will involve nearly 14,000 vertical feet of climbing!!! The Ham's in charge of communications will use UHF, VHF, packet, ATV and APRS. In addition, they will use balloons and helicopters to cover the action. The HP effort is being headed by KB7YWE and N7DHL. 73 — Mike, K7BOI. Tfc: W7GHT 218, KB7GZU 81, WB7VYH 30, and N7MPS 14. PSHR: W7GHT 124, WB7VYH 72, and N7MPS 55. Net (SESS/QNI/QTC/ Mgr.): FARM-30/2329/22/ W7WJH; NWTN-30/1195/75/ KC7RNT; IDACD-22/448/6/ K7UBC; IMN-30/456/105/ W6ZOH.

MONTANA: SM, Darrell Thomas, N7KOR—Have not much to report as far as amateur activity in the Montana Section during April. I am sure that all of the clubs were very busy and intent on the testing and rush to up-grade that came with the restructuring program. I do not have any numbers, but from the discussions on the Section Net and traffic nets, it appears there were record numbers of candidates at all of the test sessions with many up-grades achieved. Congratulations to all those who have achieved an up-grade and are now eligible for HF privileges. Looking forward to hearing you on the air and feel free to join in during our various nets. Net/QNI/QTC/NM MSN 134/0 W7OW; MTN 1773/39 N7AIK; IMN 456/105 N7MPS. PSHR: N7AIK 121.

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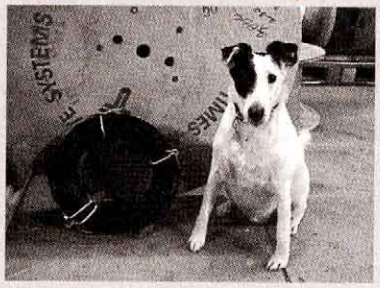

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LMR 400 SOLID CCA CNTR FOIL + BRAID 2.7dB @ 450MHz WP/UV JKT	.59/FT	.57/FT	.55/FT
LMR 400 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 3.1dB @ 450 MHz TPE JKT	.87/FT	.86/FT	.85/FT
LMR 600 (OD.590") SOLID CCA CNTR FOIL + BRAID 1.72dB @ 450 MHz WP/UV JKT	1.25/FT	1.22/FT	1.20/FT
LMR 600 "ULTRA-FLEX" STRD BC CNTR FOIL + BRAID 2.1dB @ 450MHz TPE JKT	1.95/FT	1.93/FT	1.90/FT

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.	

COAX (75 OHM GROUP)

	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
"FLEXIBLE" 450 OHM 14GA COMPRESSED STRD CCS(PWR-FULL LEGAL LIMIT++)	.25/FT	.24/FT	.23/FT
300 OHM 20GA STRD (POWER: FULL LEGAL LIMIT)	.15/FT	.13/FT	.12/FT

ROTOR & CONTROL CABLES

	100FT/UP	500FT	1000FT
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

ANTENNA WIRE

	100FT/UP	300/FT	500FT	1000FT
14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	.19/FT	.16/FT	.12/FT	.10/FT
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

ANTENNA & TOWER SUPPORT ROPE

	100FT/UP	250/FT	500FT	1000FT
3/32" DOUBLE BRAID *"POLYESTER"* 260# TEST WEATHERPROOF	.075/FT	.06/FT	.045/FT	.04/FT
1/8" DOUBLE BRAID *"POLYESTER"* 420# TEST WEATHERPROOF	.10/FT	.08/FT	.07/FT	.057/FT
3/16" DOUBLE BRAID *"POLYESTER"* 770# TEST WEATHERPROOF	.15/FT	.12/FT	.09/FT	.08/FT
5/16" DOUBLE BRAID *"POLYESTER"* 1790# TEST WEATHERPROOF	.20/FT	.17/FT	.14/FT	.13/FT

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8GA (rated:40 amps)	50FT $24.50	100FT $44.50	250FT $107.50
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14GA (rated:15 amps)	50FT $8.50	100FT $15.00	250FT $32.50
16GA (rated:12 amps)	50FT $5.50	100FT $10.00	250FT $22.50
18GA (rated: 8 amps)	50FT $4.50	100FT $8.00	250FT $17.50

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OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW. ASM: KG7OK. SEC: WB7NML. STM: W7IZ. SGL: N7QQU. OOC: NB7J. STC: AB7HB. ACC: K7SQ. With over 13,000 new General class licensees, new upgrades are finding their way to the HF bands. Oregon Section Traffic Manager, Scott Gray, W7IZ, reports many are checking into the NTS traffic nets, Fantastic! It seems this is what ham radio needed to create renewed interest in our hobby. Oregon is working very well with its' neighboring states when it comes to ARES/RACES. Section Emergency Coordinator, Lew Williams, WB7NML, reports that Oregon county Emergency Coordinators are working closely with Idaho and California ECs. This is especially important during the summer fire season. Lew is doing a fantastic job as Oregon's SEC. The Oregon ARES/RACES program is one of the nation's finest. Congratulations to all of you who are volunteering your time in this fantastic organization. With summer here, hopefully I'll get to meet lots of you at the various swap meets and conventions. Have a great July, and keep in touch. NTS traffic totals for April: N7DRP 187, K7OVK 137, N7YSS 126, K6AGD 94, W7VSE 86, KC7SRL 46. K7NLM 42, KA7AID 19, KK1A 14, KD7IEM 12, KC7SGM 12.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—The team of Official Observers (OO) have reported that those upgrades now entering the HF bands have been courteous and a willingness to learn operation techniques of traffic handling nets as well as social and club nets. The Section Amateurs that qualify for the Public Service Honor Role are listed elsewhere, but it is significant to note that the following calls do appear with regularity in the PSHR column. K7BDU, W7LG, W7QM K7MQF, W7NWP, KJ7SI, W7TVA, KA7TTY, N7YSS and W7ZIW. It is no secret that these stations are also involved in handling traffic. Of the traffic handlers K7BDU leads the way with a total of 532, W7TVA 258, W7ZIW 170, W7NWP 167, N7YSS 126, W7LG 75, K7MQF 72, W7QM 53, KJ7SI 28, N7AJ 24 and several others with lesser traffic. The Lower Columbia Amateur Radio Association has been renewed as a special service club and note these special services they have provided. In early April, eleven LCARA members provided communications for the Multiple Sclerosis Walk around Lake Sacajawea in Longview. That event raised some $30,000 for a worthy cause. Members of the club have assisted in finding an overdue 4 wheeler, installed a tri-band radio at the Castle Rock Fire Station, responded to an ELT alert from the Kelso Airport, demonstrated the Comm Van in Vernonia, Oregon to the Vernonia Amateur Radio Klub. The Comm Van was also in operation for the observance of the Mt St. Helens eruption. We echo the comments of SEC N7NVP when he offers kudos of the highest order to sponsors/organizers of the Communications Academy which was held early spring in the NOAA facility located on the old Sand Point Naval Base in Seattle. We note the special efforts of Marina Zuetell N7LSL, DEC for Medical Services; Rick Hodges, KB7TBF, King Co. EC; Scott Key, N7GUZ, King Co RACES RO; Mark Sheppard, N7LYE, ACS Manager, City of Seattle and Vince Glovick, KC7YST PNW REACT Communications Officer. Keynote speaker was Ross Mellin, WA2WDT, Dir of NDMS Communications in the US Public Health Service. A great weekend! Even my first harmonic, Gary, WA7BBJ, conducted an ATV seminar. We note the resignation of DEC Roy Van Riper, W7VR, of Freeland after nearly a decade of service to the Amateur community. We offer Roy a note of thanks. A Spring meeting was held at the Emergency Management Division EOC located at Camp Murray to discuss ACS/ARES/RACES concerns. It was attended by Jimmy Hocutt, State Telecom Dir, Allan Josue KC7GBP, State Emergency Manager, Ed Bruette, SEC WWA, Jim Sutton, WA7PHD, State RACES Officer, Mary Lewis, W7QGP, ACC/ASM, and myself. Results of that meeting should offer overall benefits to the communication structure in the Section. 73.

PACIFIC DIVISION

EAST BAY: SM: Andy Oppel, KF6RCO. ASM: KC6TYB. SEC: KE6NVU. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, W6CPO/Technical Services, KQ6TM/Section Plans and Aministration. STM: K6APW. Check out the EB WWW Page at **http://www.pdarrl.org/ebsec/**. Webmaster is KB6MP. ORCA members WA6CUY, KF6GZY, KG6HM, KF6UVB, KE6STB, KB6MP, KD6KMU, KQ6JZ, KE6MRH and KI6FQ provided communications for the MS Walkathon. MDARC welcomed new members KA6AKH, KE6DYR, WA6ZAP, KF6MKD and N6PZG. ROVARC started their second year 25 members strong and still growing. VVRC members K6ZU, K6HEW, KC6WYC, N6ZGB, NI6V, KD6FZY, KA6FDI, WH6AB and N6WVF provided communications for Walk America. K6VRL and W6KAR drove 5 hours to attend a SARS meeting. EBARC welcomed new members W6LL and KG6ATH; KF6HFA long-term loaned a XCVR for the packet BBS; WD6GGC machined new solder station tips from scratch and donated a home-brew keyer. April tfc: W6DOB 727, 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/3651/7052/8:30 PM. Your check-ins are always welcome.

NEVADA: SM, Jan Welsh, NK7N—ASM: Dick, W6OLD. SEC: Paul, NN7B. DEC: area3: Bill, KC7JLS. NM: Bobby, AB7WZ. OO: Cliff, KB7RIO. EC: Lee, K7NKH. DEC: area 2, Mike, N7EV. TS: George, K7ICW. TS: Jim, NW7O. Busy month here, dinner meeting in Las Vegas during NAB with many Cal league officials incl W6CF-Jim, Pac Div Dir. along with his asst. W6RGG-Bob, SW Div Dir Fried, WA6WZO, many local club officers and ARRL appointee's in attendance including EC: Betty, AB7LJ and her asst. EC, Richard, KB1CUX, along with other volunteers that worked the NAB booth. Dick Flanagan, W6OLD, said yes to the Asst Sec Mgrs. Appointment, and Bobby Eason - AB7WZ, also said yes to NM. Congratulations! Many working on repeaters including the FARS special Service Club. Their 145.39 machine now has 100Hz PL, sounds great! Many great club newsletters putting everyone in the know including Bill-K7NHP and Caroll, KC7TCK. The VE sessions have been going full blast, SNARS, SIERA, COMSTOCK AR Club and WA6TNW holding them. Many upgraded, so look for new callsigns soon. I'm still looking for e-mail addresses of NV appointee's, and we now have a NV ARES Web site : **http://www.cvrc.net/ares/** this is thanks to

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both Paul-NN7B and Dick-W6OLD. NV ARES net on 3965 kHz Saturday's at 8:30 local time, and Bob will look for new callsigns and new checkins! 73, Jan, NK7N. Tfc: N7CPP 12, K7OK 10.

PACIFIC: SM, Ron Phillips, AH6HN—It is with deep regret that I report the passing of Richard La Chance, WH6T, of STARCOMM WIRELESS. He had been recently hospitalized at Castle Hospital in Kailua (Oahu) and was recuperating at the home of Al, KH7BM. His legacy of elmering, training, and testing will live on with the hams he has helped. Dean Manley, KH6B reports the Hilo ARC had their monthly Hilo tailgate swap meet April 15, attended by KH6HME, KH6AFQ, AH6HB, NH7D,WH6CME, W6ORS and KH6B. The 8th Annual Moku Ola Island DXpedition, April 29, activated the club call AH0HA. The event, sponsored by the HI QRP Club, was attended by: KH6AFQ, AH6HB, NH6WW, KH6BMM,AH6NK, KH6HME, KH6DFW, KH6ANA, KH7MS, KH6JRM,KH6KT, NH6XB, AH6J, KH6FKG, KH6H, NH6DR, WY6G, AH6LH and KH6B. Ron Hashiro, AH6RH, reports that EARC's special event station (SES) commemorating the opening weekend of the movie 'Frequency' exceeded expectations. On Saturday, almost 3,000 movie-goers at the Mililani Consolidated Theaters near Honolulu in central Oahu were treated to three Amateur Radio stations operating in the lobby of the theater. Over 100 persons stopped to talk to the Amateur Radio operators, and at least 10 people were actively interested in pursuing their license. The stations were in operation from 12 noon until 8:00 PM on 20, 15, 10 and 2 meters. The guests were able to read an article on display recounting how Amateur Radio provided critical emergency communications with the island of Kauai during Hurricane Iniki. Thanks to all for your inputs. Mahalo & 73, Ron, AH6HN.

SACRAMENTO VALLEY: SM, Jerry Boyd, K6BZ—SEC "North": K6SOJ. SEC "South": WA6SLA. PIO: KD6SSZ. STM: WA6WJZ. OOC: WY6O. ACC: W6RFF. NM: K9JM. TC: WB6RBE. BM: W6KJ. Nice to see good turnouts at several clubs visited on Field Day. Also nice to note that in some instances several clubs joined together for the event. The influx of new volunteers in the Field Organization within the Sction is very much appreciated. Welcome to new El Dorado/Alpine EC KC7AGI and A/EC KB7YFU. Thanks to W6TEE for his frequent updates to the Section Website. We are in the midst of fire season, so if you have not yet joined your local ARES group please consider doing so. Not all emergency responses involve tactical traffic "in the field." There is an important role for those who stay at home and handle Health and Welfare messages. Involvement in traffic handling nets is a valuable way of giving back something for all the enjoyment our hobby offers us. The Yuba-Sutter ARC Newsletter reports their VE Session recently had 59 new or upgrade licensees compared with 12 for the same month in 1999. The Mt Vaca Radio Club establishes a simplex frequency for use when the repeater may be down. Good idea! The Yolo ARS offered a licensing class for State Office of Emergency Services employees. All 14 prospective hams became licensed. Great job! Enjoy a safe 4th of July, and see you next month. 73 de K6BZ.

SAN FRANCISCO: SM, Len Gwinn, WA6KLK—ASM: KH6GJV. SEC: KE6EAQ. Summer plans should all be in place for emergency work by now, as well as many of the general public activities that we participate in. We are looking for volunteers to fill ARES positions in all counties in the section. SCRA had a very nice homebrew evening with antennas the big item. Willits had a train speeder talk by WD6FGX. Valley of the Moon and Lake County both had successful swapfests. Your SM gave a weak signal vhf/uhf introductory talk to the Humboldt group. Other clubs are working on club facilities and public service events. WSWSS is planning a vhf/uhf conference for the end of September. Welcome to the great numbers of new and upgraded hams in the section. KE6SPI, Willits, SK. Please let your section staff know what is happening and how we can assist you.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN—The Fresno ARC held their annual hamfest in late April this year and the new location was an excellent choice. The trip and beans, as usual, were worthy of praise. There was a swap and plenty of prizes for those who purchased tickets for the drawings. One of our own operators here in the Section has qualified for and will soon receive the Cosmos award for working the required number of contacts via satellite. This is a Russian award and as one might recall some of those birds up there were put there by Russia. John Lee, K6YK, has been working the birds with vigor and is also an accomplished DXer. Congratulations John on earning the Cosmos award. Robert Craft, Sr., W6FAH has been appointed Checker for ARRL DXCC in the San Joaquin Valley Section. Bob checked cards at this years International DX Convention at Visalia. Contact Bob for information on DXCC card checking and thanks for your commitment to the DXCC program Bob. The Official Observer program is in the capable hands of Victor Magana, N1VM. Victor and his staff have done a great job in the Section and out as well. Victor and I are committed to help the FCC identify violations and enforce Part 97 of the FCC Amateur Radio Service regulations. If clubs or individuals are experiencing interference and/or jamming please notify me with details, Don Costello, W7WN, at **w7wn@arrl.org** or my phone and address can be found in *QST*. The Turlock ARC will be helping with communications for the March of Dimes walk on May 13, and I will be there. Tfc: KE6GTR 17.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: KM6GE. BM: WB6MRQ. TC: WA6PWW. OOC: KB6FPW. The Foothill Flea Markets are in full swing. Remember, second Saturday each month at Foothill college in Los Altos. The Saratoga ARA heard from Eric Schwartz of Elecraft on the joys of kit building, QRP operation and their new product. SARA meets at 7:30 PM every second Wednesday at the Saratoga Fire Station. The club/ARES net meets every Tuesday at 7:30 PM on 28.4 MHz (SSB) and 146.655- (114.8pl). WVARC meets the 3rd Wednesday. See **http://www.wvara.org** for details. PAARA meets on the first Friday at 7:30 PM in the Menlo Park Recreation Center, 700 Alma Street, Menlo Park. The Santa Cruz County ARC is meets at 7:30 PM on the third Friday at (temporarily) the Dominican Hospital Main building, 1515 Soquel Dr, Santa Cruz. The SCARES (South San Mateo County ARES group) were treated at their meeting to a drill where they took the roles of the served agencies. Sounds like fun! They meet third Thurs-

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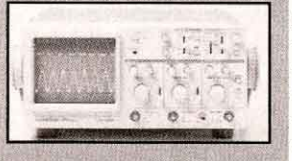

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days, 7:30 PM at the San Carlos City Hall. These are the clubs I have newsletters from this month. Other clubs in the section are listed as part of the section Web page at **http://www.pdarrl.org/scvsec/index.html**. If you'd like to see your club mentioned in these pages, send me a copy of your club newsletter to me at home (address on page 12 of this issue of *QST*) or via e-mail (**wb6w@arrl.org**). I can't report it if you don't send it! See you next month! 73 de Glenn, WB6W. Tfc: W6PRI 2.

ROANOKE DIVISION

NORTH CAROLINA: SM, John Covington, W4CC— SEC: KE4JHJ. STM: N0SU. PIC: KN4AQ. TC: K4ITL. OOC: W4ZRA. BM: KD4YTU. SGL: AB4W. NC ARRL Web Site: **http://www.ncarrl.org**. I have been told that we did very well in the Simulated Emergency Test (SET) again last year. North Carolina has a long history of great participation in this exercise, and I hope this trend will continue. The SET gives us a great opportunity to test our readiness and to evaluate our relationship with served agencies. By identifying our strengths and weaknesses during an exercise, it gives us a chance to work on improving our capabilities before we are needed. Besides that, it is a lot of fun, and some ARES groups have become quite creative with it. If your local group is not involved in SET, contact your EC and encourage them to do so this year. Better yet, volunteer to help put it together. I've done it myself a couple of times, and it is a blast. Most counties hold SET during October to coincide with other groups, but you can pick the best date for your group from September through November. Let's try to do even better this year. Our smaller counties seem to do better than many of our metro areas. It's not the size of the group that matters; it's the effort. On another note, I need for all ARRL appointees in North Carolina to provide me with your current address, phone number and e-mail address. With all of the area code changes in recent years, the appointment database is in need of updating. I also need to make sure you are officially listed. Silent Keys: Bill WB4CCA, Lewis W4LEN, and my good friend Chris WA2KDC. Hope to meet you at some of our upcoming hamfests: Salisbury July 8, Cary July 15, Western Carolina July 29. April Traffic: W4EAT 744 (BPL), AB4E 473, NC4ML 290, W2CS 223, K4IWW 178, KI4YV 170, AC4DV 149, KE4JHJ 148, W4IRE 123, AA4YW 119, K4AIF 89, W3HL 74, KE4AHC 36, N0SU 29, W4CC 24, KL7NL 21, AD4XV 18, WA2EDN 16, WA4SRD 15, WD4MRD 14, NT4K 13, KF4OZF 11, AC4ZO 11, KC4PGN 8, KB8VCZ 7, KR4ZJ 6, W4DYW 4, KE4YMA 4.

SOUTH CAROLINA: SM, Patricia Hensley, N4ROS—Congratulations to all of the new and newly-upgraded licensees. The restructured Amateur Radio requirements have been in effect for approximately two months. New calls have been heard on some of the nets, and the amateur extra phone segments seem to be more populated. We now have the opportunity to made April 15, 2000, one of the most significant milestones in Amateur Radio. Our individual respect for each other as operators, and our collective respect for the hobby will ensure a bright future for Amateur Radio. Amateur Radio offers many interesting facets for new licensees, but two areas directly contribute to helping other citizens in the state. These are: the National Traffic System(NTS) and the Amateur Radio Emergency Service/Radio Amateur Civil Emergency Service(ARES/RACES). The South Carolina SSB net meets daily at 1900 hours local on 3915 kHz. The ARES/RACES program provides training and operation for emergency communications. Normal public communication (telephone and cellular systems) and public service communication (police, fire and ambulance) can be greatly disrupted or eliminated during disasters. The SC ARES/RACES Net is conducted at 1800 hours local on 3993.5 kHz on the first and third Mondays of the month.. A happy and safe Fourth of July to everyone. Tfc: KT4SJ 222, KA4LRM 106, K4JMV 88, W4DRF 72, KA4UIV 57, WA4UGD 56, AF4QZ 28, W4CQB 25, K4BG 22, KF4HAV 20, WD4BUH 20.

VIRGINIA: SM, Lynn Gahagan, AF4CD—SEC: K4EC. ASM/A: KE4NBX. ASM/B: W4TLM. ASM/C: TC: W4IN. ASM/D: KC4ASF. PIC: W2MG. OOC: KR4UQ. ACC: STM: AF4CD. Once again one of our fellow Hams has passed on. Charles "Chuck" Haser - W3HSW is now a "Silent Key." Chuck was a communications and computer engineer who worked for RCA, General Electric and Quality Systems, Inc. He also was an active volunteer for ARES and public service events and was someone that you could always count on. He will be missed indeed. Chuck was a member of the Mount Vernon Amateur Radio Club. On April 29, a digital drill/SET took place around the state with about 45 participants. There were 112 messages that were moved over the packet system in about a 2.5 hour time span. From this drill, we learned some things about polling setups that caused a problem getting messages into and out of SW VA. Pactor was also used during the SET. Summer is finally here. It is now Hurricane season. With it comes the possibly of thunderstorms and heavy rains throughout the state. Please have your equipment ready to deploy if and when you are asked to help out during an emergency. Also during the summer months there are many public service events that may need our help. The National Weather Service is having many SKYWARN classes throughout the section. One of the classes is being held on August 21 from 7 to 9 PM. At the NWS Sterling Park forecast office. All SKYWARN courses require advance registration. Contact your local area NWS for more information. Field Day is just a week or so away. It's time to make those last minute arrangements as time is running out. I hope everyone is able to operate and have fun. I know that I am looking forward to it. If your club or group has an announcement and would like for it to appear in the section news please email me at **af4cd@aol.com**. Tfc: WA4DOX 240, WB4ZNB 225, KR4MA 218, W3BBQ 199, AF4CD 184, KR4MU 168, K4YVX 154, N4ABM 125, W4CAC 102, K0IBS 69, W4UQ 65, K4MTX 65, W4YE 33, W4VIC 25, KB4CAU 21, KE4PAP 18, WB4UHC 15, W4JLS 11, KF4HJW 5, N4FNT 4, WB2KQG 3, W4TZC 2, W4IN 2, W4MWC 2, K4JM 1.

WEST VIRGINIA: SM, O.N. (Olie) Rinehart , WD8V— The Good, The Bad, and The Ugly, isn't that from a Clint Eastwood movie or something? The Good is we are at the height of the Hamfest season, and I have really enjoyed the luxury of being in good enough health to visit several of you. These person-to-person contacts exceed even "on the air" contacts,

and I have learned a great deal. Another Good is that we are well into the Amateur Radio program as restructured, and I venture to say that very little negative has developed to this point. I do sense a revitalization of interest in all phases of Amateur Radio. Let's keep this positive enhancement of our hobby flowing. The Bad is the sunspot cycle, propagation, and at times almost total useless condition of the bands. Another Bad is, the situation with the multitude of license and upgrade applications. The VEs have employed extra help, worked present staff overtime, and will very soon catch up. Please be patient, check your databases, but refrain, if possible from contacting your VE about an individual license application. This overload of e-mail and telephone contacts simply compound the problem. 73. Tfc: KA8WNO 254, WD8V 216, KC8CON 44, WD8DHC 43, K8MHR 110, W8FZP 32. PSHR: WD8V 230, PSHR 142, WD8DHC 128, KA8WNO 118, W8IVF 105, WVFN 1,001/86/30 KC8CON; WVMDN 609/30/30 WW8D, WVN E 189/89/31 N8RNY; WVN L 149/33/31 N8RNY; ARES/RACES 1247/49/31 WX8F; DIGITAL 1/118/62 K8MHR.

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. April 15 came and went, and it certainly was not with a whimper, but rather with a roar. In Colorado, 386 hams participating in ARRL VE sessions upgraded or were granted new licenses on that day alone. This included 107 in Colorado Springs, 80 in Longmont/Boulder, 49 in Denver, 45 in Durango/Four Corners, 39 in Ft. Collins, 32 at the Jeffco library, 24 in Grand Junction, and 10 in Greeley. Subsequent to the 15, there were additional paperwork only sessions and then the normal VE sessions at swapfests that were also heavily attended. ARRL-VEC had not sent enough of the new CSCE forms for the session in the Springs, and about one third of the folks would have been turned away. Fortunately, Dean Buckhouse, KB0VVA, coordinator for the Mountain Amateur Radio Club (MARC) VE Team in Woodland Park heard of the plight and came to the rescue. Although he was already en route to the Springs on personal business, he turned around, and drove an hour out of his way to obtain MARC's supply of CSCE's and deliver them to the session. Thanks, Dean, for exemplifying the true spirit of Amateur Radio. Hope everyone has a great Field Day! E-mail me: **n0wpa@arrl.net.** 73, de N0WPA. NTS traffic: AD0A 98, K0TER 77, N0UOD 30. CAWN: W0WPD 801, K0HBZ 642, W0LVI 508, N0NMP 459, W0GGP 445, WB0VET 432, AA0ZR 420, W0NCD 378, KI0ND 288, N0JUS 270, N0FCR 118, N0DKK 98, K4ARM 83.

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 114 msgs with 1130 checkins. New Mexico Breakfast Club handled 234 msgs with 1014 checkins. Yucca Net handled 30 msgs with 613 checkins. Caravan Club net handled 11 msgs with 59 checkins. SCAT Net handled 10 msgs with 497 checkins. Four Corners Net handled 28 msgs with 378 checkins. GARS Net handled 5 msgs with 40 checkins. Rusty's net handled 92 msgs with 643 checkins. Valencia Co Net handled 5 msgs with 40 checkins. If you haven't looked recently, the NM Section Web Page is at **qsl.net/nmsac** and Art Priebe, N5ART, is doing an outstanding job of keeping the Web Page in top shape. Art would appreciate your input. You may e-mail him at **n5art@arrl.net**. The NM Spring Tailgate was great with approximately 400 in attendance. Many thanks to all who made it such a success! The weather was perfect with thanks to Keith, KC5YXB, "the Weatherman." The Mesilla Valley "Bean & Chili Feed" was also very good, and was good to see many old friends. Our thanks to Rick from Rad-Com in Lubbock, TX, for helping to make both events such a success! Congrats to the Deming ARC on their excellent write-up in the Las Cruces Sun News. The PVARC (Roswell) Hamfest is Aug 5-6, and the NM ARRL State Hamfest at the Rio Rancho Armory, near Albuquerque, on Aug 26-27. Alamogordo Hamfest is Sept 2. Best 73, W5PDY.

UTAH: SM, Mel Parkes, N5UVP—Summer is here! Get ready for all those neat fun summer ham activities and events. Support your club at Field Day and all the special service events in your community. If you haven't registered for the Utah Hamfest 2000 yet got to our Web site and do so! **http://www.utahhamfest.org/.** We hope to see all of you at this event. We have a new club in the state, I would like to say thanks to all the individuals who have helped support organizing the new club in Utah County, especially Don Smith, K7VN, and Rod Mansfield, KF7WL, who have both spent many hours discussing and coordinating the efforts to get the new club started. If you live in Utah County or would like to get involved with a new club, please contact me for details. If any of you would like me to include comments in this column about your club or Amateur Radio events please let me know via e-mail at **n5uvp@arrl.org**. Have an enjoyable summer! 73 de N5UVP.

WYOMING: SM, Bob Williams, N7LKH—There have been some changes in the WY Section staffing so it seemed appropriate to recapitulate the current staffing for the benefit of the section members. We now have two Assistant Section Managers: Jerry, WB7S, in Basin, and Christine, KC7MJI, in Casper (Mills). The ACC remains Mary, KF7MC, the TC remains Art, KK7BZ, the SEC remains Steve, WA7H, and the PIC remains Gene, W7JIL. The SGL Ken, KB7JUT, has dropped out so that position is vacant, welcoming any volunteer. In the STM position, Rhett, KJ7IM, has dropped out and is replaced by Duane, NN7H. Lynn, K7IKO, has volunteered for OO and his activation is pending the FCC making up its mind on criteria updates for the position. Apparently the restructuring is having some affects on the criteria. Remember the section activities for the summer: Glacier Hamfest 15-16 July, Tour de Wyoming Bicycle Tour 16-22 July, Meadowlark Hamfest 17-20 August, and Yellow Pine Hamfest 9-10 September. Tfc: NN7H 246. PSHR: NN7H 209.

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. Congratulations to Walt Verney (AF4HE) and Michael Glennon (KB4JHU) for receiving the Certificate of Recognition from Alabama Governor Don Siegelman. They were recognized for their part in preparing the state of Alabama for Y2K. They did a great job during the six months leading up to Jan 1st, preparing the hams in Alabama for a possible Y2K disaster. Speaking of Walt Verney, it is with deep regret that I announce that Walt is no longer able to dedicate the necessary time required to be SEC. I hate to see him give up his appointment, but he promises to continue to be active in the Alabama Section. I wish him luck, and thank him for the time he gave to the job. Jack Evans, KC4PZA, has volunteered to take Walt's place as SEC. Jack is very active on the radio, and is well liked by all. He is involved in Shelby County ARES, and is active in SKYWARN. Join me in welcoming Jack to his new appointment! Thank you, Jack Evans, for stepping in! You can find more up-to-date information about what is going on within the Alabama Section 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: Tom Rogers, KR4OL. STM: Jim Hanna, AF4NS. SGL: Charles Griffin, WB4UVW. BM: Eddie Kosobucki, K4JNL. ACC: Bob Lear, K4SZ. OOC: Mike Swiderski, K4HBI. TC: Fred Runkle, K4KAZ. PIC: Matt Cook, KG4CAA. July has two major events. July 8 has the Ga State Conv and Gainesville hamfest sponsored by the Lanierland ARC. Ken Johnson, Ken Parrish, and Terry Jones have labored long and hard to fill the Ga Mountain Ctr with exhibits, and tailgaters and informative programs. See you there. Then later in the month the Ga Games returns to Atlanta. This Olympic based sports festival attracts tens of thousands of athletes to compete in hundreds of events in dozens of venues spread across north Georgia. The Ga Games is a major Amateur Radio event that requires a hundred or more hams. The communications effort is headed by young Robert Ziskind, KE4QLH. Please volunteer when he calls you. Attn DXers: There are now just two DX card checkers authorized by the DXCC desk. They are Tom Harrel, N4XP, Watkinsville, and Martin Holzman, WA4MOG, Statesboro. Both are experienced DXers. One in the north and one in the south to serve your card checking needs. QCWA lost 2 fine members recently. Bill Plage, W4DQT, passed on April 21 and Bill Doughty, W9UIX, died on May 8. Both veteran hams will be missed. Check your calendar: Aug 19 is the annual Ellijay picnic and hamfest. Your humble SM has moved into new digs. My address is now 15010 Briarhill Lane, Atlanta 30324. The phone number is now 404-315-1443. Stay cool. 73. Tfc (Apr): WB4GGS 236, K1FP 164, AF4NS 122, WU4C 93 KA4HHE 66, K4BEH 20, K4WKT 20, K4JNL 12, K4BAI 5.

NORTHERN FLORIDA: SM: Rudy Hubbard, WA4PUP—ASM-WPAN: KO4TT. ASM-APRES: WY8O. ASM-ECEN: K1CE. ACC: WA4B. BM: N4GMU. OOC: AF4EW. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4N. TC: KO4TT. Packet: N4GMU. April 15th was a very busy day. The VECs in the dists were busy with the paperwork for upgrading of Amateur Radio licenses. Also, upgrading continued on the fourth Thurs night in the APAN District. At this writing, the biggest news in Florida is the call sign on the amateur license tags. The State has issued amateur tags for almost 50 years. By the way, Florida was one of the first, if not the first, state to recognize the hams with their call-sign on their auto tags. It seems the State has blocked off a series of numbers etc, and will conflict with the amateur call signs. The situation is being worked on by several amateurs, information will be put on the various Web pages and on the nets as it becomes available. Rick Palm, K1CE, has been appointed ASM for the East Central District. He replaces Dick Dudley, who is now building airplanes. You should read the April *QST* starting on page 42. The subject is PSK31, reporting where hams discovered a new way to communicate using a digital scheme. This has potential in emergency communications. The guys are already working on putting this into operation with the hurricane season. Several reports have been received suggesting our adopting this means of communication and making it a part of the Sections' Emergency Communication Plan. de 73, Rudy. Tfc: WX4H 2880, NR2F 667, KE4DNO 246, KF4NFB 184, AF4PU 128, K1JPG 113, WB2FGL 81, KF4TM 80, W5MEN 70, W4KIX 63, AF4GF 62, KE4PRB 60, KM4MC 38, K4JTD 37, WD4IIO 32, N9MN 28, AB4PG 23, WA4EYU 18, W8IM 14, WB2IMO 13, N4JAQ 11, WX4J 8, WB9GIU 6, KG4EZQ 2, NØZO 2.

PUERTO RICO: SM, Víctor Madera, KP4PQ—El comienzo de la nueva era en cuanto al sistema de nuevas licencias de la FCC resultó excitante. Decenas de radioaficionados se presentaron a las sesiones de exámenes del ARRL/VEC para adelanta sus licencias. Felicitamos al ARRL/VEC de Puerto Rico y a su Liaison, Ricardo Díaz, KP4RP por haber celebrado cuatro sesiones en el mes de abril, todas muy concurridas. Nos reunimos con un nutrido grupo de la Iglesia Adventista para orientarles sobre los cambios recientes. Ellos están en el proceso de activar su grupo conocido como "Radioaficionados Cristianos" (RAC). Felicitamos a Jaime Vázquez, WP4A por haber roto el record de Norte América del WPX-CW99 en 10 mts. sigle band HP desde la estación de KP4WW. También participaron WP4LNY, WP4MXD y WP3C. El PRARL esta coordinando el "Lighthouse Weekend" desde la isla de Caja de Muertos. Se pueden comunicar conmigo vía email a kp4pq@arrl.org

SOUTHERN FLORIDA: SM, Phyllisan West, KA4FZI. Several new hot links have been added to the Southern Florida Web page (**www.sflarrl.org**). In the Club section, the Jupiter Tequesta Repeater Group features an article about their April 28 special event station at the restoration celebration of the 140-year-old lighthouse at Jupiter Inlet. Using the call sign "W4J" they demonstrated Amateur Radio to many visitors and handed out very interesting articles about amateur radio. KE4PPI, reports that the Jupiter group has also been officially invited to play an active roll in this years Boy Scout Show in May. They will man two booths to service the expected 2,500 scouts with "hands on" experience and an exposition. The Osceola County Emergency Team link and Martin County ARES link can be found in the ARES section of our SFL Web page. Osceola reports successful participation in a mock hurricane drill this month, and Martin had an outstanding SET exercise operating publicly at Phipps Park on 7 bands using emergency power. They also held a real nuclear power station emergency drill. The Indian River ARC

kept busy with the MS Walk-a-Thon, March-of-Dimes, and Red Cross Bicycle Rally. DEC N4LEM is issuing photo badges for ARES members there. Broward has a mobile SSTV set up link with the EOC for the May SET, a great help for storm damage assessment. Lee County's new EC, KF4EAH, is planning an ARES special event station and visitor direction for the NWS hurricane hunter plane visit as busloads of students and the public move through the display. The Amateur Radio Public Service Corp in Dade County had amateur volunteers handy at the Key Largo Breakaway Bicycle event April 29-30. The new Okeechobee six-meter repeater should be operational now. Give it a try on 53.310 and let EC Al Berryman, AD4RZ, know how you do. Traffic by Jan, KJ4N: W7AMM 869, WA9VND 778, K4FQU 488, KA4FZI 336, KC4ZHF 327, KJ4N 254, KD4GR 203, WB4WBY 184, AA4BN 182, WB4PAM 140, W8SZU 130, KD4HGU 121, KE4IFD 121, WA4EIC 98, W6VIF 89, KE4UOF 74, K4VMC 64(club), KT4XK 42, KD4JMV 40, KF4IDG 34, KG4CHW 22, AF4NR 21, KE4WBI 14, W4WYR 11, K4OVC 6, WA8EXA 4, W3JI 4. 73, de KA4FZI.

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. St Croix amateurs turned out to provide communications for the St Croix International Triathalon. Among those participating were Chris, NP2EL, Al, KP2CF, Marc, NP2BF, Cleo, NP2BW, Jerry, WB6RCN, Lou KV4JC and SM John, NP2B. Although the number of race participants were down, the coordination between the VI Police and the local hams could not have been better. Chris, acting as net control, did a superb job. As SM, I was very proud to have been a part of the team. Jeanette, NP2C (XYL of NP2B) has updated the Website of the Caribbean Maritime Mobile net, **www.viaccess.net/~kv4jc**, and has just completed the VI section Website, see **www.viaccess.net/~jellis**. Check it out, lots of pix of the local "hi-rollers"! Local repeaters 146.63 St John, 146.81 St Thomas and 147.25 St. Croix. 73 for now, John, NP2B.

WEST CENTRAL FLORIDA: SM, Dave Armbrust, AE4MR, **ae4mr@arrl.org,** WCF Section Web Page at: **http://www.wcfarrl.org**. ASM: NA4AR. ASM-Web: KR4YL. ASM-Legal: K4LAW. SEC: KE4MPQ. TC: KT4WX. BM: KE4WU. OOC: W3BL. STM: AB4XK. SGL: KC4N. ACC: AC4MK. PIC: AB2V. The Midnight Madness test session had over 100 attending, congratulations to all the new upgrades. The WCF Club President's Conference had an excellent turnout on May 6th with 9 counties represented. FL Specialty License Plates are now using amateur calls seriously threatening availability to amateurs. Please write your State Legislators regarding this important issue. (April) SEC KE4MPQ reports 201 (+5) ARES members, 48 Operations and 90 hours. OOC W3BL reports 415 hours. Net/NM QNI/QTC/QND Bulls/Sess: AIN/WA4ATF/95/6/132/8/4. ARES/KE4VBA 85/3/117/4. SPARC/KF4FCW 431/34/727/30. Turtle/KT4TD/369/217/704/30. Be sure to check in to the WCF Section Net at 7:30 PM Sundays on 3.9725 MHz Joe Pirkle, AD4IH, again reports an impressive PSHR total of 1,648 and SAR total of 1,235. Well done, Joe. PSHR: AD4IH 1,648, KT4PM 173, K4SCL 155, K4RBR 143, AB4XK 140, KF4KSN 120, KT4TD 114,W4AUN 107, WB2LEZ 97, W3BL 95, AA4HT 83 SAR: AD4IH 1,235 (BPL), AB4XK 441, K4SCL 403, K4RBR 158, KT4PM 112, AA4HT 89, KF4KSN 43, W3BL 31, KE4VBA 29, KT4TD 22, W4AUN 20, KG4CYY 13, AE4MR 10, WD4BEK 6, KG4DUF 5,WB2LEZ 5. 73, Dave, AE4MR.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—As far as I can tell, the Sierra Vista hamfest was a success. I had a nice time meeting many people and seeing several pass their VE exams to obtain their first license with another group upgrading. Now it is time for our annual event called Fort Tuthill, our state convention. Yes, this event will be on 28-30 July 2000, THIS MONTH. Flagstaff is cool this time of year, and the weather is always good. Special thanks to the ARCA officials who spend many hour of their own time planning for this event. Also, I will be at the Yavapai Amateur Radio Club on the 27th. My activities as your ARRL rep has had to take a back seat due to family business during April, May, and June so I have not kept up with the activities. It seems that Honeywell no longer needed my services so I have had spend time and look for another job. I am still too young to retire. Don't forget that the ARRL Southwestern Division Convention will be October 6-8, here in Scottsdale. You can do the advanced signup will at Fort Tuthill. The summer community service events are in full swing. I hope you are either participating or helping with the planning of these events. Remember that we keep our frequencies because amateur radio is a public service organization. Your ARRL dues can be renewed through your local ARRL affiliated club. This allows the club to get a small portion of the dues, $2.00. You still pay the $34.00 fee, but the club only sends in $32.00. Charles Ellis, W6PNM, has announced that the Kingman hamfest will be on 16 September 2000. The Old Pueblo Radio Club is planning for their hamfest in October. Please keep your newsletters coming so I can keep up with the activities around the state. My e-mail address is **kd6xh@arrl.org**, and my home telephone number is 520-744-9095. If you call and I am not home, please leave a message and I will call you back. 73, Clifford Hauser, KD6XH.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF— The FCC radio license forms are available on the ARRL Headquarters WEB SITE. The two "MUST" forms, you should know about are the TIN REGISTRATION FORM (606) and the license Renewal form 605. The requirement for the TIN form was established by Congress so, if you want to do business with the Government, you must establish your TIN number. This is a simple form so that all Government information can be attached to your Social Security number or a near equivalent ID number. - Our ASM, W6UBM, Al reports that he has been having an S9 signal level noise for several weeks. The noise is on most of the day and is turned off about 9 PM. Al called, W6BZH, Paul, to check out the source of the noise so Paul is working the problem. Paul as many of you know has been a speaker at the DX Club when the meetings were held at the Dept. of Water & Power cafeteria. Paul is the engineer for DWP who does the interference locating. Al was very impressed with the new $5,500 receiver provided by DWP. DWP also has

a new hand held receiver for locating noisy computers. This was reported as big problem in apartments where some of the computers are old and lack power line filtering and radiation shielding. W6UBM's phone number is listed on our Web site **www.qsl.net/arrlsw/lax**. Al can help you get in touch with the DWP interference locating Service. Our good buddy, OOC, Joe, W6UPN, is now out of the hospitals. He said that he was in several hospitals for some rare ailment that has not been disclosed. It is great to have you back, Joe, and, we really did miss your "JOKES". Our Los Angeles Area Council of Amateur Radio Clubs, meeting was a real BLAST. Mike, KK6WO, was presiding with Spud, K6KH, trying to help let us know the purpose of the "LAACARC." It was a great meeting, and we are all dedicated to helping spud figure out several new projects where we can spend our money in a worthwhile way. Public Service projects like ARES and APRS should be worth considering at our next meeting in July. So, give your ideas to your Club Representative and send him to the July meeting full of vim and vigor. Vy 73, Phineas, W6BF.

ORANGE: SM, Joe Brown, W6UBQ—ASM Riv Co: Joe, KO6XB, 909-685-7441. ASM Org Co: Art, W6XD, 714-556-4396. ASM SB Co: James, KE6LWU. Orange Section Web site is **http://www.qst.net/arrl-orange/** Check it out. From the Inland Empire ARC on Field Day: "Work as many stations as possible on the amateur bands (except 10, 18, and 24 MHz) and, in doing so, learn to operate in abnormal situations and under less than optimum conditions. Citrus BeltARC officers for 2000: Pres, Jeff ,KD6NXD; VP, Cathy, N6DXC; Treas, Ed N6IIE; Sec, Jay, KD6TGH. The Orange County Fair plans are in full swing. To volunteer for the ham radio booth project contact the Orange County Emergency Groups Coordinator, Jim, KF6PXS, 714-968-7897. Hospital Disaster Support Communications is now written into the Orange County mass casualty disaster plan and has been recognized by FEMA. Let's all congratulate April Moell, WA6OPS, for this effort and for her devotion and dedication to Amateur Radio Public Service. I would also like to take this opportunity to thank Corky, W5BYG, for his many years of service as DEC, Orange County District Emergency Coordinator. This slot is now open, so if a ham with diplomatic, political and organizational skills wants to step up to the plate, contact Joe Brown, W6UBQ, 909-687-8394 or **w6ubq@aol.com**. Many new hams and upgrades are the new kids on the VHF and/or the HF block, and they need an introduction to some of our operating practices. The Orange Section is developing a workshop for use by any club in the Orange Section. Subjects included are customs, how-to procedures, self-regulation and the benefits of public service. Tfc: KC6SKK 189, W6QZ 181, KO6RZ 119, VE7CW/6 80. PSHR: W6QZ 160, KO6RZ 119, KC6SKK 109. Digital: N6GIW MB 210, W6QZ BBS 156. SCN/V: KO6RZ 29 Sess, QNI 210, QTC 43.

SAN DIEGO: SM, Tuck Miller, NZ6T, 619-475-7333— Emergency communications are an important part of the Amateur service, and all volunteers are welcome. We have had several activities within the past few months, and I would like to thank all who have not only volunteered their time, but their equipment as well. Sometimes people do not realize that value of not only the equipment, but the man hours that are put in for the public. If I could, I would give everyone a raise in salary. Since we work for free, I guess I could double it. I can not possibly name the hundreds of persons who volunteer each year to the various activities, but I would like to take a moment to thank those who have stepped out in front in a leadership role. Starting with my Asst. Section Managers, we have Harry, W6YOO. Harry is our MARS coordinator, and keeps us abreast of all activities. Al, W6WYN, takes care of Red Cross Communications, while Pat, KC6VVT, and Pat, WA6MHZ, are my administrative assistants. Del, N6JZE, has held 2 positions for over 16 years, OOC, and TC. He has recently stepped down, and we thank him for his many years of service. Bill, K6TWO, will be our new OOC, and Gary, KF6LRV, will be our new TC. Warren, KT6A, keeps plugging along as our traffic manager, thank you. Steve, K6PD, is a man we cannot forget, as he keeps us up to date with all the latest bulletins. In the ARES, section, our SEC Dave, KC6YSO, leads a great team of DECs, Rich, N6NKJ, Dennis, K7DCG, Ralph, KF6TOK, and Dennis, WB6CGJ. We have several liaisons to different agencies. Too many to name due to the length of this column, but rest assured you are very valuable. Folks, you are what makes all this happen. Keep up the great work. Lest I forget, tnx to my YL, Evelyn, N6EVE, the ACC, for her support of my activities within Amateur Radio. Traffic: KT6A 872, KD6YJB 97, WA6IIK 1 BPL: (500 or more) KT6A 872. PSHR: (70 or more points) KT6A 138, KD6YJB 81. 73, Tuck, NZ6T.

SANTA BARBARA: SM & STM: Rob Griffin, K6YR 805-543-3346 & **k6yr@arrl.org**—SEC: Jack Hunter, KD6HHG (**kd6hhg@arrl.net**). ACC: Michael Atmore, KE6DKU (**jatmore@telis.org**). OOC: Howard Coleman, W6HQA (**w6hqa@pacbell.net**). PIC: Jeff Reinhardt, AA6JR (**jreinh@ix.netcom.com**). TC: Warren Glenn, KM6RZ (**wglennrz@ix.netcom.com**). ASM-Ventura, Don Milbury, W6YN (**w6yn@juno.com**). ASM- Internet: Jack Bankson, AD6AD (**jackbankson@jps.net**). DECs: Santa Barb-Dave Lamb,WA6BRW (**dlamb@silcom.com**); SLO-Bill Peirce, KE6FKS (**ke6fks@arrl.net**) CUBESAT IS COMING! A major project of the Cuesta College Engineering and Technology Department and the campus ARC, WA6RKE/W6HDO, CUBESAT plans call for design & construction of a 10 centimeter, 2.2 lbs communication satellite for a mid-2001 launch. Support welcomed to **cbuttsch@slonet.net** (K7RR). Join the Section Reflector: Send a blank e-mail to this address **arrlsb-subscribe@groups.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 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) & 448.875-(100). PSHR/Tfc: K6YR 172/300, KF6OIF 117/48, KE6MIW 97/40, KC6NBI 125/19, KM6RZ -/24 & KF6UMU 130/-. That's 30. Rob, K6YR, SM.

WEST GULF DIVISION

NORTH TEXAS: SM, Don Mathis, KB5YAM—STM: KC5OZT. BM: KC5OZT. SEC: K5MWC. SGL: N5GAR. OOC: WB5UDA. ACC: WN5PFI. ASMs: 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. If you would like to be on the Section News-

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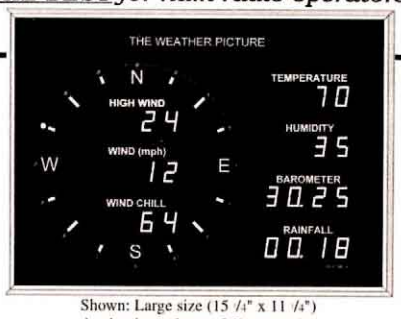

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letter mailing when issued, send me an e-mail: **dmathis@lsic.net**. I will be announcing at HamComm that I will not be running for an additional term as Section Manager. I wish to thank the many members of my staff for the large amount of time and effort that they have spent in the last year with me. I want to especially thank Carolyn, KC5OZT, and Jim, N5JZ. I have made many new friends and contacts around the section this last and year and look forward to working with them more in the future. I also want to thank the many section appointees at all levels that have simply have done their job. It is my hope that there will be some good candidates that will decide to run for the position. A good positive race, with a friendly discussion of the issues facing the section and Ham Radio can be nothing but good for us. I would hope to be able to support the winner. Tfc (April): KC5OZT 456, N5JZ 409, K5NHJ 342, K5AO 189, W5AYX 147, N5GG 111, WA5I 90, KC5VLW 89, KB5TCH 60, K5MXQ 55, KB5YAM 4. Brass Pounders League—N5JZ 176 orig./deliveries; K5NHJ 142 orig./deliveries. PSHR (April) N5JZ 354, K5NHJ 249, KC5OZT 175, WA5I 158, KB5TCH 132, N5GG 117, KC5VLW 109, K5MXQ 98, W5AYX 88, KB5YAM 78, KD5AHW 75. 73, Don, KB5YAM.

OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, W6CL. SEC: W5ZTN. ACC: KB5BOB. PIC: WA9AFM. OOC: K5WG. SGL: W5NZS. STM: K5KXL. I didn't get a whole lot of input for this months column, this is the time of year when we are all making plans for Field Day, so I apologize if I missed something. I will be modifying the context I use to communicate with the section soon. My ISP has limited the number of e-mails that can be used in a distribution list to 50, so I have been unable to communicate with you for a couple of weeks now. By now, they should have a list server available to me. You will be able to subscribe to this list and we can hold discussions and share information pertinent to the section. I will include information here, when it becomes available. I haven't mentioned the Website in a while. You can find the following information specific to Oklahoma on the site: Net information, Section Cabinet information, announcements, hamfests, VE Schedules, links to Oklahoma Clubs and organizations and plenty more. I am open to ideas and input for the Website, so if you have any let me know. You can find it at **http://www.busprod.com/k5ttt.** 73 for now, Charlie. Tfc (Apr): KF5A 1575, N5IKN 806, KE5JE 155, K5KXL 129, KM5VA 138, WA5IMO 110, KI5LQ 86, WA5OUV 79, KK5GY 63, K5CXP 26, W5REC 25.

SOUTH TEXAS: SM, E. 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. July 4th is upon us. The month of April brought several tornadoes to Texas and Louisiana. Our deepest sympathy goes out to those who lost their life and property. I believe the National Weather Service, with their early warning system, is responsible for saving many lives in these storms. By the time you read this Ham Com 2000 will be over. I hope everyone found the items they just couldn't live without. The important thing is to get to put a face with those you talk to on the air. The 7290 Traffic Net and the Texas Traffic Net picnic was a great success in Brenham, TX. Congratulations to K5BNI and W4RRX who received the Whitney Nugget Award this year. There was VE testing with only one young man passing. KA5AXV came to take his General. He took the Extra, for the fun of it, and passed. I presented him with a 2000 ARRL Radio Handbook, and a big welcome to the world of HF bands. Congratulations Mark. We wish to thank W5OYY, KØYNW, K5BNI, W4RRX, and N5ECP, for all the hard work that went into this years picnic. I had the opportunity to observe 2 different VE teamsin all of the restructuring. It takes real dedication to do their job. They deserve any recognition we can give them for a job well done. Our hearts go out to those that lost homes and property in the New Mexico fires. I would like to bring to your attention the article, Real Hams, page 9 in the May 2000 issue of *QST*, by David Sumner, K1ZZ. I hope all of you take time out to read this article, it's time well spent. We need all the help we can get during the upcoming hurricane season. The prediction is for a lot of activity in the Gulf this year. I think the nets are doing a great job of welcoming these new A/Gs and A/Es to the HF bands. These will be our replacements, so treat them with respect. Set a good example. We have two new ASMs in South Texas, Bob Ehrhardt Sr. W5ZX, and Joe Fisher III, K5EJL. The new SEC for South Texas is Bob Ehrhardt Sr., W5ZX. Please welcome them to the South Texas Staff. Have a good 4th. 73 until next month. Tfc: W5SEG 619, KA5KLU 324, W5KLV 173, W5GKH 131, W5TUK 118, W5NRJ 94, N5OUJ 83, W5ZX 50, N5NAV 49, KØYNW 37, W5ZIN 24, K5UCQ 17, W5OYY 9.

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. I am taking this forum to announce in advance that I will not be seeking a third term as Section Manager (SM). This will give enough advance notice for persons to give thought to running for the office. There is one requirement not listed by ARRL, and that is that to be effective as SM, the candidate must own a computer and be on line. There is an outstanding cadre of field appointees that will make the transition very easy. I have enjoyed two terms as the WTX SM. Due to increasing age and my current health, travel is getting more difficult. The burden on my family has been heavy; my eyesight has deteriorated to the point that it is not a good idea for me to drive. This, combined with my heart problems, leads me to decide that it is time for me to stay closer to home. The position needs someone with more endurance and better health than I currently have. If you have any questions regarding the position, don't hesitate to contact me. Until next time, 73 de Charlie, WB5T.

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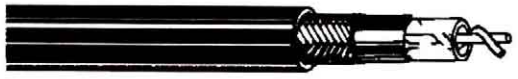

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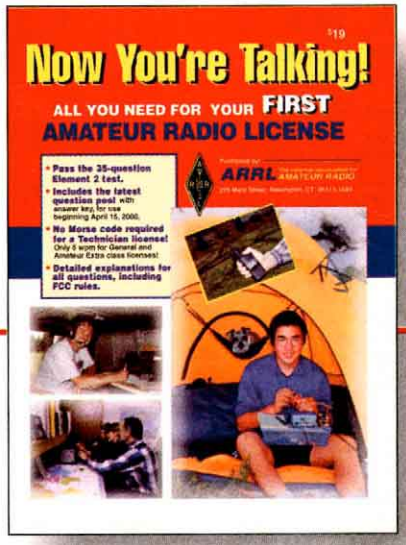

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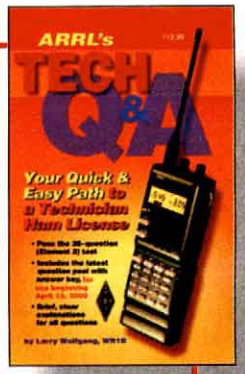

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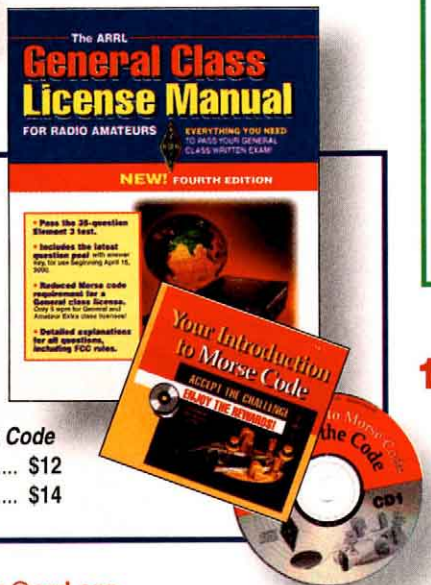

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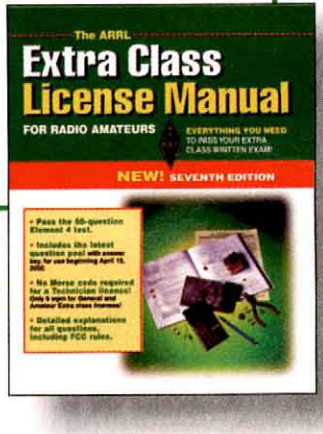

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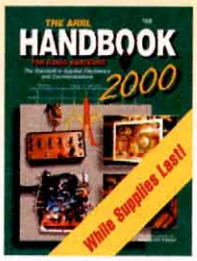

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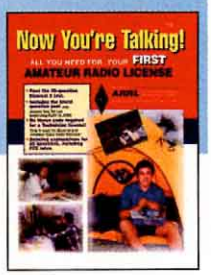

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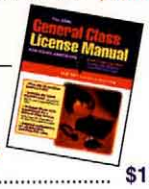

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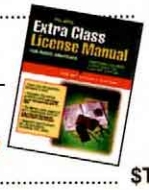

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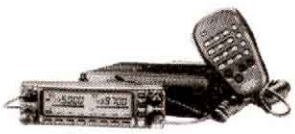

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PLP2739 Big Grip (4000)	$7.65
HPTG6700I	$1.15/ft
PLP2755 Big Grip (6700)	$10.95
HPTG11200	$1.55/ft
PLP2558 Big Grip (11200)	$16.50

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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

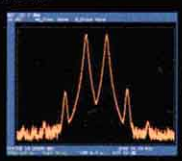
The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system accounts for the settings of the IF WIDTH and SHIFT controls, and automatically sets a DSP bandwidth which matches 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!

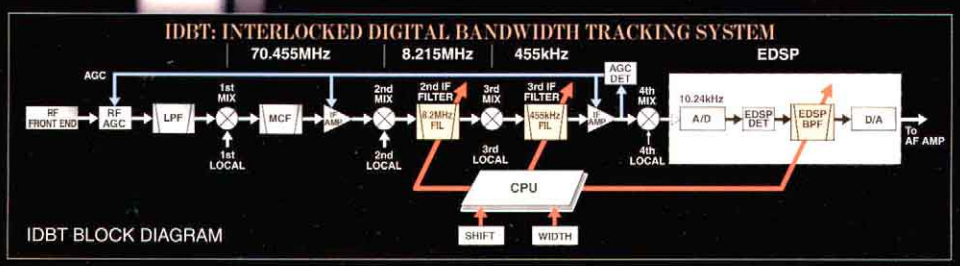
IDBT: A Breakthrough in Selectivity!

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

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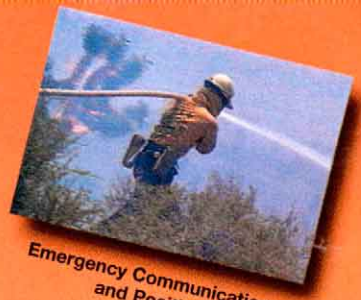
TH-D7A(G)

The Best Just Got Better

Unique Jog Controller w/Backlite Keys

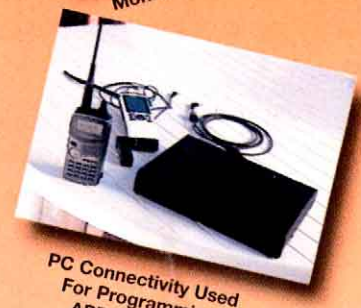


Emergency Communications and Position

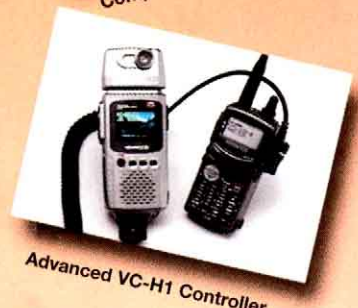
Grid Square/Distance/Direction Information

Monitor DX Packet Clusters

Complete Line of Accessories



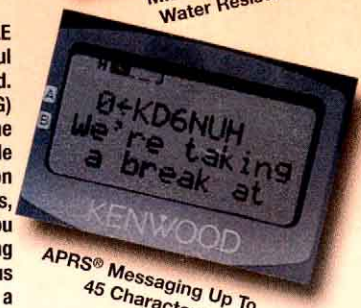
PC Connectivity Used For Programming APRS®/Packet



Advanced VC-H1 Controller

MIL-STD 810 C/D/E Water Resistance

Weather Station & PHG Data Reception



APRS® Messaging Up To 45 Characters

Great Companion for the TH-D7A

APRS®/PC Mapping Available For DOS Windows/Mac

- FM dual-band (144MHz/440MHz) hand held
- 5.5 Watts @ 13.6 volts
- 200 memory channels w/8 alpha display
- Built-in 1200/9600bps TNC (AX.25 protocol)
- Built-in APRS® (Automatic Position Reporting System) software
- GPS interface for position/directional data (NMEA-0813)
- Dual RX on the same band for voice and data (VHF only)
- PC Programmable for frequency and name (PG-4W required)
- 16-digit 10-channel DTMF memory
- Monitor DX Clusters
- DTMF remote control (TM-742A/TM-V7A)
- Dual receive on same band V+V/V+U
- AIP (intermod rejection)
- Free Operation manual at ftp://ftp.kenwood.net

NEW UPGRADE VERSION NOW AVAILABLE FOR SALE
"The TH-D7A was by far one of the most successful revolutionary radios ever produced by Kenwood. Now it has gotten even better. The New TH-D7A(G) has many of the same advanced features of the new TM-D700A mobile that includes selectable position memories, text memories, position ambiguity, new audible beeps and visual indicators, auto response message, to name just a few...You can even upgrade your current TH-D7A by sending it to a Kenwood Service Center for only $60 plus shipping. Visit http://www.kenwood.net to see a complete list of detailed upgrade features the new TH-D7A(G) offers and learn about our upgrade offer."

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