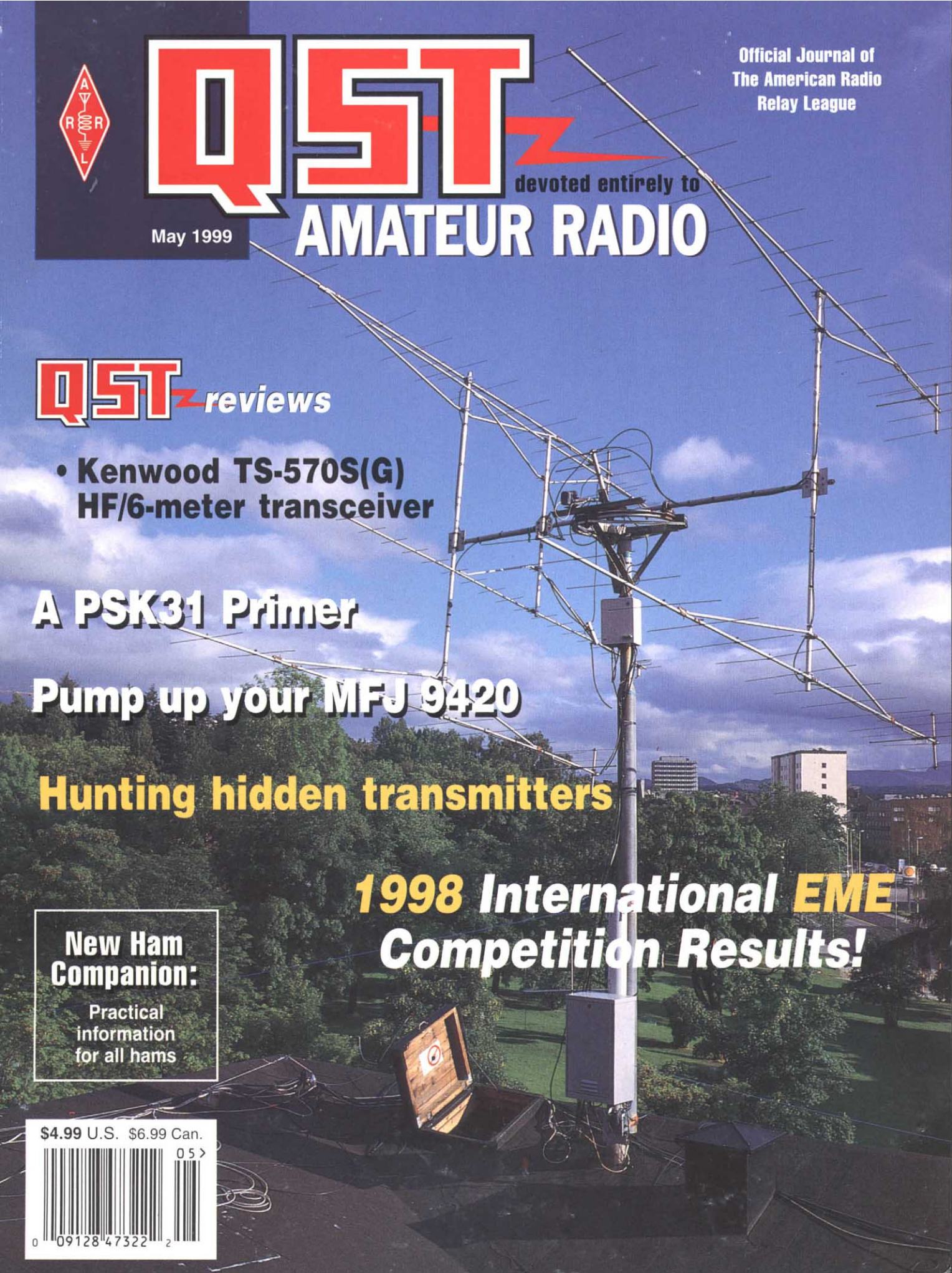
Official Journal of
The American Radio
Relay League

QST

devoted entirely to
AMATEUR RADIO

May 1999



QST reviews

- Kenwood TS-570S(G) HF/6-meter transceiver

A PSK31 Primer

Pump up your MFJ 9420

Hunting hidden transmitters

1998 International EME Competition Results!

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Practical information for all hams

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IC-706 SERIES

The most versatile series of compact, multi-banded rigs ever made.

The new "G" is
NOW AVAILABLE
See your ICOM dealer today!

NEW IC-706MKIIG

THE BEST GETS EVEN BETTER FOR 1999
More power, 440 MHz, and still more features! The new IC-706MKIIG has 50 watts on 2 meters, 20 watts on 440 MHz, DSP as standard equipment, auto repeater, CTCSS, and backlit keys. Tried, tested and proven, the 706 series is your best choice for a complete ham rig.

PROVEN PERFORMANCE:

"Great portability vs. performance ratio. It's great to have a radio where you can talk on your local repeater, work on your mobile DXCC total and still not miss out on six meter openings!"
– Kevin Olson, K3OX

"I enjoy everything about the IC-706MKII; size, ease of operation, power."
– Richard Lemme, K9FA

"This is my first ICOM & I am very pleased with it."
– Merlin R. Myers, KAØQZK,

"God, I love this rig. My little 706MKII goes with me everywhere and is on 24 hours a day."
– James H. Weidner, K2JXW

"The DSP unit works great for knocking out the heterodynes from the foreign broadcast on 40 meters. Thanks for making such a great compact rig."
– Bill Youse, N6DZS

"706 -- the love of my life."
– Gary Mashburn, KF4PTW

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IN 1997, HAMS WERE "WOW"ED AGAIN
The IC-706MKII added still more features and more power. Today, the '706 series radios have earned a reputation among hams as rugged, hard working rigs. They perform as well on a serious DX'pedition as they do in a car or in a contest shack.

SAVE $100. Limited time offer.
IC-706MKII
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IC-706

ICOM options required for PC operation:
CT-17 Level Converter
OPC-478 Cable
Third party software

PC Ready!

WAY BACK IN 1995...
The ICOM IC-706 was introduced to the amateur community. Never before had so many features and so much fun been put together in such a small package. HF, 6 meters AND 2 meters in one box? Yes.

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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*

PC Ready!

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

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**

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- Charge almost all of your NiCD & NiMH battery packs for your handhelds, camcorders, cellular, and notebooks!
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Offer extended to 6/30/99

PC REMOTE CONTROL
Windows™ software, RS-746, developed by ICOM

PULL OUT MORE SIGNALS. DX'ing? Even faint signals buried in noise can't hide from the '746's adjustable IF-DSP noise reduction. **ELIMINATE ADJACENT CHANNEL INTERFERENCE** with Twin Passband Tuning, 3 optional filter slots (front panel selectable), and a selectable DSP Audio Peak Filter (320/160/80 Hz). The '746's DSP Auto Notch eliminates multiple heterodyne signals. **ONE LOOK AT THE LARGE LCD DISPLAY SAYS IT ALL.** A glance "above the line" instantly lets you know all operating conditions and settings. Look "below the line" for menu selection, 5 soft key functions (which vary with the menu), passband width, and a band scope to search for signals.

***QST* bottom line:**
"An impressive transceiver for HF, 50 MHz and 144 MHz work. With loads of those features desirable to the serious HF operator *and* all modes at 100 W on both 6 and 2 meters, the IC-746 is a fine choice in a mid-priced rig."
– *QST*, September, 1998

SPECIFICATIONS

Transmit: ..... HF/6 Meter/2 Meter, 100% Duty Cycle
Receive: ..... 30 kHz-60 MHz, 108-174 MHz Quadruple conversion superheterodyne
Mode: ..... AM, FM, FM-N, SSB, CW, RTTY
Power: ..... 5-100 Watts (2-40W, AM)
Power Supply Requirement: ... 13.8 V DC
Memory Channels: ..... 102 total, 99 regular, 2 scan edges, and 1 call
Size: ..... 11.3(W) x 4.7(H) x 12.5(D) in. 287(W) x 120(H) x 316.5(D) mm.
Weight (approx.): ..... 19 lb, 10 oz / 8.9 kg

FEATURES

- **IF-DSP (15.625 kHz)**
  - Noise Reduction
  - Automatic Notch Filter
  - Selectable Audio Peak Filter
- **Twin Pass Band Tuning (PBT)**
- **Multi-Function LCD Display**
  - Band Scope, Memory Names, Key Assignments, PBT Settings, Split Frequency, Memory Keyer Contents
- **3 Optional Filter Slots**
  - 2 for 9 MHz, 1 for 455 kHz
  - All Front Panel Selectable
- **Digital, Multi-Function Metering**
  - Signal Strength, RF Output, SWR, and ALC levels
- **Auto Antenna Tuner**
- **RF Speech Compressor (not AF)**
- **Tone Squelch and Tone Scan**
- **Auto Repeater Duplex Setting for 2 Meters**
- **Quick Split Function**
- **Complete CW Functions**
  - 4 Ch. Memory Keyer
  - Electronic Keyer
  - CW Pitch Control
  - Full Break In (QSK)
- **VOX**
- **Voice Synthesizer (opt)**
- **Triple Band Stacking Register**
  - Remembers tuner selection, preamp, antenna, mode and frequency for last 3 frequency selections

CALL BUTTON
One touch recall of user programmed frequency and mode

RF GAIN AND SQUELCH
Programmable RF gain, squelch, or both

CONTINUOUSLY ADJUSTABLE POWER LEVEL
5-100 watts variable

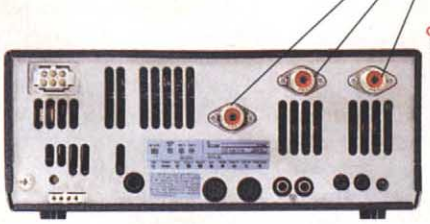
3 ANTENNA CONNECTORS
Two for HF & 6M, and one for 2M

DIGITAL METERING (ON LCD)
Measures three parameters, all at once

SMARTUNE™
Automatically senses how fast you want to tune by how fast the knob is turned

QUICK RIT/XIT ACCESS
with zeroing function for today's crowded bands

BUILT IN AUTO ANTENNA TUNER
No external antenna tuner is required for HF and 6M operation.



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Get more out of your HF. Let the digitally-advanced '746 give you the edge, and still hand you the best of 6 & 2 meters. For a brochure, call **425-450-6088**

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RS-746 Windows™ Remote Control Software
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See page 10 for detailed contact information.
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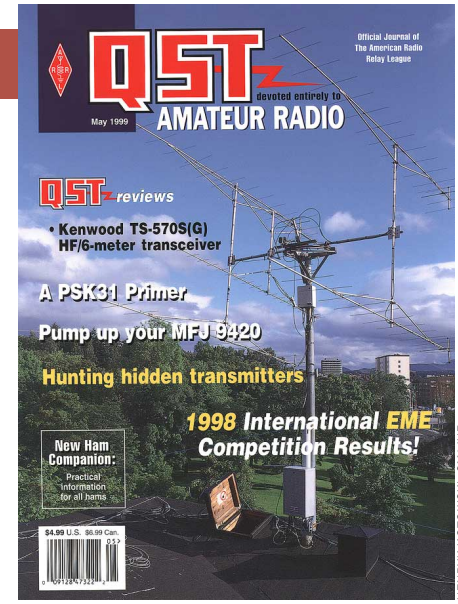

HENRYK KOTOWSKI, SM0JHF

Our Cover

This is the EME (moonbounce) antenna array at LA1K, the Akademisk Radioklubb in Trondheim, Norway. The club was formed in 1923 by students at the Norwegian Institute of Technology and it has been extremely active ever since. LA1K was one of the many stations on the air for the 1998 ARRL International EME competition. See the complete results in this issue.

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 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. Subscription rate for libraries and institutions: $34 per year postpaid in the US and possessions, $47 elsewhere. Single copies $5 in the US.

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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.

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PR-BP7H - 13.8 Volt, 1000 mAH NiMH battery pack for Icom IC-02AT, IC-2GAT, IC-H16/U16, or Radio Shack HTX-202, HTX-404. **Cost: ~~$67.90~~ $49.90 each.**

PR-BP173H - 9.6 Volt, 650 mAH NiMH battery pack for Icom IC-W32, IC-T7A, IC-T22A. **Cost: ~~$61.90~~ $46.50 each.**

PR-PB34H - 9.6 Volt, 1000 mAH NiMH battery pack for Kenwood TH-22 and TH-79. **Cost: ~~$55.90~~ 41.90 each.**

PR-FNB27H - 12 Volt, 1000 mAH NiMH battery pack for Yaesu FT-26, FT-415, FT-416, and FT-530. **Cost: ~~$58.90~~ $44.90 each.**

PR-FNB41H - 9.6 Volt, 1000 mAH NiMH battery pack for Yaesu FT-50, FT-10, FT-40. **Cost: ~~$58.90~~ $44.90 each.**

PR-FNBV47H - 7.2 Volt, 1800 mAH NiMH battery pack for Yaesu FT-50, FT-10, FT-40, and Vertex VX-10. **Cost: ~~$58.90~~ $44.90 each.**

Prices good through May 15, 1999

Audio Accessories

SPM-400 Series - Mini Boom Microphones

The SPM-400 series headsets include an in-the-ear speaker and a patented rubber-covered earloop design that adjusts to comfortably fit either the right or left ear of any user. The entire headset/speaker assembly is made of durable polyurethane and rubber. The unit features an in-line Push-To-Talk switch that can be clipped to the user's lapel or belt, or the unit can be keyed remotely using an optional remote cord.

Models Available: SPM-400 (for ADI, Alinco, Icom, Standard, Yaesu), SPM-401 (for Kenwood), SPM-402 (for Yaesu FT-50 / VX-1R / VX-5R), SPM-403 (Motorola GP300), and more. Cost: as low as $25.95 each.

SPM-700 Series - Clandestine "Palm" Microphone

The new SPM-700 series represents a big step forward for low profile communications needs. The unit's microphone and PTT switch are located in a one piece molded plastic unit that can be easily attached to a finger with velrco and concealed in the palm of your hand! The cords for the microphone and the included earphone can be easily run inside clothing to keep that low profile look, but even small amounts of exposed cord blend in because of all of the wire used in the unit is flesh colored!

Models Available: SPM-700 (for ADI, Alinco, Icom, Standard, Yaesu), SPM-701 (for Kenwood), SPM-702 (for Yaesu FT-50 / VX-1R / VX-5R), SPM-703 (Motorola GP300), and more. Cost: as low as $39.95 each.

SPM-500 Series - Throat Microphones

The **PRYME Radio Products**™ SPM-500 series throat microphone by PREMIER Communications is a low profile solution for operating in high noise environments. Our SPM-500 rests comfortably against the user's throat, picking up audio directly from vocal cord vibrations. It provides outstanding background noise suppression, surprising clarity, and can be easily concealed inside a shirt or jacket. The microphone has a built-in, in-the-ear speaker and an in-line Push-To-Talk that can be clipped to the lapel or belt. The PTT may also be operated remotely as a "finger tip" PTT by running the included remote cord down the user's sleeve.

Models Available: SPM-500 (for ADI, Alinco, Icom, Standard, Yaesu), SPM-501 (for Kenwood), SPM-502 (for Yaesu FT-50 / VX-1R / VX-5R), SPM-503 (Motorola GP300), and more. Cost: as low as $59.95 each.

SPM-600 Series - Remote Speaker Microphone

The SPM-600 series is a full-sized portable microphone with durable construction. The super high 500 millwatt audio output rating makes this our best remote speaker microphone ever. It has a high-quality electret condenser mic element and a large internal speaker for even more of the "big audio" that you've come to expect from the **PRYME Radio Products**™ line of audio accessories.

Models Available: SPM-600 (for ADI, Alinco, Icom, Standard, Yaesu), SPM-601 (for Kenwood), SPM-602 (for Yaesu FT-50 / VX-1R / VX-5R), SPM-603 (Motorola GP300), and more. Cost: as low as $39.95 each.

HT Antennas

RD-8 - 2M / 70 CM Rubber Duck Antenna

Our 6.5" flexible wonder, the RD-8, will definitely improve your signal on both Two Meters and 440 MHz. Scanning enthusiasts and amateur radio operators alike agree that the RD-8 offers fantastic performance at an affordable price. It has a gold plated BNC connector. Tuned for amateur band operation (144-148 / 430-450 MHz). **Cost:** $17.95 each.

RD-98 / RD-98SMA - 2M / 70CM
Extended Thin Duck

The RD-98 is a 17" dualband HT antenna that is only 1/16th of an inch in diameter. This combination of strength and gain has made the RD-98 the favorite antenna of emergency service volunteers everywhere. Tuned for amateur band operation (144-148 / 420-450 MHz). **Cost:** $24.95 each (BNC), $27.95 each (SMA).

AL-800 - 2M / 70CM
Telescoping Antenna

This highly popular antenna is great for hiking, riding, or whenever you end up on the fringes of your favorite repeater. Telescopes to 34" or collapses to 10". When you are back in town, unscrew the telescoping section and replace it with the 9" rat tail section (included). Tuned for amateur band operation (144-148 / 420-450 MHz). **Cost:** $34.95 each.

*see our webpage for details

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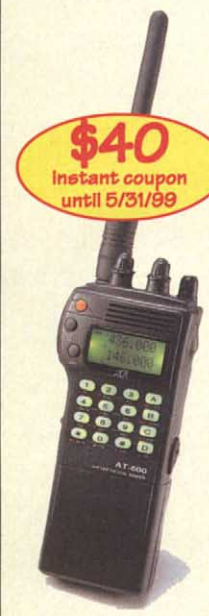
AT-600HP Dualband 2M/70CM HT



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Tx range: 144-148, 430-450 MHz • Rx range: 108-174 MHz (including AM airband), 400-470 MHz, plus 830-985 MHz (cellular blocked) • MARS and CAP capable (permits are required) • simultaneous VHF/UHF receive • single band, or full duplex operation • crossband repeat • separate volume and squelch controls for each band • six-character alphanumeric display • 200 memories store any offset or tone • CTCSS encode *and* decode included • 10 DTMF autodialer memories for autopatch use • DTMF paging included • Auto Power Off & battery save • 5 Watts out with supplied battery (HP version only) • PC programmable • on-the-air and wired cloning • Large backlit keypad and display • Battery voltage meter function • Small! 4.25" (H) x 2" (W) x 1.5" (D) excluding battery pack

AT-201HP 2 Meter HT
AT-401HP 440 MHz HT

$40 instant coupon until 5/31/99

AT-201: Tx range: 144-148 • Rx range: 130-179 MHz • **AT-401:** TX range: 430-450 MHz • Rx range: 400-470 MHz • MARS and CAP capable (permits are required) • 5-watts output with supplied battery pack (HP version only) • 40 memory channels store any offset or tone • CTCSS encode and decode included • programmable band and memory scan modes • DTMF paging included • dual frequency watch • auto-repeater offset • user selectable frequency or channel display modes • backlit display and keypad • Size: 4.25" (H) x 2" (W) x 1.3" (D) excluding battery pack

PR-52 6 Meter (50 MHz) HT
PR-222 1.35 Meter (222 MHz) HT

NEW!

PR-52: Tx range: 50-54 MHz • Rx range: 44-54 MHz • ***PR-222:*** Tx range: 222-225 MHz • Rx range: 216-229 MHz • 5-watts output with included NiCd battery pack • MARS and CAP capable (permits are required) • built-in CTCSS encode and decode • 40 memory channels store any tone or offset • direct frequency entry using 16 button keypad • frequency or channel display modes • PC programmable (with optional software) or cable cloneable • Palm-sized! World's Smallest 6 Meter and 1.35-Meter singleband handhelds! Size: 4.25" (H) x 2" (W) x 0.75" (D) excluding battery pack!

TALK KING* Family Radio Transceiver

Operates on 3 AAA batteries (not included) • All 14 U.S. FRS channels • External microphone jack • No license required! • Up to 2 miles range • Backlit display • Adjustable volume control • Tone Coded Squelch: eliminates interference and increases privacy • Very small size! Fits in your shirt pocket! • Simple "menu-style" operation • Rugged, non-removeable antenna • Built-in belt clip keeps unit secure • Available in three great colors • Clear and loud receive audio

NEW!

- Channel scan for finding busy channels
- Automatic power off • Key lock prevents accidental channel changing
- Available in three colors: blue, yellow, and camouflage
- Size: 3.5" (H) x 2" (W) x 0.8" (D) excluding antenna

AR-147* 2M Mobile • AR-247* 222 MHz Mobile • AR-447* 70CM Mobile

NEW!

DAYTON Hamvention Booths # 319 - 320

The next generation of amateur single band mobile radios has arrived. These are the first amateur mobile radios ever to feature both CTCSS and DCS (Digtially Coded Squelch) encode/decode, and tone scan. DCS adds 106 new tones to the radio, in additon to the 50 standard CTCSS tones, that can be used for selective calling or repeater **AR-147:** Tx range: 144-148 MHz • Rx range: 118-171 MHz (includes AM air) • Output: 50/15/5 watts • **AR-247:** Tx range: 222-225 MHz • Rx range: 215-229 MHz • Output: 30/15/5 watts • **AR-447:** Tx range: 430-450 MHz • Rx range: 400-470 MHz • Output: 35/15/5 watts • 81 memories • CTCSS (50 tones) and **DCS** (106 tones) encode, decode, and tone scan • MARS capable (permits required) • 9 DTMF autodialer memories • Built-in redialer for autopatch use • Programmable band and memory scan • Time Out Timer • DTMF paging • Dual frequency watch • Auto Repeater Offset (AR-147 only) • Direct frequency entry using multi-function DTMF microphone • PC programmable (with optional software) • Auto Power Off • Frequency or channel display modes • Four-step display dimmer • Power line over/under voltage protection • Small! Size: 1.5" (H) x 5.5" (W) x 6.25" (D)

*These units have not yet been FCC approved. They are not, and may not be, offered for sale until after this approval is granted.

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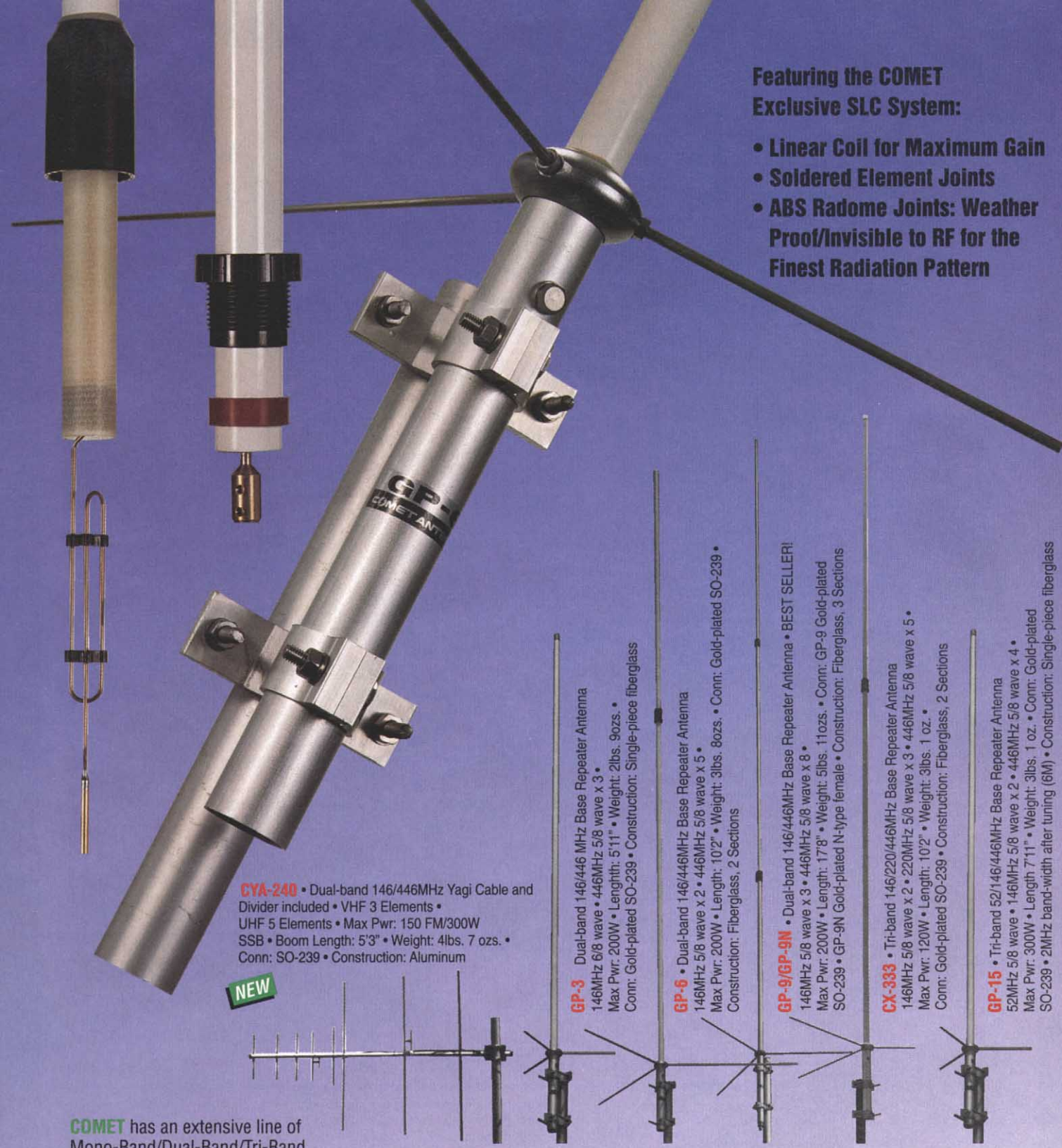

Featuring the COMET Exclusive SLC System:

- **Linear Coil for Maximum Gain**
- **Soldered Element Joints**
- **ABS Radome Joints: Weather Proof/Invisible to RF for the Finest Radiation Pattern**

CYA-240 • Dual-band 146/446MHz Yagi Cable and Divider included • VHF 3 Elements • UHF 5 Elements • Max Pwr: 150 FM/300W SSB • Boom Length: 5'3" • Weight: 4lbs. 7 ozs. • Conn: SO-239 • Construction: Aluminum

NEW

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GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna 52MHz 5/8 wave • 146MHz 5/8 wave x 2 • 446MHz 5/8 wave x 4 • Max Pwr: 300W • Length 7'11" • Weight: 3lbs. 1 oz. • Conn: Gold-plated SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

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"It Seems to Us..."

Just Do It

When was the Golden Age of Amateur Radio?

If you're like most hams, your answer is that it was about the time you were first licensed. Oh, that's probably not how you will describe it. You'll say it was the '30s, when homebrew was king (the Depression provided the incentive to build a station inexpensively, and plenty of free time to do it). Or perhaps it was the '50s, when the sunspots peaked like never before or since and you could work the world with a couple of watts to a piece of wet string (never mind that at the time, TVI forced many amateurs off the air). Maybe it was the '60s, when the amateur satellite era began and the post-Sputnik emphasis on math and science brought tens of thousands of bright young people into our ranks (the AM vs. SSB and incentive licensing fratricides of the period notwithstanding). Possibly it was the '70s, when FM repeaters brought us wonderful new public service capabilities (and until frequency coordination came to be accepted, repeater wars). And so on—we remember the good feelings, and filter out the bad. It seems to be human nature to believe that the time when we first discovered Amateur Radio was a magical time, never to be duplicated.

Here is a contrary view: The Golden Age of Amateur Radio is ***right now***. And here's the evidence to support that view.

There are exciting new modes to explore. The APRS gurus are finding new applications for this ingenious, amateur-developed tool. This month in *QST* we highlight another mode developed by amateurs for amateurs: PSK31, an HF digital mode that may well revolutionize RTTY operation. PSK31 is a keyboard conversational mode that joins PACTOR, CLOVER, G-TOR, PACTOR II, and the venerable AMTOR in an ever-expanding bag of Amateur Radio tricks for getting data from one point to many others. Want to play with PSK31? If you have a computer, a sound card, and an Internet connection you can download the free (!) software and be on the air with it in 15 minutes.

HF digital proponents are not the only ones to make effective use of computers and sound cards. SSTV aficionados have been doing it for years. These tools have brought the two most challenging VHF pursuits, moonbounce and meteor scatter, within the reach of amateurs who have only modest RF hardware. Digital ATV is catching on— and not just as a carbon copy of what the broadcasters are doing. The availability of reasonably priced components for high-speed digital operation is energizing the packet community.

Amateur Radio at the portal to the 21st century is not only about digital modes and software. Home construction is alive and well, thanks in large part to the QRP clubs and the kit projects they sponsor. Even here the Internet plays a positive role: as you build you can compare notes with other builders around the world, who can help you past any rough spots. How did you spend your Christmas season? Doug Hendricks, KI6DS, of the NorCal QRP Club spent his kitting more than 200,000 parts for the sold-out NorCal 20 project. Recognizing the opportunity, several companies have entered the kit market. Restoring and venerating older equipment is another healthy, growing field of endeavor.

There's plenty to keep us interested in new gear, too. Tiny hand-held transceivers sport multiband and scanning features that were unimaginable a few years ago; the range of choice in FM hand-helds and mobiles is mind-boggling, and prices have never been more attractive. The traditional dividing line between HF and VHF is blurring as VHF and even UHF coverage is added to transceivers designed principally for the HF market. HF mobile operation is enjoying a renaissance, thanks to clever, compact equipment designs. Even antennas have improved: the current generation of computer-designed skyhooks outperform their predecessors and continue to offer a fertile field for experimentation.

What about operating? January's ZL9CI expedition to Campbell Island made more than 96,000 contacts, eclipsing the mark set by VK0IR two years ago by almost 20% with the help of returning sunspots. Ten meters is exciting again, and worldwide DX should burst forth on six meters this fall thanks to the recent proliferation of equipment that covers the band and the increase in countries that grant operating permission there. If you're an experienced ham with a good station, your biggest problem with DX may be that it's too easy! If that describes you, invent a new challenge for yourself—those QRP kits aren't just fun to build, they're also fun to operate. If your interests are more lofty, you don't have to wait for the launch of Phase 3D; there are plenty of amateur satellites in orbit, and ways to explore "near space" with radio-equipped unmanned balloons.

If we've left out your favorite Amateur Radio pursuit, accept our apologies. There's so much going on, it's impossible to do justice to everything on one page!

No matter what currently excites you about Amateur Radio, and there's bound to be *something*, our admittedly unoriginal advice is: Just Do It. There's never been a better time.—*David Sumner, K1ZZ*

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Utah — Jim Rudnicki, NZ7T, 306 North 1500 East, Layton, UT 84040 (801-547-9218); **nz7t@arrl.org**

Wyoming — Robert Williams, N7LKH, PO Box 130, Wapiti, WY 82450 (307-527-7758); **n7lkh@arrl.org**

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Georgia — Sandy Donahue, W4RU, 960 Ralph McGill Blvd, Atlanta NE, GA 30306 (404-875-9450); **w4ru@arrl.org**

Northern Florida — Rudy Hubbard, WA4PUP, PO Box 843, Milton, FL 32572-0843 (850-626-0620); **wa4pup@arrl.org**

Southern Florida — Kevin Bunin, K4PG, 3307 Lakeview Dr, Delray Beach, FL 33445 (561-496-5257); **k4pg@arrl.org**

Puerto Rico — Raul Escobar, KP4ZZ, PO Box 366051, San Juan, PR 00936 (787-760-9070); **kp4zz@arrl.org**

Virgin Islands — John Ellis, NP2B, PO Box 24492, Christiansted, St Croix, VI 00824 (340-773-9643); **np2b@arrl.org**

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Los Angeles — Phineas J. Icenbice Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186); **w6bf@arrl.org**

Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (909-687-8394); **w6ubq@arrl.org**

San Diego — Tuck Miller, K6ZEC, 3122 E 2nd St, National City, CA 91950 (619-475-7333); **k6zec@arrl.org**

Santa Barbara — Robert Griffin, K6YR, 1436 Johnson Ave, San Luis Obispo, CA 93401-3734 (805-543-3346); **k6yr@arrl.org**

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Oklahoma — Charlie Calhoun, K5TTT, 16101 E 98th St N, Owasso, OK 74055 (918-272-9872); **k5ttt@arrl.org**

South Texas — E. Ray Taylor, N5NAV, 688 Comal Ave, New Braunfels, TX 78130 (830-625-1683); **n5nav@arrl.org**

West Texas — Charles C. Royall, WB5T, 2063 Putter Dr, San Angelo, TX 76904 (915-944-0469); **wb5t@arrl.org**

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- Optional PC control

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- Automatic notch filter
- Twin passband tuning
- Triple conversion

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Cutting edge technology for today's serious DX'er, yet easy & affordable enough for casual listener use.

Setting a new standard in affordable HF communications, the ICOM IC-R75* comes fully equipped to satisfy both the serious DX'er and the serious DX'er's wallet. **Hear MORE of what's out there.** Pick up more amateur, marine and shortwave broadcasts; the new 'R75* covers from **0.03 – 60.0 MHz.** (That's wider rx than most other HF receivers.)

Pull out the weak signals. The IC-R75 sports a remarkable arsenal of signal detection weapons ready for your command: a **triple conversion** receive system rejects image and spurious signals. An **automatic notch filter** reduces interference by minimizing "beat" and "howl" signals. Use **Twin Passband Tuning (PBT)** to zero in on signals by shaping the IF passband. ICOM's all new **Synchronous AM detection (S-AM)** technology reduces signal fading in AM broadcasts. Optional **Digital Signal Processing (DSP)** noise reduction in the AF stage converts analog SSB, AM and FM signals to crisp, clear audio output (you'll hear the difference on the 'R75's **large, front mounted speaker**). Further tailor the 'R75 to meet your listening needs by installing **up to two optional filters.**

There's much more. Our Website offers the complete specs. But the real eye opener will come only with a test drive of this **suprisingly affordable** rig, so plan to visit your authorized ICOM dealer soon*.

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*This device has not been approved by the Federal Communications Commission. This device may not be sold or leased, or offered for sale or lease, until approval of the Federal Communications Commission has been obtained.

AMERITRON True Legal Limit™ Tuner

Easily handles 1500 Watts continuous carrier even on 160 Meters . . . High-current edge-wound silver plated Roller Inductor . . . Two 500 pf high capacitance tuning capacitors with 6:1 vernier reduction drives . . . 3 core choke balun . . . Six position antenna switch . . . True peak reading Cross-Needle SWR/Wattmeter . . .

Call your dealer for your best price!

AMERITRON ATR-30

$599

Suggested Retail

- *Handles 1500 Watts carrier*
- *Super High Current edge-wound silver plated Roller Inductor*
- *500 pf tuning capacitors with 6:1 vernier reduction drives*
- *3 core choke balun*
- *6 position antenna switch*
- *True peak reading meter*

AMERITRON's ATR-30 *True Legal Limit*™ roller inductor antenna tuner is ham radio's toughest! It'll handle 1500 Watts *continuous carrier output* on *all* modes and *all* HF bands into most antennas -- even on 160 Meters where most antenna tuners fail.

It's perfect for Ameritron's most powerful amplifiers where the ATR-30 just loafs.

All band coverage lets you operate 1.8-30 MHz including all MARS and WARC bands.

Super High Current Roller Inductor

You'll see Ameritron's new *super high current* air core roller inductor. It's *edge wound* from a thick solid copper strip and silver plated. This produces a large surface area and a massive conductor. It can carry huge circulating RF currents and withstand tremendous heat that'll melt or burn ordinary roller inductors.

A gear driven turns counter and crank knob gives you precise inductance control.

Two 500 pf Tuning Capacitors

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 Balun, 6 position Antenna Switch

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

Read *true* Peak Power

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Roomy Cabinet maintains High-Q

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

AMERITRON ATR-15 Antenna Tuner

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.

Ameritron has the best selection of *TrueLegalLimit*™ HF Amplifiers

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

Ameritron's *most powerful* Amp

with Eimac® 8877 ceramic tube

AL-1500

$2845

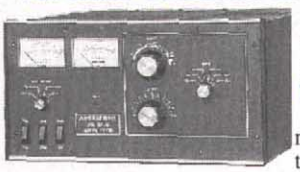
Suggested Retail

TrueLegalLimit™

Ameritron's *most powerful* amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 Watts drive gives you the full output power -- and it's just loafing because the power supply is capable of 2500 Watts PEP. All HF bands, all modes. 77 pounds, 18½Dx17Wx10H in.

Ameritron's *toughest* Amp

with Eimac® 3CX1200A7 tube



AL-1200

$2295

Suggested Retail

TrueLegalLimit™

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.

Ameritron's *classic* Amp

with 2 graphite plate Amperex® 3-500ZG tubes

AL-82

$2295

Suggested Retail

TrueLegalLimit™

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.

1.5 *plus* kW SSB HF Amp

with 2 Eimac® 3CX800A7 tubes

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.

1 kW Desktop HF Amp

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. 8½x14x 15½ in. Plugs into 120 VAC outlet. Graphite plate *Amperex®* 3-500ZG tube. Nearly 70% efficiency. Weighs 48 lbs.

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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.

Representative Bilirakis Reintroduces Amateur Spectrum Protection Act

A new bill to protect the Amateur Radio spectrum has hit the ground running in the House of Representatives, with 22 cosponsors only a few days out of the block. Titled HR.783, "The Amateur Radio Spectrum Protection Act of 1999," the measure was introduced by Congressman Michael Bilirakis. A Florida Republican, Bilirakis also sponsored last year's measure, which attracted 83 cosponsors on both sides of the aisle. The session ended before action could be taken on that bill. Rep Frank Pallone Jr, a New Jersey Democrat, is the initial cosponsor of the 1999 bill.

HR.783 would amend the Communications Act to require the FCC to provide "equivalent replacement spectrum" to Amateur Radio and the Amateur Satellite Service in the event of a reallocation of primary amateur allocations, any reduction in secondary amateur allocations, or "additional allocations within such bands that would substantially reduce the utility thereof" to amateurs. Representative Bilirakis was interested in helping the Amateur Radio community in recognition of the fine performance of amateur emergency communicators after several recent hurricanes in his state, and especially Hurricane Andrew.

HR.783 is largely the same as last year's HR.3572. The major difference is that the 1999 version adds "Amateur Satellite Service" frequencies to "Amateur Radio Service" in detailing the frequencies that would be afforded protection under the act.

US hams are urged to write their members of Congress in support of this bill.

To review the rationale and history behind HR.783, see the discussion of HR.3572 in the June 1998 issue of *QST* (p 15).

Representative Michael Bilirakis (R-FL-9th) (right) takes a moment in the Rayburn Room off the floor of the House to "grip and grin" with Steve Mansfield, N1MZA, ARRL Manager of Legislative and Public Affairs, following the introduction of HR.783, The Amateur Radio Spectrum Protection Act of 1999.

Bilirakis Urges Members of Congress to Sign On

Shortly after the introduction of HR.783, A "Dear Colleague" letter from Representative Bilirakis was circulated on Capitol Hill seeking cosponsorship from his colleagues. Here is a slightly edited form of the letter:

March 1, 1999
Dear Colleague:

Organized volunteer radio amateurs, or "hams," step forward to provide emergency communication services when regular channels are disrupted by disaster. When hurricanes, earthquakes, tornadoes and other catastrophes affect civilian populations, Amateur Radio is often the first contact with the outside area. These trained volunteers work at their own expense and often at considerable risk to themselves.

Licensed Amateur Radio is entirely non-commercial. In fact, individual amateur operators are prohibited from receiving any form of payment for the volunteer work they do. These services have included helping authorities reestablish communication after Hurricane Andrew devastated my state, helping to spot tornado touchdowns in the Midwest, monitoring flooding along the Mississippi and relaying 'health and welfare' messages after a California earthquake. Amateur operators also participate in regular organized exercises to assure that messages will go through if disaster strikes.

In addition to emergency communication, amateur operators use their spectrum allocations to experiment with and develop new circuitry and techniques for increasing the effectiveness of the radio spectrum for all Americans. Much of the electronic technology we now take for granted has at least a part of its heritage in Amateur Radio experimentation.

The Balanced Budget Act of 1997 requires the FCC to conduct spectrum auctions to raise new revenues. Some of that revenue may come from the auction of current amateur spectrum. HR.783 simply requires the FCC to provide the Amateur Radio Service with equivalent replacement spectrum if it reallocates and auctions any of the Service's current spectrum.

As the "telecommunications revolution" continues, we must ensure that the distinguished record of service by amateur operators is not pushed aside by short-term interests. HR.783 will provide some measure of protection, while also maintaining the flexibility the Federal Communications Commission requires to manage the nation's telecommunications infrastructure effectively.

This is an opportunity to show the more than 650,000 licensed radio amateurs in the US that you support HR.783. If you would like to cosponsor my bill, please contact my legislative director.

Sincerely yours,

Michael Bilirakis
Member of Congress

HR.783: The Amateur Radio Spectrum Protection Act of 1999

♦ Here is the actual text of HR.783. Like all other telecommunications legislation, this bill must first be approved ("marked up") by the House Telecommunications Subcommittee. Markups sometimes involve amendments. If marked up by the subcommittee, the bill then goes to the full House Commerce Committee for markup before being "reported" to the floor. A "report" from a committee outlines what the committee means by each provision of the bill. Should the bill pass the House, it goes to the Senate where the same process occurs all over again before final passage. Anywhere along the line, a bill *could* be singled out for special treatment under "suspension of the rules." That means it could pass on a voice vote without a hearing or debate. This is usually reserved for small, noncontroversial, often technical measures. Another possibility is that HR.783 could be grafted by amendment onto a larger piece of legislation. If the bill passes as a stand alone, under suspension, or as an amendment, the effect is the same: it becomes law.

What chance does HR.783 have of passing? First, some perspective: about 10,000 bills, resolutions, concurrent resolutions and joint resolutions are introduced each Congress, but fewer than 500 actually get all the way to the President's desk. These are usually the top priorities of Congress...budget, appropriations, authorizations and a handful of more specialized bills. Each bill in Congress involves hours of drafting, research, scoring, hearings (sometimes multiple hearings), markups, meetings with lobbyists for and against, and hours of discussion and study. Getting good legislation passed can take many years.

But there is hope for HR.783. It got an early start and cosponsors seem to be signing on with enthusiasm. The Telecommunications Subcommittee has an ambitious agenda that could allow plenty of opportunities for our bill to be amended to another bill-or even passed alone. Moreover, because of the desire to demonstrate to the voting public that Congress is not hopelessly deadlocked after the impeachment impasse, leadership may press for passage of a large number of smaller bills.

While it's too early to get too excited, the signs are promising.

HR.783 Cosponsors (In order of sign on)

Frank Pallone, Jr (D-NJ-6th)
Michael R. McNulty (D-NY-21st)
Ronnie Shows (D-MS-4th)
Nathan Deal (R-GA-9th)
Patsy T. Mink (D-HI-2nd)
Robert A. Underwood (D-GU-delegate)
John E. Baldacci (D-ME-2nd)
Sam Farr (D-CA-17th)
James M. Talent (R-MO-2nd)
Stephen E. Buyer (R-IN-5th)
Dale E. Kildee (D-MI-9th)
Norman D. Dicks (D-WA-6th)
Owen B. Pickett (D-VA-2nd)
Barbara Cubin (R-WY-1st)
Steve C. LaTourette (R-OH-19th)
Jo Ann Emerson (R-MO-8th)
George R. Nethercutt, Jr (R-WA-5th)
Robert B. Aderholt (R-AL-4th)
David L. Hobson (R-OH-7th)
Michael G. Oxley (R-OH-4th)
Dan Burton (R-IN-6)
Bernie Sanders (I-VT-at large)

106th CONGRESS
1st Session
HR. 783
To ensure the availability of spectrum to Amateur Radio operators.
IN THE HOUSE OF REPRESENTATIVES
February 23, 1999

Mr. BILIRAKIS (for himself and Mr. PALLONE) introduced the following bill, which was referred to the Committee on Commerce.

A BILL

To ensure the availability of spectrum to Amateur Radio operators.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the 'Amateur Radio Spectrum Protection Act of 1999'.

SECTION 2. FINDINGS.

The Congress finds the following:

(1) More than 650,000 radio amateurs in the United States are licensed by the Federal Communications Commission.

(2) Among the basic purposes of the Amateur Radio and Amateur Satellite Services are to provide voluntary, noncommercial radio service, particularly emergency communications.

(3) Emergency communications services by volunteer Amateur Radio operators have consistently and reliably been provided before, during, and after floods, hurricanes, tornadoes, forest fires, earthquakes, blizzards, train accidents, chemical spills, and other disasters.

(4) The Federal Communications Commission has taken actions which have resulted in the loss of at least 107 MHz of spectrum to radio amateurs.

SECTION 3. FEDERAL POLICY REGARDING REALLOCATION OF AMATEUR RADIO SPECTRUM.

Section 303 of the Communications Act of 1934 is amended by adding at the end the following new subsection:

(z) Notwithstanding subsection (c), after July 1, 1999—

(1) make no reallocation of primary allocations of bands of frequencies of the Amateur Radio and amateur satellite services;

(2) not diminish the secondary allocations of bands of frequencies to the Amateur Radio or amateur satellite service; and

(3) make no additional allocations within such bands of frequencies that would substantially reduce the utility thereof to the Amateur Radio or amateur satellite service; unless the Commission, at the same time, provides equivalent replacement spectrum to Amateur Radio and amateur satellite service.

Make a Statement on The Hill...Write Now!

Many members of Congress will not consider cosponsorship of a bill without evidence of support from their own constituents. If you'd like to help Amateur Radio make a statement on The Hill, consider sending him or her a letter. Too busy to send a letter? Send a QSL card that simply says "Support Amateur Radio. Cosponsor HR.783." When you write, you can use the following sample as a starting point.

Sample Letter to Your Member of Congress

(You may customize this letter)
The Hon. (name)
United States House of Representatives
Washington, DC 20515

RE: H.R. 783

Dear Representative (name):

Writing as one of the nation's more than 650,000 licensed radio amateurs, I urge you to consponsor HR.783, the Amateur Radio Spectrum Protection Act of 1999.

This bill, introduced by Representative Bilirakis is a nonpartisan, noncontroversial measure designed to help protect the radio frequencies used by Amateur Radio volunteers to provide emergency communication, technical experimentation and recreation.

Your cosponsorship of HR.783 helps ensure Amateur Radio's public service role for the people of your Congressional District.

I look forward to hearing from you.

Sincerely,

Leading the way in HF technology.

FT-1000MP
Revolutionary All-Mode HF Transceiver with EDSP™

•Enhanced Digital Signal Processing (EDSP™) Noise Reducer, RX/TX waveform Contour shaping control, Digital Notch plus IF Notch, Digital CW Narrow Filters, Microphone Equalization • Shuttle Jog™ Tuning Enhancement • Directional Tuning Scale for CW/Digital Modes and Clarifier Offset Display • Selectable Antenna Jacks • Programmable Tuning Steps • 100W PO • Dual In-band Receive with Separate S-meters • Built-in Collins® SSB Mechanical Filter • CW Electronic Keyer with two Key jacks • CW Spot • Automatic Antenna Tuner • 100-117, 200-234V AC and 13.5V DC power inputs • DC version available • 99 Memories.

FT-1000/D
Elite-Class All-Mode HF Transceiver

• 200W PO • Dual Receive • 108 dB dynamic range • Cascaded IF Filters • Direct Digital Synthesis (DDS) • IF Width/Shift/Notch • CW Spot • CW Audio Peaking Filter • CW Electronic Keyer with two Key jacks • IF Noise Blanker • Automatic Antenna Tuner • RF Speech Processor • Front panel RX Antenna selector switch • Two large fly-wheel-weighted tuning knobs • 99 Memories.

FT-920
All-Mode HF/6m Transceiver

• High-Performance 33MIPS* DSP • HF + 50 MHz w/100 Watts-all Bands • MOSFET PA Finals • High Speed Auto Antenna Tuner (works on RX & TX) • Omni-Glow™ Dual Display • Twin VFO Knobs • FET RF Amplifier for High & Low Bands • Digital Voice Memory System • Quick Memory Bank (QMB)Frequency System • 127 Memories. *Million Instructions Per Second

FT-847
HF/50/144/430 MHz All Mode Transceiver DSP Filters—Notch, NR and BPF • Four Antenna Jacks • Voice Monitor • Shuttle Jog Dial • Separate Sub-Band Dial • Smart Search • Digital Meter • 99 Memories • 100W for HF/6-Meter; 50W 2-Meter/430 MHz • Crossband Full Duplex • Normal/Reverse Tracking • CTCSS and DCS Encode/Decode • Direct Keypad Frequency Entry • 1200/9600bps Packet-Ready

FT-840
High Performance Compact HF Transceiver

• High Receiver Dynamic Range • Dual Band Stacking VFOs with Direct Digital Synthesis (DDS) • 100W PO • IF Shift • IF Noise Blanker • Digital Mode Interface • CW-Reverse feature • Adjustable Repeater CTCSS Tones • Optional (External) Automatic Antenna Tuner • 100 Memories.

FT-600
Multi-Purpose HF SSB Transceiver

Frequency Range: RX: 50 kHz - 30 MHz; TX: 160-10M • 100W PO • MIL-STD 810 Rating • Alphanumeric Omni-Glow™ LCD Display • Keypad Frequency Entry • Optional CW (500 Hz) and AM (6 kHz) filters available • Dual Watch • Front-mounted Speaker with High Audio Output • PC Programmable • 100 Memories (in 4 banks of 25).

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HF ENTHUSIASM

Yaesu, Choice of the World's top DX'ers

FIELD COMMANDER

Over 40 years of experience in HF transceiver design has firmly established Yaesu as the choice of the world's top DX'ers. The knowledge that produced unequaled RF technology and design that is found in the State of the Art FT-1000MP can also be found in the miniature FT-100. The FT-100 while small in size 6.3" × 2.1" × 8.1"(160 W × 54 H × 205 D mm :w/o knob) is large in features and performance. This is accomplished by using the most advanced manufacturing techniques and component mounting technology. High Dynamic range RF front-end technology and Advanced Digital technology such as DSP sets a new standard of receiver performance for miniature HF transceivers. The single piece die cast frame, dual cooling fan system and revolutionary RF high power design technique keeps the FT-100 running cool and smooth in the most adverse operating environments. (TX Power output=100W HF, 50W VHF/20W UHF) The TX Equalizer offers crisp, clear and clean TX audio reproduction that until now was only found in top of the line HF base stations. The optional ATAS-100 (active tuning antenna system) ushers in a new age of mobile and field day operation (from HF to UHF frequencies). Add the optional ATBK-100 base kit (Good for limited space, simple setup.) and you've got a base station that ranks among the best in the world.

Features

- Frequency coverage:
  RX : 100 kHz-961 MHz (cellular blocked)
  TX : 160-6 m/144-148 MHz/430-450 MHz
- Power output : 100 W (160-6 m), 50 W (144 MHz), 20 W (430 MHz)
- DSP Bandpass Filter, Notch Filter, Noise Reduction, and Equalizer
- IF Noise Blanker
- SSB, CW, AM, FM, AFSK, Packet (1200/9600 bps) operation
- Detachable Front Panel
- Two Antenna Jacks (HF/50 and 144/430)
- IF Shift
- VOX
- Dual VFOs
- Available IF bandwidths of 6 kHz, 2.4 kHz, 500 Hz, and 300 Hz (6 kHz, 500 Hz, 300 Hz filters optional)
- Built-in Electronic Memory Keyer
- Speech Processor
- Built-in CTCSS and DCS for FM operation
- Automatic Repeater Shift and Auto-Range Transponder System
- Smart Search™ Automatic Memory Channel Loading System
- 300 memory Channels
- Quick Memory Bank (QMB)
- Bright LCD with multi-function display
- Optional FC-20 External Antenna Tuner
- Compatible with ATAS-100 Active-Tuning Antenna System. Add the optional ATBK-100 base kit

FIELD COMMANDER

FT-100

Ultra-Compact HF/VHF/UHF Transceiver

YAESU

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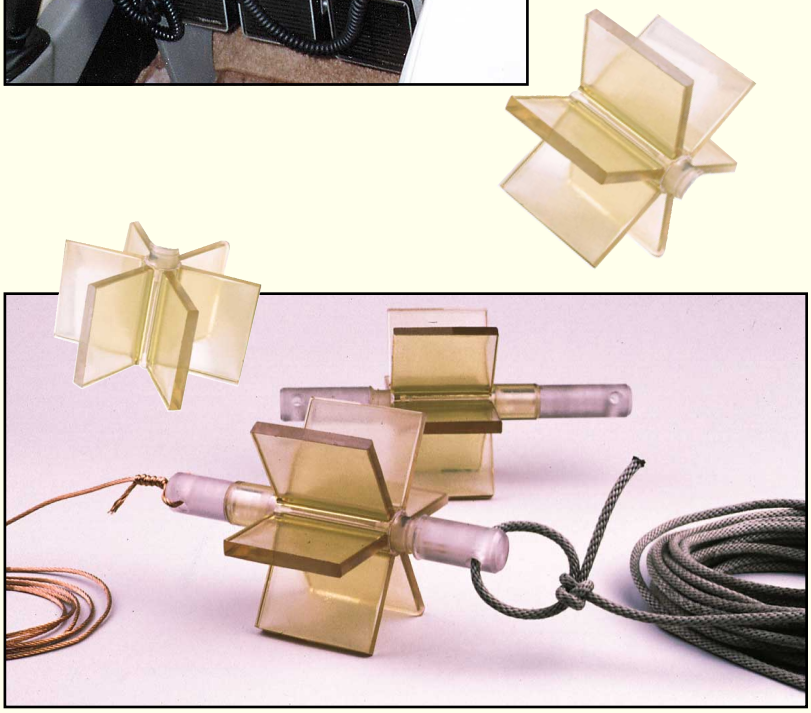
On the road again—in style. This Coachman RV behemoth owned by Don (K5CA) and Peggy (K5DQ) Wiseman is also a fully equipped ham shack on wheels. The neatly designed cab console (left) houses their HF transceiver, a VHF/UHF radio and a CB rig. Notice how all of the components, including the antenna tuner and amplifier, are securely bolted to the frame for safety. Their RV antenna farm (above right) includes a "screwdriver" remotely tuned HF antenna and a dual-band VHF/UHF whip.



These are *serious* antenna insulators! Ron, K1EPX, works in a plastics factory, so he had easy access to the materials he needed to fashion these heavy-duty antenna insulators. The insulators were made out of polycarbonate scrap and, according to Ron, they are extremely strong.

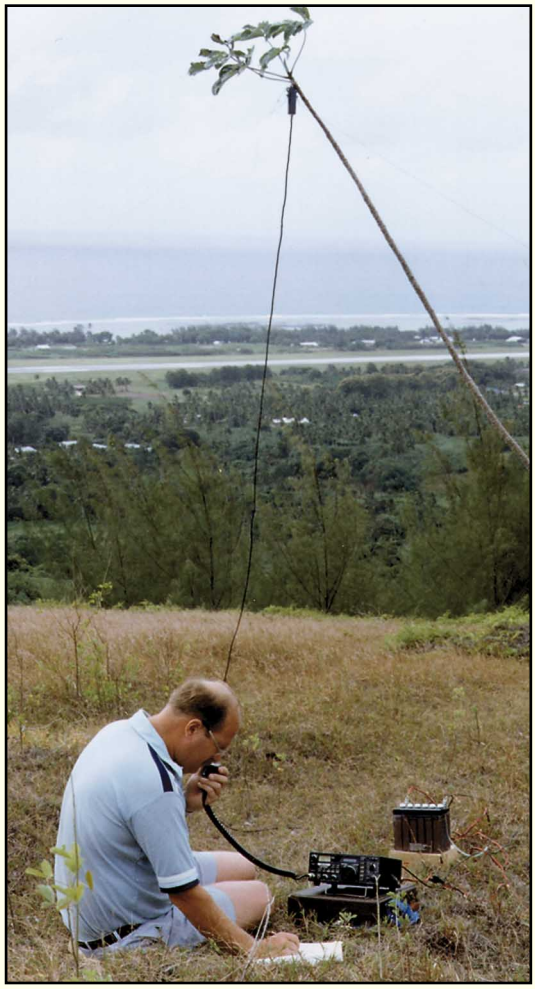
If at first you don't succeed... Jack Dalton, KC7FTH (right), is holding a trophy on which the following inscription appears: "13 WPM, September 1998. Perseverance Pays." Pete Peterson, WY7Z (left) presented the trophy to Jack at the October 1998 meeting of the Issaquah (Washington) Amateur Radio Club. It seems that Jack had a particularly difficult time passing his 13-WPM CW exam. Jack was a familiar face at VE sessions for more than *two years*, trying and failing so many times that even he lost count. Victory, when it finally arrived, was sweet!

The Old Man's "tools of persuasion" turn up in the strangest places. John, W3SST, spotted this Wouff Hong in north central Maine. It's really a dead tree that has yet to feel the bite of a logger's saw, but it's a potent reminder nonetheless!

ARRL Nebraska section manager Bill McCollum, KE0XQ (center) presents the Heartland DX Association with an ARRL Certificate of Affiliation. The Heartland DX Association is comprised of DXers in western Iowa and eastern Nebraska. They maintain a Web site at **http://www.qsl.net/hdxa**. Accepting the certificate is HDXA vice president Eddie Edwards, K0IL (left) and HDXA president Todd LeMense, KK0DX (right).

Binaural beauty. If you read the article by Rick Campbell, KK7B, in the March 1999 *QST*, you know about his fascinating binaural I-Q receiver design ("A Binaural I-Q Receiver," page 44). Here is the same receiver in an attractive homebrewed cabinet. Rick crafted the enclosure using items (such as the National dial) scavenged from hamfest flea markets.

A pilgrimage to history. While on vacation last fall, Charlie Smith, KE4OZN, made a detour to the site where Marconi made his first contacts on American soil with ships at sea from a station in Babylon, New York. The successful tests ignited a communication revolution in the US—one that would soon witness the development of the Amateur Radio Service.



South Pacific rover. In the July 1998 "Up Front" we featured a photograph of Ed Hartz, K8VIR, operating from a national park in New Zealand. Well, he is at it again, but this time Ed took his radio to the island of Rarotonga where he operated as K8VIR/ZK1EHH. He carried his rig and battery to a hill overlooking the international airport and discovered a conveniently placed tree to function as his antenna support.

SSTV from *Mir*

In early 1997 Farrell Winder, W8ZCF and Don Miller, W9TNP, conceived the idea of placing a small slow-scan television (SSTV) station aboard the Russian *Mir* space station, using VHF and UHF FM to transmit images to hams on Earth. After months of design, testing and delicate negotiation, their SSTV package was sent to the space station. The system is basically a five-inch LCD display integrated with a Tasco TSC-70 color SSTV scanner and an Apple M5673LL camera. The FM transceiver is a Kenwood TM-V7A.

Cosmonauts Sergei Avdeyev and Gennady Padalka began using the system last December to transmit SSTV images, much to the delight of hams throughout the world. If you have a computer and a sound card, all you need is SSTV software available on the Web (see **http://www.ultranet.com/~sstv/download.html**) and an FM receiver. When this issue went to press, the cosmonauts were transmitting images on 145.985 MHz, but they plan to move to 437.975 MHz in the near future. Farrell Winder, W8ZCF, provided the images shown on this page.

A close-up shot of a Progress vehicle docked at the station.

Mir cosmonauts maintain a "shrine" to Yuri Gagarin, the first man in space, and Konstantin Tsiolkovsky, the father of Russian rocketry.

This image was shot from within the *Mir* Piroda module.

Gennady (left) and Sergei review the Kenwood TM-V7A instruction manual.

A view of the St Lawrence Seaway.

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THE FCC IS "BACK"

♦ In the spring of 1957 I was a 15-year-old fledgling with fragile self esteem who was struggling for a foothold on this planet. Five years earlier I had lost my father, an Air Force flight instructor, in a flight-training accident and I was left trying to improvise a role model relationship with anyone who might be willing. I settled on Irv, W2MCA, a gentle and generous man who owned a radio-TV repair store in my bleak Brooklyn neighborhood. He and another neighborhood kid, Ted, K2QMF, selflessly coached me many evenings over a period of several weeks with lessons on theory and with code speed proficiency. Finally, with their help and encouragement, and with the worst case of jittery nerves I had ever experienced, I took and passed the Novice exam.

With the impatience that only youth can know, the next few months dragged on as if shackled by some huge naval anchor. But time eventually did pass and *it* finally arrived in my mailbox. *It* was a small envelope with "Federal Communications Commission" printed in the upper left corner.

That piece of paper inside the envelope told me something much more important than my call sign. It told me that someone, someone very distant from my obscure and isolated Brooklyn existence, knew something of me and seemingly thought well enough of my abilities to entrust me with building and operating a complex radio transmitter. That piece of paper symbolized my first tentative step as an adult into our society. Several months later, by the time I upgraded to General as K2ZPA, that piece of paper had grown so important to me that I would never ever let my license lapse. I would never be tempted to trade that call sign in on a vanity call and I would never abuse my operating privileges in any manner that might jeopardize the license. I was K2ZPA and K2ZPA was me.

At the FCC field office in Manhattan, where I had gone in 1958 to take the General exam, I encountered a gruff and grizzled FCC field engineer. He seemed to project a no-nonsense, no-patience attitude that held no particular love for snot-nosed kids like me who were clamoring to fill the amateur bands. He intimidated all of us, but I instinctively knew that his *gatekeeping* was really a sign that he cared, and a sign that the FCC cared. He and the FCC were protecting and parenting the institution of Amateur Radio and any fruit it might bear. And bear fruit it did. For one thing, it launched my future. I was fortunate enough to go on to engineering school and then graduate into a long and still gratifying career in defense electronics.

Amateur Radio seemed to flourish under the stern protection of the FCC, but deregulation eventually eroded the Commission's abilities. Using budgetary pressures as rationale it backed away from its obligation to being the examining and licensing authority. But most notably it backed away from its enforcement authority and seemingly abandoned hams to deal with wackos and settle disputes on their own. The new message was that the FCC was a weary parent and no longer cared much about Amateur Radio and its future.

Recently I was pleased to read that the FCC had reorganized its enforcement activities into a new Compliance & Information Bureau, which was giving notice that it was now going to seriously enforce the rules. This certainly sounded nice, but by this stage in my life I had grown weary of political pronouncements emanating from Washington. They are difficult to take seriously. However, I've been overjoyed by the leadership position adopted by Riley Hollingsworth, K4ZDH, the new FCC "enforcer."

Hollingsworth has put a human face on the FCC. I hope it is a sign that it is trying to reestablish a long-lost relationship. I think those of us who care about the future of Amateur Radio need to warmly respond to the new enforcement efforts of Hollingsworth and others at the FCC. —*Walter Shepherd, K2ZPA, Newbury Park, California*

SILENT KEY? NOT!

♦ I was reading "A Broadband HF Amplifier Using Low-Cost Power MOSFETs" by Mike Kossor, WA2EBY, in the March *QST* when I happened to spot this startling note on page 43: [7]Ed Oxner, ex-W9PRZ (SK)

Let me assure you that the reports of Ed's demise are greatly exaggerated. Ed is alive and well and living in Texas. I worked with Ed for six years at Siliconix and he is still the Great Guru of the Field Effect Transistor. His call is now KB6QJ.

I immediately sent Ed an e-mail, chewing him out for not telling me that he had died.—*Richard L. Bonkowski, W3HWJ, Santa Rosa, California*

THE VALUE OF LEAGUE MEMBERSHIP

♦ My license was about to expire last March, and in January I received a letter from an outfit that will remain nameless. They wanted to "help" me renew my ticket. All I had to do was send some money and they would take care of it. How nice.

Just a couple of days later I received my ARRL membership renewal notice. Along with the notice were complete instructions for renewing my license (both electronically and by mail), a complimentary Form 610 and a pre-addressed envelope! Without knowing whether I would opt to rejoin the League, they still went to the trouble and expense of including the necessary paperwork to assist me in renewing my license—*free of charge*. My next decision was easy.

I started a cozy fire with the previously unnamed "helpful" materials, then sat down and filled out my ARRL membership renewal and included a little extra for a *QEX* subscription. Here's to your great work!—*Tracy Hooker, KA5ECS, Las Cruces, New Mexico*

FLORIDA PRB-1 CASE

♦ Here in Florida (Seminole County) we have been involved in a three-year battle over Amateur Radio antenna heights. During this time many clubs and individual amateurs have tried to work out an acceptable ordinance with Seminole County. Unfortunately, the county produced an ordinance that restricted tower heights to only 35 feet in a "standard neighborhood."

I have taken my request for an 80-foot tower through every administrative procedure. I have been in contact with the ARRL, as well as a number of attorneys who have directed me as to what action to take so that we would be in the best position for a federal court battle.

On October 27, 1998 the Seminole County Board of Commissioners denied my request for a "special exception" and thereby set the stage for a federal court case. Once ruled upon, this case will set the standard for Florida and also have a major effect on the entire region, if not the country. The ARRL attorneys in Washington have already stated that they will be putting together a "friend of the court brief." The case still has a long way to go, but I am grateful for the support of the ARRL and my fellow amateurs throughout the nation.—*Lenard J. Persin, WB4HZQ, Maitland, Florida*

NOT MISSING A THING ON HF

♦ I don't recall ever writing a letter to the ARRL since I became a member, but the level that some parts of the Amateur Radio bands have sunk to is embarrassing. I have been a codeless Technician since 1991, even though I have been involved with radio monitoring

since the early '70s as a kid and I have made a career out of radio and electronics.

Almost all of my ham time is devoted to 6-meter SSB (home and mobile) with a sprinkling of 2-meter SSB thrown in. I have not talked to or heard a rude or insulting operator on either band. Six meters in particular seems to attract an excellent crop of well-mannered, competent operators.

Occasionally I've wondered what I was missing by not upgrading to get HF privileges. I couldn't scare up a contact on 6 meters during a recent 800-mile trip, so I decided to tune around the HF bands. I was embarrassed at what I heard, especially at 20 and 75 meters. Needless to say, I have little incentive to get on HF!—*Gary Mitchelson, N3JPU, Silver Spring, Maryland*

WHATEVER HAPPENED TO PRIDE?

♦ I have been a proud and active ham for over 30 years. All of that time I have been proudly supportive of ARRL and a recruiter of new hams into the hobby. I have proudly held a Novice (WN4QOK), General (WA4QOK) and now an Amateur Extra. Additionally, all members of my family are hams and all are CW qualified, by the way. (I am beaming with pride.)

I have consistently opposed any proposals that lower the standards of licensing, such as the no-code proposals of the late '70s, and the current restructuring proposals being debated here. It is my personal opposition to the tendency in America to legislate equality and then to validate that legislation with a give-it-away, everybody-deserves-everything agenda. The resulting dilution in the quality of our institutions and the pride in individual achievement has been devastating.

It is my opinion that the ARRL had better get its collective act together and realize that quantity versus quality is neither wise nor desirable, nor is it a long-term solution to the problems it seeks to solve. Reductions in standards (disguised as "restructuring") will most definitely continue to erode the hobby's fabric as expressed in the pride of earned privileges and achievement. It is the pride gained through the rigors of achievement that builds our unity and strength.

Having said all this, I am not foolish enough to think that I can change the path of ARRL leadership and the business of Amateur Radio. The recent (past 10 years) recruiting philosophy will certainly boost the number of licensees and the ARRL's bottom line, but this is a temporary fix at best. We will be back in another 20 years or less to lower standards again.

What a great ARRL legacy. Who needs pride anyway? I have a final suggestion: Let's give our evolving communications folly a fresh new name. How about "The International Citizen's Band?"—*Bill Glenn, AA4BQ, Pennsacola, Florida*

WIRELESS MODEMS

♦ I wish to thank Ed Hare, W1RFI, and the ARRL for being on top of things in regard to the wireless modem problem that has been appearing on the low end of 80 meters. For those of you who are not up to speed on this problem it would be best to review the "It Seems to Us" column in the February 1999 *QST*, or visit the ARRL Web site (**http://www.arrl.org**) for more information.

In a nutshell, these pesky little devices are appearing on or about 3.52 MHz in your neighbor's homes and are connected to their telephone lines. They are designed to connect devices such as computers and cable television converter boxes to phone lines that are not within a convenient physical distance from a phone jack. These 100 mW duplex FM transmitters are on the air day and night. Needless to say, if you have one or more of these wireless modems close to your ham station the bottom end of the 80-meter band becomes useless.

I had one such wireless modem in my neighborhood. I finally went on my own personal fox hunt and rooted it out. It was about six blocks away and had a signal of about 20 dB over S9. Through the cooperative efforts of the ARRL technical people, the local FCC field office, TCI Cablevision and other concerned hams, this modem was turned off and swapped out for one that doesn't use a ham band. I hope the manufacturer of this wireless modem will issue a recall and retune the devices to other frequencies.—*Bill Martin, N7EU, Bothell, Washington*

HAMS AND KIDS

♦ As I read the comments from Mike, KB9LII, about his children in the February issue ("Changes, Changes"), I realized that there are serious issues that must be faced if we are to continue to deserve the privileges (not rights!) granted us by our government. These issues are not license restructuring, the CW battle, the Internet, cell phones, or any other tangible item. These are merely challenges that present opportunities. The real issue is narrow-minded individuals who have forgotten the true spirit of Amateur Radio. The real issue is those who feel their freedom of speech includes spewing sewage on 75 meters. Somehow I don't believe this is what our Founding Fathers had in mind.

I was first licensed in 1971, as a 9th grade student. Thanks to Amateur Radio, and even more so to the wise Elmers who took an active interest in my life, I have enjoyed a 20-year career in technology, not to mention a fine hobby. To these fine amateurs I owe more than I could ever repay. Good hams like these can still be found, although they are occasionally overshadowed by the worst elements in our ranks.

Mike, please tell your children that there are many more of us out here that believe in them. They are our future. We need them and we are proud of them. Tell them not to give up because of the actions of a few bitter old men. I for one would be honored to QSO with your children any day.—*Ron T. Parks, WB5DYG, Gilbert, Arizona.* QST

This Month in Amateur Radio

More than 30,000 of your fellow hams will converge on Hara Arena in Dayton, Ohio, May 14-16 for the **Dayton Hamvention**. This is a *must-see* event for every amateur. Explore the massive outdoor fleamarket (the largest of its kind in the world), then stroll through the endless rows of booths in the arena complex and ogle the latest gear, software, books...you name it!

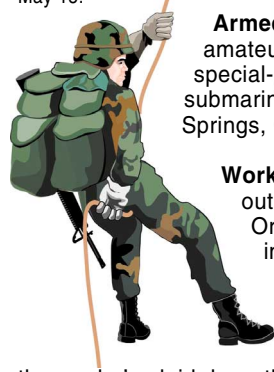
The Dayton Hamvention boasts the world's largest Amateur Radio fleamarket. If you can't find it at Dayton, it doesn't exist!

While you're at the Hamvention, stop by the **ARRL Media Relations forum** on Saturday, May 15, from 2 to 4 PM. A panel of media experts will be there with advice and helpful hints to help you get Amateur Radio in the news. The second hour will be an interactive session, so be prepared to discuss the challenges and problems you face with the media. Door prizes will be awarded at the conclusion of the event. And don't forget that Hamvention 2000 will be the site of the **ARRL National Convention**!

Of course, if you can't make it to Dayton, listen for the **Hamvention station, W8BI**. "Special Events" has the frequencies and QSL info.

Down in **Alabama** they're starting the month with a **Section Convention** in Birmingham, May 1-2. If you find yourself in the Lone Star State on the same weekend, mosey on over to the **West Texas Section Convention** in Abilene. The Far West has claimed the last half of May. The **Washington State Convention** gets underway in Yakima May 22-23 while the **Wyoming State Convention** kicks off May 29-30 in Casper.

Take to the air on Armed Forces Day, May 15!



Armed Forces Day is May 15. In addition to the traditional military/amateur contacts (see the announcement in this issue), several special-event stations will be on the air. Listen for W3CU from the submarine *USS Torsk* in Baltimore, Maryland; K0USN from Colorado Springs, Colorado; and WD4FVO from Camp Lejeune, North Carolina.

Worked All States hunters have a bevy of targets in May. Check out the QSO parties this month in Connecticut, Massachusetts, Oregon, Nevada, Indiana, Utah and Texas! See "Contest Corral" in this issue. And on the last weekend of the month you can take a crack at the CW portion of the **CQ WW WPX Contest**.

Memorial Day is more than a celebration to mark the beginning of summer. It is the day we set aside to remember those who've laid down their lives to preserve our freedom. In the spirit of Memorial Day several stations will be active including K2M, the Robert D.Grant Labor ARA in Nutley, New Jersey, and W8YAF at the Yankee Air Museum in Belleville, Michigan.

ZL9CI Dxpedition Uses Commander Amplifiers
New World Records Set

Braveheart at anchor in Perseverance Harbor. Her critical mission: get the ZL9CI crew through the notorious Southern Ocean. Cargo included highly reliable Commander Amplifiers furnished by Command Technologies. Communication & Power Ind. (EIMAC) donated the 3CX800A7 tubes.

The Campbell Island DXpedition in January, 1999 11,000 QSOs in 24 Hours 96,000 QSOs Total!

Another punishing test proves Commander Amplifiers deliver — POWER YOU CAN TRUST.

"Command Technologies in Bryan, Ohio loaned three Commander HF-2500 Amplifiers to us. They are massively constructed and behave perfectly. Our line voltage often drops to ridiculously low levels and the amps were never designed to operate that way but they continue effortlessly hour after hour, day after day." — ZL2AL

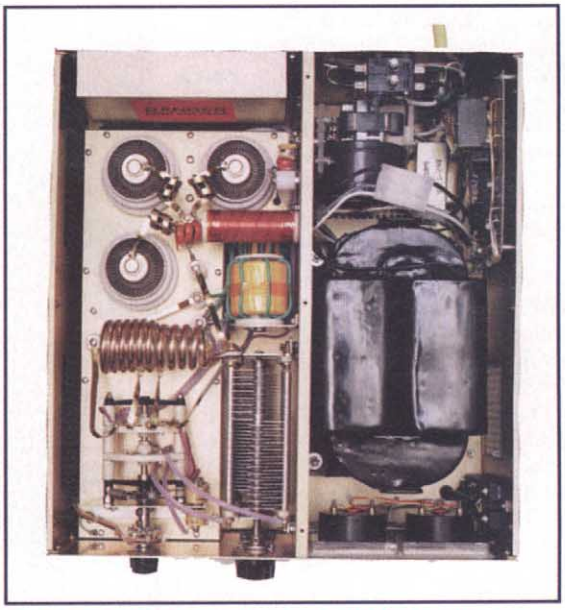
Commander Owners Got Through the Pileups

"On 07 January alone, the Commander and I worked ZL9CI eight times on six bands. Very pleased!" — Ted, N8GZ

"Working the pileup with wire antennas on 20 meters is no place for the faint at heart especially on RTTY and with a place as rare as ZL9. I managed to crack the pileup and complete a 20 meter RTTY QSO thanks to my Commander amp."— Gerry, W8GF

"The early going is the hard part... that's when I turn on my Commander Amplifier."— Dan, K8DR

"My Commander 2500 amp(s) worked the ZL9 on every band I needed them. They just keep pumping out clean RF, day after day."— Steve, K8EJ



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VISIT US AT DAYTON BOOTHS 6-7 AND GET THE ZL9CI STORY ON VIDEO

By Dale Hunt, WB6BYU

Amateur Radio Direction Finding:

The 1998 IARU World Championships

Here's one Amateur Radio contest that wasn't won sitting down! For the first time, an ARRL team competed against the world's best "Radio Orienteers" in the forests of eastern Hungary.

BELAJ ZELJKO, 9A2QU

The author punches his card at transmitter No. 2 on the 2-meter hunt.

The Ninth IARU World Championships in Amateur Radio Direction Finding (ARDF) were held September 1-7, 1998, in Nyiregyhaza, a town in eastern Hungary. More than 250 competitors represented 31 countries. In its debut appearance, the United States was represented by an ARRL-sponsored team.

What is ARDF?

ARDF is a fast-paced trio that's part transmitter hunt, part map and compass exercise and part footrace. A typical course has five synchronized transmitters (on the same frequency) hidden in a large forest. Competitors try to take the quickest route to find all the transmitters and reach the finish line (marked by a transmitter on a separate frequency). The route is often four to five miles. Separate competitions are held on 2 meters and 80 meters.

The ARDF Championships are organized by the International Amateur Radio Union (IARU), with teams representing member-societies. The sport is quite popular in IARU Region 1, with strong teams from the former Soviet bloc, where ARDF is often a part of school athletics. Today, many European countries are active, as are some in Region 3 (Asia and Oceania).

There are four competition categories for men: Juniors (under 19); Seniors (any age);

BARBARA JOHNSTON, KE6OTF

The ARRL team at the opening ceremonies. Back row, left to right: KE6HTS, WB6OBB, WB6BYU, KC7CGK. Front row: HA3PA.

Old-Timers (over 40); and Veterans (over 55). Women of all ages compete in a single category. (Additional classes for women will soon be added.) Each national team can have three competitors in each category.

ARDF has a growing following in North America. Veteran US foxhunter Joe Moell, K0OV, is the ARRL ARDF Coordinator. He and Perry Creighton, VE7WWP, of the RAC, are working with the *ad hoc* ARDF Organizing Committee to support the development of the sport throughout Region 2 (North, Central and South America).

Join Team USA for the ARDF Regional Championships

Preparations are in full swing for the biggest radio-orienteering event in the Western Hemisphere. The first International Amateur Radio Union (IARU) Region 2 ARDF Championships will be part of the sixth biennial Friendship Radiosports Games (FRG-99) in Portland, Oregon. This event is sponsored by the Friendship Amateur Radio Society (FARS).

If you are selected for Team USA 1999, you will vie for medals against foxhunters from countries such as Canada, eastern Russia, and Japan. There will be practice and training events on August 9 and 10, followed by the official 2 meter and 80 meter competitions on the next two days. The closing banquet will be August 13.

Don't put off registering, even if you're not yet sure if you will be able to attend. Depending on response, it may be necessary to hold a qualifying event or find another way to allocate the limited number of available slots. There is an application form for Team USA at my Web site at **http://members.aol.com/homingin/.** (Don't omit the forward slash at the end.) Download the form, fill it out, and send it in to me via e-mail. Make paper copies of the form to hand out at your local foxhunts. Completed paper copies can be mailed to my postal box listed below. Hams not on the Internet can send a self-addressed stamped envelope to me, and I'll send back a form to fill out and mail.

To compete for a country other than the USA, contact your country's ARDF Coordinator or national society headquarters. ARDF Coordinator for the Canadian national society (Radio Amateurs of Canada) is Perry Creighton VE7WWP. His e-mail address is **ve7wwp@rac.ca**. See you in Portland!—*Joe Moell, K0OV, ARRL ARDF Coordinator, PO Box 2508,Fullerton, CA 92837*; **homingin@aol.com**.

Assembling the Team

I was the first to agree to compete, so I became captain of the ARRL team. I also served as a point of contact for other interested competitors and with the organizing committee in Hungary. (Thank goodness for e-mail!)

Marvin Johnston, KE6HTS, his wife Barbara, KE6OTF, and Dennis Schwendtner, WB6OBB, all from Santa Barbara, joined up along with Jack Loflin, KC7CGK, a high-school student from McMinnville, Oregon.

Marvin and Dennis had competed in a few events held in southern California, and Jack and I had competed in the 1997 Friendship Radiosport Games in Japan.

After initial plans were made, along came an e-mail message from Gyuri Nagy, HA3PA, a Hungarian with permanent resident status in the United States. Could he compete on the ARRL team? Oh, and by the way, Gyuri had won five gold medals (individual and team) in prior World Championships!

Rik Strobbe, ON7YD, the head of the Region 1 ARDF Working Group, had ruled (for the Belarus team) that noncitizens could participate if they had permanent resident status and were a member of the IARU member-society. Gyuri qualified.

The final team had Marvin and I in the Old-Timer category, Jack as a Junior and Gyuri as a Senior. Dennis wanted to compete, but the current rules do not allow him to have an assistant (he is blind). He came anyway. Barbara provided moral support and took photos.

We received further support from the League in the form of a Colvin Award Grant to cover the competition's entry fees. We are very grateful for this assistance.

Arrival

The ARRL team met for the first time on Tuesday, September 1, 1998, at the airport in Budapest. Gyuri had arranged for a van and drove us to Nyiregyhaza. During the four-hour trip we got acquainted and asked Gyuri a *lot* of questions about ARDF equipment, strategy, etc.

Housing for the competitors was in the dorms of the Bessenyei Gyorgy Teachers Institute. On Wednesday, ARDF transmitters were set up in an adjoining garden for practice and equipment tests. The 80-meter transmitters ran 3 W on CW to a vertical wire antenna. The 2-meter transmitters put 1 W into a horizontal turnstile antenna using A2 modulation with a keyed carrier—more difficult to hunt than the continuous carrier signals many of us were used to. This was a wonderful opportunity to discuss equipment designs with other competitors. (Most equipment was homemade and everyone wanted to try everyone else's equipment to see how it worked.)

Meanwhile, the International Jury met to approve the parameters of the competitions. The jury was then introduced to the Team Leaders and the rules of the competition were announced. For example, no video cameras, cell phones or other communication equipment would be allowed in the starting area (to thwart potential cheating). The organizers were very proud to be able to announce that, with the presence of the ARRL team, this was the first World Championship with all three IARU regions represented.

Then came a meeting of the Region 1 ARDF Working Group, with representatives of each participating IARU member-society. This group coordinates events, writes rules and addresses other ARDF issues. Representatives of other societies attended as observers. It was announced that the Wireless Institute of Australia was unable to hold the year 2000 ARDF World Championships, so the Chinese Radio Sports Association would host it instead. After the meeting, I discussed Region 2 ARDF organizing activities with Richard Ulrich from the French society REF (which represents French Guiana, Guadeloupe, Martinique, St Pierre et Miquelon and St Martin), and Arne Jensen, OZ9VA, of the Danish EDA, which represents Greenland.

At 5 PM we filled the buses and headed for the opening ceremony, proudly wearing our team uniforms—T-shirts with a large American flag on the front and back. Lacking a staff to carry our flag, we improvised and used Dennis' white cane. Teams paraded into the city square in alphabetical order, with "Amerikai Egyesült Àllamok" in the lead. The welcoming ceremony included speeches by dignitaries, as well as baton twirlers and dance troupes. Afterward, Team

DALE HUNT, WB6BYU

KC7CGK makes a triumphant finish in the 80-meter competition.

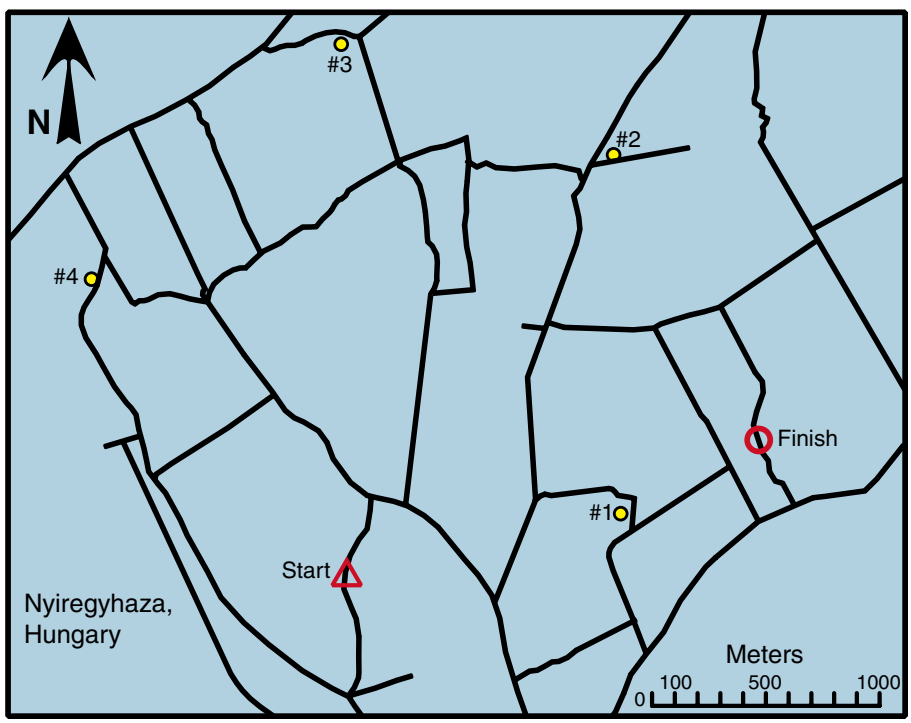
Victor Pavelek, OM1DX, crosses the finish line.

Leaders were invited to a reception with the Mayor.

The Competitions

Thursday morning we again filled the buses with competitors—and 2-meter Yagis—and drove an hour to the competition site. In an ARDF competition, one competitor from each division starts every five minutes (synchronized with the start of the transmission from transmitter Number 1). With 65 entrants in the Senior division, some participants had to wait more than five hours. Several teams brought tents and sleeping bags for the long wait.

Upon arrival, all receivers were collected before the transmitters came on the air. Ten minutes before starting, contestants picked up their equipment and were given a map and starting ticket. The starting ticket was to be punched at each transmitter: Losing the ticket meant disqualification! The map had the start and finish locations marked. This 10 minutes was a critical time to study it and develop an initial strategy. (The maps were plasticized in case of rain, but they were not totally immune to heavy sweat or insect repellant.)



The route map for the 2-meter hunt. The location of each transmitter was marked as it was pinpointed.

The official calls my name to start in 10 minutes—this is it! First task: Tie the starting ticket securely to my compass lanyard, then examine the map. Based on the locations of the start and finish points, it looks like a good strategy would be to start up the west side, head east across the top, then drop south toward the finish, making detours as needed depending on the actual transmitter locations. I study my map some more. I'll take the first major road to the left.

Finally, we're off! No bearings are allowed until we are beyond the sight of waiting competitors. I run far enough, then stop to take a bearing before fox No. 1 shuts off.

Clearly I do not have the most efficient method of taking bearings! I peak the antenna for maximum signal, sight down the boom, put down the receiver and sight in the same direction with my compass. Then I use my protractor to plot the bearing on the map, hoping I don't drop my pen. Experienced competitors mount a compass on their receiver, tape a pencil to one finger, and practice plotting angles freehand. It's much easier, especially on the run.

The bearings to the first four transmitters reinforce my planned route: No. 1 is to the east, No. 2 is northeast, No. 3 is north and No. 4 is northwest. (Old-Timers don't have to find transmitter No. 5, so I ignore it.) It looks like No. 4 is farthest from the finish line: I'll find it first, then No. 3, No. 2 and No.1, in that order. The terrain is mostly flat: mixed woodlots, corn fields, and meadows, with trails and dirt roads in between. Many areas are open enough to go cross country, although the densely wooded areas and freshly plowed fields make for pretty slow going. There are very few reflections and signal strengths are generally good.

Being slow, I have bearings on all transmitters by the time I hit the first major road junction. Faster runners often have to make course decisions before hearing all of the transmitters, which is why their initial strategy is important.

Each transmitter is marked by an orange-and-white flag and holds a punch used by runners to mark their starting cards. Nearby, an operator and member of the International Jury logs competitors and watches for rule infractions. As competitors find each transmitter, the results are radioed to the finish line to be posted.

I follow roads toward No. 4, taking cross bearings on the others as I go. When the signal is strong I take off through the trees. Speed is important here—I need to get close enough to find it during this one-minute transmission or I will have to wait for the next one. I break out of the trees as the signal turns off. I'm pointing toward a line of bushes along the edge of a road. If I'm lucky I can follow my last bearing and find it.

I follow a path through the bushes, looking back carefully to make sure I haven't passed the transmitter. I then head up the hill through open trees, keeping a constant eye out for the orange-and-white flag. A Korean competitor comes by following his last bearing. No, the signal was too strong

to be this far away, so I go back the way I came. Did I miss it? Finally, transmitter No. 4 comes back on—I *had* passed it! When I came through the path I was looking to the right. The flag was only a few feet to my left! I punch my ticket: One down, three to go.

No. 3 is northeast from here. There are no convenient roads, so I set out through the trees, running while the signal is on and walking when it's off, watching carefully in all directions. Aha! A glint of orange through the bushes. I punch No. 3 and wonder where I am on the map.

I stay on the roads heading for No. 2. At the right moment it comes on and guides me up a trail. There are no other competitors nearby so I hand my camera to the jury member (Belaj Zeljko, 9A2QU) for a quick photo. Just one more to find.

From here, No. 1 is due south. I tune off frequency and find the finish line beacon. Plotting the bearing backwards gives me an idea of my location...if the power lines cross the road at the next intersection. Yes! I'm back on the map.

I head south down the road, then left as the bearing swings toward the east. One minute before the next transmission I leave the road and walk part way up a hill to get a good bearing. The signal comes on, but the bearings are uncertain. I head for the top of the hill and suddenly the receiver is swamped! There it is, in a small grove of trees just down the other side.

The map shows the finish is less than half a mile away. I check my watch—I'm going to make it! I tune to the finish line beacon and head across a field of corn stubble (hard going—the road around it would have been faster). I leap an irrigation ditch and keep pushing—but it seems agonizingly slow.

Finally, grass—and easier walking. With the last of my energy, I jog down the corridor to the finish line. Competitors and spectators are waving flags and cheering. The corridor seems endless, but I press on and cross the finish line with a yell of combined relief, elation and anguish. I made it! My time is 1:51.53—more than 18 minutes to spare.

Dennis and Barbara were there with the video camera to record each individual moment of glory. As the first American to finish, I was interviewed by the TV crew and my photo appeared in the local newspaper. Meanwhile, Dennis discussed ARDF for the blind with Ivan Marcijan, 9A2AY, the Croatian team leader who has organized several such events. Individual and team results were displayed on computer monitors.

We didn't expect to win any medals, but none of us came in last and we all arrived within the 130-minute time limit. The final team results:

Name	*Category*	*Time*	*Foxes*	*Place*
Gyuri	Senior	69:54.54	5	22
Jack	Junior	105:45.33	4	38
Dale	Old-Timer	111:54.48	4	51
Marvin	Old-Timer	120:28.66	3	58

Note: The winners finished in 45 to 50 minutes.

After the last runner finished, the International Jury met to consider protests and approve the results. ARDF is a *very* serious sport for many competitors. One protest complained that two runners from the same country might have been helping each other. The juror from each transmitter reviewed his notes, but no one had observed anything inappropriate.

The awards ceremony that evening was held in the downtown municipal sports arena, with 500 people in the audience in addition to the competitors. It was similar to an Olympic ceremony, with national flags and anthems. The "powerhouse" teams from Ukraine, Hungary, Russia and the Czech Republic won all the medals (except the Veteran team silver, which went to Germany).

Back at the dorms, Russian Team Leader Tcherman Gouliev, UA3BL, advised Marvin and Jack on ARDF equipment, strategy and training. We were honored to have the benefit of his experience.

Friday was a "cultural program" at a local open-air history museum (with goulash for lunch, of course), providing a day of rest before the 80-meter hunt on Saturday. Later, Marvin and Gyuri worked on 80-meter techniques and map reading while Tcherman helped me with my receiver.

The 80-meter competition was held in a different part of the county, but the terrain was similar to that of the previous event. The transmitters were more scattered, however, making it harder to choose the best route. With the training and advice from Gyuri and Tcherman—and the added experience—we improved our times over the first event. The 80-meter results were:

Name	*Category*	*Time*	*Foxes*	*Place*
Gyuri	Senior	55:34.42	5	17
Jack	Junior	84:36.11	4	34
Dale	Old-Timer	111:52.48	4	57
Marvin	Old-Timer	111:22.34	4	58

The "big four" countries took many of the 80-meter medals, but Belarus, Romania, Lithuania, Slovakia and Germany shared in the honors. Afterward, we headed back to prepare for the closing banquet.

This was a good opportunity for longer conversations with new friends and to exchange small gifts. (There was some hot bargaining for US Team T-shirts—even dirty ones!) We also got some excellent advice on equipment from several experts, including PA Nordwaeger, SM0BGU, who had organized the 1994 World Championships in Stockholm.

We left Nyiregyhaza early the next morning after hurried packing and little sleep. On the flight back, most of us thought about the friends we had made, the helpful advice we had received and how we can have a more competitive team in future events.

Before the trip, we had listed the most important goals of the team as:

- Generate publicity and interest in ARDF in the US and throughout IARU Region 2.
- Foster international goodwill among competing Societies.
- Gain experience in international competitions.
- Provide a visible presence for the ARRL and the US.
- Make personal contacts with competitors from other countries to help us develop the sport.

Our success with the last four items exceeded our wildest expectations—and we'd had a wonderful time in the process! Now that we're back it's time to focus on item No. 1.

Lessons Learned

For serious competitors, the most important attributes are physical condition, orienteering skills, and direction-finding skills, in that order. (It's much harder to develop good physical conditioning than it is to learn the other skills.) For informal events (often at a walking pace), the order of importance is probably reversed.

Many teams had warm-up suits like those worn by their country's Olympic competitors. For ceremonial use, clean warm-up suits are clearly better than sweaty T-shirts!

Future Plans

The ARRL team was well received and we have invitations to visit upcoming competitions such as the French National Championships; the Region 1 Championships in Croatia (September 7-12, 1999); and the Region 3 Championships in Korea (June 21-26, 1999). And plans are already underway for the 2000 ARDF World Championships in China.

The team's most important event, however, is closer to home. The first Region 2 ARDF Championships will be held in Portland, Oregon, on August 11-14, 1999 (see the sidebar). All IARU member-societies in the Region are invited to send teams. Because ARDF is still in the development phase, there will be ARDF training workshops beforehand. The focus of this Regional Championship is to encourage the development of ARDF throughout the region, so it may be somewhat less formal than the World Championships—but that doesn't mean it will be any less fun!

Is ARDF for You?

If you enjoy having fun in the outdoors, you're on the right track. Athletic ability is a must for international competition, but physical prowess is definitely *not* necessary to have fun. Looking for several transmitters in a park is a great club activity—one that can help attract younger people to Amateur Radio. (We've had enthusiastic responses to holding ARDF events as part of the Boy Scouts' Jamboree On The Air.) More ARDF information is available on K0OV's Web site at **http://members.aol.com/HomingIn/**.

In 1994, W1RU ended his report on ARDF in China with the teaser, "Maybe you'll be the first IARU ARDF Champion from the US."[1] The opportunity is here, and *now* is the time to start training!

You can contact the author at PO Box 108, Carlton, OR 97111; **wb6byu@arrl.net**.

[1]Baldwin, Richard, "Amateur Radio Direction Finding in China," March 1994 *QST*, p 22.

By Rick Palm, K1CE

Emergency Communication: Shifting Needs of Served Agencies

Is telecommunication technology rendering Amateur Radio obsolete in the disaster relief community? A set of public service conferences featuring served agency representatives helps amateur emergency communication providers assess this troubling question.

RED CROSS WICHITA, KANSAS CHAPTER

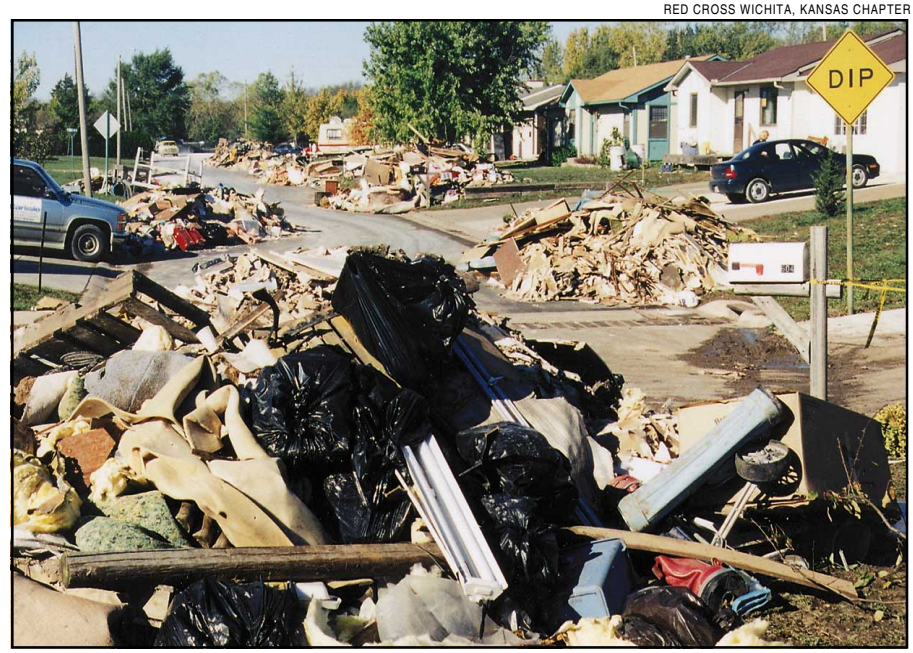
The use of Amateur Radio for public service, especially emergency communications, is as old as the ARRL itself. In the *first* issue of *QST* (December, 1915), the membership is informed of a letter sent to the Secretary of the Navy by ARRL President Hiram Percy Maxim in response to the country's preparation for war. In that letter offering the League's services to the military, Mr. Maxim states that:

The League is purely an amateur organization. Further, the exchange of and delivery of messages is absolutely complimentary, and no consideration for transmission of a message is allowed under any circumstances. Regular radio telegraphic methods are employed. A sample of our official message blank is enclosed herewith.

In a separate but similar letter to the Secretary of War, there is this direct reference to public service communications:

In times of peace we also have confronting us sudden disasters, such as flood, fire or strike. Dayton, Ohio, was an example of a disastrous flood, which destroyed telegraphic and telephonic communications, and made it possible for the amateur wireless operator to render invaluable help. A fire which destroyed the central station of the telegraph and telephone Companies in a

RED CROSS WICHITA, KANSAS CHAPTER



The Wichita flood left serious damage in its wake. Read the complete story in "Public Service" in this issue.

city, would also place that city in a very dangerous situation. The amateur wireless station would be the first place looked to in such an emergency.

Thus, an incredible record of public service and emergency communications is born, which is continued to this day, more than 80 years later. However, here is one more excerpt from Mr. Maxim's letter that is particularly worthy of note in the context of this article:

Many of our stations have had no expense spared upon them, and are equipped *better than most commercial stations*. (emphasis added).

Can we say the same today, that amateur stations are better "equipped" than "commercial" stations? Joel Kandel, KI4T, a telecommunications professional, and former chairman of the ARRL National Emergency Response Committee (ANERCOM) sounded an alarm in a recent *QST* "Public Service" column editorial: "more than at any time in the history of technological development, the world is witnessing the emergence and proliferation of new communication modes and media. The Amateur Radio Service can consider itself threatened by this development for two reasons: Many of the proponents of the new media are after our spectrum, and…much of the technology is fairly user friendly and very efficient."

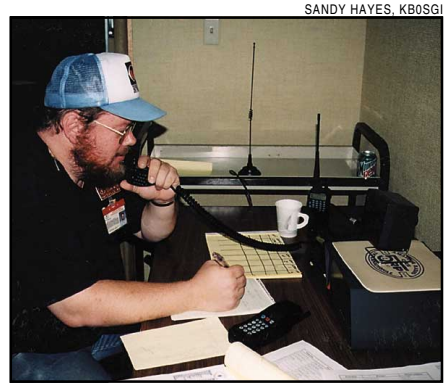
Commercial systems have now outpaced Amateur Radio in technical capability. In the face of this development, is Amateur Radio still useful as an emergency response resource? With the expected efficiency of message handling rising as new systems come on line, will amateurs be able to step up and meet these expectations?

Will the FCC continue to support our service and our spectrum when a global Internet can handle greater volumes of messages with system redundancy to allow rerouting when segments are destroyed by disaster? New satellite services are arriving, providing voice, fax, data, video, and radio determination to portable hand-held phones and palm-top terminals—with little or no terrestrial infrastructure to be damaged in a disaster. The new Iridium system, on-line now, is accessible for worldwide communication by portable cell-phone-like instruments and pagers.

Where Do We Go From Here?

Last year, the ARRL sponsored four public service conferences around the country to identify future telecommunication needs of served agencies and reconcile them with corresponding present and future capabilities of the ARES program. The question we wanted to try to answer is, how will Amateur Radio continue to play an important role in providing emergency telecommunications in the future, in the face of new technology and the greater capabilities of such systems as the global mobile-satellite services? And what could our served agency representatives tell us to help us adapt to their evolving needs?

SANDY HAYES, KB0SGI



Stan Weir, KB0SHB, operates the command center Amateur Radio station at the Wichita Kansas Chapter of the American Red Cross. During a severe flood that drove thousands from their homes on Halloween last year, Sharon Powell-Quincy, Assistant Director for the chapter, requested a communications link between its Headquarters and a shelter. At the midwestern regional Public Service Conference, Powell-Quincy had suggested that amateurs undergo Red Cross training in mass care, shelter management and damage assessment, increasing their utility and value to their chapter operations.

The conferences were held in Seaside, Oregon; Atlanta, Georgia; Wichita, Kansas; and Tampa, Florida. Conference proceedings were reported in August 1998 *QST*, p 86; September 1998 *QST*, p 84; January 1999 *QST*, p 70; and February 1999 *QST*, p 80, respectively. Local, state and national Red Cross, Salvation Army, county and state emergency management agencies, National Weather Service, forestry departments, public safety (state police), and the National Hurricane Center were all represented. Each conference drew roughly 50 conferees, who were handed many solid ideas by these served agency reps, steering us in a good direction for the future. Here's a look at a few of the salient points.

More cross-training in served agency functions will add value to our contributions.

This was a recurring theme in all four conferences. Especially in the case of the American Red Cross, amateurs can increase their value to the agency by taking advantage of training courses offered for several disaster relief functions: damage assessment, shelter management, mass care and feeding, for examples.

Traditionally, amateurs have declined to perform functions unrelated to their primary radio communication interest and training. Indeed, ARRL literature has cautioned amateurs against providing unrelated services, encouraging them to concentrate on their role as radio communicators only. The caution was founded on a healthy concern that amateurs performing unrelated functions for which they were not trained would become liabilities rather than assets, and cause Amateur Radio to lose credibility. However, if we do not broaden our perspective on Amateur Radio's traditionally limited role, we minimize our utility and risk finding ourselves outside looking in when it comes to serving agencies engaged in future disaster relief. Proper training and certification in the various functions are the keys to a successful bid for greater utility and corresponding perpetuation of our public service tradition.

Integration of amateur systems with non-amateur systems will increase utility and value.

Kandel and others who have worked on ARRL planning and advisory committees have proposed greater integration of Amateur Radio systems with other telecommunication systems, despite concerns that we would dilute the "purity" of the amateur service and give other interests a foot in our door. Kandel says this is happening anyway: APRS, an Amateur Radio developed technology, now incorporates computers, the Internet, weather stations, and the GPS. As another example, *WinLink* developers have interfaced Internet e-mail and HF radio using PACTOR. Hybrid systems such as these may represent an opportunity to enhance our contributions to served agencies for the future. Emergency managers and NWS personnel at the conferences all appreciated the value of APRS and similar systems in gathering information, and supporting communications from locations not serviced by their own.

More cross-training with other radio systems will make amateur operators more valuable in the EOC.

The Collier County, Florida, emergency manager said at the Florida conference that he has a need for operators who are capable of operating *all* communication systems in the EOC. "When hams come in, they should be able to operate anything."

Thus, we may not only need to integrate amateur systems with other systems, but we may also want to promote programs to train our ARES volunteers to develop proficiency with new systems that do not directly integrate with Amateur Radio. Over the last few years, Florida has seen members of Amateur Radio response teams carrying cell phones and pagers. During Hurricane Andrew, municipal agencies often tasked amateurs with operating government radios. In 1992, most municipal communication employed conventional two-way radio. Today, it's 800 MHz trunking. Do amateurs today know what a trunked radio system is and how it operates? Could our volunteers operate a satellite telephone terminal to relay messages? And move it from one location to another and aim it correctly at the satellite?

The Telecommunications Committee of the Florida Emergency Planners Association (FEPA) has been asked to extend training to ARES and RACES operators in new technologies adopted by county and state emergency management agencies. The ARRL is considering publishing a comprehensive

training manual featuring information on *all* modern communication systems, rendering our amateurs more valuable in the emergency operations center. When the dust settles in a disaster, we will be remembered for how useful we were to the overall response, not whether we were using our own equipment or someone else's, concludes Kandel.

We should continue to emphasize our role in providing interagency communications during multi-agency responses.

The provision of interagency communication has always been a solid, traditional role for Amateur Radio, and it appears that the need will be perpetuated for the future. Another recurring theme across the four conferences was that, despite the institution of new telecommunication technologies in the public safety sector, there is a continuing inability of responding agencies to communicate with one another at a disaster site. An organizational instinct is to protect autonomy. As emergency responses become more sophisticated and the proliferation of new disaster response agencies continues, the need for interagency communications at a disaster site will become even more profound.

Amateurs need to present a unified front to the agencies they serve.

This observation came from a high-level state official in Florida's Department of Emergency Management, and sent up a big red flag with our conferees. Infighting and turf wars, especially between ARES and RACES, are as old as the RACES program itself. Toss in the mix of clubs who claim monopolies over served agencies and emergency responses in their communities and the result is confusion and disorganization as seen by the agency officials who don't have the time to deal with it.

An educational campaign with our volunteers and clubs should be undertaken to ensure that Amateur Radio presents an orderly, professional face to the agencies we serve.

Amateurs should emphasize the unique "decentralization" characteristic of the amateur service.

Radio amateurs are already geographically dispersed throughout the areas to be affected by disaster. We are found in just about every community across the country. We're already everywhere that relief agencies would like to be, but can't, because of the obvious limitations. We need to reaffirm this unique characteristic in selling ourselves to the served agency community.

The value of decentralized radio services such as Amateur Radio has been recognized internationally by entities such as the United Nations' Working Group on Emergency Telecommunications. Not everyone will own a portable satellite telephone, at least not in the near future, owing to its expense, and the fact that they are not yet proven, reliable devices. We still hold a relative monopoly over low-cost, decentralized communications resources.

Amateurs should emphasize Amateur Radio's role as a back-up communication system, especially now for Y2K problems.

Y2K issues came up in several conference discussions. At its meeting in January, the League's Board directed staff to recommend to Section Managers, Section Emergency Coordinators, and ARES groups that they enter into special agreements (MOUs), and conduct drills, with public utilities and public safety agencies for emergency communications should regular communication systems be disrupted by Y2K problems.

There is some serious opportunity for Amateur Radio here. At the FCC's Year 2000 Task Force's public forum entitled "Year 2000: Maintaining Emergency Response Communications," it was clear after listening to many qualified speakers from the FCC, industry, state and county government, and others, that the "millenium bug" will cause problems, including telecommunication problems.

The purposes of the forum were to (1) emphasize the importance of ensuring the proper functioning of emergency communications links; (2) warn about hidden Y2K problems that could affect the functioning of emergency communications systems; and to persuade larger members of the emergency response community that are already engaged in Y2K compliance, to convey the importance of these problems to smaller emergency response entities.

The FCC is taking the Y2K threat very seriously. Many sectors are profoundly concerned about public safety systems being disrupted by Y2K problems. For example, at the time of the forum (November 1998), U.S. Fire Administration studies showed that 98% of the nation's fire departments were aware of the problem, but only 77% were active in trying to address it. Only 27% were fully ready. The USFA is working with FEMA on Y2K-related catastrophic planning.

Amateurs should take the threat seriously, too, and coordinate *now* with served agencies for MOUs and drills.

Expanding our client base with new agencies to serve will maximize opportunities for Amateur Radio.

A good suggestion came from one of our own Emergency Coordinators, June Jeffers, KB0WEQ, at the Midwest Regional Public Service Conference. If we lose the opportunity of serving some agencies as a result of our being displaced by new technology, we can hedge our bets for the future by expanding our client base, ie by drafting new and possibly nontraditional entities to serve. Looking for new clients to serve, Jeffers has been working with district schools in establishing an emergency communication network, with a permanent station at district HQ.

Jerry Boyd, K6BZ, a well-respected public safety official, ARRL Section Emergency Coordinator, and frequent *QST* "Public Service" column contributor identified other sectors for expanding our client base: public works departments, utility companies, transportation companies, hospitals, convalescent centers, senior citizen homes, and child care centers. See his foresighted editorial in"Public Service", February 1995 *QST*, p 80.

Summary

Is there cause for alarm that Amateur Radio may not have a future in public service communications? In many, especially rural parts of the country, it will be a long time before sophisticated telecommunication systems become available to public safety and related agencies. In others, new technology is here now and our role has already been diminished as a result. It is clear that new telecommunication tools will ultimately affect the needs of all of our served agencies in the not-too-distant future. We cannot become complacent. We must adapt to meet their evolving needs or we face reductions in opportunities to serve. That translates to less relevance, and a weakened position when it comes time to defend our spectrum needs in the face of increasing pressure from other interests.

If we work to adapt to our served agency's new needs, and keep up our public service record established more than 80 years ago intact, we can continue to count on the valuable returns: as examples, consider that both APCO and FEMA filed comments opposing the powerful Land Mobile Communications Council's petition to reallocate the 430-440 MHz segment of the amateur 70 cm band. In APCO's case, the organization had broken ranks as an LMCC member to do so. Such support from our served agencies is priceless and we must do everything we can to safeguard it for the very existence of Amateur Radio as we know it today, in the future.

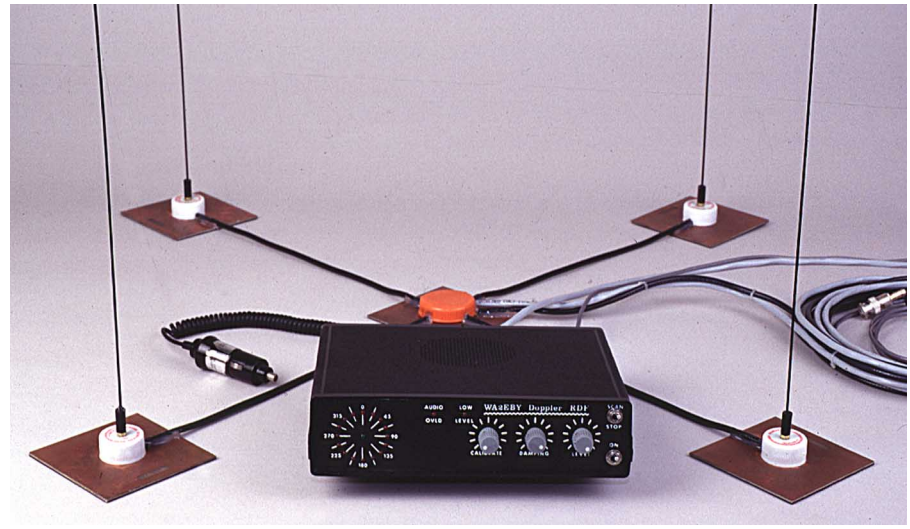
Acknowledgements

Members of the ARRL Board of Directors and Field Organization made significant contributions to the planning and execution of the 1998 Regional Public Service Conference program. Thanks go to Directors Frank Butler, W4RH; Mary Lou Brown, NM7N (SK), and Lew Gordon, K4VX. Thanks also to Section Managers Randy Stimson, KZ7T; Orlan Cook, W0OYH; Kevin Bunin, K4PG; Rudy Hubbard, WA4PUP; Mike Langrell, AA7VR; Les Shattuck, K4NK; and Sandy Donahue, W4RU. And thanks to Section Emergency Coordinators Joseph Plankinton, WD0DMV; Manny Papandreas, W4SS; Tom Rogers, KR4OL; Nils Millergren, WA4NDA; and Lewis Williams, WB7NML.

Thanks also to all of the presenters, especially Steve Hailey and Gary Gilham of National Red Cross Headquarters; Jerry Herman, N3BDW, of the Hurricane Watch Net, and John McHugh, KU4GY, of the National Hurricane Center. QST

By Mike Kossor, WA2EBY

A Doppler Radio-Direction Finder



Part 1: A radio-direction finder (RDF) is useful in locating repeater interference (intentional or unintentional) and transmitter "fox hunting." Join in the fun with this VHF/UHF Doppler RDF project!

Radio-direction finding has gained a lot of interest in recent years especially on the VHF and UHF bands. There are many different approaches to determining the origin of a radio transmission. Each approach has its advantages and disadvantages. An experienced RDFer learns to make use of several methods to master the art. Directional antennas with good front-to-back ratios (such as a Yagi or quad) are simple to use and very effective in obtaining bearings from a fixed location. Because of their physical size, however, such antennas are a bit awkward to use when you're driving around in a vehicle trying to narrow the search area. Mounting a 2-meter, four-element Yagi or quad to a car window can be a safety hazard. A much more practical method of narrowing the search area uses four 1/4 λ mag-mount antennas and the Doppler principle.

Theory of Operation

The classical example of the Doppler effect is that of a car approaching a stationary observer. The car's horn sounds higher in pitch (frequency) to an observer as the car approaches. The change in frequency occurs because the motion of the car shortens the wavelength. The horn sounds lower in pitch (frequency) to the observer as the car speeds away. This occurs because the car is speeding away from the observer effectively increa-sing the wavelength. Fewer cycles per second, hence, lower-frequency sound. A similar effect occurs when an antenna is moved toward or away from xa transmitting source. The signal received from an antenna moving toward the transmitting source appears to be at a higher frequency than that of the actual transmission. The signal received from an antenna moving away from the source of transmission appears to be lower in frequency than that of the actual transmission.

Imagine a receiving antenna moving in a circular pattern as pictured in Figure 1A. Consider the antenna at position A, nearest the source of transmission. The frequency of the received signal at point A equals that of the transmitted signal because the antenna is not moving toward or away from the source of transmission. The frequency of the received signal decreases as the antenna moves from point A to point B and from point B to point C. Maximum frequency deviation occurs as the antenna passes through point B. The frequency of

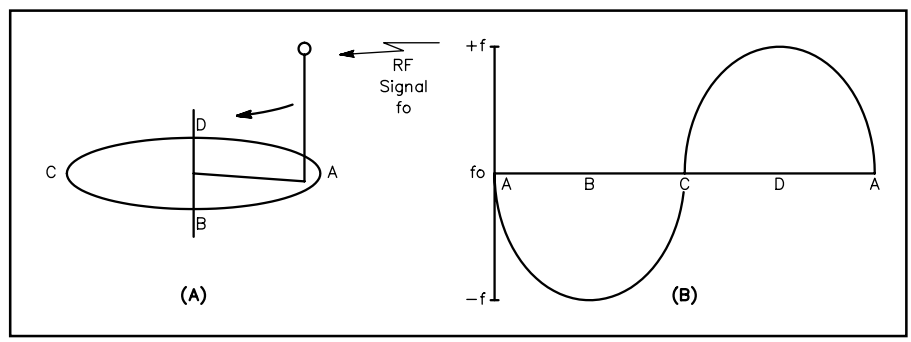


Figure 1—At A, depiction of a rotating antenna. At B, Doppler frequency shift.

RDFing Information

If you're looking for the how-to and why of radio-direction finding, you'll want to read *Transmitting Hunting: Radio Direction Finding Simplified*, by Joseph Moell, K0OV, and Thomas Curlee, WB6UZZ. This book contains all the information you're likely to need about equipment and techniques for HF and VHF radio-direction finding. You can order your copy of this 326-page book by requesting item#2701 from ARRL Publications by telephone: 888-277-5289 (toll free), 860-594-0355, fax 860-594-0303; e-mail **pubsales@arrl.org** or on the Web at **http://www.arrl.org/**.—*Ed.*

the received signal at point C is the same as that of the transmitted signal (no shift) because the antenna is not moving toward or away from the source of transmission. As the antenna moves from point C to point D and from point D back to point A, the frequency of the received signal increases. Maximum frequency deviation occurs again as the antenna passes through point D. The Doppler frequency shift as a function of antenna rotation is illustrated in Figure 1B.

$$dF = \frac{\omega r f_c}{c} \qquad \text{(Eq 1)}$$

where

dF = Peak change in frequency (Doppler shift in Hertz)

ω = Angular velocity of rotation in radians per second ($2 \times \pi \times$ frequency of rotation)

r = Radius of antenna rotation (meters)

f_c = Frequency of transmitted signal (Hertz)

c = Speed of light

We can calculate how fast the antenna must rotate in order to produce a given Doppler frequency shift with the following equation:

$$f_r = \frac{dF \times 1879.8}{R \times f_c} \qquad \text{(Eq 2)}$$

where

f_r = The frequency of rotation in Hertz

dF = The Doppler shift in Hertz

R = Radius of antenna rotation in inches

f_c = Carrier frequency of the received signal in megahertz

As an example, let's calculate how fast the antenna must rotate in order to produce a Doppler shift of 500 Hz at 146 MHz, assuming the antenna is turning in a circle with radius 13.39 inches. The frequency of rotation is:

$$f_r = \frac{500 \times 1879.8}{146 \times 13.39} \qquad \text{(Eq 3)}$$

A rotation frequency of 480 Hz translates to $480 \times 60 = 28{,}800$ or almost 30,000 r/min, which pretty much rules out any ideas of mechanically rotating the antenna! Fortunately, Terrence Rogers, WA4BVY, proposed a clever method of *electrically spinning* the antenna that works very well.[1] Rogers' project, the DoppleScAnt, uses eight 1/4-λ vertical whips arranged in a circular pattern. Only one antenna at a time is electrically selected. By controlling the order in which the antennas are selected, the DoppleScAnt emulates a single 1/4-λ whip antenna moving in a circle. A clever feature in Rogers' design is the use of a digital audio filter to extract the Doppler tone from voice, PL tones and noise. My article in *QEX* details the operation of such switched-capacitor filters.[2]

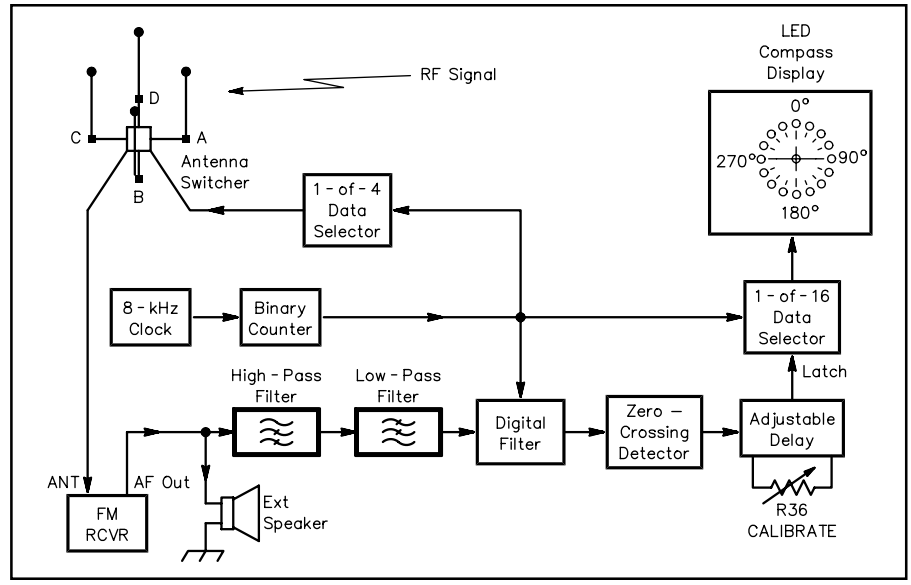


Figure 2—Block diagram of the WA2EBY Doppler RDF system.

Over the past 20 years, many modifications to Rogers' original design have evolved. A popular version introduced by Chuck Tavaris, N4FQ, is dubbed the Roanoke Doppler direction finder named for the Roanoke, Virginia, location where it was built and used. Modifications were later proposed to prevent false readings when the Doppler tone was too weak or too strong.[3] Experimentation revealed that only four antennas are needed to provide good performance. Antenna switching methods were proposed that allow the same antenna switching circuit to be used on VHF or UHF.[4] I set out to build a Doppler DF that has several of the improved features.

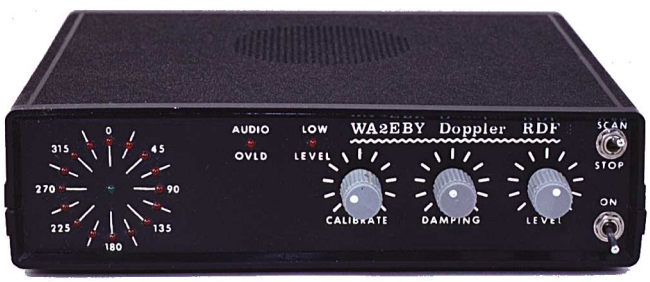
A careful review of the Roanoke design revealed use of somewhat obsolete 4000 series CMOS logic circuits that require CMOS-to-LED display drivers to operate the LEDs. These IC drivers are still available, but are a bit expensive ($15 for the three). Another costly aspect of the project is the use of four 1/4-λ mag-mount antennas for the array. The cheapest mag-mount antenna I could find cost $15 each. Multiply that times four, and you have spent $60 before you add any electronics!

My design offers slightly improved audio filtering, 74HC-series logic circuits capable of driving the LED display directly and a wideband VHF/UHF antenna switcher that you can make for about $40—including the four 1/4-λ mag-mount antennas! High-quality PC boards and parts kits are available that make building this project simple and economical.[5] Total project cost is about *one-third* the cost of purchasing a commercial RDF unit—and building the project is a lot more educational!

How it Works

To understand the operation of the Doppler RDF circuit, see the block diagram of Figure 2. An 8 kHz clock oscillator drives a binary counter. The output of the counter performs three synchronized functions: "spin" the antenna, drive the LED display and run the digital filter. The counter output drives a 1-of-4 multiplexer that spins the antennas by sequentially selecting (turning on) one at a time in the

[1]Notes appear on page 40.



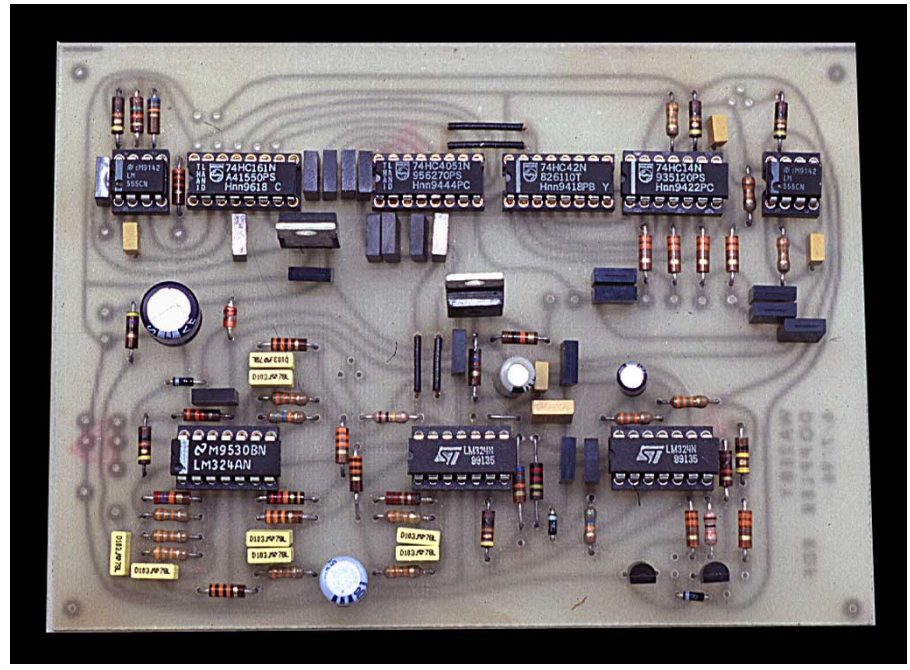
Main unit front panel

Main unit rear panel

order A, B, C, D, A, etc, at 500 times per second. The counter output also drives a 1-of-16 multiplexer used to drive the LED display in sync with the spinning antenna. The RF signal received from the spinning antenna is connected to the antenna input of a VHF or UHF FM receiver.

The spinning antenna imposes a ±500 Hz frequency deviation on a 146 MHz received signal. A 146 MHz FM receiver connected to the spinning antenna's RF output demodulates the ±500 Hz frequency deviation and sounds like a 500 Hz tone with loudness set by the 500 Hz frequency deviation. The receiver audio, including 500 Hz Doppler tone, is processed by a series of audio filters. A high-pass filter rejects PL tones and audio frequencies below the 500 Hz Doppler tone. A low-pass filter rejects all audio frequencies above the 500 Hz Doppler tone, and a very narrow bandwidth digital filter extracts only the 500 Hz Doppler tone.

The output of the digital filter represents the actual Doppler frequency shift described in Figure 1B. Zero crossings of the Doppler frequency shift pattern correspond to the antenna position located directly toward the source of transmission (position A) or directly opposite the source of transmission (position C). The zero-crossing signal passes through an adjustable delay before it latches the direction-indicating LED. The adjustable delay is used to calibrate the LED direction indicator with the actual direction of the transmission.



Main PC board

Circuit Description

Figure 3 is a schematic of the WA2EBY Doppler RDF. The heart of the system is an 8 kHz clock oscillator built around a 555 timer, U4, configured as an astable multivibrator. C26 and R27, and R28 and R29 determine the multivibrator's oscillation frequency. R28 and R29 are series connected to allow fine-tuning the oscillation frequency to 8 kHz. It's not critical that the clock frequency be exactly 8 kHz, but I recommend that it be adjusted to ±250 Hz of that frequency for reasons that I'll discuss shortly. The 8-kHz output of U4 provides the clock for 4-bit binary counter U7. The 3-bit binary coded decimal (BCD) output of U7 is used to operate three synchronized functions.

Three Synchronized Functions

The first function derived from binary counter U7 is antenna array spinning. This is accomplished by using the two most-significant bits of U7 to run 1-of-4 multiplexer U8. The selected output of U8 (active low) is inverted by buffer U12. The buffered output of U12 (active high) supplies current sufficient to turn on the antenna to which it is connected. (The details of how this is done will be covered later.) Buffer outputs U12A, U12B, U12C and U12D are sequenced in order. The corresponding buffer selects antennas A, B, C, D, A, B, etc. Driving multiplexer U8 with the two most-significant bits of counter U7 divides the 8 kHz clock by four, so each antenna is turned on for 0.5 ms. One complete spin of the antenna requires 0.5 ms × 4 = 2.0 ms, thus the frequency of rotation is 2 ms or 500 Hz. An FM receiver connected to the spinning antenna's RF output has a 500 Hz tone imposed on the received signal.

Sequencing the 16 LED display is the second synchronized function derived from binary counter U7. This is done by using the binary output of counter U7 to select 1-of-16 data outputs of U11. The selected output of U11 goes low, allowing current to flow from the +5 V supply through current-limiting resistor R51, green **CENTER** LED, D16, and direction-indicating red LEDs D17 through D32. Each antenna remains turned on as the LED display sequences through four direction-indicating LEDs, then switches to the next antenna. Each direction-indicating LED represents a heading change of 22.5°.

The third synchronized function is operating the digital filter responsible for extracting the Doppler tone. The 500 Hz Doppler tone present on the receiver audio output is connected to an external speaker and **AUDIO LEVEL ADJUST** potentiometer R50. The signal is filtered by a two-pole Sallen-Key high-pass filter[6] built around op amp U1A. It filters out PL tones and audio frequencies above the 500 Hz Doppler tone. Next, a four-pole Sallen-Key low-pass filter using U1B and U1C band-limits audio frequencies above the 500 Hz Doppler tone. The band-limited signal is then applied to the input of a digital filter consisting of analog multiplexer U5, R18, R19 and C10 through C17. (Readers interested in the detailed operation and analysis of this fascinating digital filter are encouraged to review my *QEX* paper; see Note 2.)

The Digital Filter

Using the three most-significant bits of U7 to drive the digital filter divides the8 kHz clock by two, making the digital-filter clock rate 4 kHz. The center frequency of the digital filter is determined solely by the clock frequency divided by the order of the filter. This is an 8th-order filter, which makes the center frequency of the filter 4 kHz / 8 = 500 Hz. This is the exact frequency at which the antenna spins, hence, the same frequency of the Doppler tone produced on the receiver audio connected to the spinning antenna. This is truly an elegant feature of the Doppler RDF design. Using the same clock oscillator to spin the antenna and clock the digital filter ensures the Doppler tone produced by the spinning process is precisely the center frequency of the digital filter. Even if the clock oscillator frequency drifts, the Doppler tone drifts accordingly, but the center frequency of the digital filter follows it precisely because the same clock runs it. Excessive drift in the 8 kHz clock should be avoided, however, because the analog high and low-pass filters that precede the digital filter have fixed passband centers of 500 Hz. A drift of ±250 Hz on the 8 kHz clock corresponds to ±62.5 Hz (250 / 4) drift in the Doppler tone produced. This value is acceptable because of the relatively low Q of the analog band-pass filter.

Digital filter Q is calculated by dividing

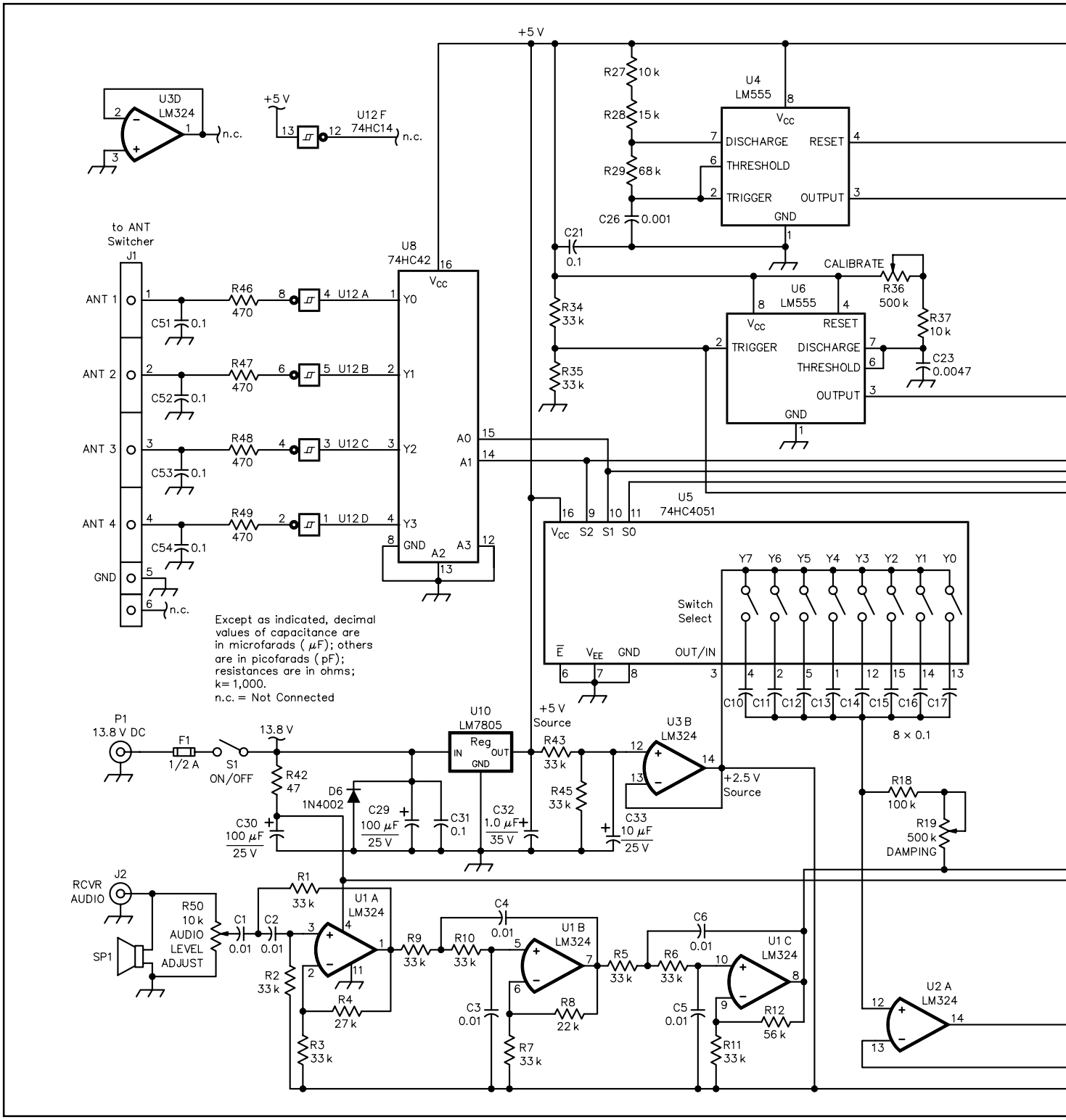
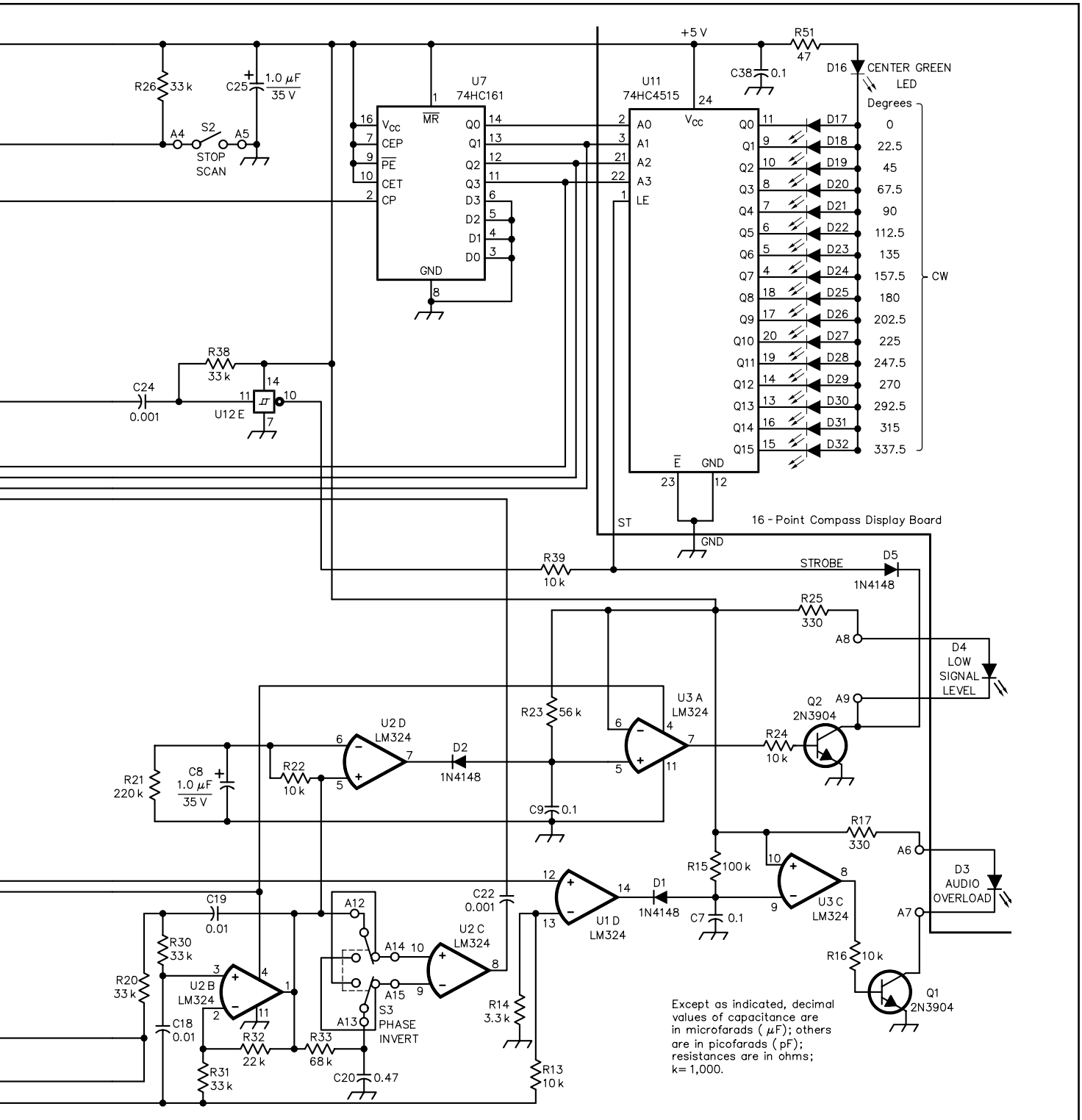


Figure 3—Schematic of the WA2EBY Doppler RDF system main circuit board. Unless otherwise specified, resistors are 1/4 W, 5% tolerance carbon-composition or film units. Part numbers in parentheses are Mouser (Mouser Electronics, 958 N Main St, Mansfield, TX 76063-4827; tel 800-346-6873, 817-483-4422, fax 817-483-0931; **sales@mouser.com**; **http://www.mouser.com**). Equivalent parts can be substituted; n.c. indicates no connection. To accommodate existing PC-board overlays, we deviate from *QST* style here in identifying LEDs with a D designator instead of the standard DS prefix. Because of changes during development, some component IDs are not used: C27, C28, C34, R40, R41, R44 and U9.

C1-C6, C18, C19, C38—0.01 µF, 25 V (581-10NJ63)
C7, C9-C17, C21, C31, C51-C54—0.1µF, 25 V (581-100NJ63)
C8, C25, C32—1 µF, 35 V tantalum (540-1.0M35)
C20—0.47 µF, 25 V (581-470NK63)
C22, C24, C26—0.001 µF, 25 V, NP0 (581-UEC102J1)
C23—0.0047 µF NP0, 25 V (581-UEC472J1)
C33—10 µF, 25 V electrolytic (140-XRL25V10)
C29, C30—100 µF, 25 V electrolytic (140-XRL25V100)
D1, D2, D5—1N4148 (583-1N4148)
D3, D4, D17-32—T1 red LED (351-3102)
D6—1N4002 (592-1N4002A)
D16—T1 green LED (351-3003)
Q1, Q2—2N3904 (592-2N3904)
R1-R3, R5-R7, R9-R11, R20, R26, R30, R31, R34, R35, R38, R43, R45—33 kΩ (29SJ250-33K)



R4—27 kΩ (29SJ250-27K)
R8, R32—22 kΩ (29SJ250-22K)
R12, R23—56 kΩ (29SJ250-56K)
R13, R16, R22, R24, R27, R37, R39—10 kΩ (29SJ250-10K)
R14—3.3 kΩ (29SJ250-3.3K)
R15, R18—100 kΩ (29SJ250-100K)
R17, R25—330 Ω (29SJ250-330)
R19, R36—500 kΩ linear-taper pot (31CN505)
R21—220 kΩ (29SJ250-220K)
R28—15 kΩ (29SJ250-15K)
R33, R29—68 kΩ (29SJ250-68K)
R42, R51—47 Ω (29SJ250-47)
R46, R47, R48, R49—470 Ω (29SJ250-470)
R50—10 kΩ linear-taper pot (31CN401)
U1-U3—LM324 (511-LM324N)
U4, U6—LM555 (570-LM555CN)
U5—74HC4051 (570-CD74HC4051E)
U7—74HC161 (511-M74HC161)
U8—74HC42 (511-M74HC42)
U10—LM7805 (511-L7805CV)
U11—74HC4515 (570-CD74HC4515E)
U12—74HC14 (511-M74HC14)

Miscellaneous
F1—0.5 A fuse (5761-51500)
J1—6-pin DIN receptacle (16PJ224)
J2—3.5 mm audio jack (16PJ011)
P1—Coaxial dc receptacle (163-4305)
S1, S2—SPST (1055-TA1320)
S3—DPDT (1055-TA1360)
SP1—8 Ω speaker (253-2120)

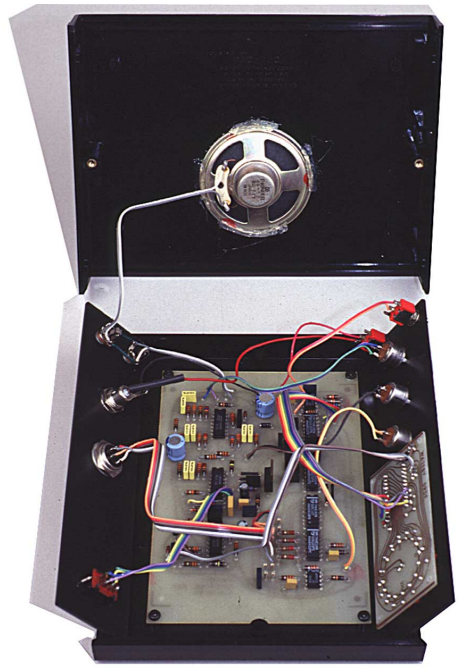
Enclosure Pac-Tec Model #CM86-175 (616-69206)
Knobs, three required (450-2023)
Main PC board (371-MAINPCB)
Display PC board (371-DISPLAYPCB)

the filter's center frequency by its bandwidth (Q = f / BW) or 500 Hz / 4 Hz = 125. It's very difficult to realize such a high-Q filter with active or passive analog filters—and even more difficult to maintain a precise center frequency. The slightest change in temperature or component tolerance would easily de-Q or detune such filters from the desired 500 Hz Doppler tone frequency. The digital filter makes the high Q possible and does so without the need for precision-tolerance components. By varying **DAMPING** pot R19, the response time of the digital filter is changed. This digital filter damping helps average rapid Doppler-tone changes caused by multipath-reflected signals, noise or high audio peaks associated with speech.

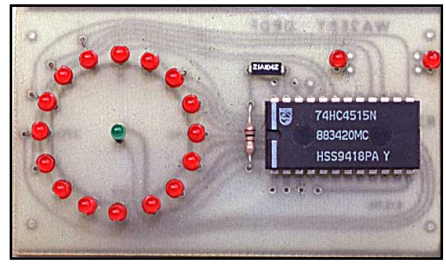
A digitized representation of the Doppler tone is provided at the digital filter output. A two-pole Sallen-Key low-pass filter built around U2B filters out the digital steps in the waveform providing a near sinusoidal output corresponding to the Doppler shift illustrated in Figure 1B. The zero crossings of this signal indicate exactly when the Doppler effect is zero. Zero crossings are detected by U2C and used to fire a monostable multivibrator (U6) built around a 555 timer. U6's output latches the red LED in the display corresponding to the direction of transmission with respect to the green **CENTER** LED, D16. Calibration between the actual source of transmission and the red direction-indicating LED latched in the display is easily accomplished by changing the delay between the Doppler-tone zero crossing (firing of U6) and the generation of the latch pulse to U11. C23, R36 and R37 determine this delay. Increasing or decreasing the delay is achieved by increasing or decreasing the value of the **CALIBRATE** potentiometer R36.

Low-Signal-Level and Audio-Overload Indicators

Two useful modifications included in this design are the **LOW SIGNAL LEVEL** lockout and **AUDIO OVERLOAD** indicators. U2D continuously monitors the amplitude of the Doppler tone at the input to the zero-crossing detector. U2D's output goes low whenever the Doppler tone amplitude drops below 0.11 V peak. This is done by referencing the negative input of U2D to 2.39 V, 0.11 V below the nominal 2.5 V dc reference level output of U2B by means of voltage divider, R21 and R22. U2D's output remains high when the Doppler tone is present and above 0.11 V peak. C9 discharges via D2 whenever U2D goes low, causing U3A's output (pin 7) to go high, turning on Q2 via R2 and illuminating **LOW SIGNAL LEVEL** LED, D4. D4 remains on until the Doppler tone returns with amplitude above 0.11 V peak and C9 recharges via R23. The LED display remains locked by disabling U11's strobe input whenever the Doppler tone is too low for an accurate bearing. This is done by pulling pin 1 of U11 low via D5 when Q2 is turned on.



Inside view of main unit



Display PC board

AUDIO OVERLOAD indicator D3 tells you that audio clipping of the Doppler tone is occurring. Clipping results if the signal level from the digital filter is too high and can produce an erroneous bearing indication. The output of U1D goes low whenever the output of the digital filter drops below 0.6 V as the amplitude of the Doppler tone approaches the 0 V supply rail. C7 discharges via D1 and causes the output of U3C to go high, turning on Q1 via R16 and illuminating **AUDIO OVERLOAD** LED D3. I elected not to lock the LED display on audio overload; doing so, however, only requires connecting a diode between the collector of Q1 and pin 1 of U11, similar to the low-level lock-out function.

Phase Correction

If the audio output of the Doppler RDF FM receiver is incorrectly phased, S3, **PHASE INVERT**, can fix that. (If phasing is incorrect, LED direction indications are 180° opposite that of the actual signal source.) Moving S3 to the opposite position corrects the problem by letting U2C sense the trailing edge. This is particularly useful when switching between different receivers. S2 disables the 8 kHz clock to disable the antenna spinning. This helps when you're trying to listen to the received signal. Presence of the Doppler tone in the received audio makes it difficult to understand what is being said, especially with weak signals.

Power Supply

Power is delivered via a 1/2 A fuse (F1) and **ON/OFF** switch S1. D6 provides supply voltage reverse-polarity protection by limiting the reverse voltage to 0.7 V and allowing sufficient current to flow to blow fuse F1. U10 provides a regulated 5 V dc to all digital ICs. C29 through C33 are bypass filters. U10's 5 V dc output is dropped 2.5 V by resistive divider R43 and R45. Noninverting voltage follower U3B buffers the 2.5 V source to provide a virtual ground reference for all analog filters and the digital filter. Using a virtual ground 2.5 V above circuit ground allows op amps to process analog signals without the need of a negative power-supply voltage. Analog voltages swing from near 0 V to near +5 V with the virtual ground level right in the middle, 2.5 V.

Next Month

In Part 2, I'll discuss the antenna switcher, construction and calibration.

Notes

[1]Terrence Rogers, WA4BVY, "A DoppleScAnt" *QST*, May, 1978 pp 24-28.

[2]Mike Kossor, WA2EBY, "A Digital Commutating Filter," *QEX*, May/June 1999.

[3]Joseph Moell, K0OV and Thomas Curlee, WB6UZZ, "Transmitter Hunting—Radio Direction Finding Simplified," (Blue Ridge Summit, PA: TAB Books, 1987) Chapter 9, pp 120-141.

[4]Joe Moell, K0OV, Homing In, "A Good Doppler Gets Better" *73 Magazine*, Apr 1995 pp 68-73, and Joe Moell, K0OV, Homing In, "Wide Band Doppler, Part 2, *73 Magazine*, Jun 1995, pp 54-58.

[5]PC boards and parts kits are available from Mouser (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**): main PC board and PC board components kit (371-2771CF), $50; display PC board and PC board components kit (371-2771D1), $20; main PC board only (371-MAINPCB), $15; display PC board only (371-DISPLAYPCB), $6; switcher PC board and components kit (371-2771-D2), $32; switcher PC board and four mag-mount PC boards (371-SWITCHERPCB), $15. Add shipping to all prices.

[6]Don Lancaster, *Active-Filter Cookbook*, (Indianapolis: Howard W. Sams & Co, 1975).

You can contact Mike Kossor, WA2EBY, at 244 N 12th St, Kenilworth, NJ 07033; **mkossor@lucent.com**.

See Feedback in July 1999 *QST*.

By Steve Ford, WB8IMY

PSK31—Has RTTY's Replacement Arrived?

There's a new HF digital mode in town and the gossip is flying!

I love RTTY. We have a warm relationship that goes back to my new-ham days in the early '70s when I was pounding green keys and reading conversations off rolls of yellow teletype paper. (Personal computer? What's that?) I jumped on the AMTOR bandwagon in the '80s and dabbled in CLOVER, G-TOR and PACTOR II in the '90s. Still, like most HF digital enthusiasts, I kept coming back to RTTY.

RTTY didn't have the error-free copy of the handshaking modes, and you certainly could not swap binary files using its limited code. But for contesting, DXpeditions and just casual conversation, RTTY was hard to beat. Unlike the 'TOR modes, you didn't have to worry about setting up handshaking links; type-and-transmit was the order of the day for RTTY. Conversations flowed easily and round-table discussions (and nets) were possible. During digital contests and DX pileups, RTTY became a mode of rapid-fire contacts. It wasn't as fast as phone, of course, but you could maintain a decent "rate."

No doubt you've noticed that I've been speaking of RTTY in the past tense. No, RTTY hasn't been tossed onto the ash heap of ham history—at least not yet. Something, however, has arrived that has the potential to knock RTTY out of the spotlight. That "something" is *PSK31*.

Prometheus Unbound

PSK31 was the brainchild of Peter Martinez, G3PLX. If the call sign seems familiar, you might recall Peter as the father of AMTOR. Up until relatively recently, PSK31 was the favorite of a small cadre of experimenters who used DSP development kits to put the mode on the air. That was all well and good, but it kept PSK31 in the shadowy corners of our hobby where few knew it existed. Like Prometheus bringing fire to the mortals, however, Peter blew the doors wide open by creating a *Windows* version of PSK31 that did all of its DSP magic using ordinary 16-bit PC sound cards. (The gods haven't yet bound him to a rock and summoned an eagle to eat his liver, but that remains to be seen!)

Not content with creating PSK31 for *Windows*, Peter placed it on the Web for *free* distribution to the global ham community. Talk about blasphemy! This meant that any ordinary ham could download the software and become active on PSK31 almost immediately.

In an article that appeared in *RadCom*, the journal of the Radio Society of Great Britain, Peter explained why he developed PSK31. Simply put, he wanted to create a mode that was as easy to use as RTTY, yet much more robust in terms of weak-signal performance. Another criteria was bandwidth. The HF digital subbands are narrow and tend to become crowded in a hurry (particularly during contests). Peter wanted to design a mode that would do all of its tricks within a very narrow bandwidth.

So What is PSK31?

First, let's dissect the name. The "PSK" stands for Phase Shift Keying, the modulation method that is used to generate the signal; "31" is the bit rate. Technically speaking, the bit rate is really 31.25, but "PSK31.25" isn't nearly as catchy.

Think of Morse code for a moment. It is a simple binary code expressed by short signal pulses (*dits*) and longer signal pulses (*dahs*). By combining strings of dits and dahs, we can communicate the entire English alphabet along with numbers and punctuation. Morse uses gaps of specific lengths to separate individual characters and words. Even beginners quickly learn to recognize these gaps—they don't need special signals to tell them that one character or word has ended and another is about to begin.

When it comes to RTTY we're still dealing with binary data (dits and dahs, if you will), but instead of on/off keying, we send the information by shifting frequencies. This is known as Frequency Shift Keying or *FSK*. One frequency represents a *mark* (1) and another represents a *space* (0). If you put enough mark and space signals together in proper order according to the RTTY code, you can send letters, numbers and a limited amount of punctuation.

The RTTYcode shuffles various combinations of five bits to represent each character. For example, the letter A is expressed as 00011. To separate the individual characters RTTY must also add "start" and "stop" pulses.

For PSK31 Peter devised a new code that combines the best of RTTYand Morse. He christened his creation the *Varicode* because a varying number of bits are used for each character. Building on the example of Morse, Peter allocated the shorter codes to the letters that appeared most often in standard English text. The idea was to send the least number of bits possible during a given transmission. For example:

E is a very popular letter on the English alphabet hit parade, so it gets a Varicode of 11.

Z sees relatively little use, so its Varicode becomes 111010101.

As with RTTY, however, we still need a way to signal the gaps between characters. The Varicode does this by using "00" to rep-

The BARTG PSK31-40 Award

As part of its 40th anniversary celebrations, BARTG, the British Amateur Radio Teledata Group, has announced the debut of the BARTG PSK31-40 Award. The award is available to amateurs who can prove that they have worked 40 DXCC entities using only the PSK31 mode. No crossband or crossmode QSOs will be allowed, and no single-band endorsements are offered. Applicants should supply a list of verified QSLs that must indicate PSK31 as the mode used. The award fee is $10 or 30 IRCs (no checks) to: Nigel Roberts, G4KZZ, BARTG Awards Manager, 13 Rosemore Close, Hunmanby, North Yorkshire YO14 0NB, United Kingdom.

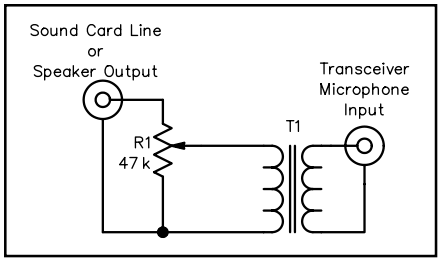


Figure 1—Use this attenuator circuit if you intend to feed the PSK31 transmit audio to your microphone jack. RadioShack part numbers are indicated below.

T1—1:1 isolation transformer (273-1374)
R1—47 kΩ trimmer potentiometer (271-283)

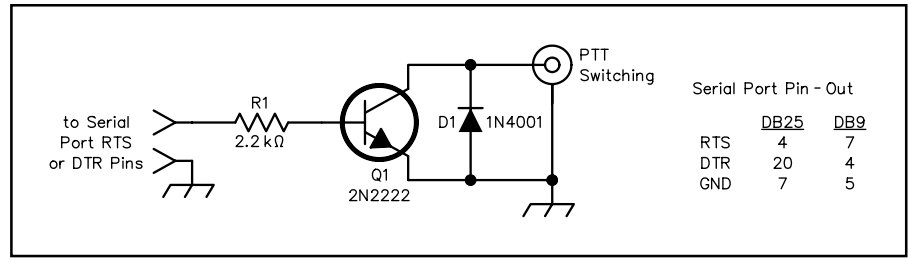


Figure 2—With this simple interface you can use a computer COM port to key your transceiver.

resent a gap. The Varicode is carefully structured so that two zeros never appear together in any of the combinations of 1s and 0s that make up the characters.

But how would the average ham generate a PSK31 signal and transmit Varicode over the airwaves? Peter's answer was to use the DSP capabilities of the common computer sound card to create an audio signal that shifted its phase 180° in sync with the 31.25 bit-per-second data stream. In Peter's scheme, a 0 bit in the data stream generates an audio phase shift, but a 1 does not. The technique of using phase shifts (and the lack thereof) to represent binary data is known as Binary Phase-Shift Keying, or *BPSK*. If you apply a BPSK audio signal to an SSB transceiver, you end up with BPSK modulated RF. (If you want the gory details, read the PSK31 software Help files.) At this data rate the resulting PSK31 RF signal is only 31.25 Hz wide, which is actually narrower than the average CW signal![1]

Concentrating your RF into a narrow bandwidth does wonders for reception, as any CW operator will tell you. But when you're trying to receive a BPSK-modulated signal it is easier to recognize the phase transitions—even when they are deep in the noise—if your computer knows when to expect them. To accomplish this, the receiving station must synchronize with the transmitting station. Once they are in sync, the software at the receiving station "knows" when to look for data in the receiver's audio output. Every PSK31 transmission begins with a short "idle" string of 0s. This allows the receive software to get into sync right away. Thanks to the structure of the Varicode, however, the phase transitions are also mathematically predictable, so much so that the PSK31 software can quickly synchronize itself when you tune in during the middle of a transmission, or after you momentarily lose the signal.

[1]It's interesting to note that the CW identifier, which is a part of the PSK31 software currently available, is limited to the same spectrum width as the PSK31 signal itself. This means that the CW generated by the PSK31 program is actually narrower than average CW. In other words, it is completely free of key clicks!

The combination of narrow bandwidth, an efficient DSP algorithm and synchronized sampling creates a mode that can be received at very low signal levels. PSK31 rivals the weak-signal performance of CW and it is a *vast* improvement over RTTY, as I discovered first hand.

Its terrific performance notwithstanding, PSK31 will not always provide 100% copy; it is as vulnerable to interference as any digital mode. And there are times, during a geomagnetic storm, for example, when ionospheric propagation will exhibit poor phase stability. (When you are trying to receive a narrow-bandwidth, phase-shifting signal, phase stability is very important.) This effect is often confined to the polar regions and it shows up as very rapid flutter, which is deadly to PSK31. The good news is that these events are usually short-lived.

From BPSK to QPSK

Many people urged Peter to add some form of error correction to PSK31, but he initially resisted the idea because most error-correction schemes rely on transmitting redundant data bits. Adding more bits while still maintaining the desired throughput increases the necessary data rate. If you double the BPSK data rate, the bandwidth doubles. As the bandwidth increases, the signal-to-noise ratio deteriorates and you get more errors. It's a sticky digital dilemma. How do you expand the information capacity of a BPSK channel without significantly increasing its bandwidth?

Peter finally found the answer by adding a second BPSK carrier at the transmitter with a 90° phase difference and a second demodulator at the receiver. Peter calls this quadrature polarity reversed keying, but it is better known as quaternary phase-shift keying or *QPSK*.

Splitting the transmitter power between two channels results in a 3-dB signal-to-noise penalty, but this is the same penalty you'd suffer if you doubled the bandwidth. Now that we have another channel to carry the redundant bits, we can use a *convolutional encoder* to generate one of four different phase shifts that correspond to patterns of five successive data bits. On the receiving end we have a *Viterbi* decoder playing a very sophisticated guessing game. Peter describes it best:

"The Viterbi is not so much a decoder as a whole family of encoders. Each one makes a different 'guess' at what the last five transmitted data bits might have been. There are 32 different patterns of five bits and thus 32 encoders. At each step the phase-shift value predicted by the bit-pattern guess from each encoder is compared with the actual received phase-shift value, and the 32 encoders are given 'marks out of 10' for accuracy. Just like in a knockout competition, the worst 16 are eliminated and the best 16 go on to the next round, taking their previous scores with them. Each surviving encoder then gives birth to 'children,' one guessing that the next transmitted bit will be a 0 and the other guessing that the next transmitted bit will be a 1. They all do their encoding to guess what the next phase shift will be, and are given marks out of 10 again that are added on to their earlier scores. The worst 16 encoders are killed off again and the cycle repeats.

"It's a bit like Darwin's theory of evolution, and eventually all the descendants of the encoders that made the right guesses earlier will be among the survivors and will all carry the same 'ancestral genes.' We therefore just keep a record of the family tree (the bit-guess sequence) of each survivor, and can trace back to find the transmitted bit stream, although we have to wait at least five generations (bit periods) before all survivors have the same great great grandmother (who guessed right five bits ago). The whole point is that because the scoring system is based on the running total, the decoder always gives the most accurate guess—*even if the received bit pattern is corrupted*. In other words, the Viterbi decoder corrects errors."—*Peter Martinez, G3PLX*

Operating PSK31 in the QPSK mode will give you 100% copy under most conditions, but there is a catch. Tuning is twice as critical with QPSK as it is with BPSK. You have to tune the received signal within an accuracy of less than 4 Hz for the Viterbi decoder to detect the phase shifts and do its job. Obviously, both stations must be using very stable transceivers.

Like most PSK31 operators, I tend to stick with BPSK, but while I was enjoying a conversation with Joe, K9BH, on 20 meters, he suggested that we give QPSK a try. After a brief pause, Joe called me in QPSK. With a gentle tweak of my transceiver's VFO and a click or two on the software AFC box, a yellow cross appeared in the tuning indicator and text began flowing across my screen. Despite considerable fading and noise, I didn't lose a single character of text during the 20-minute conversation that followed. Impressive!

What Do You Need to Get Started?

The first step is to jump onto the Web and download the latest version of PSK31 from **http://aintel.bi.ehu.es/psk31.html**. Make sure you download the latest version that's compatible with all sound card equipped PCs running *Windows* 95 and 98. Once you have it safely tucked away on your hard drive, install the software and read the Help files.

Assuming you have a reasonably stable HF SSB rig, you'll need to run two shielded audio cables between your transceiver and your computer. If your radio has an accessory jack that offers an audio line output, this is the preferred way to feed receive audio to your PC. Connect one shielded cable between the radio line output and the sound card's line *input*. If your radio does not have a line output, you'll have to use the external speaker jack.

For transmit audio, use another shielded cable and connect it between your sound card's speaker or line output jack and the accessory audio *input* of your transceiver. You can also opt to route the transmit audio to your microphone jack, but you'll need an attentuator similar to the one shown in Figure 1. If you use the accessory audio input, don't forget to disconnect your microphone before you go on the air. When you key the transceiver, the microphone may be "live," too!

And what about keying your transceiver? There are two approaches: Use one of your PC's COM ports and an interface like the one shown in Figure 2 to key your rig via the PTT line at your accessory jack. Or, simply switch on your transceiver's VOX and let it key the rig when it detects the transmit audio from the sound card.

Start the Software

You'll be delighted to discover that the PSK31 software is extraordinarily easy to use. As I've mentioned already, there are excellent Help files included, so I won't go into the software features in detail. We'll just hit the highlights and drop some useful tips along the way.

The first thing you must do is set the sample rate for your sound card. This isn't as complicated as it seems. The vast majority of sound cards support sample rates of 11025 Hz. All you have to do is type this number in the box that appears in the **SETUP** section. Leave the center frequency at 1000 Hz and add your call sign in the box below. In this section you can also choose which COM port you want to use for transceiver keying, or select "None" if you are using VOX.

Switch on your transceiver and adjust your on-screen-sound card volume controls. Make sure you know how to adjust the record sensitivity so as not to overdrive or underdrive the sound card input. You can usually do all this through the sound card mixer utility (this probably came with the sound card software, or may be part of *Windows*).

Listen First

Start by placing your radio in the upper sideband (USB) mode. That's the convention that's been adopted by most PSK31 users throughout the world.

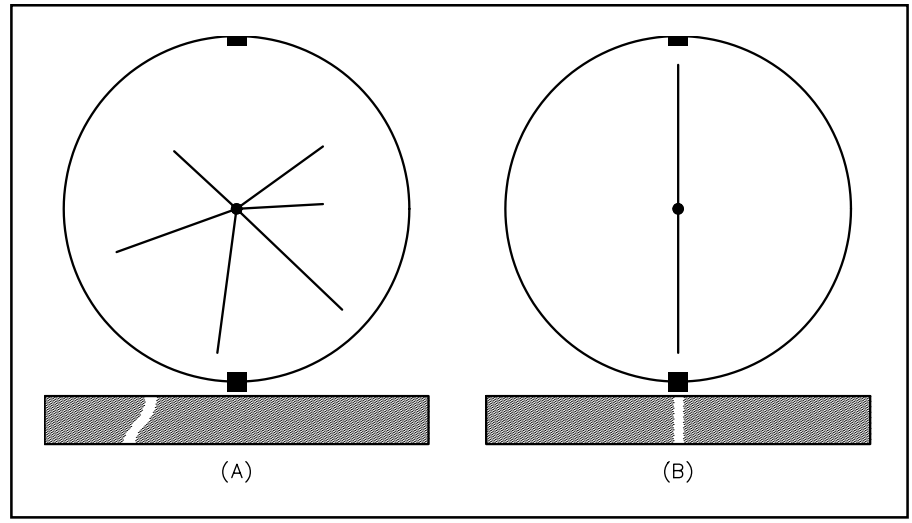


Figure 3—Tuning in a PSK31 BPSK signal. (In this diagram the tuning display has been enlarged for clarity.) As you tune across the signal, a white trace will appear (A). Just make a slight adjustment and the PSK31 signal is properly tuned (B).

PSK31 signals have a distinctive sound unlike any digital mode you've heard on the ham bands. You won't find PSK31 by listening for the *deedle-deedle* of a RTTY signal, and PSK31 doesn't "chirp" like the TOR modes. PSK31 signals *warble*—that's the best way I can describe them. They sound like high-pitched warbling carriers as you tune across them. (Until I learned to recognize the sound, I was tuning in computer-generated spurs and wondering why the text was nothing but garbage!)

Tuning in a PSK31 signal, like anything else, takes practice. If your rig has digital tuning (most modern radios do) select 1-Hz tuning steps or something close. If your radio will not tune in 1-Hz increments, you can use 10-Hz steps to get in the ballpark, then use your RIT control to zero in, or rely on the PSK31's automatic frequency control (AFC). You must tune slowly because PSK31 signals are narrow. If you become impatient, you'll sweep right past them! Begin your search on 20 meters, between about 14068 and 14080 kHz. That is where most of the PSK31 activity is concentrated, although you'll find PSK31 on other bands as well.

As you tune in a signal, watch the "waterfall" display immediately below the tuning circle. This display is analogous to an audio spectrum analyzer, continuously sweeping through a range of audio frequencies. Detected signals appear as white traces against the dark background, moving from top to bottom like water cascading over a fall. Your goal is to bring the white trace that represents a PSK31 signal to a point directly beneath the circle (see Figure 3).

As you center the signal in the waterfall display, you'll see that the flickering red bars in the tuning circle are suddenly switching to yellow and aligning themselves vertically. Keep tuning until the bars are as vertical as possible. By this time you should be seeing text on your screen. Congratulations!

You'll probably notice that the bars are starting to rotate slightly within the circle as you monitor the conversation. This is caused by drift—either the transmitting station is drifting or you are. No problem. Just click on the AFC box and the software will begin tracking the frequency changes.

Transmitting

Transmitting is actually easier than receiving, but before you begin, make sure you are not overdriving your radio by feeding too much audio from the sound card. Using your sound card volume controls, click on **TUNE** or tap the **F8** key and increase the card's output while watching your ALC indicator. Make this adjustment with the transceiver attached to a dummy load. If you must do it on the air, use the CW identifier and keep the transmissions short. When you see the ALC beginning to activate, stop (click on **TX OFF** or hit **F5**). That's all the audio you need.

You'll notice a long, narrow box just below the larger receive window. That's your outgoing text window. The instant you begin typing in this window, the software will switch your rig to the transmit mode. When you've finished (answering a CQ, for example), click on **TX OFF** or tap **F5** and you'll jump back to receive. After you've established contact, click on the **NET** box to allow the software to keep your transmit frequency on track with the receive frequency.

Sending a CQ is as easy as clicking on the **CQ** button or tapping **F7.** The software will take it from there and will return to the receive mode when it's finished. It's worth noting that you can also use the PSK31 software as a Morse CW keyboard. Just click on CW in the **MODE** section and start typing. (PSK31 does *not* decode CW, however.)

PSK31: A Testimonial

At the time this article went to press, I

had been a PSK31 user for about two months. I've been running PSK31 using my ICOM IC-706 MkII transceiver and my end-fed long-wire antenna. To say the results have been impressive is an understatement!

My first PSK31 contact was with K8SRB on 40 meters. Stan was only running 25 W to a G5RV dipole antenna, but the text on my screen was virtually error free despite the high noise levels. We chatted for about 45 minutes and Stan passed along a wealth of PSK31 tips. For example, he demonstrated the need to keep your transmit audio at the proper level by momentarily overdriving his rig so I could hear the difference and see it on the waterfall display. (The splatter appeared on the display as vertical lines to the left and right of the center position.) Stan also clued me in on the importance of checking the **NET** box so that our transmit and receive frequencies would track each other. As Stan put it, "If we must drift, let's drift together!"

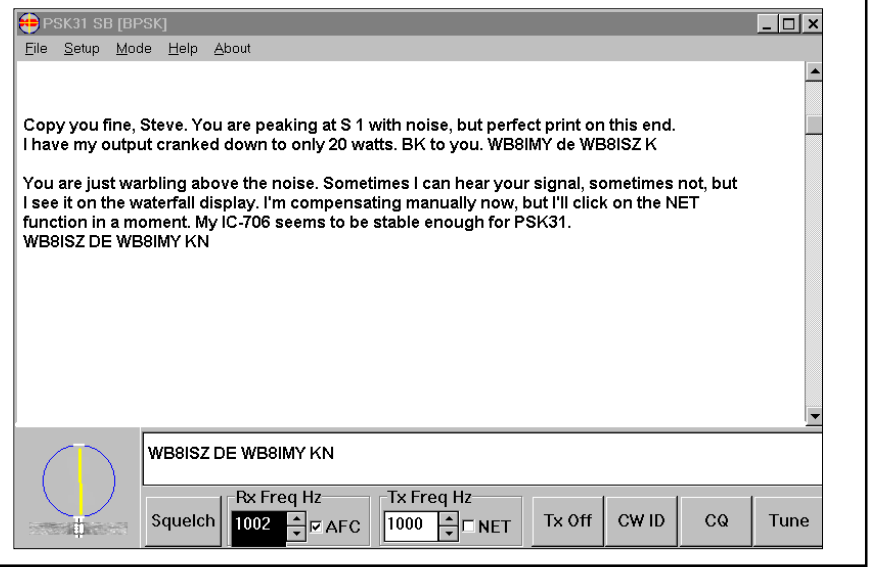
A few days later I had the spooky experience of being able to copy text from a signal I could not hear. I was tuning across the 20-meter digital subband when I saw a faint, ghostly trace on the waterfall display. I watched the display and tuned in the signal, but I could hear nothing recognizable in the noise. There may have been a warbling tone present, but I couldn't be sure. Suddenly the text began to print a CQ from WL7VO in Chicken, Alaska, near Fairbanks. I answered and was astonished to see his reply. The contact didn't last long because the band was dying fast, but it was captivating nonetheless. If we had been using RTTY a QSO would have been utterly impossible.

Since that time I've logged dozens of PSK31 contacts, including a fair amount of DX. The mode is catching on quickly in Europe, Australia and Japan. In fact, the activity level has risen to the point where you can find PSK31 signals on the air just about any time 20 meters is open. I've also been plumbing the depths of 80 and 160 meters, looking for PSK31 signals amidst the noise. The few contacts I've had on 160 have proven the power of PSK31. Despite Mother Nature's static crescendo I was able to copy readable text.

Is PSK31 the Heir to the HF Digital Throne?

The best answer is a strong "maybe." I'm not brave enough to stick my neck out and predict that PSK31 will overtake RTTY as the number one "live" HF digital mode, but it is off to a promising start. Even though Amateur Radio is a technological hobby, hams embrace change reluctantly. Will the graybeards of Baudot RTTY forsake their *deedle-deedles* for PSK31?

Well, this semi-graybeard is ready to make the switch. I love the weak-signal performance of PSK31. It seems far more suitable for HF than RTTY. I *will* predict that an upcoming DXpedition is going to travel with PSK31 software in one of its laptops. That much seems inevitable. And how long will it be before the first PSK31 contests appear?



Here is an actual PSK31 QSO in progress.

Is PSK31 Legal?

Some armchair lawyers have questioned the legality of PSK31 since its Varicode is not specifically mentioned as a "legal" digital code in Part 97. Some confusion is understandable, given the wording of 97.309(a). However, the FCC clarified the meaning of the rules in an Order released October 11, 1995 (December 1995 *QST*, p 84). The Order (DA 95-2106) reads in part: "This Order amends Section 97.309(a) of the Commission's Rules...to clarify that amateur stations may use any digital code that has its technical characteristics publicly documented. This action was initiated by a letter from the American Radio Relay League, Inc. (ARRL)."

The Order goes on to note that "The technical characteristics of CLOVER, G-TOR, and PACTOR have been documented publicly for use by amateur operators, and commercial products are readily available that facilitate the transmission and reception of communications incorporating these codes. Including CLOVER, G-TOR, and PACTOR in the rules will not conflict with our objective of preventing the use of codes or ciphers intended to obscure the meaning of the communication. We agree, therefore, that it would be helpful to the amateur service community for the rules to specifically authorize amateur stations to transmit messages and data using these and similar digital codes."

Given that PSK31 is in the public domain for amateur use, that software is readily and freely available, and that its emission characteristics clearly meet the standards of Section 97.307 for RTTY/data, there is little doubt that its use by FCC-licensed amateur stations is legal.

However, just to complete the documentation, in a letter to the FCC dated January 27, 1999, ARRL General Counsel Christopher D. Imlay, W3KD, documented the technical characteristics of PSK31 in a manner similar to how CLOVER, G-TOR, and PACTOR were previously documented. There is no need for PSK31 to be mentioned specifically in the rules, because CLOVER, G-TOR, and PACTOR are simply given as examples.—*David Sumner, K1ZZ*

Join the PSK31 E-mail Reflector!

Internet e-mail makes it easy to stay up to date with this rapidly developing mode. By joining the PSK31 reflector you'll receive the latest information, along with operating tips and other useful advice.

An e-mail reflector is like a group discussion. When mail is sent to the reflector, it is automatically redistributed for everyone else to read.

You can join the PSK31 reflector by sending an e-mail message to: **majordomo@aintel.bi.ehu.es**. In the subject field of your message enter your full name and call sign. In the message body simply type: **subscribe psk31**.

In the meantime I'll be prowling the bands for those telltale warbles. Perhaps it is time for King RTTY to retire and yield to the heir apparent. As we enter the new millennium will PSK31 wear the crown? Time will tell!

A special thanks to Peter Martinez, G3PLX, for his assistance in the creation of this article.
You can contact the author at 225 Main St, Newington, CT 06111; **sford@arrl.org**.

By Phil Salas, AD5X

The MFJ 9420D (D = Deluxe)

MFJ's adapter makes their small SSB transceiver into a bare-bones CW rig. A few simple upgrades (phone jack, CW filter, RIT) move it into the CW mainstream.

The MFJ series of single-band transceivers has become very popular in the amateur community. Of all the radios, I believe that the MFJ 9420 is the most versatile. With its extremely effective speech processor, the MFJ 9420 is a potent, lightweight and compact portable, mobile and fixed-station rig.

Although the MFJ 9420 is primarily a SSB radio, it can also work CW with the addition of an adapter board. The MFJ-415 CW Adapter lowers the frequency of the MFJ 9420 to the CW portion of the band with the push of a switch. It also provides side-tone monitoring and semi-break-in keying.

Several excellent reviews have already been written about this radio.[1] The purpose of this article is to show you how to significantly enhance the '9420, especially for CW operation.

[1]Notes appear on page 47.

Headphone Jack

This is the only enhancement that applies to SSB *and* CW operation. The MFJ 9420 does not have a headphone jack. This can be a *real problem* for late-night, quiet listening. I also wear 'phones much of the time when operating CW. A headphone jack is also handy for mobile operation. You can use it to connect the MFJ 9420 audio output to a CD-to-tape player adap-ter (such as a RadioShack #12-1951) to give you plenty of audio. The 1-W audio output of the MFJ 9420 is inadequate in a noisy mobile environment. (This audio level is fine for 16 or 32-Ω headphones, but you might want to include a 10 or 20-Ω series resistor if you use 4 or 8-Ω phones.—*Ed.*)

I wanted to add a 1/8-inch stereo jack to match most modern headphones and CD-to-tape adapters. Because the MFJ 9420 output audio amplifier has a balanced speaker output, the headphone jack must be isolated from ground. I accomplished this by using an enclosed PC-board mount jack mounted in an enlarged hole on the back panel. Figure 1 shows the wiring diagram. This DPDT jack is perfect for this application. The jack requires a 1/4-inch hole, so I drilled a 3/8-inch hole and insulated the nut from the chassis with a 1/4-inch fibershoulder washer. (See Figure 2.) This washer is a little too thick for the shaft length of the jack, but a few swipes of the fiber washer over a flat file fixed that. While I was at it, I made the speaker removable by adding a plug and jack to the speaker wires. (See Figures 1 and 3.)

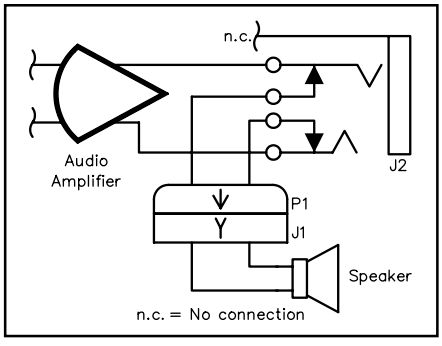


Figure 1—Schematic of the new headphone jack and speaker connections. Equivalent parts may be substituted. See Note 2 for suppliers' addresses.
P1,J1—Two-pin polarized, interlocking connectors (RS 274-222)
P2—1/8-inch stereo jack, enclosed, closed circuit (RS 274-246) mounted with a 1/4-inch fiber shoulder washer (Mouser #534-4711). See Figure 2.

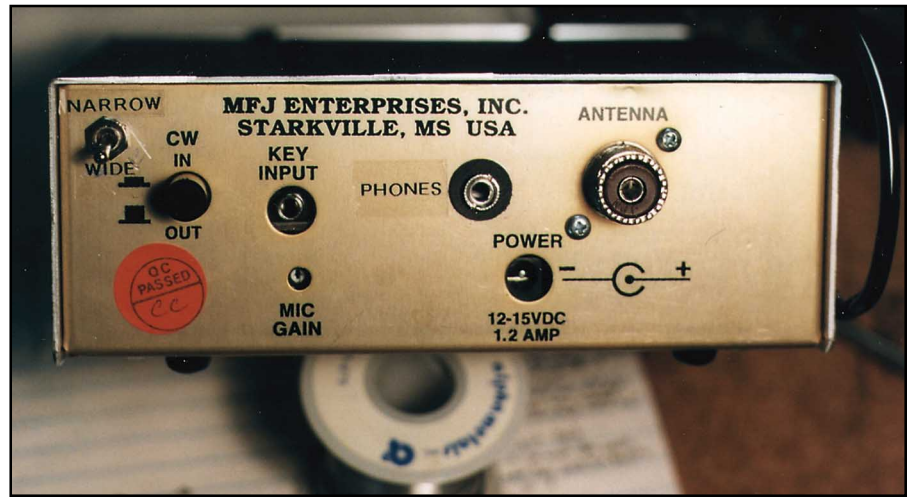


Figure 2—A rear view of the transceiver shows the new CW-filter switch at the upper left and the new headphone jack at the center. The dark circuit around the **PHONES** jack is a fiber shoulder washer to insulate the jack from the cabinet.

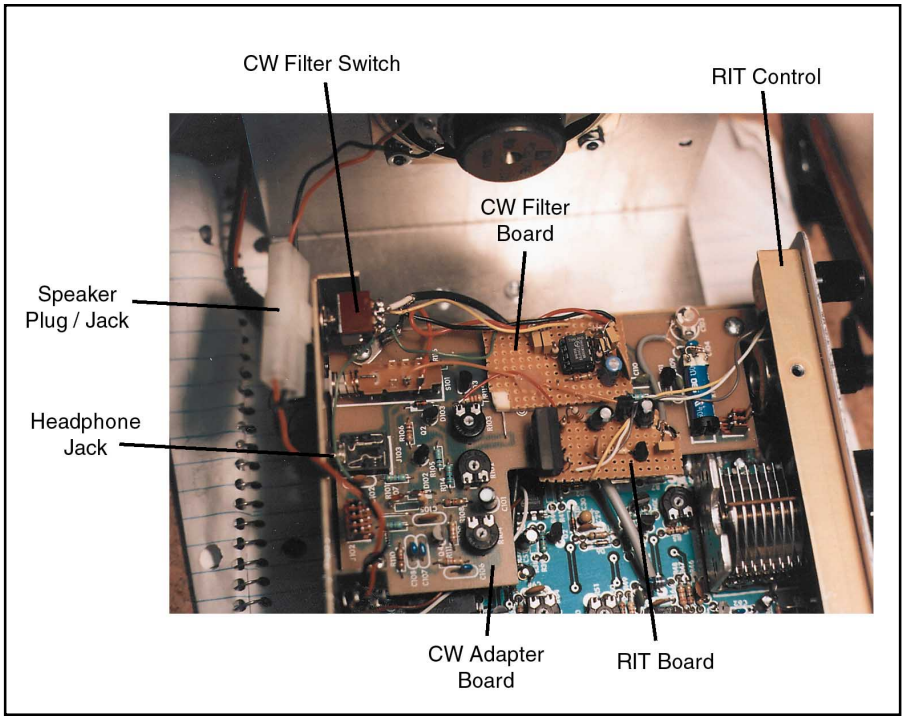


Figure 3—An interior view of the modified transceiver with modifications labeled.

CW Audio Filter

The MFJ 9420 is optimized for SSB. Therefore, no narrow-bandwidth CW filter is available. Because I operate CW most of the time, I wanted a filter.

I built an audio CW filter (see Figure 4) that consists of two band-pass filters, each with a Q of five and unity gain centered on 700 Hz. Pretty much any dual op amp can be used. I had several LM358s in my junk box, so I used one of these. When you build this filter, it's important to closely match the 0.0022 µF capacitors, 510 kΩ, 1 MΩ and 11 kΩ resistors used in both stages. That is, it doesn't matter if the values vary 5% from those shown, but the actual values of same-value parts used should match within a few percent of each other. A miniature DPDT switch selects the filter (**NARROW**) or bypasses it (**WIDE**).

When I built this unit, I found it centered almost exactly on 700 Hz, and the 3-dB bandwidth was only about 100 Hz. The filter worked great! Now for the tough part—let's mount it in the radio!

It isn't that bad. You can install everything without disassembling any of the boards inside the MFJ 9420 (that was one of my goals when I started this project). I built the filter on a small piece of RadioShack perf board material, with leads for +10 V dc, ground, audio in and out. I used two layers of double-sided tape (RS 64-2343) to mount the filter in the large blank area on the CW-adapter board. The first tape layer consists of small pieces placed around solder connections and wires on the bottom of the perf board. The second layer covers the entire bottom of the perf board. The **WIDE/NARROW** switch is mounted on the back panel near the upper-left corner. Figure 3 shows this all well.

I needed a way to break the audio path without removing any boards. To do this, I located C54 on the main board and rocked it back and forth until the leads broke. I tack-soldered a 1.0-µF electrolytic capacitor's negative lead to the negative lead broken from the original C54. The positive lead of this new capacitor connects to a common contact on the filter switch through a piece of RG-174 coax with the shield soldered to ground near the new C54 and near the switch.

Refer to Figure 4. You can pick up the audio input for the filter at pin 4 of the CW Adapter board. The side-tone audio is conveniently bridged onto the main audio line at this point. Solder a wire from pin 4 on the CW Adapter board to the other common contact on the new filter switch. Now, wire the switch so that one position shorts the audio across the switch: the **WIDE** mode. Wire the remaining switch contacts to route the audio through the filter. (The filter switch input, S1B, connects to pin 4 on the CW Adapter board. The filter output switch, S1A, connects to the new 1.0 µF capacitor.) Solder the new audio filter board's ground to any convenient ground on the CW Adapter board. Solder the +10 V filter wire to a pin on the CW Adapter's **ON/OFF** switch that can provide +10 V. Because the narrow filter is only used for CW reception, I picked the pin that provides +10 V only when the CW Adapter is on.

That's it. Now you can switch a narrow filter in and out when operating CW. This provides a tremendous selectivity advantage. In addition, when you center the received signal in this filter, your transmit offset is exactly 700 Hz (if the transmit offset is properly set).

Receiver Incremental Tuning (RIT)

The MFJ 9420 has no RIT. RIT is not needed for SSB operation, but it's very important for CW, especially when using a narrow filter.

Figure 5 shows my RIT circuit. A 78L06 voltage regulator ensures that the frequency-control voltage stays rock solid. I used a back-biased 1N4004 diode as a varactor. I got this idea from the NorCal 38

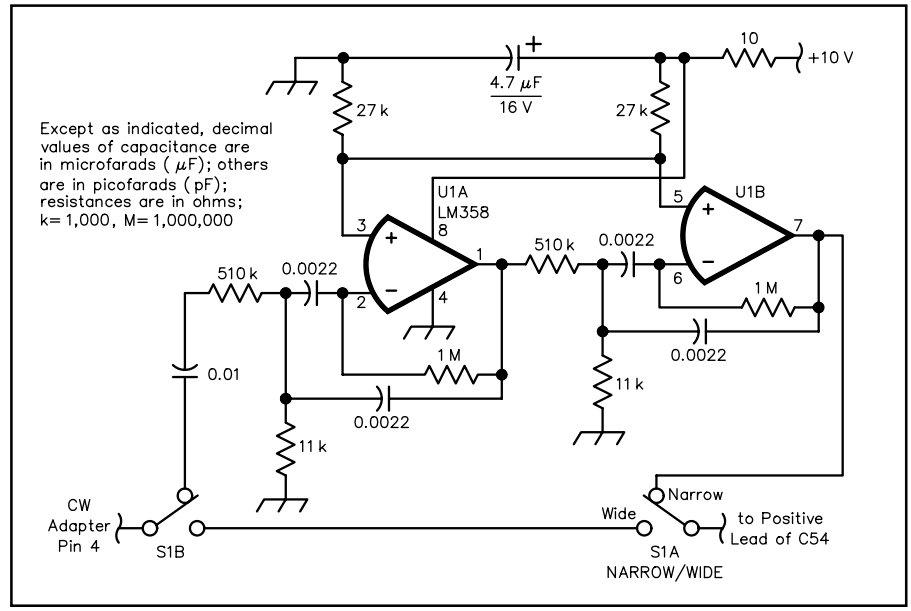


Figure 4—A schematic of the CW filter circuit and its switching. See text for connection details.

K1—SPST 12 V dc normally open SIP reed relay (1.6 kΩ coil, Hosfelt #45-191)

S1—DPDT toggle switch (Hosfelt #51-270)

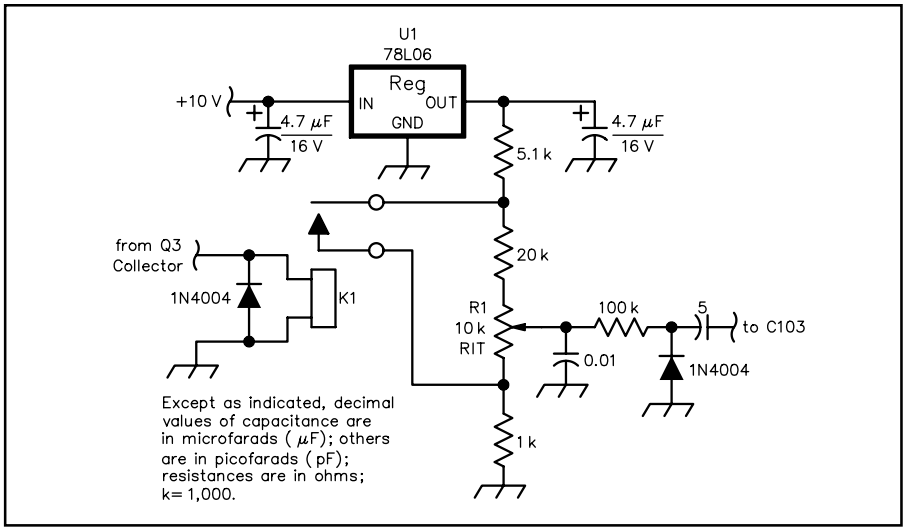


Figure 5—A schematic of the RIT circuit. See text for connection details.
R1—10 kΩ pot with center detent (Mouser #313-2000-10K)
K1—SPST SIP reed relay (Hosfelt #45-191)

Special, which uses a 1N4004 as a varactor to pull a crystal. The 1N4004 seems to work much like a MV2104. Like all varactors, you get the most capacitance variation at low voltages. Therefore, I set the center voltage at 1 V. With the circuit shown, the voltage varies from about 200 mV to about 1.8 V. Using the 5 pF series capacitor, I get a tuning range of about ±500 Hz. When transmitting, the relay fixes the voltage at 1 V by shorting out the potentiometer and 20-kΩ resistor. The relay is a normally open SPST SIP reed relay. This relay is small and has a relatively high coil resistance (about 1.6 kΩ). A second 1N4004 across the relay coil suppresses voltage spikes when the relay is deenergized, but any small-signal diode could be used here. Incidentally, I found no voltage-suppressor diode across the existing relay on the CW Adapter board, so I added one just to be safe. The RIT control is a 10 kΩ pot with a center detent. I mounted it in the upper-right corner of the front panel (see Figure 3). Any linear-taper pot could be used, but the center detent is nice for RIT. It makes the "no RIT" position easy to find and eliminates the need for an RIT on/off switch.

I built the RIT circuit on another small piece of perf board and attached it to the CW Adapter board with two layers of double-sided tape as I did with the audio filter. I built the RIT circuit much later than the audio filter. Now, I'd build both circuits on the same piece of perf board. A piece of small-diameter shielded microphone cable connects the RIT output to C103. (RG-174 will work well here, also.) Like the audio filter, the RIT circuitry can be connected without removing any boards or controls from the radio. After everything is connected, you will need to readjust C103 for correct frequency alignment in the CW part of the band. While you're at it, check and adjust (if necessary) the transmit CW offset. Make this 700 Hz, to match the narrow filter. Out of the box, my CW Adapter had about 1 kHz of transmit offset.

Summary

I've described modifications for the MFJ 9420 transceiver that turn this rig into a no-compromise SSB *and CW* radio. My parts cost for everything was less than $10, and the time required is only a few hours. The results are worth it!

Notes

[1]Steve Foxrd, WB8IMY, "MFJ 9420 20-Meter SSB-Travel Radio," *QST*, Feb 1996, pp 76-78.

[2]Parts Suppliers: Hosfelt Electronics, 2700 Sunset Blvd, Steubenville, OH 43952; tel 800-524-6464, fax 614-264-5414. Mouser Electronics, 2401 Hwy 287 N, Mansfield, TX 76063; tel 800-346-6873; e-mail **sales@mouser.com**; URL **http://www.mouser.com**.

Phil Salas, AD5X, is the Director of Radio Technology at Alcatel USA in Richardson, Texas. He was first licensed in 1964 and is active primarily in the HF CW bands. He shares his station with his wife Debbie, N5UPT, and daughter Stephanie, AC5NF.

New Books

HF Radio Systems & Circuits

By William E. Sabin and Edgar O. Schoenike, Editors

Written by members of the Engineering Staff, Collins Division, Rockwell Corporation

Published by Noble Publishing Corporation, Atlanta GA, Second edition, 1998. Hard cover, 9 1/8 × 6 1/4 inches, 652 pages; includes 3 1/2-inch floppy disk of PC-compatible programs. ISBN 1-884932-04-5. Available from the publisher or from the ARRL (order Item 7253): $75.

Reviewed by Paul Danzer, N1II ARRL Technical Advisor

I gotta get this one! Every once in a while a book comes my way that gives me that reaction, and this one certainly did. This is a makeover of the classic engineering book, *Single Sideband Systems and Circuits* (see "New Books," *QST*, Jan 1996, p 94), but it's written in a manner that's accessible to professionals and hams alike. Before you say, "Oh yeah, here comes the calculus and vector analysis," think again. Math is sparsely used, and most often you neither need the math to understand the text nor to use the final design equation.

One of the editors, Bill Sabin, W0IYH, is a frequent contributor to ARRL publications and is the author of Chapter 17, Receivers, Transmitters, Transceivers and Projects of the most recent editions of *The ARRL Handbook for Radio Amateurs*. That chapter itself is a good recommendation for this book.

What did I like about the book? Well, to start with, it uses a *systems approach* to look at HF communication.

This book contains chapters and discussions of all aspects of HF radio. As an example, suppose you wanted to be able to work Western Europe at any time of the day or night from your QTH. This book, and several others, covers antenna requirements, transmitters, receivers and propagation—unique here is the total view of what it takes to establish a *link* from your QTH to the area of the world you want to work. Chapter 3, High Frequency (HF) Link Establishment, covers just this topic and demonstrates how commercial and military communication services would go about setting up this capability.

As you might expect, a book written by members of the staff of Collins (now Rockwell Collins) covers the basic elements of HF design. The chapter on system design includes information you might find valuable for your field day set-up—how to operate with more than one receiver. Chapter 4 starts the "conventional design" section. A minimum of mathematics is used, and generally just a basic knowledge of algebra will be enough. The idea of modular radio communication systems is brought out in the Exciter and Transceiver Design chapter—you have noticed how similar some of the ham radio hand-held transceivers are to commercial marine and public service units.

The book concludes with the description and application information for the 10 programs —actually 10 sets of programs—supplied on the accompanying disk. It is refreshing to actually get instructions on the use of software included with a book. Many publishers (and books) somehow don't manage to supply this information.

If you are interested in HF communications, want to improve your station to work more DX, or are considering building a major piece of hardware, this is a good reference to use before you spend any money or heat up that soldering iron. Collins quality was known in the ham world for many years, and the guys who wrote and edited this book have continued that tradition.

By Sam Ulbing, N4UAU

Surface Mount Technology—You *Can* Work with It!

Part 2—Last month, we built a couple of simple projects with surface-mount devices. This month's inverter projects go a bit farther.

Projects 2A and 2B—Two 5 V Inverters

A low-current, negative 5 V supply is often a handy item to have on the workbench. Many amplifier circuits are simpler to design using positive and negative voltage sources. Perhaps you have an alphanumeric LCD and found it needs a negative voltage on the **CONTRAST** pin to work. A simple way to supply this negative voltage is to use an ICL7660 voltage inverter, which has been around for a long time. (I'll present another voltage-inverter application in Project 4.) Advances in technology have improved on the '7660. Two ICs I know of that offer significant improvements over their precedents, but both are available only in SM cases: The LM2662 by National is in an SO-8 package and Maxim's MAX871 is available only in SOT-23. Certainly it is possible for manufacturers to make these improved IC versions in a DIP, but neither National nor Maxim have chosen to do so. This appears to me as another signal that the industry is moving toward SM-only parts.

The Technology

Figure 9 shows how these voltage-inverter ICs operate internally. Each consists of four CMOS switches (S1 through S4) sequentially operated by an internal oscillator. During the first time interval, S1 and S3 are closed and S2 and S4 are open; the +5 V input charges C1 with its + terminal being positive and the opposite terminal at ground. At time interval two, S1 and S3 are open and S2 and S4 are closed. There is still 5 V across C1 with the pin 2 side being positive, but pin 4 is no longer at ground potential. The 5 V charge across C1 is transferred to C2—and since C2's positive side is connected to ground—the other side must be 5 V lower than ground, or –5 V. The reason the SM switches can handle more current and still be physically smaller is related to their lower resistance and, since both operate at higher frequencies, smaller-value capacitors can be used for a given current output. For best efficiency, low ESR (equivalent series resistance) capacitors should be used. An input bypass capacitor (the value of which depends on the IC and application) improves performance if the power source has a high impedance.

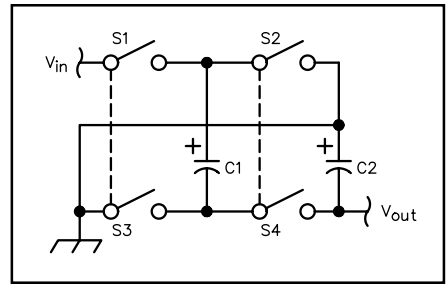


Figure 9—Diagram of the internal workings of the three voltage inverters. See the text for an operational explanation.

LODER BROOKS, KD4AKW

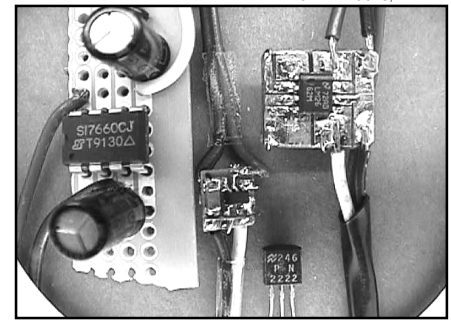


Figure 10—Here, the three voltage-inverter projects are compared in size to a PN2222 transistor.

With the trend toward smaller ICs and fewer IC pins, there are often families of nearly identical but specialized ICs. The LM2662 is one of two nearly identical inverters described in the same data sheet. The other, the LM2663, uses pin 1 as a shut-down control instead of a frequency control. This is a common feature with the new technology because of the ever-increasing use of battery power sources, and is especially useful when the inverter is computer controlled. During shut-down, the IC's current drain is reduced to only 10 µA. The MAX871, like the LM2662, has a brother described in the same data sheet. The MAX870 is identical to the MAX871n except that it runs at 125 kHz, and although it needs larger capacitors, it draws only 0.7 mA.

Because large-value capacitors increase a circuit's physical size, it's good to know the minimum capacitance value you can use. This depends on the frequency of operation and the ESR of the capacitor. Nonpolarized capacitor types commonly recommended are Sprague series 593D or 595D, AVX series TPS and the ceramic X7R series. Unfortunately, a capacitor's ESR is often not given in a parts catalog and you may have to consult a data sheet. If you want to try other capacitor values, use the following formulas to calculate output resistance and ripple. Note that C1's resistance is four times as important for reducing resistance as C2, but C1 has no effect on ripple.

$$R_{out} = 2R_{sw} + 1/f \times C1 + 4ESR1 + ESR2 \quad \text{(Eq 2)}$$

$$V_{ripple} = I_{load}/f \times C2 + 2I_{load} \times ESR2 \quad \text{(Eq 3)}$$

where

R_{out} = output resistance of the circuit
R_{sw} = sum of the *on* resistances of the internal switches
f = frequency of the oscillator driving the inverter
ESR1 = equivalent series resistance of C1
ESR2 = equivalent series resistance of C2

[16]Notes appear on page 50.

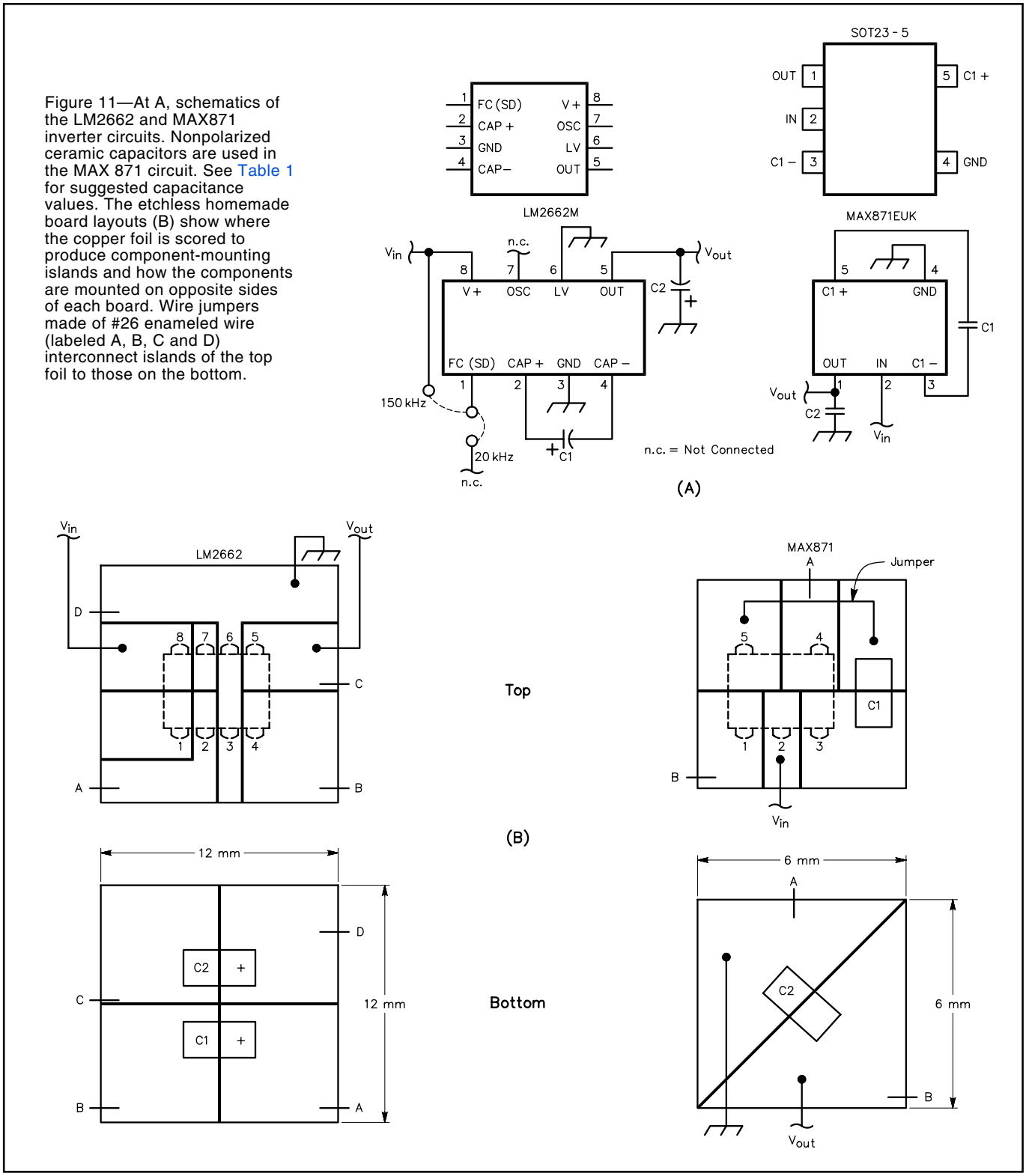


Figure 11—At A, schematics of the LM2662 and MAX871 inverter circuits. Nonpolarized ceramic capacitors are used in the MAX 871 circuit. See Table 1 for suggested capacitance values. The etchless homemade board layouts (B) show where the copper foil is scored to produce component-mounting islands and how the components are mounted on opposite sides of each board. Wire jumpers made of #26 enameled wire (labeled A, B, C and D) interconnect islands of the top foil to those on the bottom.

V_{ripple} = peak-to-peak ripple voltage at the output

I_{load} = load current delivered by the inverter

All three ICs can be used in other modes, such as voltage doublers, connected in cascade to increase output voltage, or connected in parallel to increase output current. For information on circuits to use and more information about design consi-derations, refer to the device data sheets.

The SOT-23 is a popular IC size and it is important to develop the skills to work with it if you want to make full use of the new technology. When you build the MAX871 project, set it aside because you may find it useful in Project 4.

Table 1 summarizes some features of the ICs mentioned, and Figure 10 shows you what the three completed circuits look like. You can see that the LM2662 circuit is somewhat smaller than the '7660, yet it provides *10 times* the current output! The MAX871 circuit is extremely small and outperforms the ICL7660.

Figures 11A and 11B show the schematics and board layouts, respectively. The circuits are simple, each requiring but two capacitors and one IC.[17]

Table 1

	ICL7660	LM2662	MAX871
Package	DIP, SO-8, Can	SO-8	SOT-23
Circuit Resistance (Ohms)	55	3.5	25
Osc Frequency (kHz)	10	20	500
Recommended Cap (µF)	10	100	0.2
V_{out}* @ I = 0	10.0	10.0	10.0
I = 14 mA	9.41	9.97	9.71
R = 100W	6.30	9.66	8.04
I_{supply} (mA)	0.17	0.30	2.7

*These figures are based on actual circuit measurements with the load connected between the positive and negative outputs.

Building the LM2662 Circuit

To save space, I put the IC on one side of a double-sided board, mounting the capacitors on the opposite side. Interconnections between the two board sides are made by short pieces of #26 enameled wire. The wires (labeled A, B, C, D in Figure 11B) bend around the edge of the board. If you have built Project 1, you will have no problem with this one. Be careful to observe capacitor polarity. Even though the LM2662 is smaller than the ICL7660, it offers more features. Pin 1 (which is not used in the ICL7660) controls the LM2662's internal oscillator. The inverter runs at 20 kHz when this pin is left unconnected, and at 150 kHz when connected to V_{CC}. If you want the circuit to operate at 150 kHz, add a jumper between pins 1 and 8 of the IC. This allows you to use smaller capacitors, but at the price of a higher supply current.

Building the MAX871 Circuit

The first time you see this project, you may think "It's too small to build by hand!" But I've built four different circuits this size and made a PC board for each one—so can you! Because the SOT-23 package is smaller than the SO-8, I used a 0.005-inch wheel to make the island-separating cuts on my PC board. Although the IC's pins are small and closely spaced, the SOT-23-5 board requires only two critical cuts: those between pins 1 and 2 and between pins 2 and 3. The spacing between pins 4 and 5 is as large as that of an SO-8 package. Mounting C2 beneath the board makes component layout much easier.

SOT-23 packaged devices are too small for manufacturers to imprint the part number on them—MAX890EUK just will not fit! Instead of MAX890EUK, Maxim uses the marking **ABZO**. If you get two SOTs mixed up, you will have to consult the data sheets to determine which is which.

Next Month

In Part 3, we'll look at a low-voltage battery protection switch that makes use of a few SM ICs: three SO-8s and one SOT-23.

Notes

[16]Part 1 of this four-part series appears in the April 1999 issue of *QST*, pp 33-39.

[17]Obtaining the parts—Project #2A: Gerber Electronics stocks the LM2662 and Newark Electronics stocks low-ESR tantalum SM capacitors. If you cannot find an LM2662, use the LM2660, Maxim MAX660 or the Linear Technology LTC660; all have similar characteristics and identical pin outs. Digi-Key carries some of these ICs, but does not stock the low ESR SM capacitors. Low-ESR SM capacitors are quite expensive, so you may want to use standard tantalum capacitors instead. These are available from most suppliers. I have a PC board for the layout described; price: $1.50. Contact Sam Ulbing, N4UAU, 5200 NW 43rd St, Suite 102-177, Gainesville, FL 32606; **n4uau@afn.org**. Credit cards are *not* accepted.

Project #2B: A limited number of parts kits, with hard-to-find 1 µF ceramic capacitors (to permit maximum current output with minimum ripple) are available from me for $6 *without* a PC board. If you want a pre-made PC board add, $1.25. (Florida residents add sales tax.)

If you are interested in making your own boards as described, I have a limited number of parts kits consisting of a 3×6-inch double-sided, copper-clad board, eight cutoff wheels (two 0.005 inch, four 0.009 inch and two 0.025 inch diameter) and the special mandrel recommended for use with the ultra-fine cutoff wheels. Price: $13. This kit allows you to make the boards for all the projects in this series and more. (Florida residents must add sales tax. For orders outside the US, please add $3 for shipping.)

You can contact Sam Ulbing, N4UAU, at 5200 NW 43rd St, Suite 102-177, Gainesville, FL 32606; **n4uau@afn.org**.

New Products

CLEMENT S. PEPPER'S *DIGITAL IC GALLERY*

◊ Howard W. Sams and Company and Prompt Publications introduce a new book that should be a welcome addition to the library of nearly every electronics experimenter or hobbyist.

The Digital IC Gallery is a 608-page paperback containing information on identifying a wide range of digital devices in the TTL and CMOS logic families. Previously, having ready access to this data required an extensive collection of manufacturer's data books or vendor's catalogs. This single reference also makes it much easier and more convenient to explore a wide range of devices that may be available and appropriate for your intended application. Logic and connection diagrams, truth tables, functional descriptions and performance data are included.

You'll find chapters on monostables and timers, flip-flops, latches and shift registers, counters and dividers, decoders and encoders, multiplexers and demultiplexers, arithmetic and logical functions, buffers and line drivers, bus transceivers and more. A glossary of industry definitions helps in relating dif-ferent terminologies used for identical parameters by competing manufacturers. An appendix listing numerous available manufacturer's data books is also provided.

Author Clement S. Pepper has over 30 years of R&D and system development experience and shares some of his accumulated knowledge with this comprehensive study of the latest semiconductors.

The Digital IC Gallery retails for $39.95. For a more complete description of this book and a wide assortment of additional electronics related publications, visit **http://www.hwsams.com** or contact the publisher directly: Howard W. Sams and Company, 2647 Waterfront Pkwy E Dr, Indianapolis, IN 46214; tel 317-298-5789, fax 800-552-3910.

COMPUTER MONITOR TROUBLESHOOTING TIPS

◊ Just in time for the hamfest season, Howard W. Sams and Company and Prompt Publications release a troubleshooting guide for computer monitors.

1999 Computer Monitor Troubleshooting Tips, by M. I. Technologies Inc, provides detailed step-by-step guidance and point-to-point procedures for solving a wide variety of monitor problems. Over 3,500 troubleshooting and repair tips listed by manufacturer name and model number on monitors from the major manufacturers, and an overview of VGA monitor theory and monitor EEPROM repair are included. You also get specific repair information on KD1700 series monitors with free schematics and parts lists.

The 304-page paperback comes with a CD-ROM containing the *Windows Techtips Monitor Repair Database* and an ECG component cross-reference database. The CD also includes a catalog directory with a complete listing of M. I. Technologies monitor schematics, a CAP-Wizard (in-circuit capacitor tester) and FCC number identification software for cross referencing monitor model numbers to the original manufacturer. Contact information for many of the monitor manufacturers is also provided.

1999 Computer Monitor Troubleshooting Tips retails for $49.95. For a more complete description of this product and a wide assortment of additional electronics related publications, visit **http://www.hwsams.com** or contact the publisher directly: Howard W. Sams and Company, 2647 Waterfront Pkwy E Dr, Indianapolis, IN 46214; tel 317-298-5789, fax 800-552-3910.

Next New Product

By Brian Kendal, G3GDU

A Box Too Far?

Using modern radio gear, two UK hams demonstrated radio ranging principles that had been proven 60 years ago by German scientists using primitive equipment. To what end? Fun, of course! And a "personalized" understanding of history.

For many years I've admired the navigational systems used by the Luftwaffe in the early 1940s to bomb targets in the UK, if only because I personally experienced their accuracy during the "Blitz" on Sheffield when I was a schoolboy.

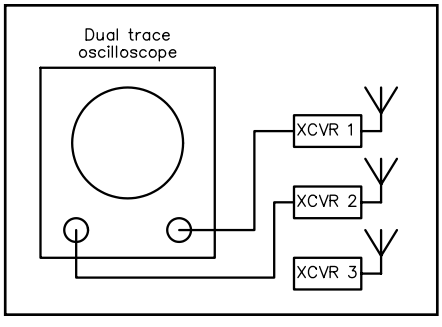
The most advanced of these systems was called *Y-gerat*. It used a ranging system in which a 300 or 3000-Hz tone was transmitted from a base station on a frequency of 42.5 MHz. This tone was received by equipment on the aircraft and retransmitted on 46.9 MHz. At the base station, the audio phase difference between the transmitted and received signals was measured, and from this result, the range of the aircraft was calculated.

One afternoon, when I was rather less busy than usual (only about 100 urgent tasks pending!), I fell to thinking about whether it would be possible to reproduce this technique using the equipment in my shack to measure the distance to my local 2-meter repeater.

My gear consisted of two transceivers, each connected to its own antenna, and an IC-2E H-T. To simplify things I decided to use the standard 1750-Hz access tone rather than a separate audio oscillator (there was nothing magical about the original Luftwaffe frequencies).

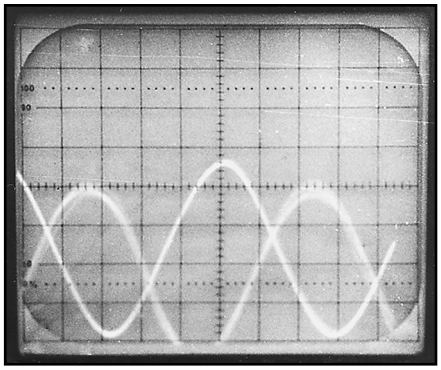
To minimize the risk of blocking, the IC-2E was used to access the repeater and provide the measurement tone. The retransmitted access tone could clearly be heard by either transceiver. The remaining task was to display the time difference between the transmitted and received signals on an oscilloscope.

To display the access tone directly would have required delving into the IC-2E with a soldering iron. I sought a simpler solution by using one transceiver to monitor the outgoing signal and the other to monitor the signal from the repeater. In each case I coupled the audio signals from

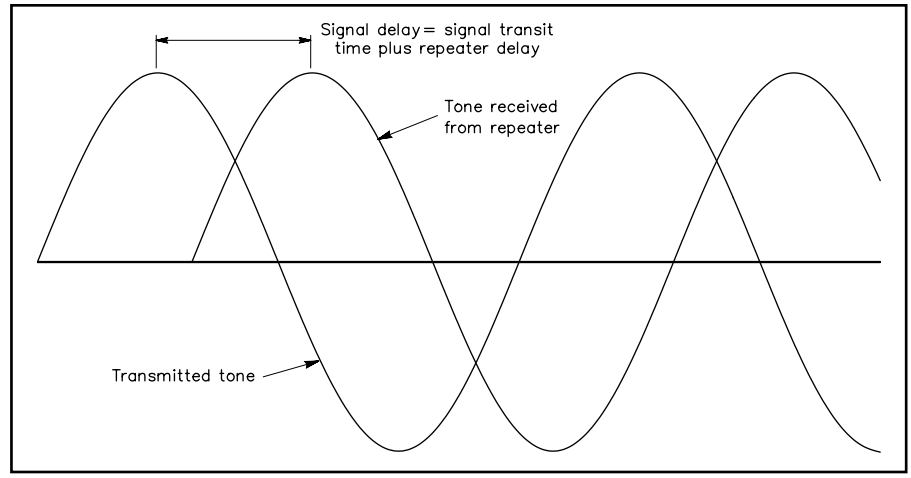


For comparing signal delays through the transceivers, a tone is transmitted by transceiver 3, which is received by transceivers 1 and 2. By alternating the positions of the three transceivers, the relative delays can be determined. For range measurement, transceiver 3 radiates a tone. This is monitored by transceiver 2, the output of which synchronizes the oscilloscope time base. Transceiver 1 receives the incoming signal and the delay is shown on the screen.

Derek Atter, G3GRO, presses the **CALL** button on the mobile radio in the front of the car. The IC-2E hand-held on the roof is monitoring the transmitted signal and the IC-2E beneath the oscilloscope is receiving the signal from the repeater.



The transmitted and received tones as seen on the oscilloscope. The received signal shows some noise components. The signal delay measured here is about 225 µS.



Interpreting the oscilloscope display. The received signal sometimes shows a slight noise component. A more accurate assessment of the phase shift can be made if the display is photographed and analyzed later.

the headphone sockets to the oscilloscope inputs. At this point I could lock the oscilloscope trace onto the modulation of the transmitted signal and clearly see the phase shift of the received signal. All that remained was to interpret the results.

The access tone is 1750 Hz, so the length of one cycle is approximately 571 microseconds. By expanding the oscilloscope trace, the phase difference between the transmitted and received signals was measured as about 35 microseconds. A quick calculation gives the time for a signal to travel a statute mile and return as approximately 10.74 microseconds. The distance to the repeater, therefore, is just over 3 miles—a fair approximation of that distance as shown on a map.

At this point I was feeling very pleased with myself—but I had forgotten one of the basic rules of radio. That is, if everything seems to work out right on the first attempt, something is definitely wrong!

Irreproducible Results

Recently, I decided to repeat the experiment and, from the moment I started, everything went wrong. The transceivers I had used on my previous experiment had been replaced by an IC-821 and an IC-746. Additionally, a pair of IC-2Es was on hand.

When I repeated the experiment, the delay of the received signal varied from one rig to the next, and the signal's "round trip" time was far greater than expected.

To sort out the problem, my first task was to compare the signal delays in my equipment. I measured these values by using one rig to provide a modulated signal while monitoring the other two and comparing their signal outputs on the oscilloscope. From this I saw that the IC-2Es had the shortest delay, that a trip through the IC-821 took about 25 microseconds longer, and that a pass through the IC-746 added an additional 12 microseconds.

If the outgoing tone and the returned signal were monitored on identical receivers, any errors caused by receiver delays would cancel out and the phase shift of the returned audio would represent the signal transit time plus any delay in the repeater itself. Any signal delay in the tone transmitter would be irrelevant because the transmitted signal was being monitored at its output.

At this point I realized that my original intention of directly measuring the distance to the repeater was not possible because I could not directly measure the signal delay within the distant equipment (the repeater). The other alternative was to assume the distance to the repeater (which I knew reasonably accurately from the map), measure the "round trip" time and from that deduce the repeater's signal delay. Then, having effectively "calibrated" the repeater, I could measure distances from other locations.

Using this technique, the "round trip" time was measured as about 115 microseconds, the distance of the repeater 2.6 statute miles and the signal transit time 28 microseconds, giving a repeater delay of about 87 microseconds.

Overt Ops

The time was now ripe to attempt some serious ranging. Accompanied by Derek Atter, G3GRO, I drove to a point several miles away where we knew there was a car park, a tea bar and good repeater coverage. The weather was a typical English autumn day—thick fog and intermittent rain. Despite this, we set up our equipment in the rear seat of our car, with the oscilloscope running from a spare battery and an inverter in the trunk. A ground-plane antenna was erected on a short mast to minimize possible interference from the inverter.

The repeater was not in use so it was immediately possible to synchronise the oscilloscope and measure the signal's "round trip" time as 225 microseconds. From this we could deduct the repeater delay of 87 microseconds, giving a signal transit time of 138 microseconds. Dividing this by 10.74 gives a distance to the repeater of 12.8 miles.

When we returned home we compared this with an accurate map, which shows a measured distance of 12.6 miles. We felt that our technique was remarkably accurate, considering its home-grown nature. If the weather had been better we could have taken several other readings.

Once the equipment had been connected, the initial measurement, which included synchronizing the oscilloscope time base, took less than half a minute. Subsequent measurements could be taken in a few seconds.

I was lucky with both experiments in that the repeater provided a strong signal to both locations. To use this technique for long-range measurements, narrow RF filters would be required between the transceivers and their respective antennas to prevent desensitization.

Ex-radar mechanics may be surprised that my calculations are based on a "radar mile" of 10.74 microseconds and not the 12.36 microseconds with which we're more familiar. The reason for this is that radar equipment typically uses nautical miles while the former figure refers to a "Radar Statute Mile."

Conclusion

What has been achieved by this experiment? Not much, really. The basic principles were developed by German researchers before WW II, and the same techniques were used in surveying in the days before GPS. We did prove, however, that reasonably accurate range measurements can be made using only the equipment available in an average ham shack. The process also gave me a renewed respect for the German scientists of some 60 years ago.

You can contact the author at 12 Weald Dr, Furnace Green, Crawley, W Sussex RH10 6JU, United Kingdom; **Brian@g3gdu.freeserve.co.uk**.

Q Kevin Kalil, KF4ZQK, asks, "I purchased an H-T that was supplied with a screw-on rubber duck antenna. I also own a 1/4-wavelength telescoping whip antenna that I'd like to use, but it has a male BNC connector. Is there some sort of adapter that will allow me to use this antenna with my H-T?"

A The type of connector your H-T uses is known as an *SMA*. In this case, it is a female SMA. To use your telescoping whip all you need is a male-SMA-to-female-BNC adapter. These are commonly available from several *QST* advertisers.

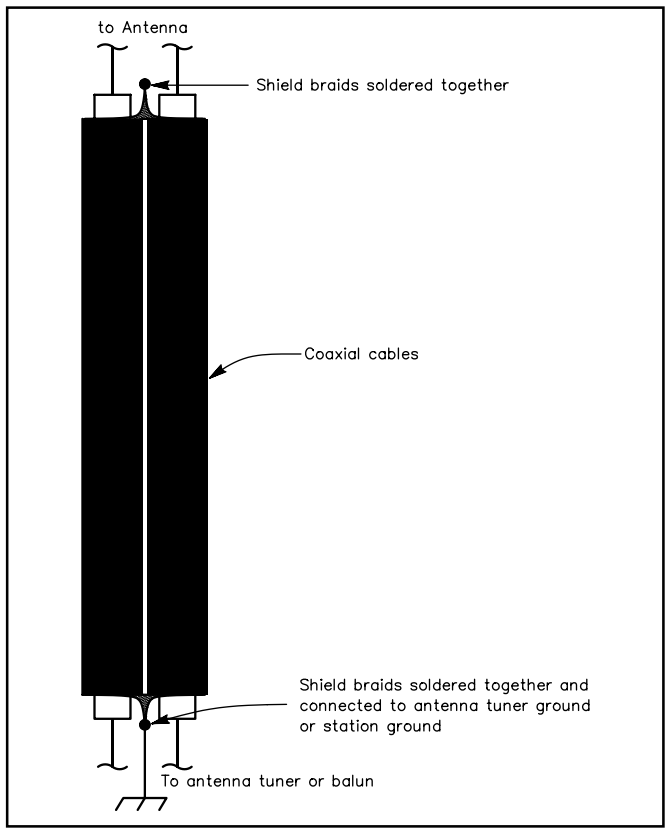


Figure 1—You can make a shielded balanced feed line out of two pieces of coaxial cable. It won't have the same low-loss characteristics of open-wire or ladder line, but it is a workable alternative when the feed line must pass over a large metal surface.

Q Larry Amann, K5TQN, asks, "I'd like to feed a dipole above my roof using my antenna tuner and a balanced feed line. However, my roof is metal and the feed line would have to rest on it for a considerable distance. I know that you need to keep open-wire feeders away from metal, but this is not possible in my case. Could I make my own shielded balanced line by using two lengths of coax in parallel?"

A The idea of using two parallel lengths of coax to create a kind of "shielded" balanced feed line has a long history. A number of hams have used this approach in situations where they needed to pass a balanced feed line over an expanse of metal, such as a metal roof. The technique involves placing two coaxial cables in parallel (using tape or cable ties to keep them firmly together along the entire length), shorting the shield braids of both coaxial cables at both ends, and grounding the "shack side" of the braids at your antenna tuner (see Figure 1). The inner conductors of the coax then become your "shielded" parallel feed lines.

The primary drawback with this technique is that you will not enjoy the same degree of low-loss performance as you would with standard twin-lead or ladder line. On the other hand, it should allow you to maintain a balanced line all the way to your antenna, despite your metal roof.

Q Mike Usas, N8KXI, asks, "Which is the proper way to describe the 75/80-meter band? I've heard it called 75 or 80 meters by both old and new hams. Is it 75, 80 or both?"

A You've asked a good question. The answer falls into that gray area of Amateur Radio slang. For those who may be new to the hobby, the idea of using 75 or 80 meters to refer to the same band can be confusing.

Technically speaking, a wavelength of 80 meters corresponds to a frequency of 3750 kHz. A wavelength of 75 meters corresponds to 4000 kHz. When hams kick these numbers around in conversation they are usually referring to either the phone or CW/data segments of the band. When they say "75 meters" they are talking about everything from 4000 down to 3750 kHz—the phone portion of the band. When they mention "80 meters," they're usually discussing the band segment from 3750 kHz down—CW/data.

Of course, like anything else in common language, the terms are often interchanged, depending on who is speaking! For example, many hams simply say "80 meters" when they mean anywhere in the band.

Q When looking at the contest results in *QST* I often see a reference to "check logs." What are check logs?

A Check logs are logs that, for various reasons, are not eligible for entry into the contest. A log that is submitted past the entry deadline, or one that arrives on time but can't be used because of uncorrectable format problems, may be listed as a check log. A log might also be designated as a check log if there were discrepancies in the contest exchanges being sent, or if numerous scoring errors are discovered. By designating a log as a check log, it is listed in the results so that people know that station did submit a log to the Contest Branch. At times, participants may also submit logs for log-checking purposes only rather than as a competitive entry.

Don't confuse check logs with logs used for crosschecking purposes by contest officials. With improved software and computer techniques, all logs that are submitted to Headquarters in electronic format are now being crosschecked against one another to ensure more accurate and complete contest score reporting.

Q I live in an area where outdoor antennas and towers are restricted. I've noticed, however, that several of my neighbors have flagpoles; apparently they are acceptable. Is there any way to design a "stealth" antenna using a flagpole?

A Certainly! Flagpole stealth antennas are ham traditions that go back many years. Plastic or fiberglass flag poles make fine supports for vertical antennas that consist of little more than a quarter-wavelength of #10 wire snaked through the hollow center (see Figure 2). You can put a quarter-wavelength

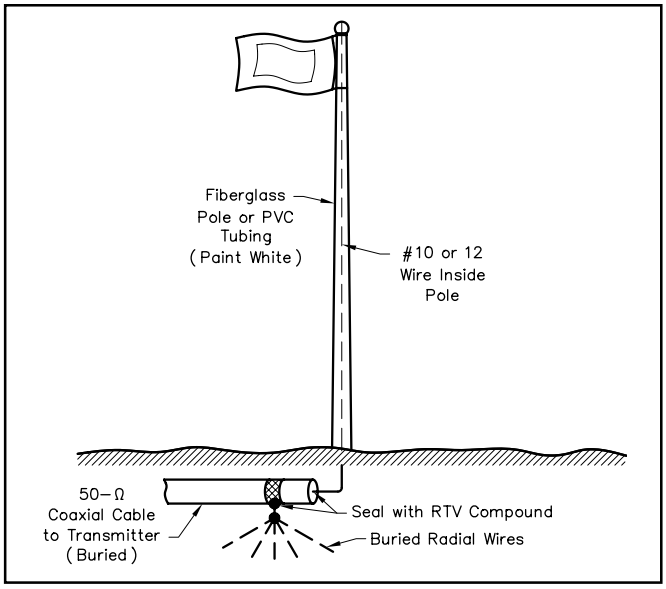


Figure 2—A typical flagpole antenna.

vertical antenna for 20 meters in a flagpole that's only about 17 feet tall and feed it with 50-Ω coaxial cable buried in the lawn. And while you are digging, bury as many insulated copper radial wires as you can. Make the radials as long as possible, but don't worry about their specific lengths. Quantity is what counts most.

I know of one ham who took a particularly clever approach with his flagpole vertical. He buried a remote-controlled antenna tuner in a weatherproof enclosure at the base of his 35-foot flagpole. As a result, he is able to load the antenna on 40 through 10 meters at the push of a button! Just more proof of the old adage, "Where there is a will, there is a way."

Q Gerry Miller, AA2ZJ, asks, "I recently stumbled on what I believe are beacon signals from about 200 to 400 kHz. They identify in CW, sending their call signs over and over. Some of the call signs I've copied include CAT, PPK, UR and NEL. Can you solve this mystery for me?"

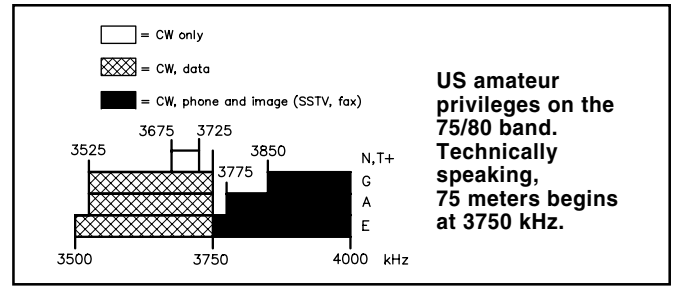
A The signals you've received are indeed beacons. Specifically, they are nondirectional navigational beacons, many of which are maintained by the Federal Aviation Administration and the US Navy, among others. Most of the beacons identify themselves with two or three-letter call signs sent in Morse. These beacons can be heard over great distances when conditions are right.

There are radio hobbyists who embrace the challenge of "DXing" these beacons and even obtaining QSLs to confirm reception. One excellent tool for identifying the beacons can be found on the Web at **http://www.airnav.com/navaids/**. At this site you can plug in the call sign and see the location and other information about the beacon.

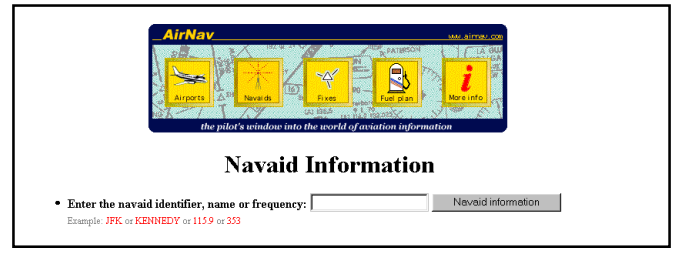
For example, you mentioned hearing NEL. According to the database, that call sign belongs to a Navy beacon located in Lakehurst, New Jersey.

Q Bob Abbey, WN4J, asks, "I would like to begin conducting code practice sessions with local hams on 2-meter FM. Is this legal? Would it be a prohibited form of 'broadcasting'"?

A There is nothing to stop you from transmitting code practice on 2-meter FM. In fact, W1AW does just that on 147.555 MHz. This is permitted by Section 97.111(b)(5). Concerning the "broadcasting" issue, this term is defined in Section 97.3(a)(10) as "Transmissions intended for reception by the general public, either direct or relayed." All amateur transmissions must be intended to be received only by other amateurs. Nothing prevents a nonham from overhearing an amateur code-practice session—from a practical standpoint, we hope they do—but that sort of reception is unintentional.



US amateur privileges on the 75/80 band. Technically speaking, 75 meters begins at 3750 kHz.



If you copy the ID of a beacon between 200 and 400 kHz, chances are you can identify it on the Web at http://www.airnav.com/navaids/.

Q I just installed a Creative Labs "SoundBlaster" AWE64 sound card in my shack PC to replace my old SoundBlaster 16. My kids use the computer for games and homework and they wanted the enhanced sound capability. I wanted to try SSTV and the new PSK31 HF digital mode using the sound card as well. The problem is that *Windows 95* keeps telling me that the AWE64 is not working, even though it detects it, and it insists that my old SoundBlaster 16 is still present! I'm confused.

A So is your computer! It sounds like you need to do a clean sweep of the *Windows* 95 SoundBlaster driver files, purging the old SoundBlaster 16 drivers and loading the new AWE64 drivers.

1. Grab the file *SBW9XUP.EXE* on the Web from **http://www.support.soundblaster.com/**. This will give you a complete set of the very latest AWE64 drivers.
2. Run the file in an empty directory to unzip it.
3. On your *Windows* 95 task bar, go to START, SETTINGS, CONTROL PANEL, SYSTEM and, finally, DEVICE MANAGER.
4. Go to the "sound, video, and game controllers" line.
5. Remove all sound card listings.
6. Go back to START and restart your computer in the *MS-DOS* mode.
7. Go to the "c:\windows" directory.
8. Delete awe*.*.
9. Go to the "c:\windows\system" directory.
10. Delete sb*.*, wfm*.*, csp*.*, and cif*.*
11. Go to the "c:\windows\inf" directory.
12. Rename *.bin to *.cli
13. Reboot the computer.
14. When your PC detects the AWE64 and asks for a CD-ROM or diskette, do not insert it. Instead, click on the BROWSE button and go to the directory where you unzipped the *SBW9XUP.EXE* file.
15. Let your PC pull the drivers from there.

Once your computer pulls the drivers and finishes booting to *Windows*, you should have everything installed correctly.

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; e-mail doctor@arrl.org QST

By Bob Witte, KB0CY/7J1AUE

VHF FM Portable in Japan

Making ham radio part of your business or personal travels doesn't have to involve racks of gear and extra checked bags. As 7J1AUE discovered, an H-T and a reciprocal license provide a lot of international fun and goodwill. Konichi-wa, operator-san!

After visiting Japan a couple of times on business, I wondered what it would be like to make ham radio part of the package. After all, Japan is the source of most of the Amateur Radio equipment we use in the US and has more licensed operators than any other country in the world. On several trips between 1995 and 1998, I operated portable from Japan as 7J1AUE.

JA License Requirements

Japan's Ministry of Posts and Telecommunications (that country's "FCC equivalent"), issues reciprocal licenses (with 7J prefixes) to US amateurs based on the class of their US licenses (see Table 1). The tickets are normally valid for one year unless an applicant has permanent resident status, in which case a five-year license is available.

The Japan Amateur Radio League (JARL), the country's national Amateur Radio organization, can handle the required paperwork on your behalf. The JARL recommends that you send the application form, application fee and supporting documentation to them at least 60 days prior to your visit. At press time the application fee for a one-year reciprocal license is 120,000 yen ($100 assuming 120 yen per dollar). The renewal fee is 2500 yen (about $20).

Bands and Equipment

My main operating setups while in Japan usually involve portable VHF and UHF stations—small and flexible. Rigging HF antennas in hotel rooms might pose problems, so VHF seems the way to go.

Japanese hams have privileges on the same general VHF/UHF bands as US hams, minus 222 MHz. The JA 2-meter band extends from 144 MHz to 146 MHz, with the FM portion from 144.70 to 145.80 MHz. The FM calling frequency is 145.0 MHz. Because of the small 2-MHz frequency allocation, there are no 2-meter repeaters in Japan.

The 70-cm band covers 430 to 440 MHz, with the FM simplex portion extending from 431.4 to 434 MHz. The FM calling frequency is 433.0 MHz, with simplex channels at 20 kHz intervals (433.020, 433.040, 433.060, etc). Repeaters occupy 434 to 435 MHz and 439 to 440 MHz, with a 5-MHz transmit/receive offset. The 430-MHz band is very popular in Japan. It's a lot like 2 meters in the States. The popular 1.2-GHz allocation, extending from 1260 to 1300 MHz, has its share of repeaters, too.

My "suitcase compatible" station is a dual-band hand-held transceiver (Kenwood TH-79A). Many FM transceivers sold in the US do *not* cover the JA 70-cm band. To get around this I performed a modification to my rig to allow it to transmit on the 430-MHz part of the band. This subband *is* allocated to US hams, but we use it for modes other than FM, including ATV, CW and SSB.

On business trips I usually take my notebook PC that has a compact 12-V power supply that's capable of operating from all international power sources. To power the Kenwood rig I made an adapter cable that feeds12 V from the power supply. The ac mains in Japan run 100 V (at 50 or 60 Hz, depending on location), so not all US power supplies or other equipment will function there.

My 2-meter and 70-cm antennas consist of compact 1/2-wave verticals with BNC connectors. A remote speaker/mike provides additional operating convenience.

Because my business travels usually take me to high-rise hotels in major Japanese cities, my usual technique is to position the antennas near the window, which gives me a great line-of-sight signal out over the city. Sleeping on an upper floor is a great advantage when it comes to achieving a commanding "height above average terrain!"

Operating Procedures

When I first considered the idea of operating in Japan, I received advice from a variety of people, mostly via e-mail. I also came across an article by N3JMM about his experience operating in Japan.[1] Some people warned me that VHF/UHF operation was

Table 1
Japan Amateur Radio License Classes

License Class	*Privileges*	*Requirements*	*US Reciprocal License*
First Class	All privileges at 1kW output written exam	12 WPM Morse code,	Amateur Extra
Second Class	All privileges, but 200-W power limit	9 WPM Morse code, written exam	Advanced, General
Third Class	All privileges except 10 and 14 MHz bands with a 50-W power limit	5 WPM Morse code, Written exam	Technician Plus
Fourth Class	All privileges except 1.8, 10, 14 and 18-MHz bands, with a 10-W power limit below 30 MHz and a 20-W power limit above 30 MHz	Written exam only	Technician

Resources

Tokyo International Amateur Radio Association (TIARA)
PO Box 119
Akasaka, Minato-ku,
Tokyo 107 Japan
http://www.qsl.net/~7j1ajh/tiara.html
TIARA is an Amateur Radio club for foreign hams in the Tokyo area.

Japan Amateur Radio League
International Division
1-14-2, Sugamo, Toshima-ku,
Tokyo 170 Japan
http://www.jarl.or.jp
intl@jarl.or.jp

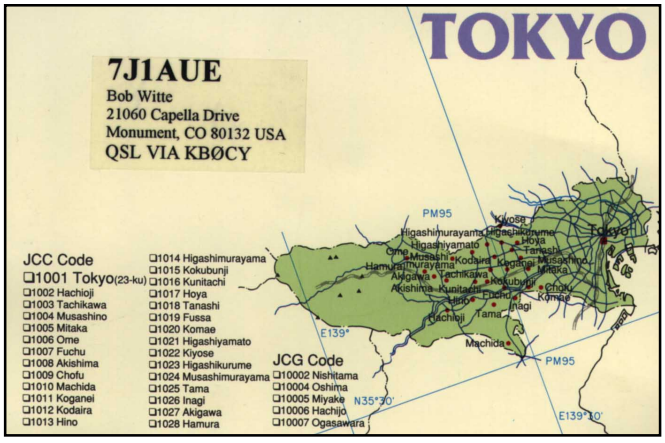


Figure 1—My 7J1AUE QSL card is made from a generic card found in greater Tokyo.

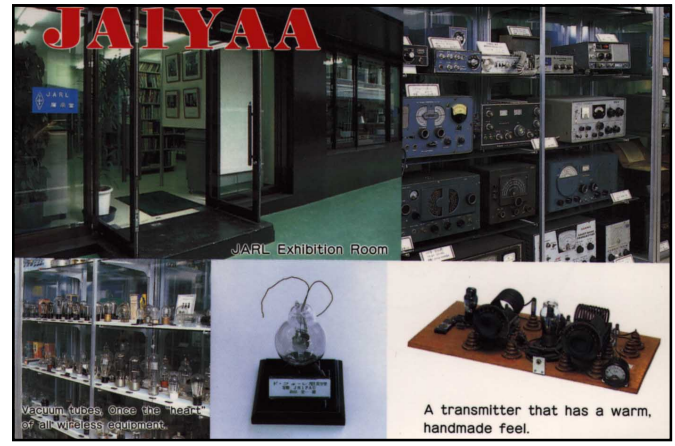


Figure 2—The QSL card from the JARL station and JARL Exhibition Room at JARL headquarters.

nearly impossible because of the language barrier (I don't speak Japanese). This was a potentially serious problem, but I have worked many English-speaking JA hams on the HF bands, so I decided to give it a try.

Tuning around my chosen bands revealed only a smattering of English. For this reason I stayed away from repeater frequencies, where I would need to be able to understand the flow of the conversation before becoming involved. I opted to concentrate on simplex instead. This worked well because there is considerable FM simplex activity in Japan.

Interestingly, the protocol for operating simplex is quite different from that used in the US. The calling frequency plays a much more important role. It's similar to how the marine VHF calling frequency is used in the States.

An operator calling CQ transmits on the calling frequency and says something like "CQ CQ 430, this is Seven Japan One Alpha Uniform Echo listening on 3.10." The CQer then switches to the specified frequency, 433.10 MHz (3.10) in this case, to listen for calls. Of course, CQers need to make sure that the "working channel" is clear before calling, then switch to the calling frequency and call CQ.

This type of operation makes you appreciate the "call channel" button found on most Japanese transceivers. Japanese hams use a mixture of English and Japanese when calling CQ. "CQ CQ 430," with the call sign phonetics in English and the rest of the words in Japanese. The phonetics are generally of the standard ITU variety, with "Japan" a frequent substitute for "Juliet." Once you know the CQ/calling frequency protocol, figuring out the rest is pretty simple.

When I called CQ I often used the Japanese phrase "kochira wa" for "this is." I also attempted to say the frequency in Japanese by using my Japanese phrase book. In the end I abandoned that approach, concluding that anyone who would be able to talk with me would have a basic knowledge of English.

English is widely taught in Japan's school system, but without daily use, many people lose their fluency. On the other hand, English words have deeply penetrated Japanese culture, so around Tokyo you will see signs and advertisements that have embedded English words. American tourists often encounter Japanese residents who are eager to converse in English.

My experiences on Japan's VHF/UHF ham bands convinced me that most people weren't terribly comfortable working me on the air, most likely due to the language barrier. Almost every time I made a call, however, some brave soul would respond. As we struggled to understand each other, I assured them that their English was far superior to my Japanese. Many QSOs were very much like "rubber stamp" DX contacts—names, locations and call signs were about all that could be exchanged.

More often than not I ended up with a major pileup on my hands. My use of English and the 7J call sign immediately identified me as a foreigner. Not many 7J call signs show up on VHF/UHF, so many operators were eager to work me.

I made many contacts on 430 MHz but had little luck working other stations on 2 meters. Eventually, I abandoned 2 meters and worked 70 cm exclusively. Because my gear was FM-only, I left the SSB portion of the band unexplored. Perhaps on a future trip I can try the weak-signal modes.

Many of the JA hams I talked to were interested in getting a QSL card from me. I had found some generic cards in a ham radio store in the Tokyo area, so I was equipped to respond with a 7J1AUE QSL card (see Figure 1). I asked JARL members to QSL via my home call sign. As long as they marked the cards as going via KB0CY, the QSL bureau can handle them. I gave my address over the air to a few JA hams so they could QSL directly.

Other Tokyo Radio Activities

With or without a reciprocal license, every ham who visits Tokyo should make their way to the electronics shopping district, Akihabara ("Electric Town"). Stores in this amazing district sell every conceivable type of electronic product—everything from connectors to personal computers. There are a variety of shops that have connectors, components, test equipment, appliances, stereo equipment, ham gear and computers. I didn't find any great ham equipment bargains, and the models on sale were generally Japanese versions, which may not work well in the US (and may present warranty problems.—*Ed*). I did find, however, that there are many more accessory items available in Japan, often available at very reasonable prices.

The JARL has a small Amateur Radio museum at its headquarters (see Figure 2). This is accessed via the Sugamo Station of the Japan Rail system. Want directions? Simply walk out of the station and look for the ham antennas on a nearby tall building. If you can't see the antennas, try a different exit from the station. Finding a specific address is a difficult proposition in Tokyo, so don't leave the station area until you see the antennas!

Conclusion

My thanks go out to the Japanese operators who took the time to talk with me on the air during my visit. I was always greeted with enthusiasm and enjoyed every single QSO. It was great fun! My special thanks goes to Keita Negishi, 7L4WLW/AB2FT, who assisted with this article. Keita responded to one of my calls on 433 MHz in Japan.

The next time you find yourself headed to another country, think about making ham radio a part of the trip. Ham radio opens up new possibilities and provides valuable insights into how ops in other countries experience our shared resource—Amateur Radio.

[1]Michael J. Marcus, N3JMM/7J1AKO, "VHF/UHF Tokyo Style," *CQ Magazine*, December 1993.

21060 Capella Dr
Monument, CO 80132
kb0cy@arrl.net

By Billy B. Johnson, WB5RYB

Thanks for the Memories: Why Logging is Important!

Logbooks are handy for tracking awards, QSL cards, etc. But a carefully kept station log is also a complete history of your radio experience. If you invest a little time up front, you'll reap the future rewards that can only be gleaned from poring over a big stack of personalized radio history. Your history!

When I entered the Amateur Radio ranks as a Novice, keeping a detailed station log was required by the FCC. Each transmission required an entry in my station logbook noting the type of transmission, frequency, time and date. If I made a contact, call signs, station locations and contact dates and times were also required. Logging became a time-honored tradition for many hams.

In 1983, the FCC eliminated logging requirements for most amateur operations. Many hams immediately eliminated this clerical chore from their station activities. The feeling among these hams was that logging took time away from operating and added little in the way of immediate benefits.

These days, most new hams start as Technicians and get their first operating experience on local repeaters. Because most repeater contacts aren't logged, many beginners don't develop the "logging habit."

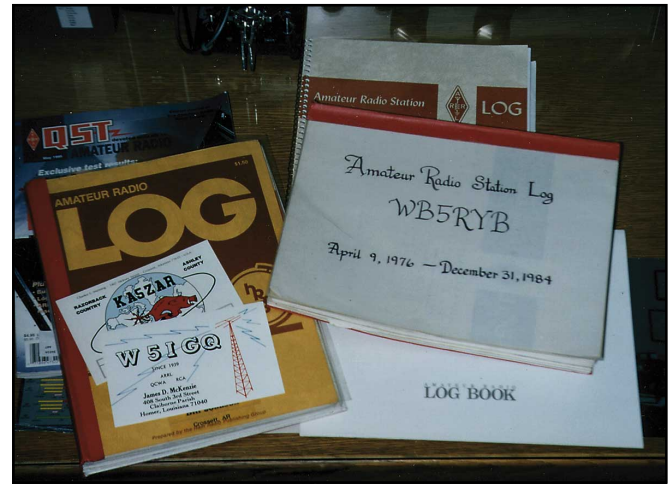
Minus the FCC requirements, logging habits vary from op to op. Some hams still faithfully log every contact, others log only interesting QSOs or DX contacts and some don't log at all. Most mobile contacts never make it into a log.

Although logging is no longer required, there *are* several advantages to keeping a detailed station log. If you're chasing awards or wallpaper, a log is almost a necessity. If you enjoy sending and receiving QSL cards, some method of recording and/or tracking cards sent and received really helps the process.

Fortunately, today we can keep traditional logs or let our personal computers handle the paperwork. Computers offer the flexibility of storing and retrieving information by call sign, QTH, date of contact, etc (see Figure 1). This "data sifting" capability is especially helpful if your log contains hundreds or thousands of contacts and you want to find information about a specific station.

Some computer logging packages are quite sophisticated. They're actually complete station management systems. These software loggers talk to your transceiver, handle all logging chores, rotate your antennas, look up call signs and QSL routes on CD-ROM databases, and much more. They ask your radio for frequency and mode information and get the time and date from your computer's internal clock. Everything is logged automatically!

At my station, WB5RYB, I use manual *and* computer logs. All HF contacts—except contests—are logged manually in a standard *ARRL Logbook*. Although I prefer manual logging, I find the computer useful in tracking the sent/received status of the QSL cards I need for various awards. I also use the computer to prevent dupli-



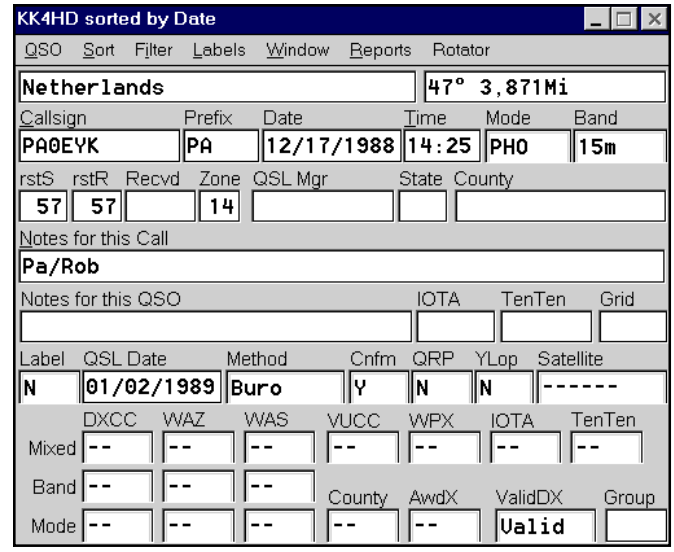
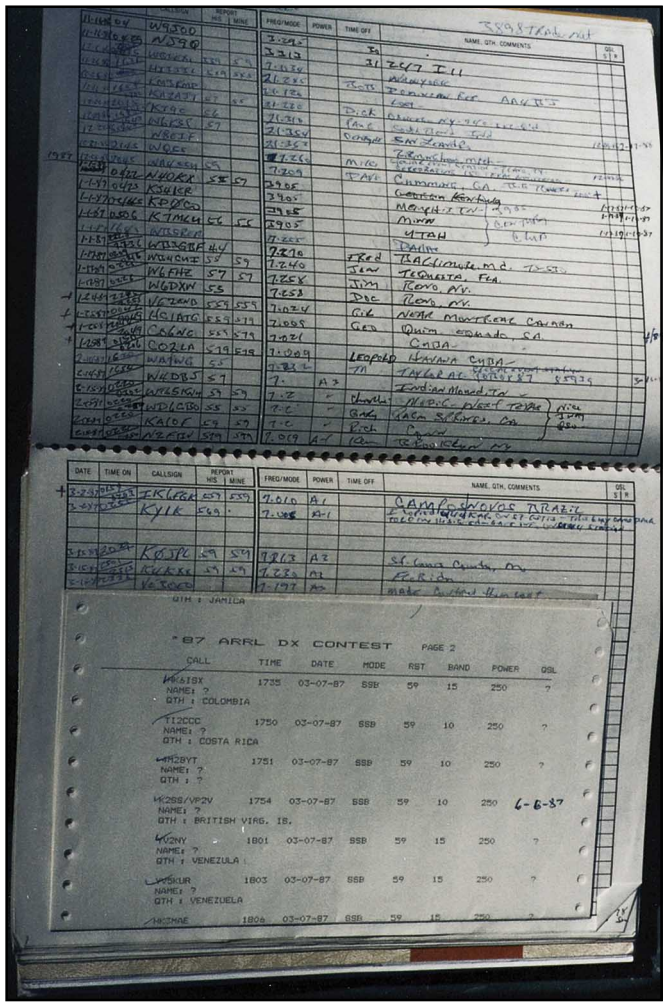
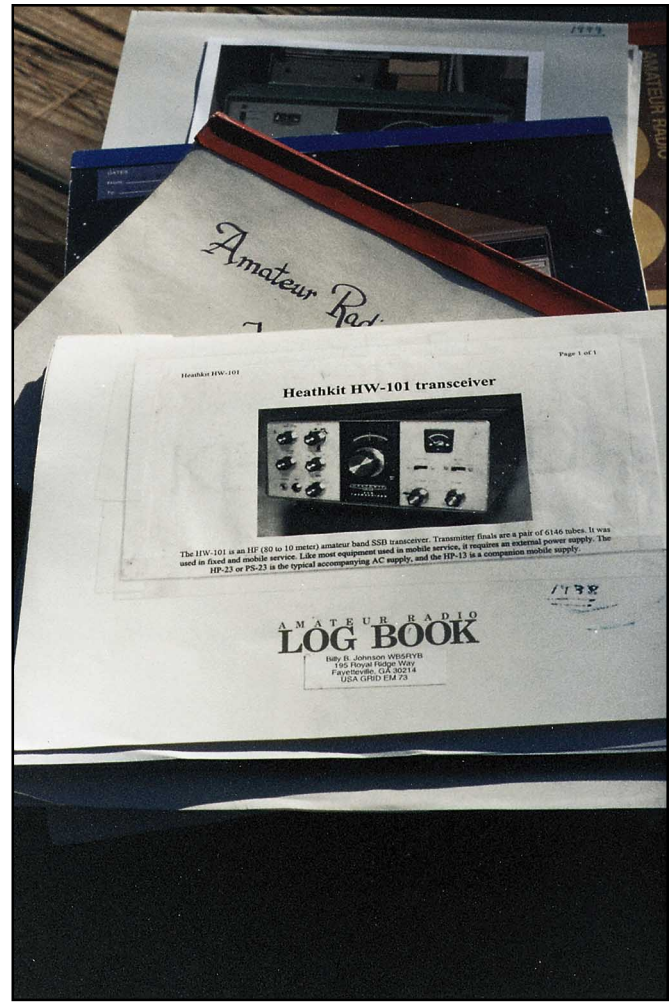


Figure 1—Computer-based logging programs such as *DX4WIN* make it easy to put your PC to work as a capable station assistant. See the advertising pages of *QST* or the *National Contest Journal* for other logging software vendors.



Your log can also double as a scrapbook, holding samples of contest logs, for example.



It's fun to include a photo or magazine advertisement for the radio you were using at a particular time. Additions like these turn your log into a rich depository of your personal history.

cate contacts on 3905 Century Club and OMISS nets. And when it comes to contesting, computer loggers are the only way to fly!

I've tried several "canned" logging programs and found that most work well. Because of my operating style and the information I like to enter, however, I prefer manual logging. At this stage of my life, finding time to operate is a major problem. I'm often on the air for a quick contact or two, and in these instances I find that it's much faster and more convenient to manually jot down a log entry than it is to turn on the computer and boot up the program.

Another reason I prefer manual logging is the type of information I like to include in my logbooks. I often enter more than just the name, QTH, time, date and signal report. I record things such as rigs, antennas, weather conditions, counties, grid squares, propagation conditions and other QSO information that I find interesting. I have several classic "boat anchor" rigs, and I always make note of which radio I use during a QSO.

There are many good logbooks available. My favorite is published by the ARRL. It's user-friendly and printed on only one side of the page.

Beyond the Basics

My logbook is really a logbook, scrapbook and notebook rolled into one. It also serves as an ad hoc diary to record my feelings on various contacts and other ham radio topics. In addition to the usual logbook fare, I often include interesting magazine articles, results of my antenna tests, frequencies and times for my favorite nets, propagation conditions as reported by WWV, and so on. I also occasionally include letters I've received from other hams, pictures they've sent, and other goodies. I tape these items to the blank (back) sides of the pages.

I'm infatuated with propagation and the effects it has on radio operation. I often record the sunspot numbers and the A and K indexes as reported by WWV. It's fun to look back five years to see how conditions have changed. I enjoy contesting, too, so it's interesting to see how propagation has affected my scores from year to year. When I work rare DX stations I like to record propagation conditions in the log. It's fun to track propagation effects through a complete sunspot cycle.

Once I accumulate several full logbooks, I take them to a local printer who binds them in chronological order. These log "books" contain the complete operating history of WB5RYB and go back to 1976 when I signed my Novice call sign, WN5RYB, and was just discovering the wonders of our hobby. I often enjoy looking through them and reminiscing about past QSOs, contests or other events.

Buried in the musty pages are notes describing the joy and excitement I felt when I upgraded from Novice to General. They also contain details of my first phone contact, notes on third-party traffic I ran for an exchange student from Argentina and the installation and testing of my 15-meter monoband Yagi. Also recorded are the thrills I experienced the first time I stayed up most of the night chasing DX on 20 meters.

These books contain records of contacts with hams aboard airplanes, ships, hot air balloons, motorcycles—and even a farm tractor! They have a detailed account of the time I assisted a

sailboat that got into trouble in rough seas off the coast of Peru. There's a record of the balloon *Double Eagle II* attempting a nonstop flight across the United States and being forced down by bad weather in Ohio.

These pages contain countless records of my weekly QSOs with two old friends, W5IGQ and KA5ZAR. There's a crude sketch of me in front of the rig, drawn by my son, Gary, when he was six years old. Also included are notes on the ham radio demonstration I gave to my daughter's Brownie Troop (many years ago). These logs even contain ham radio poetry that was written by a ham in St Louis, Missouri. Most of all, there are records of thousands of interesting and entertaining QSOs with hams the world over.

One of the things I have enjoyed most about ham radio is the camaraderie that exists among fellow operators. Before moving to Georgia from Arkansas, the hams in our local club gave me a going away party. I asked each one of them to sign my log.

These logs are also helpful in some very practical ways. When neighbors complain about TVI, I always ask for dates and times. My logbook usually reveals that I wasn't on the air at the time and couldn't have been responsible for the situation.

If I *was* operating at the time, my log quickly provides information about frequencies, antennas, radios and power outputs. This gives me a good reference point to determine if I can duplicate the interference and implement preventative measures to eliminate the problem in the future. The information in my log is always very helpful in analyzing interference problems.

Get Busy!

If you're not logging your contacts, I suggest you give it serious consideration. Logging takes relatively little time, provides a forum for recording your contacts and can be used to record valuable technical and personal information about your station and your ham radio experience.

A log, when kept up to date, provides an accurate history of your operating activities (and anything else you want to include). My suggestion on station logging is simple: Do what works best for you. If you enjoy computer logging, use a computer. If a pencil and paper are more to your liking, go traditional.

And don't be afraid to improvise. If your logbook doesn't have space for the information you want to record, be creative and innovative in your logging process. Design your own logging system and use it consistently. Seek out additional information about the ham on the other end of the QSO. Many times you'll find that you have other interests in common, such as restoring and operating older tube-type radios, contesting, photography—whatever.

Who cares if the FCC no longer requires station logs? Truth be told, keeping a detailed log can be one of Amateur Radio's finest and most satisfying aspects. Once you get the hang of it, I'm sure you'll agree. See you further down the log!

195 Royal Ridge Way
Fayetteville, GA 30214
bbjohnso@gapac.com

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 4 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.

By H. Ward Silver, N0AX

Test Your Knowledge!

Here are some questions designed to strengthen your on-the-air *savoir-faire.*

1. When operating SSB on 20 meters, the maximum frequency that your transmitter frequency readout should show is …
a. 14150.3 MHz c. 14230.0 MHz
b. 14347.0 MHz d. 14350.0 MHz

2. The lowest displayed frequency for SSB operation on 40 meters should be …
a. 7153 kHz c. 7200 kHz
b. 7175 kHz d. 7225 kHz

3. Novices have VHF/UHF privileges on 222 MHz and what other band?
a. 2 meters c. 1.2 GHz
b. 900 MHz d. 10.7 GHz

4. To determine whether your hand-held can generate enough signal to access a local repeater, you should …
a. activate the transmitter for a second or two, then listen for the squelch tail.
b. transmit while announcing "W1XYZ testing."
c. call CQ several times and then sign your call.
d. whistle into the mike several times and then say, "Hola....Hooooooola."

5. If you're a net control preparing to start a net session and a conversation is already taking place on the usual frequency, you should …
a. ignore them and start the net anyway.
b. break in and demand that they change frequency.
c. politely request that they change frequency and, if they refuse, start the net on a nearby frequency.
d. transmit obscenities until they leave.

6. It's good practice to sign "maritime mobile" whenever you're operating …
a. while towing a boat.
b. in a boat.
c. in international waters.
d. from a car in VE1.

7. "LiTZ" (Long-Tone-Zero) is used when …
a. activating an autopatch to order pizza.
b. beginning an important contact.
c. testing transmitter output.
d. notifying listeners of an emergency.

8. Which letter of the alphabet has only one commonly used phonetic?

9. True or False
a. It is illegal to transmit directly on top of a broadcast station transmitting from Region 1 on 40 meters.
b. Fast-scan television is not permitted on the amateur HF bands.
c. The power limit on 30 meters is 200 W.
d. Regulations require both stations to identify every 10 minutes during a conversation.
e. Letting an unlicensed person operate your station is "third-party traffic."

10. What is a calling frequency?
a. Where the DX station is listening.
b. Where the DX station is transmitting.
c. A frequency to make many rapid contacts.
d. A frequency to arrange or schedule contacts on nearby frequencies.

11. If the FCC declares a communications emergency and designates a particular frequency for emergency traffic, how long is that frequency dedicated to emergency use?
a. 24 hours
b. 48 hours
c. until the FCC lifts the emergency
d. until FEMA is on the scene

12. If someone says your signal is "broken up," what does that probably mean?
a. Your audio is intermittent.
b. You are suffering from depression.
c. The power in your house is going on and off.
d. Someone is interfering with your signal.

Bonus: Off what do "ping jockeys" jockey pings?

Total Your Score!

There are a total of 16 possible answers in this quiz, not including the bonus question. Give yourself one point for each correct answer.

11—16	You've achieved *le plateau* of operator knowledge!
6—10	Your skills are a bit shaky, but acceptable.
1—5	Ouch! Time to find an Elmer or a good study guide.

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Vashon, WA 98070

Answers

1. b—Anything higher than that and your upper sideband signal may start spilling out of the band. Most transceivers show the frequency of the amplitude-modulated carrier!
2. a (see above)
3. c
4. b—Unidentified transmissions are quite annoying and illegal.
5. c—Be polite and remember that no net "owns" a frequency.
6. c
7. d—Pressing the "0" DTMF key for three seconds or longer will activate LiTZ decoders and alert listeners that you have an emergency situation
8. X—The universal phonetic is "X-Ray"
9. F, T, T, T, T
10. d—Establish contact on the calling frequency, then quickly move the conversation elsewhere.
11. c
12. a—Faulty mike cables or connectors are prime suspects for intermittent audio.

Bonus: Ping jockeys listen for brief signal bursts (pings) that are reflected from the ionized trails of meteors as they burn in the atmosphere.

Edited by **Joe Bottiglieri, AA1GW** • Assistant Technical Editor

The Kenwood TS-570S(G) HF/6-Meter Transceiver

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

An evaluation of the Kenwood TS-570D HF transceiver appeared in a *QST* product review in January 1997. Since that time some additional refinements have been made to this series. Shortly after that issue of *QST* hit the streets, Kenwood released a second version—the TS-570S. The 'S version of the radio was nearly identical to the 'D—the only difference being the addition of all-mode capabilities on the 6-meter band.

Just a few months ago, Kenwood announced a second generation of this already popular transceiver series. These new units are now designated "G" versions. Two separate models are still available—the TS-570D(G) for the HF bands, and the TS-570S(G) covering both HF and 6 meters.

This time around we'll be concentrating primarily on the changes made in the G versions, and presenting lab measurement data and some operational details on the 6-meter capabilities of the TS-570S(G). The HF performance specifications of the new units remain virtually unchanged from those of the previous review's TS-570D. The lab data presented in Table 1 for all bands other than the 6-meter band is data taken directly from that review (spot checks of our new unit confirmed very similar HF performance).

If you're considering purchasing any radio in this series you'll definitely want to have a look at the earlier review. Members can view that article (or reviews on any equipment that we've covered in the *QST* product review column since January 1980 for that matter) and an Expanded Test Result Report free of charge on our Member's Only Web site.

Non-members, or members without Internet access, can order paper copies for a nominal fee through the ARRL Technical information Service (860-594-0278 or **reprints@arrl.org**). Members receive a discount on these reprints. Additional lab test data on 6-meter band performance and the enhanced DSP capability of our product review '570S(G) is available as an Expanded Test Result Report.

Those who purchased the initial versions of these radios will be pleased to hear that the new capabilities offered in the G versions can be retrofitted to the earlier units by Kenwood's service facilities (currently $125 plus shipping). 6 meters, however, can not be added to either the D or D(G) models.

6-Meter Capabilities

The TS-570S(G) provides 100 W all-mode band coverage (25 W AM) from 160 through 6 meters and an extended general coverage receive range of 0.5 to 60 MHz. The built-in antenna tuner also works on 6 meters, and comes in very handy for matching a single 6-meter antenna across the relatively wide 4 MHz range between 50 and 54 MHz. The tuner is also effective for employing a number of antennas intended primarily for HF, such as 40 and 80-meter dipoles for example, on 6 as well.

Outputs are provided for two separate coax feedlines. Either can be assigned to any combination of bands—making it convenient to connect different antennas for HF and 6 meters.

For FM repeater operations, all versions of the '570 include CTCSS encode *and* decode built-in. Many of the repeaters on both 6 and 10 meters use CTCSS to control the interference between repeaters that commonly occurs when these bands are open. Operating frequencies for repeater inputs and outputs are entered independently using the same arrangement used for split VFO operation on the HF bands (not by setting offset and duplex as is common with the hand-helds and mobiles). CTCSS settings and repeater frequency pairs can be stored in any of the unit's memories. Independent CTCSS tones for transmit and receive on a single frequency or repeater pair, however, are not available.

As we mentioned in the earlier review, these transceivers have built-in features that make them well suited for use as an IF with external VHF and UHF transverters. These include a display arrangement that corrects the frequency readout to indicate the resulting operating frequency for 6 and 2 meters and 70 cm, and a system that automatically reduces the transmitter power output to a more manageable 5 W.

Couple this with the 'S version's 100 W all-mode 6-meter output and the radio's built-in digital signal processing, CW memory keyer (an optional voice recorder is also available) and compact size—and this unit could serve nicely as the backbone for a roving or hilltopping station for VHF/UHF contesters.

Bottom Line

The new G versions of the popular TS-570D and TS-570S add significant new features to these already nicely-equipped mid-priced transceivers.

What's New?

I happened to have access to an early production unmodified TS-570S. This gave me the unique opportunity to set up the new G version side by side with a first generation unit.

The G version includes a handful of new abilities and improvements on some of the original features. One of the more notable changes is an enhancement of the NR1 DSP noise reduction feature, used primarily on SSB. In the earlier model, the SSB noise reduction works well, but imparts the typical watery audio quality common in most of the current DSP implementations. In the new G version, a menu item has been added that allows you to vary the amount of noise reduction employed. While on the earlier radio I often found myself leaving NR1 off except under extreme conditions, with this new flexibility I can strike a balance between the amount of noise reduction and the resulting reduction in the overall audio clarity. There's also an "auto" setting that varies the level of noise reduction based on the signal strength.

Table 1

Kenwood TS-570S(G), serial number 00600059

Unless otherwise noted, HF specifications and measurements were taken from an earlier review of a TS-570D, serial number 80600403 (see text).

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 500 kHz–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. TS-570S(G) adds 30–60 MHz on receive and 50–54 MHz on transmit.	Receive, 0.3–30 MHz (0.3-60 MHz for TS-570S(G)); transmit, as specified.
Modes of operation: USB, LSB, CW, AM, FM, FSK.	As specified.
Power requirement: Receive, 2 A (no signal); transmit, 20.5 A, at 13.8 V.	Receive, 0.8 A (max volume, no signal); transmit, 18 A (max), tested at 13.8 V.
Size (HWD): 3.8×10.6×10.6 inches; weight, ≈15 lb.	
Receiver	*Receiver Dynamic Testing*
SSB/CW/FSK sensitivity (bandwidth not specified, 10 dB [S+N]/N): 0.5-1.7 MHz, 4 μV; 1.7-24.5 MHz, 0.2 μV; 24.5-30 MHz, 0.13 μV; TS-570S(G) only, 50-54 MHz, 0.13 μV.	Minimum discernible signal (500-Hz filter): *Preamp off* / *Preamp on* 1.0 MHz: –113 dBm / –121 dBm 3.5 MHz: –132 dBm / –140 dBm 14 MHz: –130 dBm / –139 dBm 50 MHz: –128 dBm / –141 dBm
AM sensitivity (bandwidth not specified, 10 dB [S+N]/N): 0.5-1.7 MHz, 31.6 μV; 1.7-24.5 MHz, 2 μV; 24.5-30 MHz, 1.3 μV; TS-570S(G), 50-54 MHz, 1.3 μV.	10 dB (S+N)/N, signal 30% modulated with a 1-kHz tone: *Preamp off* / *Preamp on* 1.0 MHz: 8.4 μV / 3.3 μV 3.8 MHz: 1.05 μV / 0.4 μV 53 MHz: 1.43 μV / 0.38 μV
FM sensitivity: For 12-dB SINAD, 28-30 MHz, 0.25 μV; TS-570S(G), 50-54 MHz, 0.25 μV	For 12-dB SINAD: preamp off, 29 MHz, 0.6 μV; 52 MHz, 0.79 μV; preamp on, 29 MHz, 0.15 μV; 52 MHz, 0.19 μV.
Blocking dynamic range: Not specified.	Blocking dynamic range (500-Hz IF filter): *Preamp off* / *Preamp on* 1.0 MHz: 114 dB* / 115 dB 3.5 MHz: 114 dB* / 119 dB* 14 MHz: 115 dB* / 115 dB* 50 MHz: 108 dB* / 106 dB*
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range (500-Hz IF filter:) *Preamp off* / *Preamp on* 1.0 MHz: 86 dB / 91 dB 3.5 MHz: 99 dB / 99 dB 14 MHz: 98 dB* / 97 dB* 50 MHz: 98 dB* / 88 dB
Third-order input intercept point: Not specified.	*Preamp off* / *Preamp on* 1.0 MHz: +19.5 dBm / +19.5 dBm 3.5 MHz: +17 dBm / +9.4 dBm 14 MHz: +21.7 dBm / +9.6 dBm 50 MHz: +21.0 dBm / –9.5 dBm
Second-order intercept point: Not specified.	14 MHz, preamp off, +60 dBm; preamp on, +59 dBm.
FM adjacent channel rejection: Not specified.	Preamp on, 29 MHz, 68 dB; 52 MHz, 66 dB

The manual settings worked best for me.

All versions include a menu item that allows you to tailor the transmit audio characteristics. Settings include flat (or "off"), high boost, formant pass, bass boost and "conventional." A separate variable speech processor is also included. These are nice capabilities—the only problem is that with the earlier '570s, you can't listen to the resulting audio without a second receiver!

The G version now includes a transmit audio monitor. You can switch this on and vary the monitor audio output level through a menu setting. A sample of your transmit audio can now be monitored through the speaker or by using headphones. This feature is also very convenient for evaluating the performance of accessory microphones.

Curiously, the transmit audio equalizer menu item on the G now also includes a setting titled "U." The manual refers to this setting only as "Not *currently* available." Hmmm…

Another nice addition in the G is a receive audio equalizer. This allows you to perform the same types of audio shaping on received audio. Anyone who has spent extended periods of time operating, during contests for example, will appreciate the ability to vary the audio tone of the receiver occasionally. This can go a long way toward reducing fatigue as the hours roll on! This menu item also includes the mysterious "U" setting.

Just for the CW Operators

The G models have also added some new features particularly of interest to CW operators.

There's a new setting that allows you to manually adjust the CW weighting. The earlier versions have auto weighting—the ratio automatically tracks the keying speed. With auto weighting disabled, the previous models would default to 3.0:1. The new versions allow you to use the auto weighting *or* to manually adjust the weighting to your own preferences—16 ratios between 2.5:1 and 4.0:1 are available.

One of the most innovative features included in all the '570s is "CW Zero-Beat." Tune close to a CW signal, press the **CW TUNE** button, and the radio automatically tunes to and zero-beats the signal. The system works very well with all but the weakest signals or busiest band conditions.

In the G versions, the **CW TUNE** button can also be used to automatically set an RIT offset. A menu setting can unlock the transmit and receive frequencies of the "Auto Zero-Beat" system, allowing you to retune to CW signals without changing your transmit frequency, a very handy capability for net or roundtable operations.

All '570s use DSP to provide a wide range of CW filter bandwidths (optional conventional CW filters for 500 or 270 Hz are also available). The new units have even improved on this slightly. The originals included DSP-based bandwidths of 50, 100, 200, 300, 400 and 600 Hz and 1.0 and 2.0 kHz. The G versions add some welcome additional bandwidths of 80, 150 and 500 Hz.

Computer Controllability

As we mentioned in the earlier review, the 570 series radios include a built-in level converter for easy connection to your computer. Since that time, Kenwood has made available a very impressive *Windows*-based software package. You can download this free from Kenwood's Web site: **http://www.kenwood.net**. Download the software,

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
FM two-tone, third-order IMD dynamic range: Not specified	Preamp on, 20 kHz spacing, 29 MHz, 67 dB; 52 MHz, 62 dB; 10 MHz spacing, 52 MHz, 96 dB.
Noise reduction: Not specified.	NR1, ≈10 dB; NR2, ≈20 dB (at default 20 ms setting).
Beat cancel attenuation: Not specified.	50 dB or greater notch.
S-meter sensitivity: Not specified.	S9 signal at 14 MHz: preamp off, 94 µV; preamp on, 25 µV. 52 MHz: preamp off, 90 µV; preamp on, 12 µV.
Squelch sensitivity: SSB, CW, FSK, AM, 0.5-1.7 MHz, 20 µV or less; 1.7-30 MHz, 2 µV or less; FM, 28-30, 50-54 MHz, 0.25 µV or less.	FM, at threshold, 29 MHz, 0.04 µV; 52 MHz, 0.04 µV; SSB, at threshold, 14 MHz, preamp on, 0.4 µV.
Receiver audio output: 1.5 W at 10% THD into 8Ω.	2.1 W at 3.7% THD into 8 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW (500-Hz IF/600-Hz DSP): 258-769 Hz (511 Hz) CW (500-Hz IF/100-Hz DSP): 443-557 Hz (114 Hz) CW (500-Hz IF/50-Hz DSP): 470-530 Hz (60 Hz) USB wide: 286-2433 Hz (2147 Hz) USB narrow (DSP controls at 12 o'clock): 404-1633 Hz (1229 Hz) LSB wide: 287-2428 Hz (2141 Hz) LSB narrow (DSP controls at 12 o'clock): 404-1626 Hz (1222 Hz) AM wide: 115-2670 Hz (2555 Hz) AM narrow:113-1270 Hz (1157 Hz)
IF rejection: 70 dB.	115 dB.
Image rejection: 70 dB.	109 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: SSB, CW, FM, FSK, 5-100 W; AM, 5-25 W.	SSB, 5-115 W; CW, 5-108 W (varies slightly from band to band); AM, 5-23 W; FM, 5-109 W.
Spurious-signal and harmonic suppression: 50 dB.	As specified. Meets FCC requirements for spectral purity.
SSB carrier suppression: 40 dB or greater.	As specified.
Undesired sideband suppression: 40 dB or greater.	As specified.
Third-order intermodulation distortion (IMD) products:	See Figure 1.
CW keyer speed range: Not specified.	Approximately 10-75 wpm.
Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.	S9 signal, 50 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	SSB, 18 ms; FM, 14 ms.

Unless otherwise noted, all dynamic range measurements are taken at the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise-limited at the value indicated.

Expanded Product Review Report Available

The ARRL Laboratory offers a detailed test result report on the Kenwood TS-570S(G) that gives in-depth, technical data on the transceiver's performance. Request the *TS-570S(G) Test Result Report* from the ARRL Technical Department, 860-594-0278; e-mail **mlevesque@arrl.org**. Members can see this on-line on our Member's Only Web site.

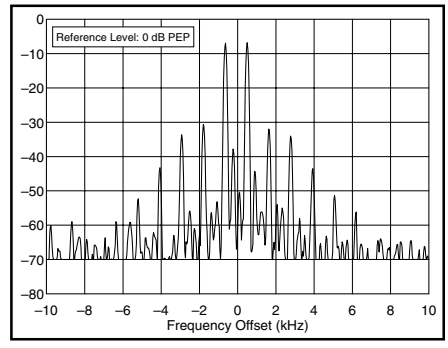


Figure 1—Spectral display of the TS-570S(G) transmitter during two-tone intermodulation distortion (IMD) testing on 6 meters. The worst-case third-order product is approximately 32 dB below PEP output, and the worst-case fifth-order product is approximately 35 dB down. The transceiver was being operated at 100 W output at 50.2 MHz.

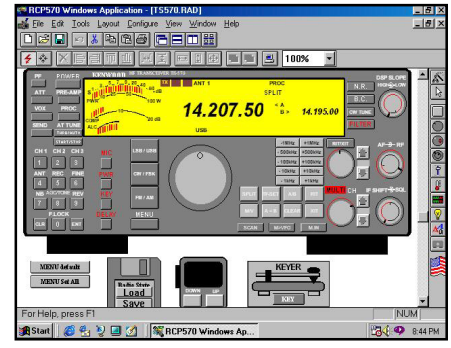


Figure 2—The Kenwood RCP570 control software displays a virtual front panel nearly identical to that of the actual transceiver. Extensive documentation in the owner's manual and the software package should be very helpful to those interested in developing their own control software.

install a common computer interconnect cable between the male DB-9 connector on the back of the transceiver and the COM port on your computer, load the software and you're ready to go—no additional interface hardware is required.

The software displays a virtual representation of the front panel (see Figure 2). While under computer control, you can use either the actual front panel switches and knobs or the mouse and virtual front panel to operate nearly any control on the radio—even the rotary controls such as the volume, squelch and DSP slope settings for example.

The presently available version of the software was designed for the earlier radios. It does not yet include the program modifications necessary to operate the expanded features in the G versions.

The Future?

The improvements made in the new G versions of the TS-570s are subtle but significant—those who purchased the earlier radios will certainly want to consider sending them in for updating.

Kenwood's willingness and ability to install these added capabilities into the earlier existing TS-570D and S models is certainly noteworthy. These changes do not reflect corrections of significant operational defects in the original units—they are simply improvements that further refine an already well-designed product. Will the time come when the processors or internal control and applications software included in most amateur transceivers become user updateable?—Perhaps.

Modern electronics and computer-based products continue to evolve rapidly. What a great time to be a Ham!

Manufacturer: Kenwood Communications Corp, 2201 E Dominguez St, Long Beach, CA 90801; tel 310-639-5300, fax 310-537-8235; **http://www.kenwood.net**. Manufacturer's suggested retail price, $2070. Typical current street price, $1400.

The Yaesu VX-5R Tri-band H-T

Reviewed by Jay Mabey, NU0X
Assistant Contest Manager

Its small size and rugged construction struck me the minute I unpacked this little radio. Leafing through the documentation revealed an impressive range of features. The VX-5R is a *tri*-band transceiver covering 6 meters, 2 meters and 70 cm. In addition, it receives AM broadcast, AM shortwave broadcast (up to 16 MHz), FM broadcast, AM aircraft, a couple of additional ham bands, public service and television audio. This translates to 0.5 to 16 MHz, 48 to 729 MHz and 800 to 999 MHz (cellular blocked, of course).

The VX-5R's 220 regular memories, 3 home channels, 10 sets of band-edge memories and five 24-channel memory groups allow plenty of memory storage and provide a very good measure of scanning flexibility. All this is squeezed into a chassis that could hide behind a deck of playing cards.

While several very small H-Ts—some including expanded receive capability—have hit the market in the last couple of years, these typically sacrifice the convenience of a full DTMF pad and have reduced output power levels. With the VX-5R, Yaesu splits the size gap between the subcompacts and the typical compact dual-banders—and tosses in full power output, a DTMF pad *and* 6-meters to boot!

Packing all this (and lots more) into a transceiver this size, of course, comes at a price. The hefty 72-page well-written manual is a "must read." The 20 buttons and the rotary encoder knob are the epitome of multitasking. Nearly every key has several duties, and the encoder dial is used to vary a wide variety of settings.

The cabinet construction is diecast aluminum. Here's a little radio that could potentially do more damage to an object it was dropped on than to the unit itself. I definitely would not want to fumble it onto an exposed toe! This transceiver is ready to rough it on the trail, pull active public service duty or discreetly hitch along on a trip to the local mall.

Though the keypad buttons are understandably small, their shape and spacing makes radio operation and programming reasonably easy. Even with the full keypad, this unit still uses a huge menu—45 selections in all—to control most features and settings. Each menu item is alphanumerically titled with up to 15 characters for easy identification.

The unit uses a dot-matrix LCD display. Active features are indicated by 12 icons in a single row along the bottom edge of the window. Display characters can be set to "large" (for us aging baby-boomers) or "small." In the small mode you can display VFO A and B frequencies simultaneously. You can customize the display with an extensive selection of icons. Alphanumeric memory naming, up to 8 characters in length, is also available, and tagged memories show frequency, memory channel number and name simultaneously.

The keypad and display panel is backlit in "red"—very cool—and easy on night vision, too. One problem I encountered during nighttime use, especially as I was becoming more familiar with the various programming sequences, was that in the default mode the backlighting only remains on for 5 seconds after you press any key or turn the encoder. Fumble-fingered Jay had some trouble pushing the key sequences rapidly enough to complete the necessary steps in time! This was remedied by changing a menu selection that allowed me to toggle the backlighting on or off with each press of the lamp button. A third option lets you activate the lighting for 5 seconds only when the lamp button is pressed (conserving battery power).

The VX-5R has several features intended to extend battery life. These include commonly employed methods such as four power output settings (with a setting as low as 0.3 W), a receive battery saver, a transmit time-out timer and automatic power-off. Some of the more innovative arrangements include a menu setting to turn off the top mounted red/green transmit/receive LED and a transmit battery saver which will automatically reduce the power output of the transceiver if the signal last received was very strong. There is also an automatic power-on feature that can turn the unit on after a programmed time interval (up to 24 hours). You can activate a display that indicates the total receive and transmit time since the transceiver was last turned on. Battery voltage can be directly displayed, and a two-stage low battery icon comes up when the battery is nearly depleted. The manual includes a table outlining approximate operating times with the Lithium-Ion or optional FBA-23 alkaline cell pack—averaging about 6 1/2 hours. These estimates are based on a duty cycle of 6 seconds transmitting, 6 seconds receiving and 48 seconds in squelched standby.

Bottom Line

With the VX-5R, Yaesu has managed to pack three bands, full power and extremely expanded receive coverage into a compact package that's rugged enough to meet the challenges of your active lifestyle.

On the trail the VX-5R can literally be a life saving device. The unit comes with a built-in thermometer and you can add an optional altimeter/barometer sensor. For hiking in the mountains, this radio would allow you to monitor your favorite SW, NOAA weather radio (10 preprogrammed channels) *and* broadcast AM, FM and TV frequencies (*search continues for local man lost in state park—film at 11!*). In addition, you could communicate using simplex or through repeaters—and personally keep track of changing terrain and local weather conditions. One limitation—the indicated temperature (in Celsius only) is a read-out of the internal case temperature of the VX-5R. You would probably want to leave the unit off and exposed for a while for a meaningful reading of atmospheric temperature.

I didn't use it in the White Mountains, but I did take it along on a day hike near a local reservoir and found it a useful accessory—kind of the electronic equivalent of a Swiss army knife. Alas, the product review VX-5R did not include the barometer/altimeter (SU-1) option. It would have been fun to take along a topographic chart and see if the altimeter feature would be useful for helping determine location. If Yaesu could add a flashlight, a compass and a flint to this thing I could rid myself of my daypack!

I used the VX-5R from home, while hiking and mobile. For mobile operations I picked up an SMA to BNC adapter (available as a Yaesu option or from various connector suppliers) and used my VHF/UHF mobile antenna. On 6 meters I was limited to using the supplied antenna. In all cases the radio received fine reports with no transmit audio distortion indicated no matter how close I spoke to the built-in microphone. Audio output is surprising loud for a unit this size and the receiver's sound quality is decent through most of the range of the volume control.

With the ability to crank out high power and its generously sized antenna the VX-5R never failed to turn in good signal reports. As might be expected, extended transmissions on high power do result in some considerable hand warming. The Lithium-Ion battery supplies very adequate operating time between charges. A rapid charger is included, and you can also charge the batteries or operate the radio using an optional car cord. A battery case for alkaline batteries is available as an accessory—certainly a useful alternative to the rechargeable battery if you intend to take this guy for an extended trip on the trails.

The incredible expanded receive coverage offers plenty of entertainment potential. AM broadcast receive is definitely limited by the compromise antenna, but was adequate for listening to several local stations.

Table 2

Yaesu VX-5R, serial number 8L010699

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency Coverage: Receive, 0.5-16.0 (AM), 48-59 MHz, 59-108 MHz (WFM), 108-137 MHz (AM), 137-174, 174-222 (WFM), 222-420 MHz,[1] 420-470 MHz, 470-729 (WFM), 800-999 MHz (cell blocked); transmit, 50-54, 144-148, 430-450 MHz.	Receive and transmit, as specified.
Power requirements: 10.0-16.0 V dc;[2] receive, 0.15 A; transmit, 1.9 A (max, high power). Size (HWD): 3.5x2.3x1.1 inches; weight, 9.0 ounces.	Receive, 0.48 A (max volume, no signal); transmit, 1.5 A, tested at 13.8 V.
Receiver	*Receiver Dynamic Testing*
Sensitivity: AM, 10 dB S/N, 0.5-16 MHz, 0.5 µV; WFM, 12 dB SINAD, 76-108, 174-222, 470-729 MHz, 0.9 µV; NFM, 12 dB SINAD, 50-54, 144-148 MHz, 0.16 µV; 430-450 MHz, 0.18 µV.	AM, 10 dB S+N/N, 0.5-16 MHz, 2.1 µV; WFM, 12 dB SINAD, 4.1 µV; NFM, 12 dB SINAD, VHF, 0.15 µV; UHF, 0.17 µV.[3]
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 52 MHz, 55 dB, 10 MHz offset from 52 MHz, 82 dB. 20 kHz offset from 146 MHz, 61 dB, 10 MHz offset from 146 MHz, 66 dB. 20 kHz offset from 440 MHz, 58 dB*, 10 MHz offset from 440 MHz, 65 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset from 52 MHz, 66 dB. 20 kHz offset from 146 MHz, 65 dB. 20 kHz offset from 440 MHz, 58 dB.
Spurious response: Not specified.	IF rejection, 21 dB;[4] image rejection, 52 dB.[5]
Squelch sensitivity: Not specified.	At threshold, VHF, 0.10 µV; UHF, 0.11 µV.
Audio output: 400 mW at 10% THD into 8 Ω.	661 mW at 10% THD into 8Ω.
Transmitter	*Transmitter Dynamic Testing*
Power Output: VHF, 5.0 W; UHF, 4.5 W; medium, low unspecified.	52 MHz, 5.3 / 2.3 / 0.88 W; 146 MHz, 4.4 / 2.1 / 0.9 W; 440 MHz, 4.3 / 1.9 / 0.74 W.
Spurious signal and harmonic suppression: 60 dB.	VHF, 66 dB; UHF, 65 dB. Meets FCC requirements for spectral purity.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, VHF and UHF, 80 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	VHF, 15 ms; UHF, 3 ms.

*Measurement was noise limited at the value indicated.
[1]"Action Band 1"—mode varies with frequency range within this segment.
[2]External dc. Battery is 7.2 V.
[3]Sensitivity (both AM and FM) is generally good across all ranges. Figures reported here are worst case.
[4]For 52 MHz. IF rejection on 146 and 440 MHz was 79 and 75 dB, respectively.
[5]For 440 MHz. Image rejection on 52 and 146 MHz was 147 and 54 dB, respectively.

Expanded Product Review Report Available

The ARRL Laboratory offers a detailed test result report on the Yaesu VX-5R that gives in-depth, technical data on the transceiver's performance. Request the *VX-5R Test Result Report* from the ARRL Technical Department, 860-594-0278; e-mail **mlevesque@arrl.org**. Members can see this on-line on our Member's Only Web site.

Shortwave reception—especially in the evening—was great fun! The included antenna is good for listening to the major broadcasters—49 meters yielded a particularly wide selection. WWV broadcasts on 5, 10 and 15 MHz were typically readable—depending on propagation, of course. I added a few feet of wire, attaching it between sections of the antenna that thread together (more on this later). This increased signal strengths considerably and added even more new stations to explore. I couldn't help but tune through the HF ham bands, and soon found myself wishing for SSB and CW reception capabilities and considerably smaller tuning steps.

FM broadcast receive works well. Reception is about equal to the FM radio in my "Walkman." AM aircraft receive seems good, but I was close to the airport when I ran this check. Tuning around and listening to television audio, public service, commercial and ham communications kept me pleasantly occupied for hours!

The VX-5R is equipped with an automatic range transponder system. This allows like-equipped radios to "poll" one another—keeping track of (and alerting the user) when the radios move out of range of each other. This could be a useful feature for hunting and hiking trips or search and rescue operations. You can program a CW ID function that will identify these automatic transmissions with your call sign at 10-minute intervals. (Had to bring up good ol' FCC Part 97 somewhere…)

The transceiver can automatically set the repeater offsets for the 2-meter and 70-cm bands—very handy if your region maintains "standard" offsets. Odd splits and crossband splits can be entered and memorized. CTCSS and digital coded squelch (*DCS*) encode and decode is built in. Provisions for using independent tones or codes for transmit and receive on a single frequency or duplex pair are not included. Tone and code scan, for determining the CTCSS or DCS setting on a received signal, is available.

Some of the very early production VX-5Rs, including our product review unit, have a problem with the tone decode feature. While it works fine in most applications, if you are scanning through memories that include CTCSS tone squelch information, the scan fails to detect any activity on those frequencies. Yaesu is aware of the problem and will repair these units under the terms of their warranty. VX-5Rs presently shipped to stocking dealers are free of this defect.

The '5R also has a built in spectrum analyzer. It can display relative signal strength on five frequency steps above and five below the selected VFO frequency. You can set it up to make a single sweep and stop, or to scan continuously. In continuous mode, you can use the encoder knob to move the center frequency of the sweep up or down the band. Receive audio is muted when the unit is sweeping. Center the display on a signal peak, touch the PTT, and the sweep will stop. You'll be ready to operate on the active frequency.

Yaesu's "Smart Search" feature is also included. Activate this one and the radio will sweep the selected band above and below your center frequency and automatically program up to 31 active frequencies in memories set aside specifically for this purpose. This could be very useful for hams visiting a new area, or for scanner buffs "mining" a band in search of undiscovered activity.

In the area of construction I can offer but two complaints. The first was the plastic belt clip. It doesn't seem nearly sturdy enough to do justice to the overall rugged design of the VX-5R. While I didn't encounter any instances where the radio actually slipped off my belt, for my active lifestyle I would prefer a considerably beefier arrangement—something with gripping teeth and a bear-trap grade spring. The last thing I want to do is look down at my side and find the radio missing! (Especially one this small.)

My second gripe is the antenna. To use the VX-5R on all of its bands you must "adjust" the flexible rubber covered antenna. For 6-meter operation and to improve reception

on the lower frequencies, you unscrew a 1-inch long tip off the end of the 2-meter/70-cm SMA terminated antenna and screw on a 3 1/2-inch loading coil. Yaesu calls this "feature" an "innovative multi-section antenna." It seems unlikely that I'd be able to keep track of all these pieces for very long. My solution was to use a small padded zipped pouch as a radio jump-kit. I kept all the parts and accessories—and the manual—in the pouch when not in use. The only advantage of the screw-on coil design was that it makes it convenient to attach a few feet of wire for improved low frequency reception.

My overall impression of this radio?—I would buy one myself. I do a lot of coastal kayaking, hiking and other outdoor activities, and such a multi-talented (and very size conscious) radio would certainly be a welcome addition to my extremely limited "must take along" parcel of goodies. Once an overall familiarity with the manual and the well-named menu titles is achieved the VX-5R is a full featured, rugged, dependable and easy to use communications tool.

Manufacturer: Yaesu USA, 17210 Edwards Rd, Cerritos, CA 90703; tel 562-404-2700, **http://www.yaesu.com**. Manufacturer's suggested retail price, $429. Typical current street price, $350.

The ICOM IC-Q7A Dual-band H-T

Reviewed by Joe Bottiglieri, AA1GW
Assistant Technical Editor

Pocket-sized electronic devices are all the rage these days. Hand-held cellular telephones, personal data assistants, pagers—even entertainment devices, such as portable FM radios and various types of recorded media players—are shrinking at an alarming rate. We are seeing the same revolution in microelectronics that drives this trend affecting the products that appear in the Amateur Radio market.

Standard, with the introduction of their compact C108 H-T a few years back, helped prove that very low power transceivers could still be effective for local simplex and repeater use. Alinco—with its credit card sized DJ-C5T—has certainly secured the distinction of producing the smallest dual-band Amateur FM transceiver yet. Yaesu has further refined the subcompact concept with its VX-1R—adding considerably expanded receive frequency range, making their little radio an attractive product to the significant number of hams who also enjoy scanner and broadcast listening.

ICOM now enters the fray with the IC-Q7A, a 2-meter/70-cm low-power lightweight shirt pocket transceiver that also receives from 30 to 1310 MHz (less cellular 'phone frequencies—*jeepers, I'm tired of adding this!—Ed.*).

Selectable receive modes—FM, WFM or AM—are available throughout the entire range. You can listen in on broadcast FM, television, AM aircraft (including the military AM air frequencies), public service, commercial and four additional ham bands (50, 220, 900 and 1200 MHz) just to name a few. For those who enjoy radio listening, the 'Q7A is a veritable pocket-sized entertainment center!

This unit, as with most of the other subcompact H-Ts, uses a small number of controls and an extensive menu system to access the various operations. The front panel has a raised area on the left side that sports three uniquely shaped rubberized push buttons. The primary functions of these buttons are stepping through the bands and increasing or decreasing the volume. Four additional buttons on the front panel are labeled **CALL LOCK**, **V/M**, **SQL** and **POWER**. The only other buttons are the **PTT** and **FUNC** buttons located on the left side of the chassis.

A generously sized top-mounted knob serves as a frequency encoder/channel selector. The same knob adjusts the squelch level when used in conjunction with the **SQL** button, and scrolls through menu topics and changes settings in the set mode. A jack for a single pin four-section 3.5 mm plug for an external speaker/mike and a female SMA antenna connector are also located on the top panel.

In spite of the lack of direct keypad frequency entry, the tuning scheme for moving around in this unit's vast frequency landscape is really quite nicely implemented. The **BAND** button allows you to select seven different ranges. These are approximately 30-90 MHz; 90-142 MHz; 142-255 MHz; 255-383 MHz; 383-770 MHz; 770-940 MHz (please refer to the earlier editor's note) and 940-1310 MHz. Band stacking registers retain your last used VFO frequency in each band as you step through the others. Press and hold the side-mounted function button and each click of the encoder will step in your choice of 100 kHz, 1 MHz or 10 MHz increments. You can set the tuning dial rotation to be speed sensitive. As you spin the knob more rapidly, the tuning rate will automatically accelerate. Ten different tuning step sizes, ranging from 5 kHz to 100 kHz—including a 6.25 kHz setting—are independently selectable for each band. An RIT function for use above 835 MHz is also included.

Entering the set mode brings up an alpha-numerically tagged menu of the various settings parameters and their present states. The particular items that appear on the menu vary depending on whether the radio is in the memory or VFO mode. Additional seldom-needed settings are contained in a separate "expanded" section. All of the menu titles are easy to relate to their intended application—"TONE," "SKIP," "STEP," "OFFSET," "LIGHT" for example.

The radio is powered by two AA batteries. A pair of AA NiCds and a charging unit are included. The batteries must be removed from the transceiver and inserted into holders in the wall charger for recharging. The wall unit has slots for charging up to two pairs of batteries at the same time. Charging time for a pair of batteries is about 7 hours; two pairs take about 9 hours. One advantage of this arrangement is that it allows you to use common AA alkaline batteries without requiring the purchase of an accessory dry-cell battery case. Slip some alternative AAs into the radio and you can continue to use it while the NiCd batteries are charging. Additional or replacement NiCds—or disposable batteries for that matter—are relatively inexpensive and readily available. An icon in the display, appropriately shaped like a little battery, indicates full or half charge and will flash when the batteries are nearly exhausted. The transceiver does not include provisions for connecting to power from an external dc source—no optional car cord is available.

CTCSS tone encode, decode, tone scan and pocket beep are included. Independent transmit and receive CTCSS tones can be programmed on a single frequency or duplex pair. The 'Q7 offers an expanded selection of tones—50 as opposed to the usual 38. The tone scan feature allows you to listen to receive audio as the unit is searching for the proper tone. Most tone scan systems mute the audio while determining the tone. This lets you easily verify that there's a signal available for tone scanning.

DTMF capabilities for autopatch or remote control applications are not available. The unit is also incapable of crossband split frequency operation.

The documentation that's packed with the

Bottom Line

With its light weight, subcompact size and wide range of scanning and broadcast band receive capabilities, the IC-Q7A VHF/UHF FM transceiver is always a welcome and entertaining companion—at home, at work or on the go.

Table 3
ICOM IC-Q7A, serial number 02103

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency Coverage: Receive, 30.0-1310.0 (cell blocked); transmit, 144-148, 430-450 MHz.	Receive and transmit, as specified.
Power requirements: 3.0 V dc; receive, 0.17 A; transmit, 0.44 A (max, high power).	Receive, 0.19 A (max volume, no signal); transmit, 0.47 A.
Size (HWD): 3.4x2.3x1.1 inches; weight, 6.0 ounces.	
Receiver	*Receiver Dynamic Testing*
Sensitivity: AM, 10 dB S/N, 118-136 MHz, 0.56 μV; 222-247 MHz, 0.79 μV; 247-330 MHz, 1.4 μV; WFM, 12 dB SINAD, 76-108, 175-222 MHz, 1.0 μV; 470-770 MHz, 5.6 μV; NFM, 12 dB SINAD, 30-118 MHz, 118-175 MHz, 0.16 μV; 175-247 MHz, 0.22 μV; 247-330 MHz, 0.4 μV; 330-380 MHz, 0.32 μV; 380-470 MHz, 0.18 μV; 470-750 MHz, 1.0 μV; 750-1000 MHz (cell blocked), 0.32 μV; 1000-1200 MHz, 0.79 μV; 1200-1300 MHz, 0.5 μV.	AM, 10 dB S+N/N, 120 MHz, 0.52 μV; WFM, 12 dB SINAD, 100 MHz, 0.98 μV; NFM, 12 dB SINAD, VHF, 0.16 μV; UHF, 0.19 μV.[1]
Two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset from 146 MHz, 43 dB, 10 MHz offset from 146 MHz, 59 dB. 20 kHz offset from 440 MHz, 57 dB*, 10 MHz offset from 440 MHz, 65 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset from 146 MHz, 51 dB. 20 kHz offset from 440 MHz, 62 dB.
Spurious response: 60 dB.	IF rejection, VHF, 78 dB; UHF, 65 dB; image rejection, VHF, 96 dB; UHF, >134 dB.
Squelch sensitivity: Not specified.	At threshold, VHF, 0.21 μV; UHF, 0.35 μV.
Audio output: 100 mW at 10% THD into 8 Ω.	101 mW at 17% THD into 8 Ω.[2]
Transmitter	*Transmitter Dynamic Testing*
Power Output: VHF, 350 mW; UHF, 300 mW.	146 MHz, 370 mW; 440 MHz, 260 mW.
Spurious signal and harmonic suppression: 40 dB. for spectral purity.	VHF, 63 dB; UHF, 64 dB. Meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S9 signal, VHF, 160 ms; UHF, 150 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	VHF and UHF, 116 ms.

*Measurement was noise limited at the value indicated.
[1]Sensitivity does not meet specification in the range of 1000-1200 MHz. Typical sensitivity for that range was 1.0 μV.
[2]Volume increments in digital steps. Audio output at 8% THD was 88 mW.

radio includes a 38-page instruction manual and a small 4-page pocket-sized operating guide. The manual instructions are clear and easy to follow. Information is logically arranged and well indexed. The convenient pocket guide—though obviously not as detailed as the complete manual—covers all the important programming operations. ICOM does not include a schematic diagram, details on the wiring of the speaker/microphone jack or information on the connection requirements for packet operation.

Amateurs who are also scanning enthusiasts are treated to a wide range of capabilities that make this small unit an attractive alternative to a stand-alone hand-held scanner. In spite of its subcompact size, the IC-Q7A offers 200 memories in two selectable banks, six different scan configurations, three priority watch types and a system that can memorize unwanted active frequencies and skip them when scanning through a range of frequencies. The time duration that the scan will pause after activity ends can be varied between 2 and 20 seconds.

ARRL lab testing (see Table 3) confirms the very respectable published sensitivity specifications. While most transceivers with widely expanded receive have marginal performance on some bands, the 'Q7 turns in good numbers on all the ham bands in its range—and still manages to exhibit very nice sensitivity on the VHF, UHF and 800 MHz frequency ranges particularly important to the scanner fans. The unit meets or exceeds its published sensitivity specifications with the exception of the range between 1000 and 1200 MHz. The 1.0 μV we measured there still represents very good performance. 10 MHz two-tone, third-order IMD dynamic range measurements for 146 MHz indicate that this unit may experience problems with intermodulation. While I didn't observe any significant problems with intermod during my field testing, I would not recommend using this radio with high-gain base or mobile antennas.

On the air, the IC-Q7A works very well for short-range simplex and nearby repeater use. A couple of local repeaters were consistently workable from my living room couch. Transmit audio reports were very good—most were surprised to hear that I wasn't operating my usual ham shack transceiver. Receive audio is a bit anemic. While it's fine for couch potato operation if the TV volume is not up too high, using the radio outdoors or from the car I often found myself holding it up nearer to my ear rather than cranking up the volume and suffering the resulting distortion. The volume level was plenty adequate for casual ham and broadcast listening at my desk in our relatively quiet office area.

One particular operational annoyance is the force required to press the PTT and function buttons. Some advanced operations require that you press and hold the function button while using another control—this always required two hands.

The small size and light weight of the IC-Q7A makes it very convenient to drop it in a pocket and take it along—especially to those places where wearing a belt mounted transceiver may feel a bit conspicuous. The plastic belt clip is slightly curved and seems to do an excellent job of gripping the average belt. It snaps on and off the radio easily, making removal for when you intend to carry the transceiver in your pocket a simple operation. The included antenna may seem a bit long (at about 7 inches), but effective low-power operation requires decent antenna performance. Several of the aftermarket antenna manufacturers are now offering alternative antennas for SMA equipped radios.

Do you enjoy scanner and broadcast listening and desire a very small unit that's easy to take along? Do you find yourself often wishing you had a VHF/UHF transceiver with you on a more regular basis? Perhaps an IC-Q7A should be taking up permanent residence in one of *your* pockets.

Manufacturer: ICOM America Inc, 2380 116th Ave NE, Bellevue WA 98004; tel 425-454-8155, **http://www.icomamerica.com**. Manufacturer's suggested retail price, $239, Current typical street price, $205.

Hints & Kinks

Edited by ***Bob Schetgen, KU7G*** *• Senior Assistant Technical Editor*

This hint is a gem from the mines of South Africa! It tells how to resurrect old Yaesu FT-101s with 6146 finals. Thanks to *Radio ZS*[1] and the South African Radio League for letting us reprint it here.—*Ed.*

A NEW LIFE FOR YOUR FT-101

◊ Many amateurs who were active in the 1970s were proud owners of Yaesu's FT-101, a set that gave Yaesu a good name in the amateur fraternity and is still in use by many amateurs around the world.

If we look at the design of the early FT-101s, one of its drawbacks is the choice of low-cost TV "sweep" tubes in the output stage. Namely, a pair of 6JS6As and later, 6JS6Cs. These tubes were designed as high-power amplifiers at 20 kHz, for use in TV horizontal sweep circuits. Yaesu used them in FT-101s purely for their availability and low cost, whilst their opposition, Trio/Kenwood, opted for the superior 6146B tubes (S2001), which were specifically designed for RF application, in their TS-510, TS-515 and the TS-520. (Yaesu used 6146s the FT-101ZDs, which were more like baby FT-901s than FT-101s.—*Ed.*)

Today, however, the cost of 6JS6Cs is prohibitive, if you can find them, and many FT101s have been retired due to the high replacement cost of these tubes. Far-superior 6l46B tubes are available at a moderate cost, if not in most junk boxes.

In the October 1996 Issue of *Radio ZS*, my article on the modification of the FT-200 to take 6146s was published. In it, I mentioned that it should also be possible to modify the FT101 to take the same tubes, but I did anticipate a slight drop off in output power due to the lower plate voltage in the FT101, which is around 650 V.

Recently, I was given a Yaesu FT-101B for repair. After sorting out the many problems, mostly inflicted by amateurs who should not be allowed to take off the covers of amateur equipment, I found that the transmitter output was down to a couple of watts. I therefore decided that the set was a prime candidate for the modification. Before tackling this task, I fitted a 0.01-µF capacitor in series with C13 as a precaution. This 80-pF capacitor often becomes leaky, destroying the final tubes. A brand new set of 6JS6s was installed temporarily, just to check that the alignment was correct and the output power was 100 W.

Getting Down To It

Disconnect the power lead from the mains supply and remove the final tubes. Remove the bottom cover and screening plate over the PA and driver section. Locate the two 12-pin sockets and unsolder R14 (100 Ω), L4, C16, R12 and the black coaxial cable inner wire from the tube sockets. Unsolder all the ground connections, decoupling capacitors and the blue heater wires. Unscrew the four Phillips screws and remove the tube sockets. Fit two octal sockets with the keyway facing to the chassis center and wire the sockets as shown in Figure 1A.

Use the decoupling capacitors from the old sockets, between where indicated with an asterisk and the closest ground point. These capacitors have been left off the pictorial for clarity, but are shown in the schematic diagram, Figure 1B. As the 6146Bs require a greater screen-grid voltage than the original tubes, one must trace the orange wire from R14 (100 Ω) to the feedthrough capacitor (C35) and disconnect it from this point. Then connect it to a different feed-through capacitor, C30, which is the 300 V line for the 12BY7A driver tube.

Due to the lesser interelectrode capacitance of the 6146B tubes, two circuit modifications are necessary. In the original

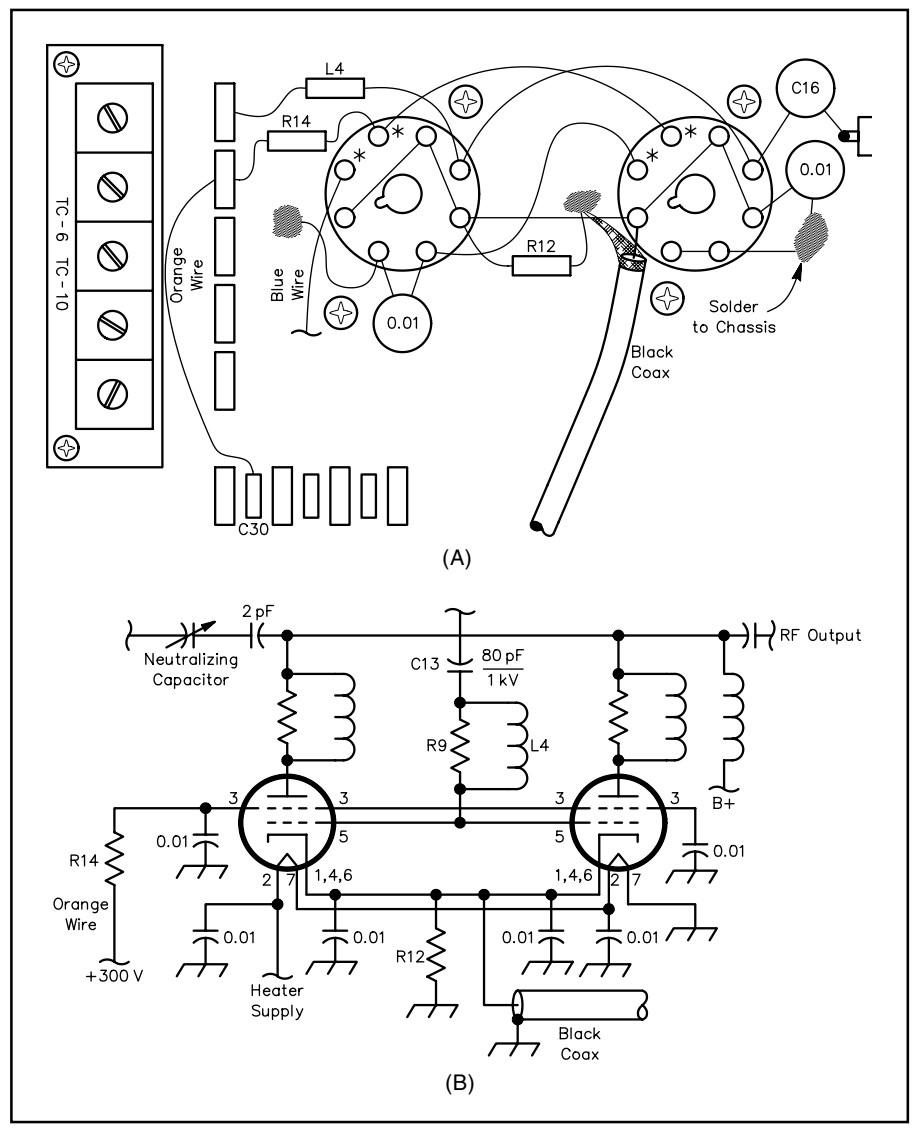


Figure 1—(A) a pictorial of the FT-101 PA compartment. (B) a schematic of the FT-101 PA circuit.

[1]R. Davis, ZS1J, "A New Life for Your FT-101," *Radio ZS,* August 1998, pp 12-13.

design, the permeability-tuned coil in the plate circuit of the 12BY7A, T103, is resonated on 10 meters using the input capacitance of the final tubes. Because this capacitance has now been reduced by almost 25 pF, we must compensate for the lost capacitance by introducing a small variable capacitance across T103.

Remove the two screws securing the circuit board with the trimmer capacitors, TC6 to TC10, to expose the terminals of coil T103. Solder a 20-pF trimmer capacitor across the two terminals and replace the trimmer board, but leave the screws loose.

Neutralizing Capacitance

The last modification is to reduce the neutralizing capacitance. Remove the 100-pF capacitor, C125, which is in the PA compartment and is connected between the top of the plate choke and the variable neutralizing capacitor. Replace this capacitor with a 2-pF capacitor and adjust the neutralizing capacitor to minimum capacitance from below the chassis.

The set is now ready for testing, switching and final alignment. Before switching it on, adjust the bias control fully counterclockwise. This control can be found on board PB-1314 (Regulation and Calibration Unit).

With the 6146Bs installed in their sockets, the plate connectors attached and the top screen fitted, power up the set and adjust the bias control for 60 mA in the SSB mode, but with no transmit audio. Switch the set off, turn it upside down and remove the two screws securing the trimmer board. Being careful not to short the board to the chassis, switch the power on and tune the set on 28.000 MHz with the preselector control at the beginning edge of the 10-meter mark. With an insulated alignment tool, adjust the installed trimmer across T103 for maximum drive, being very careful not to touch the loose trimmer board because there is high voltage on these components. This adjustment must be combined with the alignment instructions on page 25, section (3) paragraph two in the original instruction manual. Although no further alignment should be necessary on the other bands, the set should be checked for power output on all bands. Check and if necessary, adjust the neutralization as on page 24 of the manual.

If all modifications have been done correctly, you should have in excess of 100 W output on all bands.—*Roger Davis, ZS1J, PO Box 1099, Plettenberg Bay, 6600, Republic of South Africa*

CRAMPED QUARTERS OVERCOME WITH BAMBOO SKEWER AND STICKY COAXIAL WATERPROOFING GOOP!

◊ Have you ever been faced with the need to get some small part—a screw, a nut or a washer—into or out of an inaccessible spot? Well, your troubles are over!

One of the many items in my workshop is a bundle of bamboo skewers that are meant for cooking kabobs on the grill. These skewers are about $^1/_{16}$-inch in diameter and eight inches long with a point on one end. I use them for everything from cleaning melted solder out of a hole (for resoldering) to miniature dowels. Now I have found a further use for them!

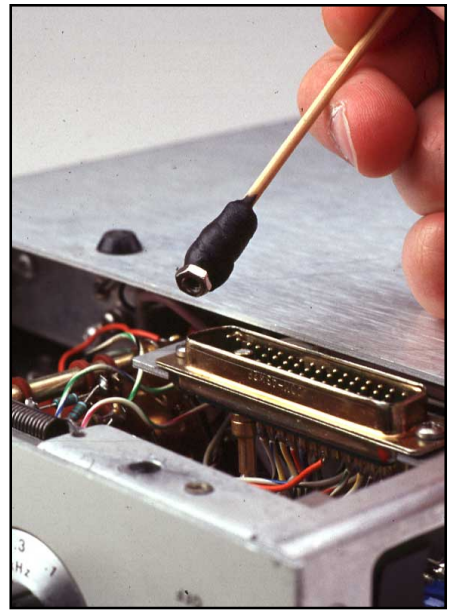


Figure 2—A small stick with connector sealant can pick up or hold a multitude of objects. It's a big help when starting threads.

One day I was trying to put a small "star" lock washer onto a bolt located far down inside my power supply. I tried long-nose pliers but to no avail. Because the pliers handles interfered with everything, I was continually dropping the washer into the "works."

I know that a magnetic wand sometimes works well, but it also requires that the object you are seeking is ferrous. (Besides, I don't have such a device.)

So on that lucky day I was casting my eyes around the shop for some other means (easy and simple), when I spied my roll of sealing tape (RadioShack #278-1645) designed to seal coaxial connectors. Remembering how sticky that stuff is, I put a small glob of it on the flat end of a skewer and my problems were over. I just picked up the star washer with the glob and placed it down into the close confines of my power supply (See Figure 2). I later found that you can pick up good-sized screws and nuts—even up to $^1/_2$-inch items—with the same procedures and you can start the threads by turning the skewer. This works on screws with either Phillips or slotted heads. It also works on wood, plastic, mica, glass, aluminum, etc. Boy is that stuff sticky!

Because space is at a premium in my shop and because storage and retrieval is becoming more difficult, I just throw away the skewer tool when I am finished. It is so cheap that I can make myself a new one when the next occasion arises.—*Glenn E. Yingling, W2UW, PO Box 62, Newark Valley, NY 13811-0062*

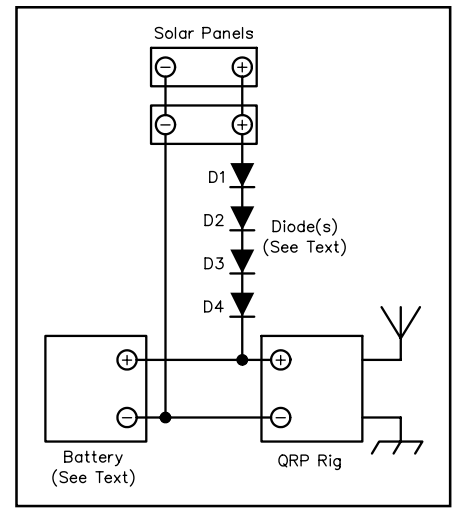


Figure 3—A diode string lowers 16 V solar-array voltage for use by radio and batteries.

A BACKPACKING SOLAR SUPPLY

◊ For backpacking, I use two small solar panels with 16 V, 0.290 A output. Paralleled, they easily produce over 0.5 A. (See Figure 3.) Isolation diode D1, plus dropping diodes D2, D3 (and as many as required) may be most any diode with a rating of 1 A at 50 PIV or more. RadioShack #276-1143 (3 A, 200 PIV) will put the charging in a good range for most batteries. To determine how many diodes to use, you should check the charge available *in full sunlight*. When you obtain a suitable charge rate with the QRP rig connected, the voltage is correct.

I built the prototype for friend WA5TYJ, who reports that it performs nicely. By using the battery for energy storage, ample power is available to operate his QRP rig. The solar panels can charge the battery and power the rig simultaneously when the sun is out. The battery takes over whenever there is insufficient sunlight.—*A. W. (Bill) Edwards, K5CN, 456 Glenmore St, Corpus Christi, TX 78412-2827*

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. QST

Happenings

*Edited by **Rick Lindquist, N1RL** • Senior News Editor*

"Riley the Enforcer" Visits ARRL HQ

The FCC's Riley Hollingsworth, K4ZDH, says that after six months as the Commission's top Amateur Radio enforcer, he's pleased with the progress he's made and the support he's received from the amateur community. "I thought it would take a year or two years to be at this point," he told ARRL staff members March 17 during a daylong visit to ARRL Headquarters. "We've had some very good enforcement luck," he said, pointing to support from FCC monitoring and field personnel in cracking some recent malicious interference cases.

Amateur Radio enforcement has been "one of the few victories the Commission has been having these days," Hollingsworth said, and he doesn't expect the impending FCC restructuring—including creation of a new Enforcement Bureau—to affect its course or momentum. At the same time, Hollingsworth expressed some concern that his efforts not be perceived as the FCC "gone crazy" on Amateur Radio enforcement. "I don't want people saying, 'This is too much government,'" he said.

Hollingsworth said that enthusiasm for amateur enforcement has even spread to FCC field personnel, some of whom are hams and who now ask to be included in amateur cases. He pointed to a recent case of interference to a Pennsylvania repeater system that came out of an investigation at the field-office level.

Calling Amateur Radio "a great natural resource," Hollingsworth said he felt privileged to be in his current enforcement role and was enjoying his work immensely. At this stage in the FCC's latest enforcement initiative, Hollingsworth says he's still making up for the FCC's "long period of neglect" of amateur enforcement. But he said he also looks forward to the day when he's no longer needed. He also said he can appreciate the frustrations of the Amateur Auxiliary during the years of FCC enforcement neglect and he welcomes their cooperation in the future. Hollingsworth said he hopes to see the FCC-Amateur Auxiliary relationship reach a point where "when they deal with the Auxiliary, they're just a phone call away from the FCC itself."

Hollingsworth said he hopes to turn his attention to such problems as the incursion of unlicensed operators on 10 meters—the so-called "freebanders" who often stray onto amateur frequencies—as well as the improper marketing of equipment to unlicensed individuals and examination fraud.

Although he relies primarily on the HF Direction Finding Group in Maryland to support his enforcement efforts, Hollingsworth said he plans to add some casual monitoring capabilities at his Gettysburg office. "If they know that we're out there bandsurfing, it will help," he said.

Hollingsworth said the volume of calls, letters, and e-mails since he took over the enforcement position last fall has been "a bit overwhelming at times." Currently about a month behind in replying, he advised those contacting him to use either a letter or e-mail (**rholling@fcc.gov**) instead of the telephone. Hollingsworth also is involved in some commercial FCC enforcement activities.

ARRL officials and staff members on hand were quick to praise Hollingsworth's successes as well as his approach, which has been a combination of stern sanctions and "jawboning" with alleged offenders to resolve enforcement issues. As a result, he has not had to designate any amateur cases for hearings, a process that can delay resolution by months and even years. "Few hams have the ability to change the hobby radically," ARRL First Vice President Steve Mendelsohn, W2ML, told Hollingsworth. "We're real fond of you." ARRL Educational Services Manager Rosalie White, WA1STO, called Hollingsworth "a huge breath of fresh air" for ham radio. "I think he's going to bring about a whole new feeling in hams' hearts for our hobby," she said.

During his visit, Hollingsworth made a quick contact with an acquaintance on 20 meters from W1AW. He also had the rare opportunity to wield the original Wouff Hong and Rettysnitch—the traditional symbols manufactured and invoked by "The Old Man" during the early years of the hobby to combat poor operating practices. League officials expressed the hope that the experience would provide an additional boost to Hollingsworth's present-day enforcement efforts.

The FCC's Riley Hollingsworth chats on 20 meters from W1AW during a visit on St Patrick's Day.

RICK LINDQUIST, N1RL

Standing in front of W1AW, "Riley The Enforcer" wields the venerable and traditional Wouff Hong (left) and Rettysnitch (right) as adjunct weapons against operators who break the rules. The Wouff Hong and the Rettysnitch were products of the creative mind and hand of "The Old Man," none other than ARRL co-founder Hiram Percy Maxim, W1AW, who occasionally invoked their specter in his *QST* editorials about "rotten QRM" and poor operating practices.

LOW-FREQUENCY EXPERIMENTAL LICENSE ISSUED

Some US experimental activity is coming to LF! The FCC has granted a one-year experimental license to the Amateur Radio Research and Development Corporation to conduct tests on the frequency 136.75 kHz. Experiments would be carried out from 12 Northern Virginia sites using the call sign WA2XTF. These experiments are to gain low-frequency experience in anticipation that the FCC may allocate a band at 136-kHz to Amateur Radio.

Last October, the ARRL petitioned the FCC to create two amateur LF allocations at 135.7-137.8 kHz and 160-190 kHz. The League asked for a 200 W PEP power limit (no more than 2W EIRP) and requested the new bands be made available to those holding a General class or higher license for CW, SSB, RTTY/data, and image emissions. Several countries throughout the world, including New Zealand, Great Britain, the Republic of Ireland, and several European nations, already enjoy LF allocations around 136 kHz.

Emissions authorized for these tests include 173-Hz and 450-Hz bandwidth frequency-shift data and 100-Hz bandwidth CW. The authorized transmitted power is 1 W ERP. The 12 stations will operate experimental transmitters, antennas and receiving systems using digital signal processing techniques.

Participating in the experimental operation are Glenn Baumgartner, KA0ESA; David Borden, K8MMO; Robert Bruhns, WA3WDR; Hal Feinstein, WB3KDU; Terry Fox, WB4JFI; André Kesteloot, N4ICK; George Lemaster, WB5OYP; Shannon Mishey, N8TBM; Paul Rinaldo, W4RI; David Rogers, K9RKH; Elton Sanders, WB5MMB; and John Seely, AA4GM. Rinaldo is the ARRL's technical relations manager.

While the list of stations is closed and new transmitting stations cannot be added, others are invited to join the project by listening and reporting results. Reception reports should be sent via e-mail to André Kesteloot, N4ICK, **n4ick@amrad.org**.

Further information concerning these LF experiments will be available in the *AMRAD Newsletter,* available at **http://www.amrad.org**.

BAY AREA REPEATER SHUT DOWN AFTER FCC ORDER

Citing what it called "an alarming and unacceptable lack of control," the FCC shut down the San Francisco area's K7IJ Grizzly Peak repeater system on March 2. In related actions, the FCC also set aside four recent license grants and issued two warnings. The cases, the first major VHF/UHF enforcement actions taken by the FCC in recent months, were brought to the Commission's attention by the Amateur Auxiliary.

The FCC's Riley Hollingsworth, K4ZDH, says the K7IJ system will remain out of service at least until the Commission has assurances from the owner and licensee, Bruce Wachtell of Carson City, Nevada, that the system will comply with FCC regulations in the future. The K7IJ system includes repeaters for the 146, 222, and 440 MHz bands. The FCC modified K7IJ's license to prohibit repeater operation for 120 days as of February 28.

Hollingsworth said that for almost a year, the repeater's control operator, identified as Blake B. Jenkins, N6YSA, of Berkeley, California, "has apparently not only allowed, but encouraged, use of the repeater by unlicensed operators, rebroadcasts of cordless telephone calls, playing of music, and profanity and obscenity." Hollingsworth said the situation was brought to Wachtell's attention, but nothing was done.

Wachtell, 64, a shipboard operator on a container vessel, was at sea in the Pacific and did not receive the FCC's latest notification, and efforts to reach him by satellite telephone proved unsuccessful. On March 2, Hollingsworth got the repeater site owner to shut down the four K7IJ machines and lock out access. Hollingsworth said he considered the K7IJ system "a runaway repeater" since the licensee apparently was not in control and was unavailable to the FCC. No FCC officials visited the site, and no equipment was seized.

When his ship got into port in Hawaii, Wachtell contacted Hollingsworth. Hollingsworth said that while they had a generally fruitful conversation, the repeater will remain shut down pending a full written response from Wachtell. Hollingsworth had requested that Wachtell detail "steps you may propose to take to correct the operational problems with your repeater system and in regard to the control operator."

Subsequent to the shutdown, the FCC suspended Jenkins' amateur VHF/UHF privileges for 120 days as of March 5. In a letter, Hollingsworth accused Jenkins of using his ham station "to solicit the jamming of other licensed repeaters" after the K7IJ repeater system was shut down.

The FCC requested information from Jenkins on his role and activities as K7IJ repeater control operator. Hollingsworth's letter also referred briefly to the "Ham Radio Jamming" section on the N6YSA Web site, "on which you provide circuit descriptions of jamming devices and techniques." Pages dealing with jamming hardware appear to be no longer available. Hollingsworth said the FCC continues to look into the conduct of an alleged secondary control operator Steven R. Rossi, KE6LNH.

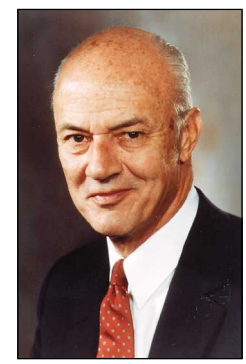
The K7IJ shutdown put some repeater operators into a panic, Hollingsworth said. "There is no general cause for alarm," he advised. The only repeater owners who need to be worried are those who fail to maintain control over their repeaters, he said.

In a related move, the FCC also set aside recent license grants or upgrades of four operators while it continues its investigation. The FCC said three of the four—James C. Walker, KF6VAA; Michael J. Nichols, KF6UAS; and Eric B. Shuler, KF6BMG (ex-KF6UJU)—used the K7IJ system before obtaining their amateur licenses. The Commission said it had evidence that the fourth operator, Gordon B. Reese III, KF6QKA, was "engaging in rebroadcasts of cordless telephone calls and other broadcasting, along with profanity and obscenity." The FCC permitted Reese, who had just upgraded to Tech Plus, to retain his Technician operating privileges for now. Hollingsworth said he's been in touch with all four individuals and will carefully consider their written explanations.

The FCC also issued warnings to Mervyn Ehambrave about alleged unlicensed operation on the K7IJ repeater, and to Timmy O Sheen Sr, N6MZA, about alleged jamming and rebroadcasts of cordless phones.

Hamvention Announces 1999 Award Winners

Kenneth M. Miller, K6IR, of Rockville, Maryland, has been named the Dayton Hamvention's 1999 Amateur of the Year. Miller was cited for "leadership, vision and dedication exhibited during his nearly 60 years of continuous involvement in Amateur Radio." Miller says he was very surprised and honored when he got the word from Hamvention Awards chair Cathi Hoskins, N8ZCQ. The Dayton Hamvention takes place May 14-16.



Dayton Hamvention Amateur of the Year Kenneth Miller, K6IR

First licensed in 1940 as W9NQT, Miller has remained an active amateur and premier Honor Roll DXer. He's a member of the Potomac Valley Radio Club and the National Capital DX Association as well as a Director of the Radio Club of America. Now retired, he once headed Penril Corp, a multimillion dollar international manufacturer of modems and other electronic devices. He also is a former executive with LearJet and Wilcox Electronics.

The Hamvention's Technical Excellence award will go to Alfonso R. Torres, KP4AQI, of Huber Heights, Ohio, recognized for "his numerous designs and inventions that have enhanced the art and science of Amateur Radio operations."

Special Achievement Award winner Paul D. Lieb, KH6HME, of Hilo, Hawaii, was cited for "his pioneering and record-setting work in tropospheric ducting and VHF, UHF and microwave communications." Miller and Lieb are ARRL life members. The award winners were announced March 1. The awards will be presented at the 1999 Dayton Hamvention banquet May 15.—*Dayton Hamvention*

K7UGA ANTENNAS DISMANTLED, SOLD

The Amateur Radio antenna system that the late Sen Barry Goldwater, K7UGA, used to complete thousands of phone patch messages for troops during the Vietnam War now is history. Five members of Goldwater's club, the Central Arizona DX Association, recently dismantled the K7UGA antenna system. "It took us about five hours to remove them from the 77-foot rotating mast," said club member Mike Bill, N7MB. Bill said the antennas have been sold.

Goldwater died last May 29. Bill says Goldwater's widow, Susan, recently asked the club members for assistance in taking down the antennas at the Goldwaters' Paradise Valley, Arizona, home. Goldwater used a Hy-Gain RP-75H rotating pole assembly turned by a 1/4-HP electric motor. The antennas were Hy-Gain LongJohns for 10, 15, and 20 meters as well as a 3-element 40-meter array, "very big and very heavy," Bill said. The system had been installed in the mid-1960s to support Goldwater's extensive phone-patch activities on MARS.

Bill says the buyer of the K7UGA antennas wishes to remain anonymous. The sale price was not revealed. For more information, visit **http://www.azhub.com/goldwater/listings.html**.

WRTC 2000 SITE, SCHEDULE, TEAM ALLOCATIONS SET

The site, schedule, and team allocations have been announced for the next World Radiosport Team Championship. The international Amateur Radio competition will be held in the tourist city of Bled, Slovenia, July 8-9, 2000, concurrent with the IARU HF World Championship event. The 2000 event will be sponsored by The Slovenia Contest Club, which sent a large group of contesters to the last world event, WRTC 96, in the San Francisco Bay area. The top-scoring team from that event—Jeff Steinman, N5TJ (ex-KR0Y) and Dan Street, K1TO—will defend their title in next year's WRTC as one of two special teams.

WRTC 2000 Organizational Committee member Tine Brajnik, S50A, said 15 teams have been allocated to North America—12 US, 2 Canadian, and 1 wild-card. Europe will field 25 teams, including five wild-card teams, while Asia gets six, South America three, and Africa and Oceania one each, both selected as wild cards by the WRTC organizer. As WRTC 2000 organizer, the Slovenia Contest Club will field a second special team for the event.

Branjik said the national team allocations were based upon the number of contest logs that beat respective continent-average scores in different categories. Wild-card teams will be picked from the list of applicants, he said. He invited applications via e-mail to **scc@bit.si** or via mail to Slovenia Contest Club, Saveljska 50, 1000 Ljubljana, Slovenia.

For more information, visit the official WRTC 2000 site, **http://wrtc2000.bit.si/center.htm**

RICK LINDQUIST, N1RL

The WRTC 96 first-place medallion won by K1TO and KR0Y (now N5TJ)

VELCRO TO HOLD FIRST ISS HAM HARDWARE

Velcro will be used to hold initial Amateur Radio gear in place aboard the gravity-free environment of the International Space Station. Since the Russian-built service module lacks rack space for amateur equipment, the Amateur Radio on the International Space Station ham gear will be attached to the wall using Velcro. The use of Velcro to keep tools and equipment in place has become widespread over the years on the space shuttles as well as aboard the Russian *Mir* space station.

Delays in the ISS program have put off the first crew deployment until next January. The first crew will consist of US astronaut William Shepherd, as the expedition commander. Shepherd recently passed his Amateur Radio examinations but had not received his call sign by press time. Accompanying him will be Russian cosmonauts Yuri Gidzenko and Sergei Krikalev, U5MIR.

ISS Amateur Radio equipment development by ARISS volunteers continued in the wake of January meetings in Houston of most ARISS partners. During the gatherings at NASA's Johnson Space Center, ARISS Hardware Team leader Lou McFadin, W5DID, said initial development of Amateur Radio for the ISS supports the "start-small-and-get-bigger" approach to Amateur Radio deployment on the ISS recommended by ARISS-Russia's Sergei Sambourov, RV3DR.

FRANK BAUER, KA3HDO

During a break in the January meetings in Houston to discuss Amateur Radio on the International Space Station (ARISS), Sergei Sambourov, RV3DR (left), of Energia, AMSAT-Russia and ARISS-Russia, and Alberto Zagni, I2KBD (right), of the ARISS-Italy hardware team, flank a vacant Russian space suit. The multinational ARISS developed more than two years ago to coordinate Amateur Radio development and operations for the ISS.

ARISS Hardware Team members have agreed on antenna design concepts, including a VHF/UHF antenna for 2 meters and 70 cm, and a flat, spiral antenna that will serve for an amateur radio L and S-band antenna. Yet to be defined is an antenna for HF. Sambourov says the antenna systems would be mounted during space walks on handrails near the back of the service module and secured using a clothespin-type clamp provided by Energia. The ARISS US and Italian teams will supply the antennas, diplexer, and mounting plate.

The ARISS team will provide training hardware for the equipment to be housed in the service module as well as antennas and antenna mockups for EVA training in Russia.

SUBMARINES ON THE AIR

The Submarine Veterans Amateur Radio Association will activate submarine radio rooms in late April to commemorate the 99th anniversary of the submarine service. Upwards of 20 museum submarines in the US and overseas will be on the air the weekend of April 24-25 with volunteer operators. "Some of the museum boats have the radio rooms restored and operable with the original equipment," said Carl Raish, KG0HS, of the SVARA.

Stations will operate on or around 3943, 7243, 14,243, 21,313, and 28,343 kHz. A certificate of participation is available for those obtaining at least four QSLs from submarines worked. The Submarine Veterans meet on the air daily except Sundays. Raish says the most popular on-air gathering is Saturdays, 1700 UTC on 14,243 kHz. This net was started about 25 years ago by World War II submarine veterans as a means of keeping in touch, and it has remained active ever since. For a certificate, send copies of at least four cards from submarines worked to Jim Flanders, W0OOG, 1539 California Tr, Plano, TX 75023-4300; **jaf@sprintmail.com**. For more information, contact Flanders or Carl Raish, 1873 S Tennyson St, Denver, CO 80219; **kg0hs@juno.com**, or visit **http://www.flash.net/~jflandrs/index.html**. *—Jim Flanders, W0OOG*

HAM RADIO-CARRYING RAFT EXPEDITION HITS A SNAG

Sea worms and storms have gotten the best of La Manteña, a 50-foot balsa log raft skippered by John Haslett, KC5KHA, of Dallas, Texas, as part of an educational and research venture. The vessel, first launched last October, has been attempting to retrace the trading routes of ancient Ecuadorian mariners by sailing from Ecuador up the Central American coast to Mexico. Ultimately, the expedition plans to attempt to cross the Pacific to Hawaii. But the voyage has run into problems and has had to be

CAMERON SMITH

The raft *La Manteña* under way in the Pacific.

scuttled in the Pacific some 160 miles southwest of Costa Rica.

The Manteña's balsa hull has twice been infested by shipworms (*toredo navalis*), a type of destructive crustacean. Haslett, 34, thought he had the problem licked. But the steps taken earlier in the voyage to prevent a recurrence—including liberal applications of tar—apparently were not successful. Decay also had affected some of the manila rope that binds the logs together. To add insult to injury, the raft had been trapped in the gyre—a large ocean whirlpool—and literally was going in circles under its influence.

After bad weather further impaired the vessel's ability to navigate, the crew accepted an offer from the Costa Rica Coast Guard to transport the crew, critical supplies and equipment, and vital raft components—including the raft's sails, hardwood masts and cross members and some of its center beams—to Costa Rica. The rest of the vessel was abandoned. The team plans to rebuild the raft and continue the long voyage.

Aboard the Manteña, Haslett had been maintaining Amateur Radio schedules with schools and other groups in the US and around the world on 20 meter SSB. The expedition also has been using Amateur Radio for routine communication with the mainland. In 1993, Haslett built a 20-ton balsa raft *Illa Tiki* in Ecuador, then traveled some 750 nautical miles aboard the vessel. It, too, was plagued by shipworms.

For more information, visit the Manteño Expedition Web site, **http://www.balsaraft.com/**.

(continued on page 87)

In Brief

• **Riley Hollingsworth to do Dayton:** The FCC's top Amateur Radio enforcer, Riley Hollingsworth, K4ZDH, will put in an appearance at this year's Dayton Hamvention. Hollingsworth is scheduled to address enforcement issues at FCC forums on Friday and Sunday at this year's event, scheduled for May 14-16. He'll also address the 3865 Drake and Antique Radio Tube Net Group forum Saturday morning (10:45-11:45 AM, Room 3), moderated by Don Spillman, W8NS.

• **New section managers:** Alabama, Northern New Jersey, and Santa Clara Valley have new section managers. Bill Cleveland, KR4TZ, of Mobile, was appointed Alabama Section Manager March 1 by ARRL Field Services Manager Rick Palm, K1CE. He replaces Scott Johnston, N4YYQ, who resigned. In Northern New Jersey SM-elect Jeffrey M. Friedman, K3JF, of Succasunna, assumed the reins in mid-March from SM Roy Edwards, AB2RE, who stepped down early. In Santa Clara Valley, Glenn Thomas, WB6W, of Milpitas, succeeds Geoffrey Ellis, KD6MFM, who resigned.

• **FCC fines operators in repeater QRM case:** The FCC has used mobile radio direction-finding techniques to solve a longstanding repeater interference problem. The Commission alleges that Michael Gallagher, KB1DTA (ex-KB3DHX), of W Concord, Massachusetts, and Kornwell Chan, W3CI, of Dresher, Pennsylvania, were maliciously interfering with the Phil-Mont Mobile Radio Club 2-meter repeater, W3QV, and has levied fines on the two operators. On multiple occasions in February, personnel from the FCC's Philadelphia office traced radio transmissions to a vehicle said to be occupied by the operators in question. Both licensees have been issued Notices of Apparent Liability for $7500.—*FCC*

• **February *QST* Cover Plaque Award:** The winner of the February *QST* Cover Plaque Award is Al Penny, VO1NO/VE1, for his article "The Crash of SwissAir Flight 111." Congratulations, Al!

• **More ham radio in the cinema?** ARRL HQ was contacted by a research company reviewing a script for a new movie involving ham radio called *Frequency*. The film, starring Dennis Quaid, is about a young boy from New York who loses his father in a fire in 1969. Years later, the son is "reunited" with his late father via ham radio. While the story line may be a bit far-fetched for some, the movie may give Amateur Radio some additional positive exposure on the big screen. Bart Jahnke, W9JJ, helped Jennifer Hagy, N1TDY, to research a call sign—one that's not likely to be issued—that may be used in the movie. No more details on the movie or when it will be filmed are available at this time.—*Jennifer Hagy, N1TDY*

Section Manager Election Notice

To all ARRL members in the Colorado, Georgia, Los Angeles, Sacramento Valley, San Francisco, South Texas, Eastern Washington, Western Washington, and West Virginia 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 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 June 4, 1999. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before July 1, 1999, to full members of record as of June 4, 1999, which is the closing date for nominations. Returns will be counted August 24, 1999. Section managers elected as a result of the above procedure will take office October 1, 1999.

If only one valid petition is received from a section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1999. If *no* petitions are received from a section by the specified closing date, such section will be resolicited in the October 1999 *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 Services Manager. You are urged to take the initiative and file a nomination petition immediately.—*Richard Palm, K1CE, Field Services Manager*

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the North Texas and Wyoming section manager elections by the deadline of December 4, 1998, nominating petitions are herewith resolicited. See the above for details on how to nominate.

How's DX?

Edited by **Bernie McClenny, W3UR**

E4, Palestine

The Palestinian Territories have been a hot spot almost since the beginning of time. A quick review of the Book of Genesis in the *Bible* will acquaint you with the battles that took place in this area between the Israelites, Canaanites and Philistines. The cultures and continents of Europe, Africa and Asia converge in this region, making it a strategic spot with a long history of wars, occupations, invasions and changes in geography.

The Old DXCC Country

Palestine, ZC6, was on the original DXCC list, which dated back to November 15, 1945, and on a pre-war list as well. It was controlled as a British mandate and included all of Palestine and Gaza (see Figure 1) until 1948. This was when Egypt took control of Gaza, Jordan became independent and Israel was created. One of the first operators from Palestine was Jack, ZC6AB (see Figure 3), in 1947. From 1948 to 1967 Palestine was just a small no man's land buffer zone between parts of Israel, Jerusalem and Jordan, as shown in Figure 5. (Only a small portion of that buffer zone is included in the current jurisdiction of the new Palestinian Authority.)

After the 6-Day War in 1967 Israel had taken control of Palestine, the Gaza Strip and the Golan Heights. The July 1968 issue of *QST* reported "The ZC6…Palestine listing, comprised of the UN Truce Area bordering on Israel no longer exists and therefore that listing is being deleted." The last known operation from Palestine was the 4X1DK group (see Figure 4) which included Gus Browning, W4BPD, Malik Webman, 4X4JU and Ami Shami, 4X4DK.

A New DXCC Country

On February 3, 1999 the ARRL issued the following DXCC News Release:

"The International Telecommunication Union, in its Operational Bulletin No. 685 of February 1, 1999, has allocated the call sign prefix E4 for use by Palestine. This is in accordance with the Resolution PLEN/3 of the Plenipotentiary Conference of the ITU held in Minneapolis, Minnesota, in 1998.

*3025 Hobbs Rd
Glenwood, MD 21738-9728
howsdx@dailydx.com

Figure 1—This was Palestine before the creation of Israel in 1948.

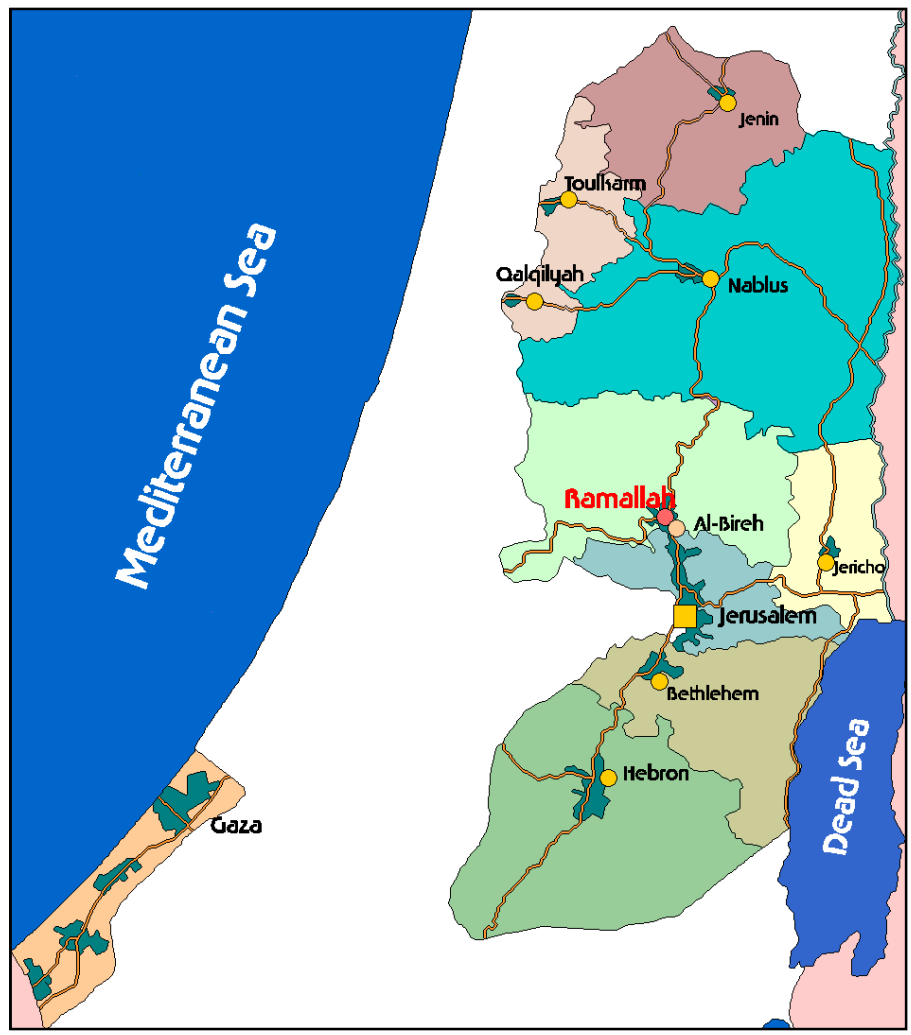


Figure 2—This is E4 Palestine, which consists of two pieces of land separated by Israel, but not far enough apart to be considered two DXCC entities.

"Under the current DXCC List Criteria, Section 1, this call sign allocation meets the requirement of paragraph b. Palestine will be added to the DXCC List effective October 1, 1999. Contacts made with E4 stations after February 1, 1999, will count for this new entity.

"Under the DXCC rules, contacts with the deleted entity of Palestine made prior to June 30, 1968, do not count for this entity. There is no commonality of territory or administration."

Currently the Palestine Territories consist of two landmasses, a shown in Figure 2. The Gaza Strip is a narrow stretch of land 6 kilometers wide and 40 kilometers in length. It is located east of the Mediterranean Sea, west of Israel and north of Egypt. Gaza City is the governmental capital and home of President Yasser Arafat.

The West Bank, on the other hand, is located between Israel and Jordan and is less than 6000 square kilometers in size. The bigger cities include East Jerusalem, which is claimed to be the capital of Palestine, Hebron, Jericho, Bethlehem, Ramallah and Nablus. The West Bank is home to more than 2.3 million people.

Since the initial announcement from the DXCC Desk several operations have taken place. Sami, E44B, is a native Palestinian and has been on the air along with Ali, E44A (JY4NE). The first DXpedition team was comprised of Pekka, OH1RY, Martti, OH2BH, Pekka, OH2TA and myself. We used the call sign E44DX from the Palestine Hotel in Gaza City. A Web page has been set up at **http://www.n4gn.com/e44dx/** that includes a log search, pictures and audio clips.

Just a few days later a Japanese group was active as JA1UT/E4 and E44/JA8RUZ. Right after the E44DX team left, a group of Hungarians took up residence as E44/HA1AG in the Adam Hotel. They also have a Web page at **http://www.okdxc.cz/e44/** with a log search feature.

Ayar, E44/OZ6ACD, will be on the air in Palestine for several months (working in Hebron in the West Bank) thanks to the donation of equipment from E44DX and the Palestine Amateur Wireless Society (PAWS). He has set up a Web page at **http://www.tiph.org/e44/info.htm**. Another semipermanent operator is David, E41/OK1DTP, who is living in Jenin, in the West Bank. David's Web site is at **http://www.okdxc.cz/e41/**. Peter, G3WQU, is living in Bethlehem and should be on the air soon.

THE ENIGMA OF JAPANESE CALL SIGNS

Have you ever wondered how the JA call sign system works? It is very complex, but the following explanation provided by Rin, JG1VGX, unravels the tangled details.

The Old-Timers in Japan hold calls in the JA#AA-ZZ and JR6AA-ZZ block. Newer licensees have three-letter suffixes in the blocks JA, JH, JR, JE, JF, JG, JI, JJ, JK, JL, JM, JN, JO, JP, JQ and JS prefixes. JS1, 2, 3 and 6 are the only ones used in this block. The JS6 prefix is for Okinawa. The JD1 prefix is allocated for Ogasawara and Minami Torishima Islands. The 7J prefix is for amateurs with reciprocal operating permits (foreigners) and the 8J prefix is for special-event stations.

Japanese call signs have nothing to do with license class. In fact, there are four different license classes. (See the license table shown in "VHF FM Portable from Japan" elsewhere in this issue.) Each license is renewable every five years. Several years ago there was a shortage of JA1 call signs, so they began to recycle call signs in the JE-JS series. When they were depleted the current JA1 area issued the following blocks: 7K2-7K4, 7L2-7L4, 7M2-7M4 and 7N2-7N4. All club stations have the suffixes from YAA-ZZZ. There are no vanity call signs issued to individuals.

Figure 3—A QSL card from Jack, ZC6AB, from April 1947.

Figure 5—From 1948 to 1967 Palestine was mostly a buffer zone.

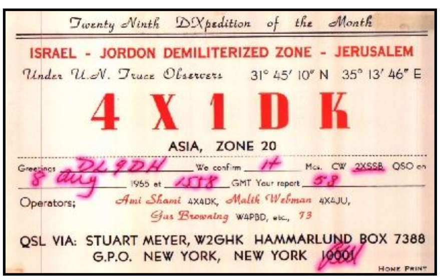


Figure 4—This was the QSL card for the last known operation from the old Palestine.

DX NEWS

Dennis Motschenbacher, K7BV, editor for the *National Contest Journal*, plans to go to the Åland Islands to operate the new OH0Z super station in the CQ WPX CW Contest. Dennis was invited by station owners Ari, OH1EH; Jukka, OH2MAM; and Juha, OH1JT. OH0/K7BV will be used before and after the contest.

There is also a good chance that Dennis will undertake a three to four day DXpedition to Market Reef. He has been invited to operate as OJ0/K7BV thanks to Seppo, OH1VR, and Lars, OH0RJ who have a spot on the reef. The plan is for Dennis and Seppo to go to the reef first and operate for a few days *before* the WPX Contest. Seppo will remain on the reef for the contest while Dennis returns to the Ålands.

Look for Dennis to be active between May 23rd and June 3rd. He prefers CW and will operate all bands, which may include 6 meters. Dennis will also attempt to make contacts through the RS-13 satellite. He will be active on 80 and 160 meters, but with less than six hours of darkness in Scandinavia at that time of year, your odds of working Dennis on those bands are somewhat slim.

George, K5KG, will be acting as a pilot station during this trip and he will provide updates to both Dennis and the DX community via the DX reflectors and DX bulletins. You can contact George by e-mail at **GeorgeK5KG@aol.com**. QSL cards for OH0/K7BV and OJ0/K7BV can be sent via KU9C. Cards for OH0Z should be sent to Ari Korhonen, OH1EH, Kreetalank. 9 As 1, FIN-29200 Harjavalta, Finland. For more information contact Dennis by e-mail at **k7bv@aol.com**.

Charlie, K4VUD, is once again planning to be in the Far East working in Tibet, Bhutan, Nepal and Thailand. Operation from Bhutan is not expected. He will be wrapping up his Nepal, 9N1UD, operation on May 17th. From May 18th to June 2nd he will be operating as HS0ZCW from Thailand. QSL cards for these operations may go to K4VUD.

The *DX News Sheet* reports that Vangelis, SV2BFN, and two other operators are expecting to operate from Mount Athos at the end of May.

A group of five Germans headed up by Sigi, DL7DF, are planning an operation from Tarawa, West Kiribati (T30) for 18 days in the October/November time frame. The group is also hoping to operate from Banaba (T33) for five days. Because of the high cost of this operation they are seeking donations. For more information contact Sigi Presch, Wilhelmsmuhlenweg 123, 12621 Berlin, Germany; **DL7DF@t-online.de**.

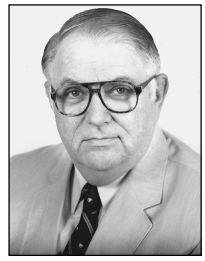
Wrap Up

That's all for this month. Thanks go to K7BV, the *59(9) DX Report*, the *Daily DX* and the *DX News Sheet*. I look forward to seeing many of you at the Dayton Hamvention this month. Becky, N3OSH, and I will be in the same place as last year, booth #502. Until next month, see you in the pileups!—*Bernie, W3UR*

Amateur Radio World

New IARU Leadership Team Chosen

For the first time in a decade, the International Amateur Radio Union is about to experience a change in its officers. In voting completed on March 12, the member-societies of the IARU overwhelmingly ratified the election of Larry E. Price, W4RA, as President, and Dr. David A. Wardlaw, VK3ADW, as Vice President, for five-year terms beginning May 9, 1999. There were 80 votes cast for the election of Mr. Price, with one abstention and one nay vote. There were 79 votes cast for the election of Dr. Wardlaw, with two abstentions and one nay vote. Mr. Price succeeds Richard L. Baldwin, W1RU, who served as IARU President from 1982; Dr. Wardlaw succeeds Michael J. Owen, VK3KI, who served as Vice President from 1989.



IARU President-Elect Larry E. Price, W4RA

President-Elect Larry Price, W4RA, has served as IARU Secretary since 1989 and was Vice President in 1983-84. He holds the degrees Bachelor of Science in Electrical Engineering (electronics major), Master of Business Administration (management major), and Doctor of Philosophy (Ph. D.) (finance major). Professionally, he retired as Professor and Department Head, Georgia Southern University, in 1991 and is presently Emeritus Professor of Finance and Economics. He has attended 13 IARU regional conferences, four each in Regions 1 and 3 and five in Region 2, and has served as an IARU delegate at every ITU World Radiocommunication and Telecommunication Development Conference held since 1992 as well as at numerous other ITU meetings. Recently he was elevated to the grade of Senior Member of the Institute of Electrical and Electronics Engineers, Inc. (IEEE). He was first licensed at age 16 in 1951 and has held elected offices in the American Radio Relay League (ARRL) continuously for the past 27 years, including service as President from 1984 to 1992. He resides in Statesboro, Georgia.

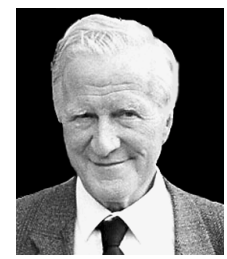
Under the IARU Constitution, the responsibility for designating the Secretary of the IARU rests with the International Secretariat, presently the ARRL. A replacement for Mr. Price will be designated prior to May 9.

Vice President-Elect David A. Wardlaw, VK3ADW, is a Dental Surgeon in private practice in Melbourne, Australia. He holds the degrees Bachelor of Dental Science, Licentiate of Dental Surgery, and Doctor of Dental Surgery, and is a Fellow of the Royal Australasian College of Dental Surgeons. He joined the Wireless Institute of Australia in 1947, was first licensed in 1948, and while living overseas in the 1960s held the call signs G3RYW (still current) and VE3CAY. He has served in numerous WIA posts, including President 1973-1979 and 1984-1988, and presently serves in several government liaison capacities for the WIA. In 1968, Dr. Wardlaw was present at the meeting that inaugurated the IARU Region 3 Association and was a member of the first Secretariat of the Region 3 Association. He has served as Region 3 Director, 1988-1994 and 1997-present, and has attended six meetings of the IARU Administrative Council. In addition to regular participation in Region 3 Conferences, he has attended three Region 2 Conferences. Dr. Wardlaw has attended numerous ITU meetings and conferences since 1978, including WARC-79, WARC-92, WRC-95, and WRC-97, as a member of the Australian delegation. He has attended other ITU meetings as an appointed IARU Expert.

Retiring IARU President Richard L. Baldwin, W1RU, has served organized amateur radio for more than a half-century. In 1948 he joined the headquarters staff of the ARRL, advancing to the position of General Manager in 1975. In the early 1960s he was given primary responsibility for the League's international programs, that even then were geared toward success at what eventually became WARC-79. He served as IARU Secretary from 1976 until his retirement from ARRL employment in 1982, and since that time has devoted much of his time to the IARU as a volunteer. He inaugurated the Amateur Radio Administration Course for telecommunications administrators, and has taught the course in every corner of the world.

Retiring IARU Vice President Michael J. Owen, VK3KI, has been involved in IARU affairs for 30 years. He was Federal President of the Wireless Institute of Australia for four years, and a member of the Australian delegation to WARC-79. He served as a Director of IARU Region 3 from its inception until 1988 and became the first IARU officer from outside North America when he was elected Vice President in 1989, serving two five-year terms in that post. He headed the IARU delegation to WRC-97 and has served as the chairman of several key IARU committees.

John Allaway, G3FKM, SK



International Amateur Radio Union Region 1 Secretary Dr John Allaway, G3FKM, of Birmingham, England, died March 7 after a long illness. Allaway was elected IARU Region 1 Secretary in 1984 and was re-elected for four more three-year terms. In that capacity he served on the IARU Administrative Council.

Over the years Allaway—a physician and an eminent and widely respected Amateur Radio figure—had held a number of high-profile posts. Former Radio Society of Great Britain General Manager David Evans, G3OUF/VE6DXX, recalls that Allaway served on all major RSGB Committees including the Telecomms Liaison Committee and was Chairman of the Finance and Staff Committee for many years. "He worked very hard for the cause of Amateur Radio and attended just about every RSGB meeting possible," Evans said.

John Allaway was also RSGB president twice—in 1976 and again in 1982. His remarkable commitment to Amateur Radio was highlighted by his many years on the RSGB Council, where he served four terms as an Ordinary Member during a 30-year period.

ARRL Executive Vice President David Sumner, K1ZZ, remembers Allaway's attendance at the IARU Region 2 Conference in Buenos Aires in 1986. "That was a low point in relations between Argentina and Great Britain. The memories of the Falklands War were still fresh," he recalls. "John had to obtain his visa via a third country, and he was a bit nervous about the sort of reception he might receive. He needn't have worried: the combination of the graciousness of our Argentine hosts and John's own humble, yet engaging, personality turned the event into the sort of minor triumph of personal diplomacy that is so often the hallmark of Amateur Radio."

An ARRL member and dedicated HF operator, Allaway's call sign appeared on the DXCC Honor Roll for many years. He wrote the HF column in the RSGB journal *RadCom* from 1966 until 1998. Recently, he was dubbed a Knight of the Order of the Golden Key by the Norwegian Radio Relay League for his many years of service to the RSGB, the IARU, and Amateur Radio in general. The award is the NRRL's top honor. — *thanks to David Evans, VE6DXX, and the RSGB*

Stan Horzepa, WA1LOU*

Ham Different

Eighteen months ago, Apple was losing lots of money and Macintosh sales were down (and out). Therefore, the pundits were burying Apple and the Macintosh.

The pendulum began swinging in the opposite direction after Apple introduced iMac and its new G3 line of desktop and laptop computers. Suddenly, Apple was making lots of money, and Macintosh sales were up (and away)—and the pundits of Mac's doom shut up.

This was great news for those of us who use Macs for ham radio applications. Not only were we assured that our platform of choice would be around for awhile, but it encouraged program developers to continue creating Macintosh ham-radio applications. A year later, we are seeing the fruits of the Mac revival as new and updated applications are released.

One of those updates adds SSTV to the Mac bag of tricks. The update is a new version of *MultiMode* (version 1.6.4), which, in addition to SSTV also permits Macs to do Morse Code, RTTY, ASCII, SITOR-A, SITOR-B/FEC/NAVTEX, FAX, ACARS and WWVB time decoding, all without any extra hardware! No data controllers are required. The program also supports DTMF, EIA, CCIR and XPH tones and provides an audio spectrum display to aid in tuning stations properly. *MultiMode* is shareware and can be had at **http://www.blackcatsystems.com/software/multimode.html** (Black Cat Systems also has other Amateur Radio Macintosh applications, including transceiver control, antenna design, propagation forecasting and gray-line calculation software, so be sure to check out their whole Web site.)

Another update is *HamLog* version 4.0, which is now a standalone, ham-radio logging application (previous versions required *FileMaker Pro*). The program comes on a CD-ROM that includes the FCC Amateur Radio database. This permits *HamLog* to automatically search the database when a call sign is entered into the program. *HamLog* is the handiwork of Keith Bransky, KE1TH. Its Web site is at **http://www.mindspring.com/~kmb/hamlog/hamlog.html**.

For the satellite aficionado, there is a new release of *MacDoppler* (version 3.8). The creation of Don Agro, VE3VRW, *MacDoppler* reads Keplerian satellite elements, calculates a satellite's position and relative velocity, then automatically adjusts for Doppler shift on both transmit and receive and positions antennas. To use the station-control features, you must register *MacDoppler* with AMSAT (for $50 US). Once interfaced to your transceiver and antenna rotor controller, it automatically corrects the operating frequencies and adjusts antenna position once per second. To download a copy of *MacDoppler*, go to **http://www.interlog.com/~dogpark/Macintosh_Amateur_Radio_Pr.html**.

Here are two good places to keep abreast of what is happening in the Mac ham world: KB6MP's The Mac Shack and G0OAN's Macintosh Amateur Radio Software Archive (at **http://www.geocities.com/SiliconValley/Bay/5899/** and **http://www.g0oanint.demon.co.uk/**, respectively).

Still On Line After All These Years

While we are on the subject of Apple computers, here's a blast from the past, an oldie, but a goodie:

"Just wanted to let you know that the 'original' packet weather station (KB6CYS) is still operating with the same old equipment (Heath ID-4001 weather computer and an Apple][+ computer) as it has been since 1984. I added some code to the program that allows it to send APRS packets, so I am now on 144.39 MHz and visible on the APRS maps from my location here in Cypress, California (south of Los Angeles). As long as this stuff holds up, I do not plan to change it!"—*Bill Hutchins, KB6CYS*

You at ARRL.NET

How would you like an e-mail address consisting of your call sign plus "**@arrl.net**"? If you are an ARRL member, it is now possible to have such an address because the League now provides an e-mail forwarding service as a membership benefit.

This service is a forwarding (or "alias") service only. No messages will be stored on the ARRL servers. E-mail sent to you at **arrl.net** will be forwarded to a real e-mail address that you provide.

To sign up for this service, go to the ARRL Members Only Web page (**http://www.arrl.org/members-only/**). If you are accessing ARRL Members Only for the first time, you will need your ARRL membership number to log on (the number appears on your *QST* mailing label).

Not only will this new e-mail address identify you as a ham, but it likely will be easier to remember than your real e-mail address (for example, compare **wa1lou@arrl.net** to **stanzepa@ct2.nai.net**). Just think how simple it would be to send e-mail to another ham, if all hams used this service? If you know the other ham's call sign, you'd know his/her e-mail address as well.

This month's Wireless Web Page of the Month is the ARRL Members Only page. Besides offering the ability to sign up for the e-mail forwarding service, the page provides other services to Web-footed members. Like *The ARRLWeb Extra Web* 'zine, which contains news and articles not published anywhere else. For example, a recent issue featured an article about one ham's ongoing efforts to improve the accuracy of conventional GPS by building a differential GPS system.

The page has a searchable index of every issue of *QST* and *QEX*. And it allows you to obtain copies of any *QST* Product Review published since 1980, view and update your *QST* mailing address and select e-mail options (for example, automatically receive notification of ARRL membership and license expirations, receive W1AW bulletins, etc). QST

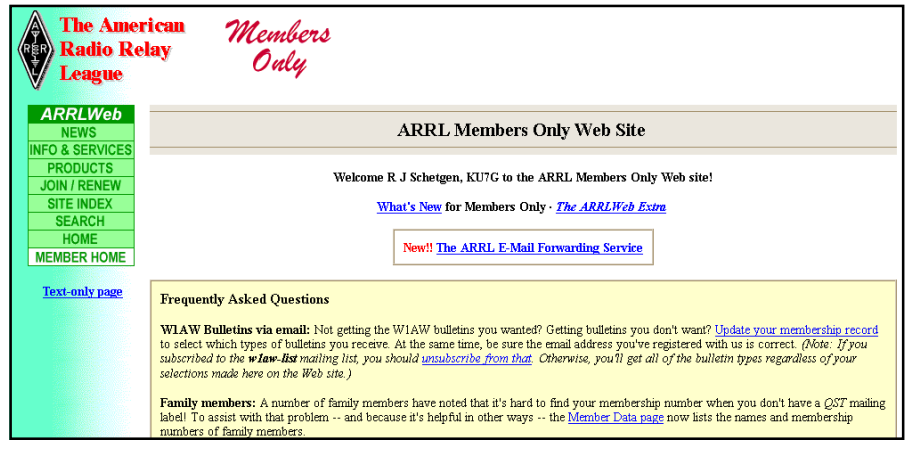


Figure 1—A partial view of the ARRL's members-only home page. The ARRL Members Only Web page at **http://www.arrl.org/members/** provides special services to ARRL members.

*One Glen Ave
Wolcott, CT 06716-1442
wa1lou@arrl.net
http://www.tapr.org/~wa1lou

The World Above 50 MHz

*Emil Pocock, W3EP**

The Micrometer Bands

The highest Amateur Radio band lies between 241 and 250 GHz. Sometimes all the frequencies above 300 GHz are listed as an additional single amateur band, but FCC licenses are not required to transmit in this region. Hypothetically, thousands of terahertz of electromagnetic spectrum is available for radio amateurs, experimenters, scientists, medical and commercial users. In practice, only a tiny portion is useful for Earth-bound communication.

Included in this vast upper reaches of the electromagnetic spectrum are incredibly high-frequency radio, infrared, visible light, ultra-violet, x-ray and gamma-ray radiation. (See Table 1.) Use of these terms to designate specific wavelengths or frequencies is somewhat arbitrary, as authorities differ over where one begins and the other ends. The distinctions between the upper reaches of radio and the lower infrared bands are so vague, for example, that they are often presented as overlapping. This table arbitrarily designates the upper reaches of radio, the incredibly high frequencies, as the next magnitude above 300 GHz.

It is common practice to refer to wavelength rather than frequency in this portion of the spectrum. Table 2 provides a convenient reference for small metric lengths. These are small units! The thickness of 10 sheets of paper is about 1 millimeter. A micrometer is a 1000 times smaller. The diameters of individual atoms are measured in Angstroms. Table 3 provides comparative frequency units through terahertz, the highest encountered in the radio range.

Micrometer Radio (1000 to 100 μm)

There has been little amateur activity on the incredibly high frequencies of 300 to 3000 GHz. The 411-GHz two-way exchange over a distance of just 50 meters made by a German team in January 1998 is the only reported contact in the micrometer band. (See this column for September 1998.) Two great obstacles prevent use of these frequencies for practical communication. The technical difficulties of generating and detecting radio energy at such high frequencies are significant, but the more troublesome problem of atmospheric attenuation probably cannot be overcome, at least on Earth.

Most ordinary electronic devices and construction techniques fail at wavelengths shorter than a few millimeters. The most successful techniques used so far rely on harmonic generators and mixers based on the Schotty diode. The power generated is typically less than one microwatt and receiver noise figure is relatively high. Further work will undoubtedly improve equipment and techniques in the upper limits of the radio spectrum.

It is difficult to avoid high path attenuation due to absorption by atmospheric gases, primarily oxygen, water vapor and carbon dioxide. (See Figure 1.) At 300 GHz, attenuation amounts to about 10 dB per kilometer and rises to over 400 dB per kilometer at 3000 GHz under standard atmospheric conditions. Several peaks of water vapor absorption between 500 and 1000 GHz result in attenuation of over 500 dB per kilometer. Even the relatively smaller 10 dB per kilometer attenuation is a prohibitively high loss and all but rules out communications over distances longer than a few kilometers.

Much of the absorption in this incredibly high radio range is due to water vapor. Signal-path attenuation can be reduced by choosing times and places where the atmospheric water-vapor content is low. Under very dry conditions, such as might be found in cold deserts or mountain regions, 300 GHz attenuation might be as little as 1 dB per km. There may be no practical circumstances in which atmospheric absorption can be reduced to reasonable levels in the 500 to 3000 GHz range. These frequencies might be useful only for space communications, where gaseous absorption is not such a significant limitation.

Light (100 μm to 10 nm)

Infrared, visible light and ultraviolet are sometimes collectively termed light. Humans can see only a small portion in the center part of this range, but certain animals can see into the infrared (such as some snakes) and into the ultraviolet (bees and other insects). As there is no clear boundary between incredibly high radio and the beginning of infrared, 100 μm is used as an arbitrary dividing line. Short wavelength infrared radiation, in turn, blends into the narrow band of visible light between 700 and 400 nm. Ultraviolet extends the range of light from 400 down to 10 nm.

There is considerable amateur activity in the light range, thanks to low-power diode emitters, diode detectors, surplus lasers and photomultiplier tubes. Many construction projects using diodes and suggestions for using low and medium-power lasers have appeared in ARRL and other publications. Most of the experimenting has been done in the visible range, but the

*Send reports to Emil Pocock, Box 100, Lebanon, CT 06249. Leave voice messages at 860-642-4347, or fax 860-594-0259 or e-mail w3ep@arrl.org.

This Month

May 5	eta-Aquarids peak
May 8	902-2304 MHz Sprints, 6:00 AM-1:00 PM local time
May 15-16	50 MHz Sprint, 2300-0300
May 23	Good EME conditions

Table 2—Small Linear Metric Units

Name	*Symbol*	*Meter*	*Explanation*
Meter	m	1	
Centimeter	cm	10^{-2}	0.01 m
Millimeter	mm	10^{-3}	0.001 m
Micrometer*	μm	10^{-6}	0.001 mm
Nanometer	nm	10^{-9}	0.001 μm
Angstrom	Å	10^{-10}	0.1 nm

*Also Micron

Table 1—Unregulated Electromagnetic Spectrum

Band	*Frequency*	*Wavelength*
Radio	300-3000 GHz	1000-100 μm
Infrared	3-461 THz	100-0.7 μm
Visible light	461-667 THz	700-400 nm
Ultraviolet	667-30,000 THz	400-10 nm
X-ray	3×10^4-3×10^6 THz	100-1 Å
Gamma ray	$>3\times10^6$ THz	<1 Å

Table 3—Frequency Units

Name	*Symbol*	*Hertz*	*Explanation*
Hertz	Hz	1	1 cycle per second
Kilohertz	kHz	1000	1000 Hz
Megahertz	MHz	10^6	1,000,000 Hz
Gigahertz	GHz	10^9	1000 MHz
Terahertz	THz	10^{12}	1000 GHz

same techniques can be used for the near-infrared and near-ultraviolet wavelengths.

Atmospheric attenuation is high throughout the longer-wavelength infrared range. Water-vapor absorption remains the largest contributor down to about 30 µm, when total absorption abruptly drops below 2 dB per kilometer. Carbon monoxide is the main problem until the visible range (around 700 nm) is reached, and shows up as seven distinct absorption bands. A careful choice of wavelength can avoid these deadly spots. Figure 1 suggests that 10 µm might make a good choice, along with three distinct troughs between 1 and 3µm. There is little atmospheric absorption in the visible range.

Ozone (O_3) absorbs ultraviolet wavelengths and may limit practical communications at wavelengths shorter than 400 nm. Ozone is abundant in the stratosphere, where it shields the Earth from the damaging effects of solar ultraviolet radiation, but ozone is present in sufficient amounts even at sea level to cause significant absorption. Short-wavelength ultraviolet radiation is also energetic enough to ionize gas molecules, which may present additional safety problems for communication.

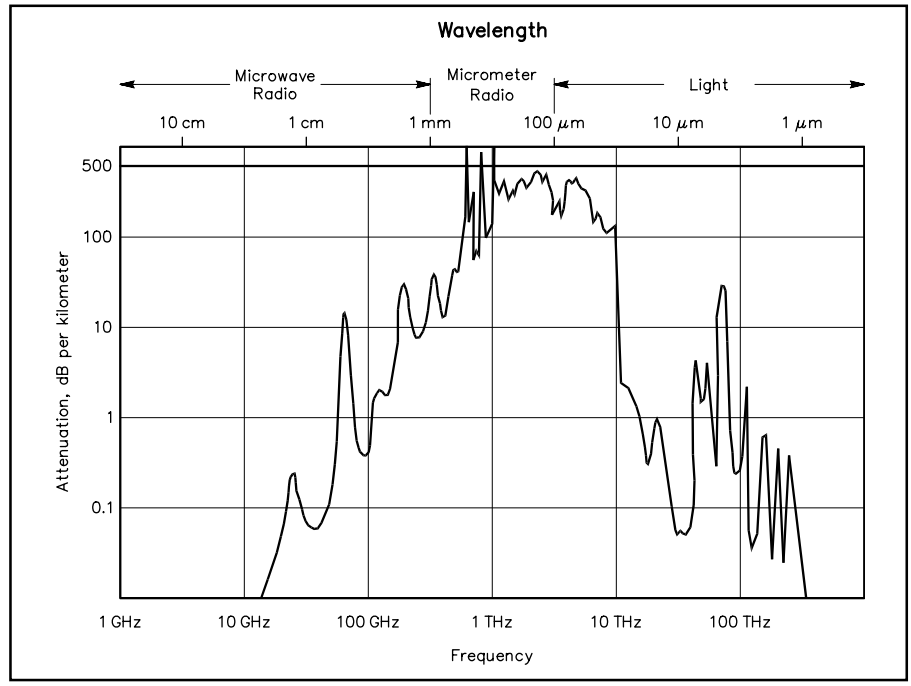


Figure 1—Attenuation of electromagnetic radiation from UHF radio to light due to atmospheric absorption. The graph represents the sum of water vapor, oxygen and carbon-dioxide absorption in a standard sea level atmosphere of 20°C and 7.5 grams of water vapor per cubic meter—about 40% relative humidity. Below 10 GHz (wavelengths shorter than 3 cm), absorption due to atmospheric gases is negligible. Oxygen and water vapor are primarily responsible for absorption between 3 cm and 30µm. Carbon dioxide is more significant in the infrared range between 15 and 1µm. Visible light provides a window with little atmospheric absorption. Not shown are high levels of absorption due to ozone in the ultraviolet range shorter than 400 nm. Based on John M. Goodman, in *Naval Research Reviews*, Fall/Winter 1980-81, page 8.

X-ray and Gamma Ray (Shorter than 10 nm)

The even shorter and much more energetic X-ray and gamma radiation present too many health and safety concerns to be considered practical for terrestrial communication, even on an experimental basis. X-rays can be generated artificially in specially designed vacuum tubes or by devices called synchrotrons. Gamma radiation is emitted both naturally and artificially during processes involving highly energized atomic nuclei and subatomic particles. Weak X-ray and gamma radiation can be detected with Geiger counters.

DX Records

The latest distance records by propagation mode from 144 MHz to above 300 GHz appear in Table 4. Seven new records have been added since last year, two of them made via meteors during the Leonid meteor shower. Several easy opportunities to register new claims exist at 903 MHz and higher in the Tropo (A) category for tropospheric contacts across the Atlantic, Gulf of Mexico or Caribbean. None have been claimed so far. Contacts from Cuba or the Bahamas to Florida, for example, would meet the Tropo (A) criteria. WA4LOX and WP4O just claimed the first 222 MHz Tropo (A) record with a 1854-km contact. Current Tropo (A) records at 144 and 432 MHz are in the respectable 2200 to 2400 km range, but there are plenty of opportunities to improve on them as well.

One change has been made in record-keeping criteria. For the time being, the frequencies above 300 GHz will be divided into just two bands for record purposes, even though the FCC makes no such distinctions. Radio from 1000 to 100 µm (300 to 3000 GHz) will constitute a single micrometer radio band. Infrared, visible and ultraviolet wavelengths from 100 µm to 10 nm will comprise the light band. Previous recognitions based on the color of visible light have been dropped because of the proliferation of separate claims. Thus, a single light record remains in the table. DX records at shorter wavelengths will not be considered.

ON THE BANDS

The bands were still trying to shake free from the winter blahs in February. There was a bit of ducting across the Gulf of Mexico, two days with aurora and some continuing worldwide 6-meter DX. Ken Neubeck, WB2AMU, reported the only 6-meter sporadic E, when he heard some activity from south Florida briefly on the afternoon of February 11. Dates and times are UTC.

Six Meter DX

There was little progress in worldwide DX during February. The now familiar north-south paths, including Japan to Australia, Europe to southern Africa and the Caribbean to South America, continued to be active. The February log of Louis Anciaux, HP3XUG, suggests what is available in South America. In addition to many LU, PY and CX stations, Louis also worked ZP6CW, ZP5SNA, ZP5ZR, several HKs, HC5K, FY5KE and CE3SAG. Ed Rodriguez, WP4O, reported many days with contacts into Argentina, Uruguay, Brazil and also worked HC5K. A few lucky US stations were able to get into the north-south action. John Butrovich, W5UWB, worked LU3HR on February 25 at 0145 and noted that N5JHV worked ZL2AGI about the same time. Bruce Crawford, WA3WUL, snagged PP1CZ on February 27 around 2250, most likely via a sporadic-E link to TE.

Europeans had opportunities to make contacts into both Africa and South America. On February 16, EH3ADW worked PP1BG and EL2VO within a single 10-minute period around 2250. Other interesting catches for the Europeans included FR5DN. South Americans, including Nestor Zucchi, LW5EJU, worked into Africa and Europe on February 23, 25 and 26, at least. Included in Nestor's log were CN8LI, EH8LP, EH8BPX, EH7BVD, several 9H and I, and IS0AGY. CX1DDO worked EH8, CU2 and CT3 on the 25th.

Indeed, South Americans probably had the best opportunities during the month for worldwide DX. Consider the extraordinary range of contacts PY5CC made over the evening of February 23. His DX packet spots began with EH9AI at 2230 and continued with CN2UN, ZD8VHF/b, TR0A/b, EH8LB and 7J6CCU (Ryukyu Islands, Japan) by 0124. He continued with CP1FQ XE1/SM0KAK, JS6CDB, KH6IAA, JR6GV, BV2DP (Taiwan) and JR6HI at 0330. Not bad for an evening's work, and this does not include all the other South Americans he logged.

Aurora

A major solar storm shook the Earth's magnetic field early on February 18 UTC. The K index reached seven at 1200 and 1500, but this was too early for favorable VHF conditions in North America. By prime time in late afternoon, the storm was already diminishing. Jay Baack, N1RWY (FN54) worked stations only as far south as FN12 on 50 MHz after 2300. Other scat-

Table 4—Claimed North American Distance Records
Compiled by Al Ward, W5LUA, February 1, 1999

Frequency and Mode	*Distance (km)*	*Stations (grid locators)*		*Date*
144 MHz				
Aurora	2167	WB0DRL (EM18ct)	KA1ZE (FN31tu)	1986 Feb 8
Auroral-E	2236	VE4AQ (EN19lu)	K5MA (FN41qo)	1991 June 9
FAI	2370	KX0O (DM78pu)	WA4CHA (EL88qa)	1993 Jun 19
Meteors	3154	K5UR (EM35wa)	KP4EKG (FK68vg)	1985 Dec 13
Sporadic E	3635	WA7GSK (DN13so)	W4FF (EL96am)	1998 May 29*
TE	6328	KP4EOR (FK78aj)	LU5DJZ (GF11lu)	1978 Feb 12
Tropo (P)	4333	KH6HME (BK29go)	W7FI (CN87ws)	1995 Jul 1
Tropo (C)	2714	WB4MJE (EL94hq)	VE1KG (FN84cm)	1994 Nov 5
Tropo (A)	2365	W1JSM (FN43nc)	VP5D (FL31ut)	1988 May 10
222 MHz				
Aurora	2088	WB5LUA (EM13qc)	WC2K (FM29pt)	1989 Mar 13
Meteors	2102	W7XU (EN13lm)	K1WHS (FN34mj)	1998 Aug 13*
Sporadic E	1500	K5UGM (EM12ms)	W5HUQ (EM90gc)	1987 Jun 14
TE	5905	KP4EOR (FK78aj)	LU7DJZ (GF05rj)	1983 Mar 9
Tropo (A)	1854	WA4LOX (EL87sk)	WP4O (FK68km)	1998 Feb 26*
Tropo (C)	2167	W5UWB (EL17ax)	K2YAZ (EN74ax)	1998 Oct 11*
Tropo (P)	4142	KH6HME (BK29go)	XE2/N6XQ (DL29cx)	1989 Jul 15
432 MHz				
Aurora	1902	WB5LUA (EM13qc)	W3IP (FM19pd)	1986 Feb 8
Meteors	2040	N6RMJ (DM14cp)	W7XU (EN13lm)	1998 Nov 17*
Tropo (A)	2273	W1RIL (FN42ah)	VP5D (FL31ut)	1988 May 10
Tropo (C)	2204	KM1H (FN42hr)	WB4MJE (EL94hq)	1992 Dec 16
Tropo (P)	4142	KH6HME (BK29go)	XE2/N6XQ (DL29cx)	1989 Jul 15
903 MHz				
Aurora	87	K3HZO (FM18qp)	WA3NZL (FM19jg)	1991 Nov 8
Tropo (C)	1741	N5WS (EL09ru)	K0VXM (EL98pj)	1998 May 22*
Tropo (P)	4061	KH6HME (BK29go)	N6XQ (DM12jr)	1994 Jul 13
1296 MHz				
Tropo (C)	2071	KD5RO (EM13pa)	WB3CZG (FN21ax)	1986 Nov 29
Tropo (P)	4142	KH6HME (BK29go)	XE2/N6XQ (DL29cx)	1989 Jul 15
2304 MHz				
Tropo (C)	1533	WB5LUA (EM13qc)	WA8WZG (EN81om)	1993 Sep 17
Tropo (P)	3973	KH6HME (BK29go)	N6CA (DM03tr)	1994 Jul 14
3456 MHz				
Tropo (C)	1352	WB5LUA (EM13qc)	WA0BWE (EN34lx)	1995 Jul 12
Tropo (P)	3973	KH6HME (BK29go)	N6CA (DM03tr)	1991 Jul 28
5760 MHz				
Tropo (C)	1187	WB5LUA (EM13qc)	W9ZIH (EN51nv)	1994 Nov 12
Tropo (P)	3973	KH6HME (BK29go)	N6CA (DM03tr)	1991 Jul 29
10 GHz				
Tropo (C)	1124	XE2/N6XQ (DL27qo)	WB6CWN (CM96qi)	1994 Aug 25
24 GHz				
Tropo (C)	267	WA6EXV (DM06wl)	K6OW (DM14kf)	1997 Jul 5
47 GHz				
Tropo (C)	110	K2AD (FM07fm)	WA1ZMS (FM07te)	1998 Apr 5*
76 GHz				
LOS	12.7	W0EOM (CM87uk)	AA6IW (CM87vi)	1997 Dec 11
120 GHz				
LOS	1.1	WA1MBA (FN32rj)	WB2BYW (FN32rj)	1994 Jul 11
142 GHz				
LOS	3.8	WA1MBA (FN32ri)	WB2BYW (FN32rj)	1993 May 2
241 GHz		None reported		
Micrometer Radio		None reported		
Light				
678 THz	248	WA7LYI (DM34tf)	KY7B (DM42ok)	1991 Jun 8

Notes: **New listing since May 1998 publication;* ***Micrometer Radio*** *(300 to 3000 GHz);* ***Light*** *(3 to 30,000 THz);* ***FAI*** *(E-layer field-aligned irregularities);* ***LOS*** *(line of sight);* ***Meteors*** *(meteor scatter);* ***TE*** *(transequatorial spread-F);* ***Tropo (A)*** *(tropospheric modes across the Atlantic, Caribbean and Gulf of Mexico);* ***Tropo (C)*** *(tropospheric modes across continental North America);* ***Tropo (P)*** *(tropospheric modes across the Pacific).*

tered reports suggest that auroral conditions reached at least to the Ohio River. Aurora was followed by 6-meter auroral-E across Canada and the northern US early on February 19. KL7NO worked or heard stations as far east as VE3JJX (EN29).

Although the K index did not reach seven on February 28, auroral signals were heard as far south as southern Illinois and across the northern states to the Pacific Northwest. Reports were scarce, suggesting the aurora was not spectacular. Nevertheless, Brad Pioveson, W9FX (EM57) worked into Missouri, Minnesota, Illinois and Wisconsin on 144 MHz after 0000. His best DX was VE3FGU (FN04).

Tropospheric Ducting

TV DXer Fernando Garcia of Monterrey, Mexico (DL95), reported UHF television from Georgia and Alabama on February 18 and from Florida on February 20 and 26 to 28. The distance across the Gulf of Mexico to Florida's East Coast is just about 2000 km. On-the-air 2-meter reports were sparse. John Butrovich, W5UWB (EL17), worked WB4MUS (EM60) on the morning of February 18. Paul Womble, AJ4Y (EL97), hooked up with KF4NEM and KF4WCG (both EM50) and N5HVJ (EL59), all in the Mobile-to-New Orleans area. Paul runs just 10 W to a 10-element Yagi.

Microwaves

Buddy Morgan, WB4OMG (EL87) worked KQ4PI (EL99) on 2.3 GHz, about 240 km distant. This is no distance record, but Buddy notes that there has been little activity on the bands above 1.2 GHz in Florida for some time. He runs 20 W to a 73-element loop Yagi, while WB4OMG puts 5 W into a 3-foot dish. The pair are looking for more contacts. Why not try for that shot across the Gulf to Texas? Any takers?

Microwave activity is alive and growing in Kentucky. Jack Nyiri, AB4CR, reports that he and K4EFD have completed an 84-km contact on 5.6 GHz across an obstructed path using small dishes and 500 mW power. The pair has equipment for 10 GHz and are putting together wideband FM gear for 24 GHz.

VHF/UHF/MICROWAVE NEWS

Another 47 GHz Record for the French

The RSGB *Microwave Newsletter* for February reported that F6BVA and F5CAU extended their 47-GHz world record to 268 km on December 26, 1998. F6BVA operated from Tour de Batere (JN12gm) at 1400 meters elevation, while F5CAU set up on the 1500-meter Mt Ventoux (JN14pd). The air temperature was just above freezing.

VHF Banquet at the Dayton Hamventon

Tom Whitted, WA8WZG, and other regulars on the 3.843-MHz VHF net invite everyone to a banquet on Friday evening, May 14, 6:30 to 11:00 PM, at the Holiday Inn North in Dayton. There will be an after-dinner speaker, prizes and noise-figure measurements. Dinner costs $30 and reservations are necessary. Order tickets from Tony Emanuele, WA8RJF, 7156 Kory Ct, Concord, OH 44077. Additional information can be found on the Web at **http://www.wa8wzg.com.**

Central States VHF Society Call for Papers

The annual CSVHF Society conference will be held in Cedar Rapids, Iowa, July 22 to 25. Anyone wishing to submit a paper for the proceedings or present a session should contact Barry Buelow, WA0RJT, by May 15. Contact Barry at 4110 Emerson Ave, NE, Cedar Rapids, IA, 52400; or e-mail **bjbuelow@plutonium.net**. QST

Rick Palm, K1CE • *Field Services Manager*

A Halloween to Remember in Kansas

"There was a roaring in the wind all night. The rain came heavily and it fell in floods"—William Wordsworth, *Resolution and Independence*, 1807.

Wordsworth, the English poet, might well have described south central Kansas on Halloween 1998. The rain indeed fell heavily and it produced record floods on the Arkansas, Walnut and Whitewater rivers. 5100 people were driven from their homes and more than $50 million in damage resulted.

"It was one great big slow-moving sucker that just didn't want to move." That's how John Ogren, severe warning coordinator for the Wichita, Kansas National Weather Service office, described the torrential rains that began late on Friday, October 30, and didn't quit until Sunday afternoon, November 1.

The first hint of the disaster came in the late evening of October 31, Halloween. "I was the duty officer on call that night," said Jack Kegley of the Sedgwick County Emergency Management Service. "About 9 o'clock, I started getting phone calls from people wanting sandbags. After three calls, I decided to go down to the office and by the time I got there, there were more calls for sandbags. That's when I called my boss and we decided to activate the Emergency Operating Center."

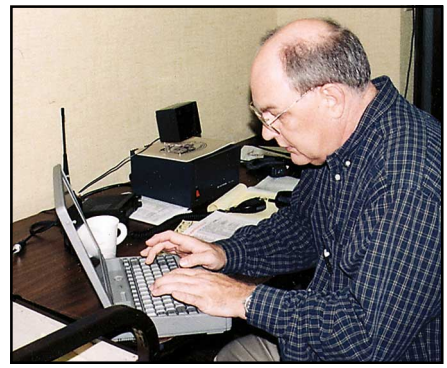
That's also when the first call for assistance from amateur operators came.

Kegley called Roger Teachman, KD0ME, Sedgwick County coordinator for RACES, and asked for hams to man the amateur station at the EOC. Teachman and other RACES members responded and manned the station throughout the night and into the early evening on Sunday.

By 3 AM Sunday morning, the Cowskin Creek, which flows through the western section of Wichita, was out of its banks and rising rapidly. By daybreak, the river had inundated approximately 300 homes in The Dells, an upscale neighborhood near Central and Maize Road in west Wichita.

Many residents were unaware of the danger until it was too late to escape the water. Rescue operations began before daybreak. By noon Sunday, more than 100 residents were evacuated.

Shortly after daybreak, the Emergency Management office asked the Midway Kansas Chapter of the American Red Cross to open a shelter at the Benton Elementary School. John Sullivan, KG0MZ, the Red Cross coordinator for ARES, was contacted and asked to provide communication between the shelter and the Red Cross headquarters in downtown Wichita.



John Sullivan, KG0MZ, enters data as part of Amateur Radio operations during the Halloween flood of 1998 in Wichita, Kansas.

"About 10 AM, I returned a phone call from Sharon Powell-Quincy of the Red Cross," Sullivan said. "She asked me to set up the communications link so I headed to the Red Cross building with some 2-meter gear and set up a station. Bill Hayes, KB0PPY, was on his way to Benton School where they had set up the shelter. We decided to use the Wichita Amateur Radio Club's 146.85 MHz repeater. By the time I got the station set up at the Red Cross, Bill was set up at the school."

Stan Weir, KB0SHB; Bill's wife Sandy, KB0SGI; Kurtis Boughton, N0UGJ; and Tom Murphy, KB0PKW; all came on duty at various times during the day. Bill Hayes and Boughton provided communications at the shelter while Weir manned the command post downtown.

At one point on Sunday evening, Bill Hayes was asked to find someone who could pick up medication for a recent heart transplant patient. Murphy happened to be monitoring the .85 repeater, heard the request and volunteered to drive to Via Christi St. Francis Regional Medical Center. He picked up the medication and took it to the Benton School shelter.

The worst, however, was yet to come.

The Walnut River topped a levee that protects the town of Augusta. Floodwaters inundated 600 homes and 100 Augusta businesses and left 1800 homeless. At Arkansas City, the Walnut empties into the Arkansas River. Levees along the Arkansas held but an old levee on the Walnut broke, flooding the southeast section of Arkansas City and 3000 people were forced to flee their homes. Sand Creek and Emma Creek, north of Wichita, overflowed into the town of Sedgwick. Now, south central Kansas had a major disaster on its hands.

The Red Cross declared it a major disaster on Wednesday, November 4, and requested assistance from the national Red Cross. Relief workers from other areas began arriving in Wichita; one of them was Chet Hallberg, K0TCB, of Prairie Village, Kansas. Chet is a Red Cross disaster communications coordinator.

From Wednesday on, amateurs performed communication tasks not associated with normal amateur activities. Hams helped install telephones and phone lines, set up computers, assisted in setting up a portable simplex link on a Red Cross frequency and used their skills to troubleshoot the various communications links.

By the weekend, amateurs were dispatched from Wichita to Augusta and Arkansas City to assist disaster assessment teams and emergency response vehicle personnel. Bill Hayes made several trips to Augusta, keeping in contact by either Red Cross radio or Amateur Radio with the disaster command center in Wichita. Weir manned the communications desk for all of the week and well into the next week as the immediate need for emergency communications wound down.

"We learned a lot about emergency communications," said Sullivan, the ARES coordinator. "We had a national person who was a full-fledged communications officer take command of our operations. We got a much different perspective of what is involved and we were involved in a whole lot of stuff."

Sullivan also had high praise for Weir. "The amount of time and work Stan put in was just phenomenal. He did yeoman service." In all, 24 hams assisted the Red Cross during the two-week period after the flood for a total of 780 man-hours of work. Another six or seven participated in the initial stages of the disaster as part of Sedgwick County RACES.

Considering the magnitude of the disaster, it is amazing that only one death and two injuries occurred. A Harvey County woman drowned when she drove her vehicle around a road barricade and into a flooded creek. Two people suffered hypothermia before they could be rescued from the floodwaters.

The water has gone down but for the people who lost their possessions, even their homes, the Halloween flood of 1998 will be a goblin to haunt them for a long time.—*Roger N. Wilson, KD0AY*; **kd0ay@southwind.net**

Handling Traffic at Fairs and Public Events

During the spring and summer, your Amateur Radio club or group may have an opportunity to showcase Amateur Radio at a fair or other public event. Traffic handling on behalf of the public should be a part of the exhibit. Here are a few tips to help assure a successful event.

Although you may only be at the site a day or two, don't compromise your station too much. Try to put up the most you can for an antenna system because band conditions on traffic nets in the summer can really be the pits! Usually, electrical lines at fairs will surround you, so a line filter is a must. An inboard SSB or CW filter in your rig is a definite plus, too.

Don't huddle around the rigs or seat yourself in the back of the booth. Get up front and meet the people. After all, your purpose is to "show off" Amateur Radio to perk the interest of non-hams.

Most people will not volunteer to send a piece of traffic, nor will they believe a message is really "free." It's up to you to solicit "business." Be cheerful.

Always use "layman's language" when explaining about Amateur Radio to non-hams. Say "message," not "traffic." Don't ramble about the workings of NTS or repeaters.

The Orange County Council of Amateur Radio Organizations sponsored this successful booth at the Orange County Fair during July, 1998, in Costa Mesa, California. Thanks to David Mofford, W7KTS, 1998 Fair Booth Chairman.

Make sure your pencils or pens are attached to the booth with a long string, or you will be out of writing utensils in the first hour!

Make sure there are plenty of instructions around for Amateur Radio operators not familiar with traffic handling to help them get the hang of the situation.

Be sure that your exhibit booth is colorful and attractive. You will catch the public's eye better if you give them something to notice. If possible, display a banner, a poster or two, a collection of QSL cards, or even a map that shows the locations of other Amateur Radio stations that your exhibit station has contacted.

Field Organization Reports

Public Service Honor Roll
February 1999

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

734
NM1K
410
K4FQU
385
K7BDU
353
K5MC
339
KB8ZYY
311
K9RTB
W9RCW
272
KB5WEE
269
NZ4O
268
N5JZ
WB4GM
239
WA9VND
236
WB0ZNY
232
W7TVA
223
W4CAC
215
K7VVC

211
N2LTC
203
WB5NKC
202
WA4GQS
199
KK3F
198
K4SCL
197
KA4FZI
195
WB2IJH
194
WB8SIW
193
W6DOB
WB5ZED
191
KA2ZNZ
N2YJZ
188
W0OYH
185
WA1TBY
182
N5NAV
N2OPJ
178
N5IKN

176
K6YR
174
KB2VVB
173
KU4IJ
169
W4EAT
AD4DO
N2RPI
166
KT1Q
164
N5OUJ
W9CBE
KA4UIV
163
NR2F
161
N2JBA
KD4GR
159
N0KJ
W5YQZ
158
W6IVV
WA7EES
157
K2DN
156
WB5NKD

155
KF6OIF
KC5OZT
154
N8FPN
KO4A
153
KE4OAV
KL7Q
152
K4IWW
K4RBR
KL7Q
151
WX8Y
KF1L
150
KB2ZJI
KC2ACL
148
KB5W
W3YVQ
WA1FNM
147
N1VXP
KB5YAM
AF4GF
KC2AHS
146
KC2ALG
K5AO
KN4VL

145
KL5T
KD2AJ
WD4MIS
WN0Y
144
K8GA
KB2LML
NY2V
KF4TQX
143
AB7NK
142
KA8FCC
K2BCL
141
N8FWA
KR4MU
W5GKH
N1LKJ
KC5QGI
140
N5XGI
WA4DOX
K5VY
WB2ZCM
K2CSS
W9YCV
W7ZIW
139
W0LAW
KB8UEY
N3WKE
W2MTA

K6NTZ
KJ4N
W7NWP
138
NX1A
WA4QXT
W7GB
N9BDL
KC4ZHF
137
AA3GV
KC4RNF
136
WD4JJ
KC4TLG
135
KE4JHJ
133
N2XOJ
132
N2AKZ
KA9KLZ
AD4BL
N2XJ
131
KA1GWE
K8LEN
130
KJ3E
AA2ED
N2WDS
W5ZX
K6AGD
KE4DNO
W7LG
129
WO0A
W6QZ
N2CCN
NN2H
N9KHD
128
WA0TFC
KC6SKK
WB2QIX
KB5TCH
WB2FGL
W7GHT
127
N2OJI
WA5I
126
K5DPG
AA3SB

KE1AI
KA5KLU
N7YSS
125
WB2GTG
KG2D
124
KG6TU
K7GXZ
NZ1D
KF4NFP
122
W5CDX
WA2UKX
KA7AID
W1ALE
121
W2FR
K2BTP
N7DRP
W7VSE
K5MXQ
120
WA8EYQ
K4MTX
W1PEX
WX4H
119
KI4YV
K0PIZ
K9GBR
N1CPX
118
WB0WNJ
K5IQZ
W4BNY
KD1LE
KE4IFD
117
KB2WII
AG9G
AF9FA
116
W2RJL
W9ZY
N1DHT
115
KB0DTI
113
W1JX
N3WK
WA4EIC
AA4HT
W2MTO
KD7ME

111
N7AIK
KG5GE
W3BBQ
N3RB
110
K5VV
WD0GUF
KB9GGA
N4GMU
K2PB
109
W2AKT
108
W4CC
KC5VLW
KT4SJ
K7MQF
107
K4YVX
W4RRX
KB0BHY
WA1JVV
106
K8QIP
W2PII
WB4TVY
105
N8DD
WA8SSI
104
W1QU
KF5A
KB2KLH
N5JUU
103
K8VFZ
W5MEN
KC4PZA
102
WB5WBZ
N3WAV
WA2GUP
101
AA4YW
K5WOD
WA1D
N2IKR
WB4UHC
N1IST
100
KA1VEC
WB4ZNB
KE6MIW

99
W1JTH
KB2ETO
98
KB4WBY
KA4LRM
97
KB2VVD
NR9K
WD9FLJ
96
K8ZJU
KD3JK
KF5A
AD6HR
N9IAI
KA1OTN
95
KF4HJW
94
KD5P
N3ZKP
KG0IV
KI0JO
93
KC8HTP
91
WR8F
WI8K
AB5RV
W0MZI
WB1GXM
89
K0PY
N1SGL
W4ZBA
88
AF2K
KB2YUR
KD4HGU
WB2CZW
87
AA8SN
K8AI
KD4PWK
K1SEC
86
KC3Y
K5UCQ
W2JHO
85
AA8PI
N1ZTD
KO4OL

N1LAH
84
KO6RZ
AE4NW
83
N1TAT
82
K0IBS
KA9FVX
KE0K
WB9GIU
WA4EYU
81
WA1QAA
AA2NX
80
AA4AT
79
W5XX
KC2DNO
K8SH
W2CC
78
K3UWO
KD5AHW
WB7VYH
77
W7EP
N9PF
K2VX
76
K8IG
KE3FL
KC5VOG
74
AL7N
WJ3K
N5HK
WB4PAM
KA7TTY
N4MM
73
KD4JMV
72
KC8GMT
KK5GY
71
KB2UQZ
KI0BM
70
KA0DBK

The following stations qualified for PSHR in January, 1999, but their results did not appear last month: K6NTZ 178, KL5T 122, AL7N 71. K5VY earned PSHR in December, 1998, with 105 points, but his call sign was incorrectly listed. Also, in December,1998: W7GHT 123, WB7VYH 91, N7MPS 84. November, 1998: N7AIK 148.

Section Traffic Manager Reports
February 1999

The following ARRL section traffic managers reported: AZ, CT, EMA, ENY, EWA, IA, ID, IL, IN, KY, MDC, ME, MI, MN, NC, NFL, NH, NNJ, NV, OH, OK, OR, ORG, SB, SC, SD, SDG, SFL, STX, SV, TN, VA, VT, WI, WMA, WNY, WPA, WWA.

Section Emergency Coordinator Reports
February 1999

The following ARRL section emergency coordinators reported: AL, AZ, CT, EWA, GA, IN, KY, MDC, MI, MN, MO, NLI, NV, SD, SFL, TN, VA, VT, WMA.

Brass Pounders League
February 1999

The BPL is open to all amateurs in the US, Canada and US possessions who report to their SMs a total of 500 points or a sum of 100 or more origination and delivery points for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL radiogram format.

Call	*Orig*	*Rcvd*	*Sent*	*Dlvd*	*Total*
NM1K	610	310	811	10	1741
WX4H	3	545	789	11	1348
K7BDU	166	373	531	51	1121
N2LTC	0	515	570	23	1108
WB0WNJ	0	359	659	0	1018
W1PEX	0	206	748	6	960
KE4DNO	6	351	452	1	840
KT6A	0	429	365	0	798
K9JPS	0	422	45	291	758
KF5A	0	360	354	0	714
K4FQU	292	69	333	1	695
KI0JO	0	280	392	0	672
KK3F	27	310	254	56	647
WA9VND	60	331	224	11	626
W9RCW	0	350	41	232	623
W3KOD	0	316	277	6	599
W3YQZ	0	270	316	1	587
K7VVC	43	255	284	4	586
W6DOB	0	215	295	54	565
W7GHT	0	276	270	8	554
K5MC	207	75	250	9	541
WB5NKC	53	111	360	12	536
K9RTB	0	298	85	153	536
N3DRM	10	284	226	9	529
KA1VEC	15	243	254	13	525
N5IKN	0	201	104	197	502

BPL for 100 or more originations plus deliveries: NZ4O 193, W9IHW 186, K9GU 182, WB0ZNY 160, N5JZ 140.

The following stations qualified for BPL in the months noted, but were not listed in this column: (January, 1999) KA2ZNZ 611. (December, 1998) N5IKN 862, KF5A 838, W6IVV 707, W7GHT 701, WB5NKC 695, NN7H 504.

At the Foundation

*Edited by **Mary E. Lau, N7IAL** • Secretary, ARRL Foundation Inc*

What's the IDEA?

The "IDEA" is the Indiana Digital Experimenters Association, Inc of Indianapolis, Indiana. The group, incorporated in 1991, exists to foster experimentation, growth, and understanding of digital communications in the Amateur Radio Service. John Deegan, K9XT, President of IDEA contacted the Foundation in mid-1998 to establish a $500 scholarship to be awarded in 1999. Here are the details of the new award, per Mr. Deegan:

"The membership of IDEA desires this scholarship be awarded to an Indiana High School Senior who is a licensed Technician or higher class Amateur Radio operator. The student should be planning to study electronics, communications, or other related fields at an accredited institution in the State of Indiana.

"The scholarship would be used solely for educational purposes and to provide assistance with costs of tuition, room, board, books, and/or other fees essential to the advanced education of the recipient.

"Award preference is based on academic merit, financial need, a demonstrated interest in promoting the Amateur Radio Service, and community service uses of Amateur Radio."

If you are a student who feels you match these qualifications, visit the ARRL Foundation Web site at **http://www.arrl.org/arrlf/**. Read all about other scholarships you may be eligible for.

If you are a ham beyond college studies who enjoys digital innovation, why not make a donation today to the IDEA Scholarship Fund? Your tax-deductible contribution is welcome at: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111. We are a 501 (c) 3 organization operating for charitable, educational and scientific purposes.

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Mary Lou Brown, NM7N, Memorial Scholarship Fund
Edmond A. Metzger, W9PRN
Jan Scheuerman, KJ4N
Portland ARC (Oregon)

The William R. Goldfarb, N2ITP, Memorial Scholarship Fund
Estate of William R. Goldfarb, N2ITP

The Edward M. Little, W2PHQ, Memorial Scholarship
William W. Thompson, W2MTA, In fond memory of Lloyd Frohling, W8PMJ
Tom and Gordon Ichikawa, W7GUN and N6IN

The Martin J. Green Sr., K2TEO Memorial Scholarship Fund
Martin J. Green, Jr., K2PLF

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Ralph M. Bryant, W2NCB
John J. Jakubielski, KA1RVG
Gary Lech, WA6SFQ
Gerald R. McManus, KA7G
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Framk Halley, KA3KNB
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Fred W. Hoffert, III, NA2U, and Elizabeth Hoffert in fond memory of Benjamin J. Friedland, K2BF
Allan D. White, W1EYI
Willliam and Mary Allsopp in fond memory of Walter E. Browne, KD5CBU
Elizabeth Taylor in loving memory of Charles F. Taylor, W6EBX
Peter C. Elmerdorf, WE2P
Anonymous
Marshall Weingarden, K8GUM
John W. Handy in fond memory of Bill Clemow, KE7CX
Francisco S. Lim, DU4IX
Ralph B. Toye, W1GPL
L. Frank Heffner, DA1RW
Eugene O. Frye, K0DJP
Robert Clark, W7DLC
Mark S. Hahn, N8WFX
Robert E, Murphy, WA1UHG
William A, Crespo, KP4AAQ
Joseph Basillesco, W1NXW
Joseph R. Pasek, KM6JA
Arnold J. Famillian, KM6HA
William G. Bush, Sr., N8HRD
James J. Pritchard, K2DRA
Charles E. Zazian, N1XYO
Chal Schader, K5CYE
Lawrence D. Capehart, WA0ZVK
Tom Frenaye, K1KI, and New England Division Cabinet Members
Ralph Switck, KD1SM
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Frank J. Billington, III, W7FJB
Richard J. Ciechomski, PU5WSQ
Robert F. Mallory, KG5CX
Michael Torell, KE4TFR
Mark R. Carver, KC8JCA
Bennett L. Basore, W5ZTN
C.S. Powell, NE9A
Joyce Hawkins Stanley, in loving memory of Milnor R. Hawkins, K2CQ
Chaparral ARC (Texas), in loving memory of James Rex Freemen, WA5YLN
Jane Crawford, in loving memory of Charles W. Crawford, WD0DBZ
Albert H. Rotsinger, W8BR
Silicon Valley VE Group (California)
Don M. Cross, Jr., KE6ETW
Hugh B. O'Donnell, W3FUO
Western New York DX Assn. (New York), in fond memory of Willard Wilson, WA2CYQ and William Cochrane, WA2LYF
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John J. Tomslewicz, W1QAJ
John W. Halter, K0JVH
Camille S. Marie, W3EPR
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Adolf Lehrer, DF5DK
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Richard V. Baum, NS7A
Robert C. Smith, K5VRF
James L. Paul, KC5LL
Robert K. Ewing, WA4GWG
Rikio Nishioka, KH6ALF
Ralph H. Plumb, K4WGW
Deming ARC (New Mexico)
Hamfesters Radio Club (Illinois)

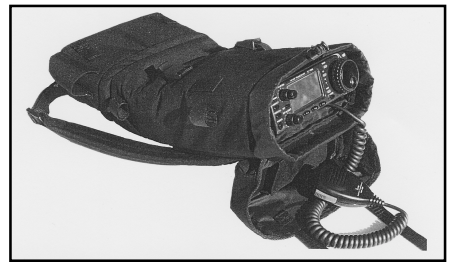
As received and acknowledged during the months of **January** and **February**.

QST

New Products

WORLD PACK™ MAN-PACK HF RADIO CARRIER

◊ Cutting Edge Enterprises introduces self-contained carrying convenience to the HF operator on the go. The laminated heavy duty weather resistant black nylon pack is padded with 1/4-inch foam and designed to securely hold a compact HF transceiver, such as the IC-706 or FT-100 in an upper compartment and an optional rechargeable battery power supply in a lower compartment. The radio is held in an adjustable sling arrangement that allows the transceiver to be raised or lowered for easy access. A mobile/portable antenna can ride along in a pocket and strap arrangement on the side. A pocket in the top cover provides storage for your hand mike or key.



The pack can be worn on your back using the body-contoured shoulder straps or carried by a handle at the top, and is small enough to qualify as airline carry-on luggage.

The World Pack is priced at $57.95. The optional rechargeable power supply kit is $63.95.

For further information, contact Cutting Edge Enterprises, 1803 Mission Street, Suite 546, Santa Cruz, CA 95060; tel 800-206-0115, fax 831-426-0115; **cee@cruzio.com**. QST

Next New Product

Op-Ed

The Public's Perception of the Safety of Radio Waves

By Gregory Lapin, Ph. D., P.E., N9GL
Chairman, ARRL RF Safety Committee
g.lapin@ieee.org

As Amateur Radio operators we need to be particularly sensitive to the fears of the public. As absurd as it may seem to us, many people believe that RF energy is inherently dangerous. A recent series of news articles illustrates how easy it is for a seemingly innocent statement to lead to misperceptions that are difficult and costly to correct. For example,

> "Cell phone manufacturers have acknowledged for the first time that their products pose a health risk to users, according to a story in London's *Independent*. Lawyers claim that the admission will pave the way for civil suits against manufacturers, for conditions ranging from tumors, damage to the immune system, and memory loss"—**http://www.wired.com**.

Several cellular telephone manufacturers have applied for patents to protect developments that decrease the exposure of humans to the signals transmitted by their phones. These changes are mainly in the antenna designs. Some of the newest techniques include moving the antenna away from the head when the telephone is held to the ear (as implemented in the popular Motorola Startek phone, for example), and driving multiple active elements within the "rubber duck" style antenna (using a phase relationship with the goal of decreasing the amount of energy transmitted in the direction of the user).

To better make their case to the patent office, some of the companies overstated that these developments would "minimize the health risks associated with using mobile phones." Although this makes for good reading in a patent application, it incorrectly implies that there currently is such a health risk that needs to be reduced.

An immense body of research to date has shown that RF emissions do not pose a health risk if significant heating does not take place in tissue. With a maximum power output of 0.6 W, it is unlikely that a cellular telephone can create such heat. Developments that decrease the amount of absorbed RF energy in the user's tissue are useful, not for health reasons, but to improve the performance of the telephone.

Much of the public has an inherent mistrust of RF energy. People don't know specifically what about radio waves could be harmful but, nevertheless, they are convinced that the danger exists. One problem is the perception that RF is radiation, partially fueled by the use of the term Radio Frequency Radiation. Although this term is correct—it is the radiation of RF from antennas that allows us to communicate—it incorrectly equates RF with radioactive emissions in the minds of many people. Although both forms of energy are correctly called radiation, their biological effects are vastly different. When the frequency of electromagnetic energy is high enough, the radiated field contains enough energy to cause chemical changes in tissue and the term ionizing radiation is used. If the ionized chemicals are part of critical biological structures such as DNA, bad things can result, including cancer.

Electromagnetic energy at lower frequencies is incapable of ionizing chemicals and, as such, is called nonionizing radiation. The amount of power in an electromagnetic wave is not related to the ability of that energy to cause ionization; it is solely a function of frequency. The frequency at which energy starts to ionize is in the vicinity of ultraviolet light, or about 10^{15} Hz (1,000,000,000,000,000 Hz). The highest radio frequencies used today are about 100 GHz (10^{11} Hz, or 100,000,000,000 Hz); common communications frequencies are less than 1 GHz. Radio waves typically used by hams are more than a million times lower in frequency than the lowest frequency that is classified as ionizing radiation. There is no viable mechanism that science has discovered by which radio signals can cause cancer.

The second thing that breeds mistrust in the minds of the public regarding RF is the microwave oven. Although many people have no idea how these devices work, they do see food get very hot very quickly. Imagine that you are such a person and, as you watch your steak being cooked in minutes by these magical "microwaves," you are thinking about your neighbor who is transmitting "microwaves" from an antenna that is pointed in your direction. What would you think?

Unlike ionization, RF heating is related to absorption of power. Additionally, as we know from working with different-size antennas, the efficiency of absorption in different-size structures is related to frequency. Heating biological tissue is a real danger that has been dealt with by the FCC in its recent environmental impact regulations for the Amateur Radio Service (§97.13c and OET Bulletin 65 Supplement B). Based on our current knowledge and exhaustive calculations, when the FCC guidelines are met, Amateur Radio signals pose no danger to people.

We should take the recent faux pas of some of the cellular telephone manufacturers as a lesson. Our hobby is based on a technology that much of the public distrusts. As long as we follow safe RF-exposure practices, the public is safe from our signals. However, it is a good idea to carefully think about how we word discussions of this nature. Decreasing exposure below what is already known to be a safe level does not make it "safer." It is still just "safe." In particular, it is a bad idea to joke about this issue, even in private. Such jokes (such as "frying the neighbors") can only be considered funny because we know them to be false. People who do not understand this will not be laughing.

QST Op-Ed Policy

The purpose of Op-Ed is to air member viewpoints that may or may not be consistent with current ARRL policy.

1) Contributions may be up to two-thirds of a *QST* page in length (approximately 900 words).

2) No payment will be made to contributors.

3) Any factual assertions must be supported by references, which do not necessarily have to be included in the body of the article to be published.

4) Articles containing statements that could be construed as libel or slander will not be accepted.

5) The subject matter chosen must be of general interest to radio amateurs, and must be discussed in a way that will be understandable to a significant portion of the membership.

6) With the exception that the article need not be consistent with League policy, the article will be subject to the usual editorial review prior to acceptance.

7) No guarantee can be made that an accepted article will be published by a certain date, or indeed, that it will be published at all; however, only articles that we intend to publish will be accepted, and any article we have decided against publishing will be returned promptly.

8) Send your contributions to ARRL Op-Ed, 225 Main St, Newington, CT 06111 QST

Coming Conventions

*Edited by **Gail Iannone** • Convention Program Manager*

WASHINGTON STATE CONVENTION

May 22-23, 1999, Yakima

The Washington State Convention, sponsored by the Yakima ARC, will be held at the Masonic Center, 510 N Naches Ave; I-82 to Yakima, Yakima Ave Exit, W on Yakima, N onto N Naches Ave. Doors are open Saturday 9 AM to 4 PM, Sunday 9 AM to 1 PM (breakfast starts at 7 AM both days). Features include exhibitors, demonstrations and presentations, ARRL Northwestern Division Cabinet Meeting (Director Greg Milnes, W7AGQ), VE sessions (Sean Byrne, AC7AJ, 509-966-9838; walk-ins accepted), banquet (Saturday eve, $12.50; program by ARRL Senior Assistant Technical Editor Dean Straw, N6BV, "Logistics and Planning for the 6Y2A DXpedition"). Talk-in on 146.66. Admission is $5. Tables are $10 (plus admission). Contact C. Jo Whitney, KA7LJQ, Box 9211, Yakima, WA 98909-0211, 509-965-3379; **kb7hdx@arrl.net**; **http://eagle.ykm.com/~w7aq/hamfest.html**.

WYOMING STATE CONVENTION

May 29-30, 1999, Casper

The Wyoming State Convention, sponsored by the Casper ARC, will be held at the Radisson Inn (formerly the Hilton), 800 N Poplar; take Exit 188B (Poplar St) off I-25, Radisson Inn is on N side of I-25. Features include swapmeet, major dealers, antennas (Bob Williams, N7LKH), ARES/RACES meeting, ARRL forum, banquet (Saturday, 6:30 PM, $15; special guest Gordon West, WB6NOA), contesting (Wayne Mills, N7NG), VE sessions (Saturday, 1 PM; Nick Nicholson, W7TSM, 307-234-1220; **tsmnick@coffey.com**). Talk-in on 146.94. Admission is $7 in advance, $10 at the door. Tables are $5. Contact Warren (Rev) Morton, WS7W, 1341 Trojan Dr, Casper, WY 82609, 307-235-2799 or 307-237-9301; **mortonwg@aol.com**; **http://w3.trib.com/~carc/hamfest.html**.

IOWA STATE CONVENTION

June 4-5, 1999, South Sioux City, NE

The Iowa State Convention (Hamboree 21), sponsored by the 3900 Club and the Sooland ARA, will be held at the Marina Inn, 4th and B St. Doors are open Friday noon to 9 PM, Saturday 8 AM to 4:15 PM. Features include flea market (Jeff Marsh, N0WWY, 712-277-3856; **jmarsh@pionet.net**), dealers, exhibitors, VE sessions, forums (MARS, ARRL, technical, advanced packet), antennas, QCWA luncheon, ARRL books and display, QRP programs, left foot keying contest, dinner (Friday eve, $10), banquet (Saturday eve, $15), handicapped accessible, free parking, full hookup campground (2 blocks). Talk-in on 146.91. Admission is $6 for both days. Tables are $10 (general area), $15 (perimeter), free electricity. Contact Mike Nickolaus, NF0N, 316 E 32nd St, South Sioux City, NE 68776, 402-494-6070; **nf0n@avalon.net**; **http://www.pionet.net/~k0brd/hamboree/**.

ATLANTIC DIVISION/NEW YORK STATE CONVENTION

June 4-6, 1999, Rochester

The Atlantic Division/New York State Convention (65th annual Rochester Hamfest and Computer Show), sponsored by the Rochester ARA, will be held at the Monroe County Fairgrounds, Rte 15A and Calkins Rd in Henrietta, NY. Outdoor flea market runs continuously for the entire weekend beginning Friday at 6 AM; indoor exhibits open Friday noon to 5:30 PM, Saturday 8:30 AM to 5:30 PM, Sunday 8:30 AM to 1:30 PM. Features include outdoor flea market with 1200 vendors, indoor flea market with 80 exhibitors, 150 indoor commercial exhibitors with up-to-date radio and communications equipment, complete computer systems (components, software, shareware), awards banquet (Friday evening at the Marriott Thruway), full day and a half of programs (Friday and Saturday at the Dome Center), VE sessions (Saturday). Talk-in on 146.88. Admission is $7 in advance, $9 at the door, under 12 free. Outdoor flea market tailgate 10 ft × 20 ft spaces are $10 each; indoor flea market 10 ft × 10 ft spaces are $35 each (advance order only); bring your own tables. Contact Harold Smith, K2HC, 300 White Spruce Blvd, Rochester, NY 14623, 716-424-7184, fax 716-424-7130; **info@rochesterhamfest.org**; **http://www.rochesterhamfest.org**.

1999

April 23-24
Arkansas State, Little Rock*

April 25
Delaware State, New Castle*

April 25
Eastern New York Section, Poughkeepsie*

April 30-May 1
Louisiana Section, Baton Rouge*

May 1-2
Alabama Section, Birmingham*

May 1-2
West Texas Section, Abilene*

June 11-12
Georgia Section, Albany

June 11-12
West Gulf Division, Arlington, TX

June 12
Eastern Pennsylvania Section, Bloomsburg

June 13
Tennessee State, Knoxville

July 10
Central Division, Indianapolis, IN

July 10
Midwest Division, Kansas City, MO

***See April *QST* for details.**

NORTHWESTERN DIVISION CONVENTION

June 4-6, 1999, Seaside, OR

The Northwestern Division Convention (SeaPac), sponsored by the Oregon Tualatin Valley ARC, will be held at the Seaside Convention Center. Doors are open for registration and setup Friday 11 AM to 9 PM; public Saturday 8 AM to 9:30 PM, Sunday 8:30 AM to 2 PM. Features include flea market (Lynn Hurd, WB7UNU, 503-624-1999), exhibits (Al Berg, W7SIC, 503-640-5456), seminars and forums, FARS transmitter hunt, VE sessions (Saturday 9 AM to noon, Our Saviour's Lutheran Church, preregister by May 1, no walk-ins; Carl Clawson, W7SL, 503-629-5796), Ladies Hospitality Suite (Room 125), banquet (Saturday 7:15 PM, $20; pre-banquet happy hour 6:30 PM; MC Greg Milnes, W7AGQ, ARRL Northwestern Division Director), ARRL guests (First Vice President Steve Mendelsohn, W2ML, and Northwestern Division Vice Director James Fenstermaker, K9JF), self-contained RV parking ($12 per night, 800-444-6740 ext 3, or 503-738-8585), RAGS Country Store (Gene Mielke, KA7JNU, 541-386-2041), refreshments. Talk-in on 146.66. Admission is $6 in advance, $8 at the door; $3 age 13-18 (when accompanied by a registered adult); under 13 free. Tables are $15 per table per day or $25 per table for 2 days. Contact Randy Stimson, KZ7T, 9890 SW Inglewood St, Portland, OR 97225, 503-297-1175; **http://www.seapac.org**.

GEORGIA STATE CONVENTION

June 5-6, 1999, Marietta/Atlanta

The Georgia State Convention, sponsored by the Atlanta RC, Gwinnett ARS, Kennehoochee ARC, and the North Fulton AR League, will be held at Jim Miller Park, Callaway Rd; from I-285 exit N on S Cobb Dr, left at Windy Hill Rd, left on Austell Rd, right on Callaway Rd, follow signs. Doors are open Saturday 9 AM to 4 PM, Sunday 9 AM to 3 PM. Features include large tailgate area, indoor and outdoor covered flea market, VE sessions, RV camping with full hookups, free parking. Talk-in on 146.88, 146.82. Admission is $4 in advance, $5 at the door. Tables are $20 (inside), $15 (arena), $10 (along walkways). Contact Charles Golsen, N4TZM, 404-252-3303, **cgolsen@atlanta.com**; or Ben Dasher, KE4YZX, 404-869-6959, **bendasher@mindspring.com**; **http://www.saf.com/arc**.

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.

New Products

QSL-ROUTES 1999 ON CD-ROM

◊ Compiled by DL9WVM, DL9KZA, SM5CAK and SM5DQC, *QSL-Routes 1999* provides information on QSL managers for more than 96,000 DX operators and operations. Over 9,000 QSL images and 3,100 manager e-mail addresses are included. *Windows 3.x*, *95* and *98* compatible. A book version will be available soon.

Price for the CD-ROM is $14.95 (surface mail) and $19.95 (air mail). Most major credit cards are accepted. For more information, contact Theuberger Verlag GmbH, PO Box 73, D-10122 Berlin, Germany; **sales@funkamateur.de**. You can order online at **http://www.funkamateur.de/english/index.htm**.

Next New Product

Hamfest Calendar

*Edited by **Gail Iannone** • Convention Program Manager*

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 **May 1** to be listed in the **July** 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 (Sierra Vista)—**May 1**. Ray Berger, W1LYT, 520-378-4214.

†**California (Fair Oaks/Sacramento)—May 23**, 6 AM to noon. *Spr:* North Hills RC. Bella Vista High School, 8301 Madison Ave; from I-80 take Madison Ave, go E for 5.8 miles to high school; from Hwy 50 take Hazel Ave, go N for 2.6 miles to Madison Ave, turn left and go W for 1.4 miles to high school. Swapmeet, new and used surplus AR gear, electronic test equipment, amateur-related computer gear, free parking, refreshments. *TI:* 145.19 (162.2 Hz). *Adm:* sellers $10 (2 parking spaces), buyers free. Earl Mead, K6ESM, 916-331-1115; **nhrc@k6is.org**; **http://www.k6is.org**.

California (Kingsburg)—May 8. Patrick Fennacy, W6YEP, 559-222-3105.

†**Connecticut (Newington)—Jun 6**; set up 8 AM; public 9 AM to 1 PM. *Spr:* Newington AR League. Newington High School, 605 Willard Ave (Rte 173). Flea market, new and used equipment dealers, tailgating ($10, 2 parking spots on a first-come, first-served basis), electronics, demos, VE sessions (10 AM, no walk-ins), refreshments. *TI:* 145.45, 146.52, 224.84, 443.05. *Adm:* $5. Tables: advance $15 (make check payable to NARL and send with SASE to John DiSarro, KA1HQK, 134 Winslow Dr, Newington, CT 06111), door $20. Joe Bottiglieri, AA1GW, 204 Churchill Dr, Newington, CT 06111, 860-666-9692; **aa1gw@arrl.net**.

†**Connecticut (Vernon)—May 29**, 9 AM to 2 PM. *Spr:* Natchaug ARC. Tolland County Agricultural Center, on Rte 30; I-84 to Exit 67, follow signs, approximately 1/2 mile. Flea market, tailgating ($7 per space, includes 1 admission), demos (SSTV, APRS), antique radio display, free parking, refreshments. *TI:* 145.11. *Adm:* $3. Tables: advance $10, door $15. Wayne Rychling, N1GUS, 59 Clint Eldredge Rd, Willington, CT 06279, 860-487-1921 eves; **warych@neca.com**; **http://users.neca.com/warych/narcfest.htm**.

†**Georgia (Calhoun)—Apr 24**, 8 AM to 2 PM. *Spr:* Cherokee Capital ARS. National Guard Armory. Tailgating, new and used dealers, VE sessions, free parking, refreshments. *TI:* 145.23. *Adm:* $4. Tables: $5. Felton Floyd, AF4DN, 706-629-0369; **wd4mqb@nwga.com**.

Georgia (Marietta/Atlanta)—Jun 5-6, Georgia State Convention. See "Coming Conventions."

†**Georgia (Statesboro)—May 15**, 8 AM to 4 PM. *Spr:* Statesboro ARS. Ogheechee Technical Institute, on US Hwy 301, just S of Statesboro. Tailgating, VE sessions (exams 10 AM), QSL card checking for WAS and VUCC, refreshments. *TI:* 147.105. *Adm:* $5. Martin Holzman, WB4MOG, 310 Groover St, Statesboro, GA 30458, 912-764-5959; **mart@bulloch.com**; **http://www.cs.gasou.edu/stars/**.

Idaho (Caldwell)—May 15. Don Ingram, KB7UKP, 208-459-2459.

†**Illinois (Chicago)—May 30**; set up 6 AM; public 8 AM to 3 PM. *Spr:* Chicago ARC. DeVry Institute of Technology, 3300 N Campbell. Indoor/outdoor flea market, commercial exhibitors, free parking, refreshments. *TI:* 147.255. *Adm:* advance $4, door $5, under 12 free. Tables: $1.50 per ft. George Sopocko, WA9JEZ, 5631 W Irving Park Rd, Chicago, IL 60634; 773-545-3622.

†**Illinois (Princeton)**—Jun 6, 6 AM to 3 PM. *Spr:* Starved Rock RC. Bureau County Fairgrounds, 811 W Peru St; Exit 56 off I-80, S to Rte 6 (Peru St), W 3 blocks to Fairgrounds. Free outdoor flea market, 4-H food stand, free parking, free overnight camping. *TI:* 146.955 (103.5 Hz). *Adm:* advance $5 (by May 20), door $6. Tables: $10 (includes 1 admission). Frank Carraro, KF9NZ, 815-856-3773; **w9mks@qsl.net**; **http://www.qsl.net/w9mks/.**

†**Illinois (Springfield)**—Jun 5, 6 AM (flea market) to 1 PM (building opens 8 AM). *Sprs:* Sangamon Valley RC and Shooting Stars 4-H Club. Illinois State Fairgrounds. Giant covered flea market, indoor exhibits, commercial vendors, VE sessions, handicapped accessible, free parking. *TI:* 146.685. *Adm:* $5. Tables: $5 (commercial vendors only); flea market must supply your own tables. Ed Gaffney, KA9ETP, 13997 Frazee Rd, Box 14A, Divernon, IL 62530, 217-628-3697; **egaffney@fgi.net**; **http://www.skylight1.com/svrc**.

†**Indiana (Wabash)**—**Jun 6**, 6 AM. *Spr:* Wabash County ARC. Wabash County 4-H Fairgrounds, on State Rd 13N, 1 mile S of the intersection of US 24 and 13. Large indoor flea market, outside flea market space ($2), major vendors. *TI:* 147.03, 442.325. *Adm:* advance $5, door $6. Tables: $10. Ralph Frank, KB9PLV, 4010 N 700 W, Wabash, IN 46992, 765-833-7372 or 219-563-8487; fax 219-563-8489; **wial@netusa1.net**; **http://www.netusa1.net/~qrziota/**.

†**Maine (Hermon)—Jun 5**, 8 AM to 1 PM. *Spr:* Pine State ARC. Hermon High School, I-95 to Exit 44 (Cold Brook Rd), N to US 2, W to High School, follow signs. ARRL forum, section meeting, dealers, tailgating, VE sessions (all classes), demonstrations, foxhunt, auction of equipment (at end of hamfest), refreshments. *TI:* 146.94, 146.52. *Adm:* $4, under 12 free. Tables: $8. Roger Dole, KA1TKS, RR 2, Box 730, Bangor, ME 04401, 207-848-3846; **dolerw@juno.com**.

Manitoba (Winnipeg)—May 29. Ed Henderson, VE4YU, 204-694-0667.

Massachusetts (Cambridge)—May 16. Nick Altenbernd, KA1MQX, 617-253-3776.

†**Massachusetts (Greenfield)—May 10**, Monday evening rain or shine, 6 PM. *Spr:* Franklin County ARC. Wesco Parking Lot on Munson St; take Exit 26 off I-91, go toward Greenfield, take right at first light onto Newton St, go to next intersection and take left onto Munson, hamfest approximately 1/2 mile on left. Flea market, tailgating, refreshments. *TI:* 146.985 (136.5 Hz), 442.2 (71.9 Hz). *Adm:* $3. Tables: bring your own. Richard Strycharz, KD1XP, 22 Silver Ln, Sunderland, MA 01375, 413-665-2211; **kd1xp@arrl.net**; **http://www.shaysnet.com/~fcarc**.

†**Minnesota (St Paul)—Jun 5**, 7 AM to 1 PM. *Spr:* TwinsLan ARC. St Paul Technical College, across from State Capitol (S side of I-94); take Marion St Exit S, turn W (right) on Marshall, follow signs. VE sessions (8:30 AM, inside college). *TI:* 146.76. *Adm:* buyers $5, sellers $10 (per parking space). Ann Foster, N0LLC, 4085 Foss Rd, St Anthony, MN 55421, 612-706-1761; **tailgate@twinslan.org**; **http://www.twinslan.org/tailgate.html**.

Missouri (Houston)—Jun 5. Bob Simpson, N0NTC, 417-967-3535.

Nebraska (Chadron)—Jun 5-6. Lynn Bilyeu, K0ODF, 308-432-2297.

Nebraska (South Sioux City)—Jun 4-5, Iowa State Convention. See "Coming Conventions."

New Hampshire (Londonderry)—May 22. Paul, K1LL, 603-432-1538.

†**New Jersey (Teaneck)—Jun 5**, 8 AM to 2 PM. *Spr:* Bergen ARA. Fairleigh Dickinson University, 1000 River Rd; from George Washington Bridge take Rte 4 W to River Rd Exit, follow signs. Flea market ($10 per space, includes admission; limited number of spaces with power $20), vendors, VE sessions (8-10 AM, Novice thru Amateur Extra; bring original FCC license, photo copy, positive ID), lots of parking, refreshments. *TI:* 146.79 (131.8 Hz). *Adm:* $5, nonham spouses and children free. Jim Joyce, K2ZO, 286 Ridgewood Blvd N, Westwood, NJ 07675, 201-664-6725; **jjjoyce@cybernex.net**; **http://www.bara.org**.

†**New York (Corona/Queens County)—Jun 6**; set up 7:30 AM; public 9 AM to 3 PM. *Spr:* Hall of Science ARC. NY Hall of Science, 47-01 111th St, Flushing Meadow Park. Tailgating, commercial dealers, electronics, computers and software, free VHF tune-up clinic, ARRL information, free parking, refreshments. *TI:* 444.2, 146.52. *Adm:* buyers $5, sellers $10 (per space); under 12 free. Steve Greenbaum, WB2KDG, 85-10 34th Ave, Apt 323, Jackson Heights, NY 11372, 718-898-5599 eves; **wb2kdg@bigfoot.com**.

New York (Rochester)—Jun 4-6, Atlantic Divison/New York State Convention. See "Coming Conventions."

North Carolina (Durham)—May 29. Joseph Fields, KF4QYY, 919-596-3738.

North Carolina (Grimesland/Greenville)—May 15. Herman Schnur, K4CTG, 252-752-2264.

†**Ohio (Dayton)—May 14-16**; Friday 8 AM to 6 PM, Saturday 7 AM to 5 PM, Sunday 7 AM to 1 PM. *Sprs:* Dayton ARA/Dayton Hamvention. Hara Arena Conference and Exhibition Center. Amateur Radio, computer, and electronics show; giant outdoor flea market (advance only, fax 937-276-8902, **fleamkt@hamvention.org**); inside exhibit booths (fax 937-376-4648, **exhibits@hamvention.org**); vendors; forums; VE sessions (reservations recommended, 937-276-3368 or **sandman@dnaco.net**; walk-ins accepted); Grand Banquet/Concert (Saturday, 6 PM; Ervin J. Nutter Center, advance $40, door $45; concert only advance $20, door $25); camping. *TI:* 146.94. *Adm:* advance $16, door $20 (good all 3 days). Dick Miller, N8CBU, Box 964, Dayton, OH 45401-0964, 937-427-3109 or 937-276-6930; **chair@hamvention.org**; **http://www.hamvention.org**.

†**Ohio (Hilliard)—May 30**; set up 6 AM; public 8 AM. Franklin County Fairgrounds, I-270 to W side of Columbus, exit at Cemetery Rd, go 1.5 miles W on Cemetery Rd to Norwitch St, turn right (just before R/R overpass), go 0.5 mile (look for Fairgrounds signs) and turn right onto Columbia St, proceed to Fairgrounds entrance. Amateur Radio Operators Flea Market, all types of electronic equipment. *TI:* 147.24. *Adm:* $5. Tables: $5 (outdoor sellers' space is $5 per 4-wheel vehicle). Chris Lind, KC8BUO, Box 14281, Columbus, OH 43214, 614-267-7779, fax 614-263-7934; **FKLN-CNTY-HFST@prodigy.com**.

†**Ohio (Medina)—Jun 6**; set up 6:30 AM; public 8 AM to 2 PM. *Spr:* Medina Two Meter Group. Medina County Fairgrounds Community Center, 735 Lafayette Rd (State Rte 42), 1 mile W of Rte 3 out of downtown Medina. Outdoor flea market (advance $7, door $8 per space), vendors, new and used ham gear, computer equipment, VE sessions (Doug, 330-725-0119, walk-ins welcome), free parking, refreshments. *TI:* 147.03. *Adm:* advance $4, door $5. Tables: advance $9, door $10. Mike Rubaszewski, N8TZY, 4264 Alpine Hill Ct, Brunswick, OH 44212-2166, 330-273-1519; **m2mgroup@aol.com**; **http://members.aol.com/M2MGroup**.

†ARRL Hamfest

Ontario (Etobicoke)—May 15. Murray Smith, VA3KTL, 416-621-1233.

Oregon (Seaside)—Jun 4-6, Northwestern Division Convention. See "Coming Conventions."

†**Pennsylvania (Pittsburgh/Butler)—Jun 6**, 8 AM to 4 PM. *Spr:* Breezeshooters ARC. Butler Farm Showgrounds, PA Rte 68, W of Butler. Tailgating ($5 per space), forums, free parking. *TI:* 147.36. *Adm:* $5. Tables: $15. H. Rey Whanger, W3BIS, 120 Cove Run Rd, Cheswick, PA 15024, 412-828-3694 (phone/fax); **w3bis@freewwweb.com**; **http://breezeshooters.net**.

†**Pennsylvania (Winfield)—May 22**; set up 6 AM; public 8 AM. *Spr:* Milton ARC. Winfield Fire Grounds, Rte 15, 5 miles S of Lewisburg, follow signs. Hamfest/Computerfest, flea market, tailgating ($5), free parking. *TI:* 146.985, 146.52. *Adm:* $5. Tables: $10. Ray Grant, K3COD, 5 Dogwood St, New Columbia, PA 17856, 570-568-1727; **rgrant@csrlink.net**.

Quebec (Sorel-Tracy)—May 30. Jean Gadoury, VE2UL, 450-836-3072.

Rhode Island (Forestdale)—May 15. Rick Fairweather, K1KYI, 401-725-7507.

†**South Carolina (Greenville)—May 8**, 8 AM to 4 PM. *Spr:* Blue Ridge ARS. Anderson County Fairgrounds, Hwy 29 Bypass; I-85 S to Exit 27, go 9 miles to Hwy 29 Business, go left approximately 1 mile, Fairgrounds on left. Indoor flea market, tailgating, camping (Friday eve). *TI:* 146.61. *Adm:* advance $4, door $5. Tables: $11 (electricity $5, chairs $1). Bob Watson, W4RGW, 501 Ferguson St, Clinton, SC 29325, 864-833-2204; **w4rgw@arrl.net**; **http://www.brars.org**.

†**South Carolina (Windsor)—May 1**. *Spr:* Salkehatchie ARS. Windsor Community Center, US 78 to Windsor, follow signs (E of Aiken, W of Williston). Vendors and tailgaters ($5 per space), free parking, Chicken BBQ, refreshments. *TI:* 147.03. *Adm:* Free. Ray Thomas, WA4OMM, 484 Rosewood Farm Ln, Elko, SC 29826, 803-266-4759; **rose2@sc.tds.net**.

†**Tennessee (Clarksville)—May 15**, 8 AM to noon. *Spr:* Clarksville Amateur Transmitting Society. Beachaven Winery Picnic Grounds, I-24 E or W to Exit 4 (Hwy 79), follow signs. Tailgate Party, lots of ham radio and computer items for sale and trade, free parking, refreshments. *TI:* 147.39. *Adm:* Free. Tables: Free (few available; first-come, first-served). Hank Koebler, N3ORX, 1150 Hutcheson Ln, Clarksville, TN 37040, 931-645-5206; **n3orx@arrl.net**.

†**Virginia (Manassas)—Jun 6**, 7 AM to 3 PM. *Spr:* Ole Virginia Hams ARC. Prince William County Fairgrounds. Tailgating ($5 per space), handicapped accessible, refreshments. *TI:* 146.97, 224.66. *Adm:* $5. Mary Lu Blasdell, KB4EFB, 9727 Loudoun Ave, Manassas, VA 20109; 703-369-2877.

†**Washington (Stanwood)—May 8**, 9 AM to 3 PM. *Spr:* Stanwood-Camano ARC. Stanwood Middle School, 9405 271st St NW; I-5 N or S to Exit 212, go W on Hwy 532, turn right at 3rd stop light, turn left on 271st St, proceed to school on right. Flea market, VE sessions, refreshments. *TI:* 145.19. *Adm:* $4. Tables: advance $15 (before Apr 30), door $20. John McCann, N7MZ, Box 941, Stanwood, WA 98292, 360-629-2921; **huppert@whidbey.net**.

Washington (Yakima)—May 22-23, Washington State Convention. See "Coming Conventions."

Wyoming (Casper)—May 29-30, Wyoming State Convention. See "Coming Conventions." QST

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**.

Happenings

(continued from page 73)

CHARGES DISMISSED IN GODSEY CASE

It took more than two years, but all charges against a Kentucky ham for impersonating a public servant and disorderly conduct finally were dropped in December. Greg Godsey, KF4BDY, of Hopkinsville, was just shy of his seventeenth birthday when he was arrested by police in his hometown.

At the time of his arrest, Godsey was active in ARES as Christian County EC. He claims the impersonation charge stemmed from his ARES association. Police also had charged Godsey with carrying a scanner capable of receiving police frequencies and confiscated his Radio Shack HTX-202. The scanner charge reportedly was dismissed in court the following month, and his H-T was returned to him. The other charges had remained on the court docket, however. Godsey, now 19, said the charges were dropped in December after both sides agreed to not sue anybody over the matter. Godsey says he and his family spent more than $3000 fighting the charges against him.

1999 YOUNG HAM OF THE YEAR NOMINATIONS OPEN

Nominations are due May 30, 1999, for the *Amateur Radio Newsline* 1999 Young Ham of the Year (YHOTY). Now in its second decade, the YHOTY award goes each year to a US amateur 18 or younger who has used Amateur Radio to significantly contribute to the benefit of the hobby, to the state of the communications art, to the community or to the nation.

For an official application, send an SASE to 1999 Young Ham of the Year Award, *Newsline*, 28197 Robin Ave, Santa Clarita, CA 91350. Nomination applications also are available at **http://www.arnewsline.org**.

The award presentation will take place at the 1999 Huntsville Hamfest in August. The 1999 Young Ham of the Year also will spend a week at Spacecamp in Huntsville.

Newsline editor Bill Pasternak, WA6ITF, says the purpose of the YHOTY Award is "to highlight the accomplishments of the nation's many young radio hobbyists, and to encourage the entry of more young people into the exciting and rewarding hobby of Amateur Radio." Corporate sponsors include Yaesu USA and *CQ* magazine.

HAM RADIO, GREAT CIRCUS TRAIN BACK ON TRACK

Amateur Radio will be back on board when the Great Circus Train makes its annual run between Baraboo and Milwaukee, Wisconsin, this summer. Last summer, the hams were left at the station after the circus train's sponsor, Circus World Museum, cited "severe space limitations" and opted to accept an offer of communication services from a cellular provider.

This year, special event station W9R will operate on HF from aboard the train during its annual journey, July 2-5. Current plans call for operation on 40, 20, and 15-meter SSB. Members of the West Allis Radio Amateur Club will operate special event station W9C from the show grounds once the train reaches Milwaukee.

Ham radio first rode the rails with the circus train in 1965. ARES members aboard help handle communication along the route and, once in Milwaukee, at the show grounds and for the circus parade.—*Jim Romelfanger, K9ZZ*

HAM TRADER YELLOW SHEETS QRT

After 38 years in business, the *Ham Trader Yellow Sheets* has ceased publication. The twice-monthly classified publication has been absorbed into the *Amateur Radio Trader*, according to an announcement in the last edition of the *Yellow Sheets*. "It has been increasingly difficult to continue to provide the reliability and low cost that we always have in the past," said a statement from Founder and Editor Al Brand, and Publishers Dave and Barbara Brand Wixon.

Yellow Sheets subscribers will automatically get an *Amateur Radio Trader* subscription, while the subscriptions of *ART* subscribers who also subscribed to the *Yellow Sheets* will be extended. *Amateur Radio Trader* of Crossville, Tennessee, is published by TAP Publishing.

PHOTO COURTESY OF JOHN BROSNAHAN, W0UN

Veteran rock musician and ARRL Life Member Joe Walsh, WB6ACU (left), spent some time during February's ARRL International DX Contest CW weekend with George Schultz, W0UA (center) and John Brosnahan, W0UN (right). Walsh, 51, perhaps best known as a guitarist with The Eagles and as a member of The James Gang, also is an active collector of Collins gear and other 1950s and 1960s-vintage radios. Brosnahan, who's president of Alpha/Power, used to provide sound reinforcement for Walsh during his James Gang years in the 1970s. Schultz, a well-known top CW op and contester, gave Walsh some operating tips during the contest. Walsh also visited the Alpha/Power factory in Longmont, Colorado, and K0RF's multi-multi effort during the contest. Brosnahan says that Walsh "is very interested in becoming active in contesting."

Silent Keys

By Kathy Capodicasa, N1GZO

It is with deep regret that we record the passing of these amateurs:

KA1BWH, Harvey E. Byther, Bangor, ME
K1COK, Michael Blaho, Wakefield, MA
K1CQF, Robert N. Rehn, South Natick, MA
N1DRQ, Richard B. Botsford, Milford, CT
*W1FAB, Kenneth D. Walker, Chicopee, MA
W1FHP, Robert J. O'Neil, Bethlehem, CT
N1FJD, Mark S. Geisler, Brewster, MA
N1GLW, Leigh K. Walton, Randolph, ME
ND1G, William E. Skeffington, Salem, MA
WB1HBJ, Olive B. Moore, South Paris, ME
N1ITN, Richard M. LaBrecque, Dixfield, ME
KA1JGL, Clayton R. Hinds, East Bridgewater, MA
W1MEP, G. C. Mallory, Bennington, VT
*K1MI, Robert P. Burr, Matinicus, ME
KA1NWW, Lawrence G. Burton, Detroit, ME
W1OIZ, Jack W. Burfitt, Weymouth, MA
KA1QQE, Robert Hook, Keene, NH
KA1REL, Steve M. Bonski, Winchester, NH
*W2AJ, Donald J. O'Connor, Binghamton, NY
WB2CJL, Robert Dow, Tonawanda, NY
K2CQ, M. R. Hawkins, Charleston, SC
WA2CYQ, Willard N. Wilson, Buffalo, NY
KA2DNP, George C. Endres, Chester, NJ
W2KYM, Marcel E. Vincent, Youngstown, NY
N2RUA, Thomas H. Slook, Moorestown, NJ
N2UTR, Stephen J. Fuerniss, Endicott, NY
KQ2W, Jack C. Hughes, Brick, NJ
W2WWP, John C. White, Syracuse, NY
WB2YGU, Harold E. Boynton, Glens Falls, NY
W2YQO, Martin Laida, Auburn, NY
W3BGX, Milford N. Ross, Timonium, MD
W3HDB, Norman H. Yastrov, Bethesda, MD
K3HIT, Vernon J. Shaffer, Camp Hill, PA
W3HOF, Charles E. Dinterman, Waynesboro, PA
AA3HY, Clair E. Schlosser, North Wales, PA
WA3KCU, Mary M. Holmes, Baltimore, MD
N3LLV, Charles L. Ertzberger, Zelienople, PA
N3NV, Denes S. Varady, Reading, PA
W3VIS, Wilbert L. Misner, Vintondale, PA
WB4AYC, Gordon R. Van Hoose, Paintsville, KY
N4BVP, Rachel S. Bush, Lynchburg, VA
KT4FE, Jessie H. Patterson, Calera, AL
W4FFD, Lloyd E. Goodwin, Micanopy, FL
WB4FSA, James M. Mackie, Edgewater, FL
KA4FTQ, James G. Monroe, Latta, SC
K4HMQ, Charles E. Stone, Bristol, TN
KM4HW, Gerhard Lutgendorf, Gainesville, FL
K4IXN, Charles L. Brickell, Chattanooga, TN
*W4IYT, Andrew C. Clark, Miami Springs, FL
K4IZI, Paul Vazquez, East Point, GA
K4LZW, Bobby E. Cole, Brandon, FL
KC4MVS, George E. Ellis, Mobile, AL
WA4NOW, Frank A. Colombo, Largo, FL
K4OH, William S. Wilson, Dothan, AL
KD4OVG, Evelyn M. Wunsch, Miami, FL
N4RJR, Frank O. Beirne, Mclean, VA
WA4RLQ, Howard H. Hobson, Birmingham, AL
W4SSL, Ron W. Davis, Chapel Hill, NC
KB4UXP, Paul K. Clifton, Durham, NC
KE4VKC, Leslie R. Ticknor, Sun City Ctr, FL
KD4XY, Isaac W. Orr, Elizabethton, TN
W5AET, William H. Meiners, San Antonio, TX
K5CAY, Daniel B. Prater, Enid, OK
N5DNG, Jimmy Hale, Beaumont, TX
K5EAB, E. G. Keiffer, Dallas, TX
WD5EYM, Allen E. Hughes, Centreville, MS
KC5FMT, Mark A. Vaglienti, Houston, TX
KC5HVL, Minelaos G. Moutos, San Angelo, TX
WA5JWI, J. Bennett Hooker, Terrell, TX
W5MCG, John T. Wheeler, Sarasota, FL
KC5MQN, James I. Grandy, Albuquerque, NM
WA5OGC, Oliver G. Meeks, Snyder, OK
W5QER, George H. Thoede, New Orleans, LA
WA5RCP, Eugene G. Sherwood, Penalta, NM
W5ROF, David E. Carpenter, Largo, FL
W6AAH, John W. Taylor, Citrus Heights, CA
N6ARP, Herman Baker, Carmel, CA
KE6AYJ, Naomi R. Keville, Arcadia, CA
KC6CZM, Robert M. Pollock, San Rafael, CA
N6DMW, Beuhring W. Pike, Ventura, CA
W6EBX, Charles F. Taylor, Lemon Grove, CA
AA6FL, Charles M. Steinhauser, Elm City, NC
KA6JAG, Ralph A. Keidel, Apple Valley, CA
KC6JDI, Wenceslaus F. Knotek, Los Altos, CA
W6JPS, J. A. Ross, Fresno, CA
K6JR, Arthur W. Schutt, Clovis, CA
KH6KB, Leslie A. Nunes, Waialua, HI
W6NHQ, Thomas L. Stewart, Twain Harte, CA
W6NPA, Robert W. Noss, Mount Judea, AR
KB6NQ, Richard L. Rathburn, Los Angeles, CA
K6OMN, Russell T. Pilkington, Calimesa, CA
KA6OTC, Patricia E. Spencer, Placentia, CA
W6TFQ, Harry H. Marsh, Fresno, CA
W6VSY, William F. Ruck, San Francisco, CA
KB7BVD, Joseph G. Shinn, Boise, ID
*K7CLU, David D. Morgan, Ferndale, WA
*KE7CX, William M. Clemow, Hillsboro, OR
*W7EAH, John E. Taylor, Tucson, AZ
W7EYM, Robert J. Martin, Bend, OR
N7GMA, Herbert S. Katzenberger, Camano Island, WA
‡K7MKJ, Lucille N. Holmes, Boise, ID
N7ROV, Ralph G. Empey, Hoquiam, WA
WB7VZW, James W. Noud, Spokane, WA
W7YKA, Lyle E. Seehorn, Sun City, AZ
K7YY, Albert F. Lafky, Spokane, WA
KC8AN, Charles L. Bishop, Roseville, OH
W8AXN, Fred E. Krieger, Flint, MI
KC8FXV, Richard W. Maxam, Bridgman, MI
W8ITR, Andrew J. Rybarick, Chagrin Falls, OH
W8KOT, Donald H. Himes, Dayton, OH
W8MFT, Carl A. Barth, Cincinnati, OH
W8OF, Stanley F. Kerber, Reading, PA
WB8SSK, Betty M. McClaren, Cleveland, OH
W8URX, Donald L. McClaren, Cleveland, OH
W8VUS, John L. Werner, Mount Lookout, WV
N8WLJ, Michael P. Neal, Kinross, MI
N9BOK, Morris A. Howard, Bloomington, IL
N9DNE, Richard D. Blanchong, Free Soil, MI
KA9EZO, Rosemary E. Moorman, Mount Sterling, IL
W9FAW, Levin J. Peek, Ocala, FL
K9GKN, Robert F. Waiss, Cincinnati, OH
W9GWD, William W. Kline, Ellicott, CO
KB9IRN, Mark J. Czaplewski, Hartland, WI
*K9JMA, Edwin M. Schaefer, North Aurora, IL
WB9ODP, Charles P. Oddo, Plymouth, WI
KA9RCL, David E. Southwick, Cedarville, IL
K9USW, Paul J. Gawrusik, Villa Park, IL
W9UTR, Charles Ravencraft, Aurora, IN
W9ZPF, Jerome J. Jurczak, Frankfort, IL
W0HQQ, Glenn F. Wagner, Mesa, AZ
W0MJE, Philip E. Brittenham, Monett, MO
KG0TM, Dean A. Dungan, Denver, CO
W0UQJ, R. H. Brenneman, Council Bluffs, IA
K0YMN, Curtis W. Schild, Bellevue, WA
CN2AQ, S. J. Quast, Tangier, Morocco
*VE3KC, David L. Macknight, Kingston, ON, Canada

*Life Member, ARRL

‡Call sign has been re-issued through the vanity call sign program.

Note: Silent Key reports must confirm the death by one of the following means: a letter or note from a family member, a copy of a newspaper obituary notice, a copy of the death certificate, or a letter from the family lawyer or the executor. Please be sure to include the amateur's name, address and call sign. Allow several months for the listing to appear in this column.

Many hams remember a Silent Key with a memorial contribution to the ARRL Foundation. If you wish to make a contribution in a friend or relative's memory, you can designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund, or the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation Inc, 225 Main St, Newington, CT 06111. QST

75, 50 and 25 Years Ago

May 1924

◊ Clyde Darr, 8ZZ, furnishes the cover illustration showing that the A.R.R.L. is the "guide post" to the prestigious O.R.S. appointment. The editorial discusses "The New White Bill," lamenting the fact that Congressman White's bill, if passed into law, would replace the existing 1912 radio statute, and would not mention Amateur Radio by name at all!

Dr Hoyt Taylor, USN physicist, tells about "The Navy's Work on Short Waves," urging amateurs to submit listener's report on the USS *Shenandoah*'s new 100-meter set. F. E. Burke, 8DGE, describes "The Ultra Audible Microphone," which is so sensitive that it can detect "the noise a fly makes while walking, the thunder of a moth's wings in flight, the speech of a honey-bee…". ARRL President Hiram Percy Maxim, 1AW, writes about "The International Amateur Radio Union." I. V. Iverson, 7ADQ, discusses "The Meissner Transmitting Circuit." ARRL Traffic Manager F. H. Schnell tells "How to Use CQ—An Announcement of Standard A.R.R.L. Practice on The Much-Discussed Subject." Don Mix, 1TS, is still aboard the arctic research vessel *Bowdoin*, and K. B. Warner writes that "Bowdoin Continues But Communication Poor." In "Daylight Transcom at Last," S. Kruse reports that "6XAD and 2ADM work thru the sunrise"!

May 1949

◊ The cover photo shows a band-pass circuit that is part of the cover article by Vern Chambers, W1JEQ, "Bandpass Circuits in a Multiband Transmitter." The editorial discusses "Power," making the point that the inexpensive and plentiful war surplus gear has given many hams a chance to get on the air and to go to high power. Unfortunately, some of them slid over to the Dark Side and started running "… 2, 3 and 5 kilowatts…." The proposed solution is that hams become sterner with their self-policing efforts. The editorial closes with the statement, "What is needed is for the law-abiding majority to ostracize these guys who have forfeited the right to class themselves as amateurs."

Ed Tilton, W1HDQ, brings us the lead article, "Simple Gear for the 420-Mc. Beginner," telling how to build a small and inexpensive modulated-oscillator transmitter and a superregenerative receiver. Styrk Reque, W2FZW, relates his techniques for the design and adjustment of "Linear R.F. Amplifiers." Vern Chambers tells how he minimized his rig's tuning controls by using "Bandpass Circuits in a Multiband Transmitter." "Technical Topics" describes some "Antennas for 160 Meters." In "TVI Patterns," photos taken by Phil Rand, W1DBM, show dramatically what TVI cures will do for the ham.

May 1974

◊ The cover shows some circuit boards built for Part II of the series, "Learning to Work with Semiconductors," by Doug De Maw, W1CER, and Lew McCoy, W1ICP. The editorial discusses the importance of the US ham being aware of IARU news.

James McKim, W0CY, tells about his "*Instant!* Oscar 6 Locator," an ingenious (but quite complex) electromechanical gadget that uses a world globe ringed by multiple LEDs, a 115-point rotary switch, motors and gears! In a simpler vein, Allan Simpson, VE4AS, adapts a Tymeter digital clock to simplistically present orbital information, in "A Satellite Timing Mechanism." John Kersten, W0NY, tells how to put old CB radios on 160 meters in "Conversion of Old CB Rigs to the Opposite End of the HF Range." Robert Myers, W1FBY, tells about "The SSB Crud-O-Ject." Walter Bain, W4LTU, discusses "VHF Propagation by Meteor-Trail Ionization," with up-to-date tips on that mode of operation. In "Happenings," photos show ARRL President Harry Dannals, W2TUK, and Ellen White, W1YL, receiving "Cajun Awards" from the Lafayette ARC, sponsors of the 1974 Delta Division Convention; Alton Broussard, W5VUQ, is shown making the award to Dannals.—*Al Brogdon, W1AB* QST

Contest Corral

Edited by **George Fremin III, K5TR***

Feedback

In the **September 1998 VHF QSO Party**, **K5CM** should be listed with 332 QSOs and 113 grids on 6 meters with an overall total of 457 QSOs and 178 grids for a score of 90,216 as a Limited Multioperator entry from Oklahoma. **N8UXR** should be listed with 251 QSOs 106 grids and 37,418 points from the WV section. **WB9DRB** should be listed in the Indiana section. The call sign for **KC6ZWT** in the SV section was incorrectly reported. **KK7LK** score should reflect the fact that he was QRP Portable. **WD3R/2** working as a Limited Multioperator in NNJ finished with 950 QSOs on four bands with 168 multipliers and a score of 200,424.

In the phone portion of the **1998 ARRL International DX Contest**, **KC5QBG** should be included with 7,695 points finishing second in the Arkansas section. In the **1998 ARRL International DX Contest** CW competition **N7AN** should have been listed as a Low Power entry.

In the **1998 IARU HF World Championships**, **VK4EMM** was entered into the database twice. The score showing for VK4EMN should not appear. **KS4YX**'s call sign appeared incorrectly as **KS4YK**.

In the **1998 August UHF Contest** results, the entry of **WA2QHF** in the NNJ Section was omitted (score unavailable at press time).

W1AW Qualifying Runs are 10 PM EDST Monday, May 3, and 9 AM EDST Thursday, May 20. The **West Coast Qualifying Run** will be at 9 PM PDST on Wednesday, May 5. Check the W1AW schedule for details.

May

1-2

North American High Speed Meteor Scatter (HSMS) Contest, sponsored by The Western States Weak Signal Society, HSCW only, 0000Z May 1 to 2400Z May 9, make as many contacts as possible using HSCW (99 WPM and above) on the amateur bands above 50 MHz. Operate up to 48 hours during the contest period. Single op limited (5 kW ERP and less); unlimited (ERP greater than 5 kW), multiband or 2 meters only. Multipliers are 4-digit grid squares per band. Score: 6 meters 1 point per QSO; 2 meters 3 points per QSO, 1.25 meters 9 points per QSO, 70 cm 9 points per QSO. On 2 meters and up random QSOs count double. Score is total of QSO points times the total multiplier. Send logs by May 30 to WSWSS HSCS Contest, P O Box 86, Downey, CA 90241-0086; **hscw@contesting.com**; **http://www.qsl.net/n7stu/hscw.html**.

ARI International DX Contest, sponsored by the Associazione Radioamtori Italiani, from 2000Z May 1 until 2000Z May 2. 160 80 40 20 15 10 meters (no RTTY on 160 meters). Single op CW/phone/RTTY/mixed mode; multi-single (mixed mode only). Once you begin operating on a band or mode, you must remain there for 10 min. Everybody works everybody. Send RS(T) and serial no.; Italian stations send RS(T) and two-letter province identifier. Score 1 point per QSO w/different countries on own continent; 3 points per QSO w/different continent; and 10 points per QSO w/I or IS stations. Work stations once per band and mode; multipliers count once per band. Stations in your own country may be worked for multiplier credit only. Final score is QSO points × Italian provinces (max 103) and DXCC countries (except I and IS0) per band. Awards. Electronic entries accepted. Send logs within 30 days to ARI Contest Manager, Paolo Cortese, I2UIY, POB 14, I-27043, Broni (PV) Italy; **i2uiy@contesting.com**.

Connecticut QSO Party, sponsored by the Candlewood ARA, from 2000Z May 1 until 2000Z May 2, with a rest period from 0400-1200Z. Phone, CW and RTTY. Work stations once per band and mode, mobiles as they cross county lines. No repeater QSOs. Single op, fixed/mobile; Novice; QRP (<5 W); multi-single, multi-multi and CT clubs. Send RS(T) and state/province/DXCC country; CT stations send county. Score 1 point per phone or RTTY QSO; 2 points per CW QSO; and 5 points per W1AW or W1QI QSO. Final score is QSO points × CT counties; CT stations use CT counties/states/provinces plus 1 multiplier for DX. CW—40 kHz up; Novices—25 kHz up; phone—1.860 3.915 7.280 14.280 21.380 28.380; VHF—50.150 144.200 146.58. Awards. Send logs by June 3 to CARA, POB 3441, Danbury CT 06813-3441; **http://www.danbury.org/cara/**.

Danish SSTV Contest, sponsored by the Danish SSTV Group, from 0000Z May 1 to 2400Z May 2. 80 40 20 15 10 6 2 meters. Score 2 points for the first QSO with a DXCC country, 1 point for each additional contact, and 1 bonus point for QSOs with Danish stations. Work stations once per band. Send logs postmarked by Jun 4 to Carl Emkjer, Soborghus Park 8, DK 2860, Soborg, Denmark; **http://home5.inet.tele.dk/carle/test.htm**.

MARAC County Hunters Contest, CW and Phone, sponsored by the Mobile Amateur Radio Awards Club, from 0000Z May 1 until 2400Z May 2. Fixed and mobile classes. Work fixed stations once per band, mobiles as they change county. Mobiles on county lines count as one QSO although they *are* multiple multipliers. Mobiles sign /M. Only one transmitted signal at a time. Send RST, county and state or province/DXCC country. Score 1 point per QSO w/fixed W/VE stations; 5 points per QSO w/DX stations; and 15 points per QSO w/mobile stations. Stations operating under a net control are invalid for contest purposes. Final score is QSO points × US counties worked. Awards. Send logs by June 4 to Norm Beavers, W3DYA, 3320 McMillan Dr, Tyler, TX 75701-8239.

Massachusetts QSO Party, sponsored by the Framingham ARA, from 1800Z May 1 until 0400Z May 2 and 1100-2100Z May 2. Work stations once per band and mode. Classes: outside MA; MA single op; MA multiop; MA portable; MA team (5 MA single ops); MA Novice/Tech; MA club. Send RS(T) and state/province/DXCC country/MA county. Score 1 point per phone and 2 points per CW/digital/video QSO. Final score is QSO points × MA counties (max 14)/band; MA stations use MA counties + states/provinces/DXCC countries. CW—1.810 3.550 7.050 14.050 21.050 28.050; SSB—1.850 3.890 7.290 14.270 21.390 28.390 144.220 432.150; FM—146.550 446.000; Novice CW—3.705 7.130 21.130 28.130. Awards. Send logs by Jun 6 to FARA, PO Box 3005, Framingham, MA 01701; **n1tyh@aol.com**; **http://www.qsl.net/~fara/**.

Ten-Ten International Net Spring CW QSO Party, sponsored by Ten-Ten International, from 0000Z May 1 until 2400Z May 2. CW only, 10 meters only. Single op, club or QRP categories. Send call, name, state/country and 10-10 number (if member). Score 1 point per QSO w/nonmembers, 2 points per QSO w/US members and 3 points per QSO with DX members. Final score is total QSO points. Send logs by May 17 to Gateway Chapter, c/o Con Ward W0RTV, 4514 Ferrer Dr., St. Louis, MO 63129-3741.

US IPA Contest, sponsored by the International Police Association Radio Club, CW and phone, 0000Z May 1 to 2359Z May 1 for CW; 0000Z May 2 to 2359Z May 2 for Phone. Single Op, Multi-Op and SWL. Exchange RST, serial number and member number (if member). Multipliers are IPA/IPARC club stations in each US state (max. 50). Score 1 point per QSO for each contact, International IPA stations are 2 points per QSO, US IPARC/IPA stations are 5 points per QSO, IPA Club stations are 10 points per QSO. Add a 100 point bonus for working a IPA club station on 5 bands. Send logs by May 31 to, Alexander Dutkewych VE3PIG/N2PIG, US IPARC Contest Chairman, Holiday Acres, Box 188, Stroud, On L01 2MO CANADA; **alexdutkewych@webtv.net**.

8-9

Box Elder County Utah QSO Party, sponsored by The Utah, Box Elder, Thiokol Amateur Radio Club, 8 AM (local time) May 8 to 12 AM (local time) May 10, operate up to 24 hours, 160 80 40 20 15 10 6 2 meters and up, all modes. Single op, multi-op, Net Control Operator (NCO). Work stations once per band/mode. Exchange operator name and call sign. Count 1 point for each two way contact; NCO points are the total QSOs × 0.2. Final score is total QSO points squared plus the square of any NCO points. Awards. Send logs to UBET ARC K7UB, c/o Bob Anderson AA7TR, 995 N Terminate St, Tremonton, UT 84337.

CQ-M International DX Contest, sponsored by Krenkel Central RC of Russia, 2100Z May 8 to 2100Z May 9. CW, phone, SSTV, 160 80 40 20 15 10 meters plus satellites. Categories: Single op-single band CW, SSB, mixed mode or satellites; single op, multiband CW, SSB, mixed mode or QRP (mixed mode, <5 W); multi-single (multiband, mixed mode); SWL or WWII veteran (multiband, mixed mode); SSTV (single or multiop, multiband, SSTV only). Change bands only once per 10 minutes. Work stations once per band, regardless of mode. Exchange RST and serial no. Scoring 1 point per QSO with own P-150-C country, 2 points per QSO with another P-150-C country, 3 points per QSO with another continent. Multipliers: Each country in the P-150-C award country list counts as a multiplier only once per band. Final score is the sum of all QSO points, times sum of all multipliers. Awards. Send logs by Jul 1 to CQ-M Contest Committee, Krenkel Central Radio Club of Russia, Box 88, Moscow, Russia; **cqm99@mai.ru**; **http://www.mai.ru/~crc/cq-m/cqmain_e.htm**.

Fists CW Club Spring Sprint, sponsored by Fists International CW, 1700-2100Z May 8. CW only, work stations once per band. 80 40 20 15 10 meters. Exchange name, state/province/DXCC country and Fists number if member or power output if nonmember. Five points per QSO with Fists member, 2 points per QSO with nonmembers and 10 points per QSO with Fists Novice or Tech Plus members. Final score equals QSO points times states, provinces (once for each) or DXCC countries (each time worked). QRP and QRO categories. Send paper logs only within 30 days to Alan Tanner, 3787 Trebein Rd, Fairborn, OH 45342; **http://www.fists.org/**.

Indiana QSO Party, sponsored by Land O' Lakes ARC, 1400Z May 8 to 2300Z May 9. Single op, multiop, club station, VHF/UHF; any class can be fixed and/or mobile. Exchange signal report and county for Indiana stations, signal report and state or county for others. Work stations once per band and mode; work mobiles in each county. Two points for SSB and AM contacts, all other modes count 3 points. Multipliers: Indiana stations multiply QSO points by total of Indiana counties, states and countries worked. Out-of-state stations multiply QSO points by the number of Indiana counties worked (max 92). No repeater QSOs. CW: 1.810 3.539 7.035 7.115 14.035 21.120 28.040. SSB: 1.860 3.890 7.280 14.285 21.385 28.585 50.140 144.215. Awards. Send logs by Jun 11 to, Sharon Brown, 905 W Parkway Dr, Pleasant Lake, IN 46779; **sharon.l.brown@gte.net**.

Nevada QSO Party, sponsored by the Frontier ARS, 0000Z May 8 until 0600Z May 9. 160 80 40 20 15 10 6 meters, SSB/CW/RTTY. Work stations once per band/mode. Send RS(T) and state/province/DXCC country; Nevada stations send county.

*RR1, Box 322
Johnson City, TX 78636
k5tr@arrl.org

CW—15 kHz up in General; SSB—25 kHz up; Novice/Tech Plus—25 kHz up. Score 2 points per CW or RTTY QSO and 1 point per SSB QSO. Final score is QSO points × Nevada counties (Nevada stations use states/provinces/DXCC countries). Awards. Send logs by Jun 15 to Jim Frye, NW7O, 4120 Oakhill Ave, Las Vegas, NV 89121-6319; **nw7o@anv.net**.

Oregon QSO Party, sponsored by the Central Oregon DX Club, 1400Z May 8 to 0400Z May 9. Oregon stations work everyone. Others work Oregon stations only. Work stations once per band/mode, mobiles again as they cross county lines. CW: 1.810 3.540 7.035 7.125 14.035 21.035 21.125 28.035 28.125; phone: 1.855 3.905 7.280 14.280 21.380 28.580; VHF: 50.125 (SSB) 145.025 (FM) 146.55 (FM). No repeater QSOs. One point per SSB QSO; 2 points per CW QSO. Oregon stations multiply QSO points by Oregon counties/states/provinces/DXCC countries; others multiply by Oregon counties worked (max 36). Add 50 bonus points for working K7O and another 100 bonus points for working club station K7ZZZ. Awards. Send logs by May 25 to Oregon QSO Party, c/o CODXC, K7ZZZ, 19821 Ponderosa St, Bend, OR 97702.

EU Spring Sprint, CW, 1500-1900Z May 15. Work EU stations only. 80, 40 and 20 meters. Send your call sign, other station's call sign, serial number and name or nickname. QSY rule: Stations calling CQ, QRZ, etc may only work one station in response to that call; they must then move at least 2 kHz before working another station or before soliciting another call. Once you are required to QSY, you may not make a new QSO on the previous frequency until you have made a contact at least 2 kHz away. Final score is the number of QSOs. Send logs to Bernhard Buettner, DL6RAI, Schmidweg 17, 85609 Dornach, Germany; **eusprint@dl6rai.muc.de**; **http://www.rrze.uni-erlangen.de/~unrz45/BCC**.

21-23

Major Six Club Contest, sponsored by the Six Club, 2300Z May 21 to 0300Z May 24, 6 meters only, count 1 point per QSO within your country; 2 points per 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 by June 21 to Six Club, P O Box 307, Hatfield, AR 71945; **sixclub@6mt.com**; **http://6mt.com/contest.htm**.

Texas QSO Party, sponsored by the Texas DX Society. 1400Z May 22 to 0500Z May 23 and 1400Z to 2000Z May 23. Categories: single op, multi-single and multi-multi; Texas mobile single op and multiop; QRP single and multitransmitter; and a club aggregate category. Exchange RST and state, province, country, or maritime region. Texas stations send RST and county. Suggested frequencies: CW—30 kHz up. Phone—25 kHz up in General segments. VHF SSB—50.200 144.200. Work stations once per band and mode. Texas mobiles may be worked once per band/mode from each county. Score 2 points per phone QSO and 3 points per CW and other digital mode QSO. Multipliers: non-Texas stations use number of Texas counties worked (254 max plus Armadillo County mystery station). Texas stations use number of Texas counties, states, Canadian Provinces, and DX countries (less USA, Canada, Hawaii and Alaska). Add bonus points to your final score: Non-Texas stations add 100 points for every 10 Texas mobiles worked per band/mode. Texas stations add 100 points for every 10 Texas mobiles worked per band/mode. Texas mobiles add 5000 points per every 5 counties covered with at least 5 contacts per county and add 100 points for every 10 Texas mobiles worked per band/mode. Send logs (and dupe sheets if over 200 QSOs) by June 30 to TDXS, POB 540291, Houston, TX 77254; **W5HNS@aol.com**; **http://n5uh.tech.uh.edu/~tdxs/**.

29-30

CQ WW WPX Contest, CW. See March *QST* page 96.

ARCI QRP Hoot Owl Sprint, CW, sponsored by QRP ARC International, from 2000 until 2400 local time May 30. Categories single band, all band, high band (20 15 10 meters), low band (160 80 40 meters).Work stations once per band. Send signal report, state/province/DXCC country and QRP ARCI number if member (nonmembers send power output). 1.830 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060. Count 5 points per QSO with ARCI member. Others count 2 points per same continent and 4 points per different continent. Multiply QSO points by states/provinces/DXCC countries worked per band and by power multiplier (>5 W × 1; <5 W × 7; < 1 W × 10; < 250 mW × 15). Awards. Mail entries by Jun 23 to QRP ARCI Contest Manager, Joe Gervais, PO Box 322, Peoria, AZ 85380-0322; **vole@primenet.com**.

Memorial Day CW Sprint, sponsored by the Michigan QRP Club, 2300Z May 31 until 0300Z June 1. CW only, 160 80 40 20 15 10 6 meters. Classes <250 mW; 250 mW to 1 W; 1 W to 5 W; and over 5 W. Exchange RST, state/province/DXCC entity and power output (MI-QRP members send membership number). Work stations once per band. Score 5 points per QSO w/MI-QRP members, 4 points per QSO w/nonmembers outside W/VE and 2 points per QSO with W/VE nonmembers. Multiply QSO points by states/provinces/DXCC entities worked per band × 1.25 if you are using a homebrew receiver or transmitter. Awards. Send logs to L. T. Switzer, N8CQA, 654 Georgia Ave, Marysville, MI 48040-1243; **n8cqa@tir.com**; **http://www.tir.com/~k8dd/rules97.htm**. QST

New Products

THE COLEMAN *ULTIMITE™* PORTABLE GENERATOR

◊ Field Day is just around the corner. It's time to start thinking about gathering up gear. Maybe this is the year to consider updating your power source.

Coleman's Advanced Products Group announces a new portable generator that leads the industry in delivering the most wattage-per-pound—certainly potentially very good news to the unfortunate club members previously responsible for hauling your present overweight power provider to your remote hilltop site!

At 23 lbs, the *Ultimite* actually weighs less than some present-day HF transceivers. Maximum output is rated at 1,100 W ac (90 A dc). At 50% duty cycle this unit can churn out 120 V ac, or 12 or 24 V dc, for nearly 90 minutes on a single 1.2-quart tank-fill.

Engine speed is governor controlled to match changing load requirements, helping to reduce site noise. Microprocessor controlled circuitry maintains a consistent 120 V ac at 60 Hz—regardless of engine rpm.

The generator is powered by a Robin two-stoke engine (a gas and oil fuel mixture is required). Removable dc jumper cables with large spring-clamp jaws are included.

The *Ultimite* is priced at $495 and is covered by a one-year limited warranty. For more information, contact Advanced Products Group of Coleman, 2983 Sterling Court, Boulder, CO 80301; tel 800-445-1805 or 303-449-0354, fax 303-444-1135; **info@ultimite.com**; **http://www.ultimite.com**.

BIRD INTRODUCES NEW HIGHER FREQUENCY LOADS AND ATTENUATORS

◊ Bird Components Products, Inc now offers new compact "Square Series" RF dry loads and attenuators with extended frequency ranges covering from dc to 2.4 GHz. The 100-ST-FN is rated for 100 W, weights approximately 2.8 lbs and is about 7.55 × 2.75 × 2.75 inches. The 150-ST-FN, rated for 150 W, weighs approximately 5.5 lbs and measures about 8.3 × 5.0 × 4.0 inches. Tri-alloy plated N connectors are standard and EIC 7/16 connectors can be specified. Cooling fins are black anodized aluminum.

Maximum VSWR for either model is specified at 1.1:1 from dc to 1 GHz, and 1.25:1 from 1 to 2.4 GHz. Available standard attenuation values are 3, 6, 10, 20 and 30 dB.

For additional information contact Bird Component Products, 50 W Jefferson St, Franklin, IN 46131; tel 317-346-6600, fax 317-346-6601; **sales@bird-electronic.com**; **http://www.bird-electronic.com**.

CRAFTSMAN PROFESSIONAL MULTIMETER + SCOPE

◊ Sears Craftsman blends the portability of a hand-held multimeter with the measurement capabilities of a 100 kHz oscilloscope in their new #82089 Professional Multimeter + Scope. This 4.2 × 8.3 × 2.2-inch unit measures true RMS ac and dc voltage and current, resistance, capacitance, frequency, dB, temperature (with an optional probe), duty cycle, pulse width and period. A TTL level generator as well as diode and continuity test capabilities are included.

Oscilloscope operations include glitch capture, pre/post triggering and a 15 waveform memory. Standard features include an RS-232 port, minimum/maximum/average displays, auto power off and surge protection. The unit comes complete with a built-in stand, six AA batteries, fuses, test leads and alligator clips. Optional accessories include a 30 A ac/dc clamp-on adapter, an inductive pick-up rpm adapter, and data acquisition software and cabling for *Windows 95/98*.

Price $299.99. Available through the Professional Meters catalog located in all Sears full-line stores and Sears Hardware stores. Sears, Roebuck and Co, 3333 Beverly Rd, BC-114B, Hoffman Estates, IL 60179. QST

Next New Product

Special Events

Edited by **George Fremin III, K5TR***

Richmond, KY: Eastern Amateur Radio Society, KE4YVD, 1700-2300Z **May 1**, commemorating the 230th anniversary of Daniel Boone's quests for Kentucky. 7.230 7.235 7.240 7.245. QSL. KE4YVD c/o Terry Holman, 156 Norton Dr, Richmond, KY 40475.

Greenville, NC: Brightleaf Amateur Radio Club, W1VOA, 1500-2200Z **May 1**, celebrating the International Festival Honoring the Diversity of Greenville, home of the Voice of America. 80 40 20 meters. QSL. Murray Merner, K4MHM, 1212 South Wright Rd, Greenville, NC 27858-3912.

Louisville, KY: Amateur Radio Transmitting Society, Inc, W4CN, 0001Z **May 1** to 2359Z **May 2**, commemorating the 125th Kentucky Derby—the "Run for the Roses." 7.830 7.230 14.250 28.400. Certificate. Shelby Summerville, K4WW, 6506 Lantana Court, Louisville, KY 40229-1544.

Freedom Township, OH: Portage Amateur Radio Club, KB8UUZ, 1200Z **May 1** to 0200Z **May 3**, Loyalty Day celebration from Freedom Township, Ohio. 7.265 14.265 28.480 50.145. Certificate. Tom Parkinson, KB8UUZ, 9992 State Route 700, Mantua, OH 44255.

Canon City, CO: Royal Gorge Amateur Radio Club, KB0UTC, 1400-2100Z **May 2**, for the Apple Blossom Festival and Sunday Funday, 7.235 14.050 14.245 28.330. Certificate. Walton Wells, PO Box 2044, Canon City, CO 81215.

Anderson, SC: Hanna-Westside High School Radio Club, KE4YSM, 1600Z **May 3** to 1930Z **May 7**, for the Save the Hanna-Westside HS Electronic Program and Ham Radio Station campaign. 7.160 14.240 21.230 28.350. QSL. Mike Epstein, Hanna-Westside Extension Campus, 1225 South McDuffie St, Anderson, SC 29624.

Brownsville, TX: CHARRO Radio Club, W5CRC, 1400-2200Z **May 8**, commemorating the last battle of the Civil War at Palmetto Hill. 14.265 21.325 28.375. Certificate, CHARRO Radio Club, 3554 Boca Chica Blvd, Brownsville, TX 78521.

Promontory, UT: Utah, Box Elder, Thiokol ARC (UBET), K7UB, 1500Z **May 8** to 0700Z **May 11**, commemorating the completion of the Transcontinental Railway on May 10, 1869 and the driving of the golden spike. All bands. Certificate. UBET ARC, 995 N. Tremont St, Tremonton, UT 84337.

Waco, TX: Heart of Texas DX Society, W5V, 1600Z **May 8** to 2400Z **May 22**, commemorating the 150th anniversary of Waco Village and the birth of Waco, Texas. 7.250 14.250 21.350 28.450. Certificate. Larry Merritt, KC5BFM, PO Box 3501, Waco, TX 76707.

Igo, CA: Cops Contest Club, W6P, 0000Z **May 9** to 2400Z **May 15**, commemorating National Police Week. 7.275 14.275 21.325 28.425. Certificate. Jerry Boyd K6BZ, Cops Contest Club, PO Box 252, Igo, CA 96047.

East Lansing, MI: Michigan State University ARC, W8S, 1200Z **May 12** to 0400Z **May 14**, celebrating the rededication of Michigan State University ARC. 3.790 7.225 14.225 28.480. Certificate. W8SH, Michigan State University, 2120 Engineering Building, East Lansing, MI 48824.

Dayton, OH: Dayton Amateur Radio Association, W8BI, 1200Z **May 14** to 1600Z **May 16**, at the 48th annual Dayton Hamvention, 7.125 7.250 14.050 14.250. Certificate. W8BI Special Event Station, PO Box 44, Dayton, OH 45401.

Mt. St. Helens, WA: W7W, 0000Z **May 14** to 2400Z **May 16**, in memory of the Amateur Radio operators and 48 others who perished in the 1980 eruption of the Mt. St. Helens volcano. 3.618 7.245 14.240 21.080. QSL. KI7ZD, St. Helens Event, PO Box 79, Pacific, WA 98047.

Baltimore, MD: Maryland Mobileers ARC, W3CU, 1400-2000Z **May 15**, operating from aboard the submarine *USS Torsk*. 7.240 14.240 21.340 28.340. Certificate. MMARC, PO Box 935, Severn, MD 21114.

Wheaton, IL: Dupage ARC, W9DUP, 1600-2300Z **May 15**, commemorating Armed Forces Day. 7.250 14.290 28.400 145.25. Certificate. John McCarty N9HRT, Dupage ARC, PO Box 71, Clarendon Hills, IL 60514.

Staten Island, NY: Fraternal Order of Police ARC of Lodge #145, K2FOP, 1700-2100Z **May 15**, to honor fallen law enforcement officers (Police Memorial Day). 14.240 28.355. Certificate. FOPARC - Lodge # 145, PO Box 205, Bowling Green Station, New York, NY 10274-0205.

Intake, MT: Lower Yellowstone Amateur Radio Club, W7DXQ, 1500-0800Z **May 15**, celebrating the annual paddlefish migration up the Yellowstone River. 3.890 7.230 21.350 28.400. QSL. K. Braun, PO Box 101, Savage, MT 59262.

San Pedro, CA: United Radio Amateur Club, K6AA, 1600Z **May 15** to 2400Z **May 16**, Los Angeles Harbor "World Trade Week." 14.250 21.350 28.450 146.55. QSL. URAC / K6AA, Berth 84, Foot of Sixth St, San Pedro, CA 90731.

Altoona, PA: Horseshoe Amateur Radio Club, K3A, 1400Z **May 15** to 2200Z **May 16**, celebrating the sesquicentennial of Altoona, Pennsylvania. 40 20 15 10 meters. Certificate. Ted Holland, 217-19 5th Ave, Altoona, PA 16602.

Colorado Springs, CO: Rocky Mountain Navy Amateur Radio Club, K0USN, 0000Z **May 15** to 2400Z **May 16**, celebrating Armed Forces Day. 40 20 15 10 meters. Certificate. Captain Mike Anderson, WV7T, Commanding Officer, RMNARC, 2210 North Weber St, Colorado Springs, CO 80907.

Camp Lejeune, NC: Onslow Amateur Radio Club, WD4FVO, 1500Z **May 15** to 2000Z **May 16**, Armed Forces Day at the Camp Lejeune MARS Station. 3.967 14.250 21.350 28.350. Certificate. Juan Lopez, AC6ZM, 8th Comm BN, Unit 20147, Camp Lejeune, NC 28542.

Angels Camp, CA: Calaveras Amateur Society, WA6YGA, 1500Z **May 15** to 2300Z **May 16**, operating from the Calaveras County Fair and Frog Jumping Jubilee. 7.240 14.240 21.320 28.385. CARS, PO Box 391, Angels Camp, CA 95222.

Poughkeepsie, NY: Poughkeepsie Amateur Radio Club, W2CVT, 1200Z **May 15** to 2200Z **May 16**, operating from the Samuel F. B. Morse Home. 7.120 14.270 21.120 28.375. Certificate. Con Stein W2PTF, 3 Little Rd, Wappingers Falls, NY 12590.

Brownville, ME: Piscataquis Amateur Radio Club, K1PQ, 1500-2000Z **May 16**, commemorating Brownville's 175th anniversary. 14.075 14.230 21.305 28.305. Certificate. PARC, PO Box 365, Brownville Jct., ME 04415-0365.

Centreville, MI: The Amateur Radio Public Service Association, KC8EO, 1600-2400Z **May 22**, honoring a visit to St Joseph County by K9-Search and Rescue. 3.860 7.245 14.235 28.310. Certificate. Jim Teeters N8SHO, PO Box 7171, Sturgis, MI 49091.

Baltimore, MD: Historical Electronics Museum Amateur Radio Club, W3GR, 1400Z **May 22** to 2000Z **May 23**, commemorating the 115th anniversary of the first permanent telegraph line. 7.055 14.242 21.120 28.450. Certificate, HEMARC-MS4015, PO Box 746, Baltimore, MD 21203.

Springhill, LA: Springhill Amateur Radio Club, Inc., W5S, 0000Z **May 22** to 2400Z **June 4**, celebrating 300 years of Acadian French influence in Louisiana and the bicycle "Tour du Louisiana." 80-10 meters. Certificate. SARC Inc, PO Box 722, Springhill, LA 71075.

Schenectady, NY: Union College Amateur Radio Society, W2UC, 1500-1900Z **May 23**, commemorating radio pioneer Ely Kinney's 1913 radio contact with Union College. 7.052 28.435. QSL. W2UC, EE/CS Department, Steinmetz Hall 210, Union College, Schenectady, NY 12308.

Nutley, NJ: Robert D. Grant United Labor Amateur Radio Association, K2M, 1200Z **May 28** to 2400Z **Jun 1**, "CQ Memorial Day." 28.420 52.525. Certificate. RDGULARA—WA2VJA, PO Box 716, Nutley, NJ 07110-0716.

Hart County, KY: Monroe County ARC, K4PL, 1500Z **May 29** to 2100Z **May 30**, operating from the Spelio Fest for cave explorers in Hart County. 7.240 14.240 21.325 28.475. QSL. David Welch K4PL, 111 Pocahontas Trail, Glasgow, KY 42142.

Belleville, MI: Yankee Air Museum, W8YAF, 1200-2000Z **May 31**, celebrating Memorial Day. 7.270. Certificate. Frank A. Nagy, N8BIB, 24315 Waltz Rd, New Boston, MI 48164-9167.

Elgin, IL: Elgin Amateur Radio Society, W9IKN, 1300-1800Z **May 31**, 22nd annual Valley Foxtrot 10-Mile Run. 7.235 14.240 50.135 147.525. Certificate. Elgin ARS, PO Box 1351, Elgin, IL 60120.

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 **Dec** *QST* would have to be received by **Oct 1**. Submissions may be mailed to George Fremin III, K5TR, at the address shown in this column.

*RR1, Box 322
Johnson City, TX 78636
k5tr@arrl.org

Strays

I would like to get in touch with...

◊…hams who served in the US Army at Kagnew Station in Asmara, Eritrea. Allen Peacock, N5NTY, 4420 Westgrove Rd, No. 2003, Addison, TX 75001; **ap129727@aol.com**.

Next Stray

By **Dan Henderson, N1ND**
Contest Manager

1998 ARRL International EME Competition Results

As a young ham many years ago, I sat in wonderment and awe at the marvels this exciting hobby offered. Maybe it was a product of growing up in the '60s, but nothing fascinated me more than the fact that hams actually used the Moon to make contacts. Bouncing signals off the Moon seemed an unattainable goal to me, especially after visiting the NASA satellite tracking station located deep in the mountains of western North Carolina. Seeing the giant dish that was used to talk through outer space, I knew this was something I wanted to try. Making EME (Earth-Moon-Earth, otherwise known as *moonbounce*) contacts was a goal I set for myself in this hobby after that visit to the tracking station.

Well, 30 years later I still need that first EME contact, but 212 of the brethren used the 1998 ARRL International EME Competition to polish their skills in what continues to be one of the most captivating and challenging aspects of our hobby. Because of their refinement in equipment and operating techniques, "newbies" to EME need not be intimidated if they decide to tackle the challenges that this unique mode offers.

Reaction was mixed regarding the fact that the two competition weekends were separated by 2 months. Some didn't find this to be a problem, but for others the later weekend in December brought winter storm conditions. Yet overall participation remained high, and a smattering of newcomers to the EME ranks emerged, as did most of the reliable EME "big guns."

The top single-op multiband winner was OE5EYM. No stranger to being on the leaderboard, Ernst led the pack with 1,757,299 points and 191 QSOs on 3 bands. Dave, W5UN, led all single-op scorers with an outstanding 330 QSOs worth 1,815,000 points on 144 MHz. Close on his heels was SM5FHR, only 4 QSOs behind. Single-band leaders included DL9KR's 524,000 point effort on 432 MHz, K5JL with 291,600 on 1296 MHz, and OE9ERC with 18,200 on 2304 MHz.

Gerald, K5GW, and company blew away the competition for Multiop Multiband with a score of 2,888,400. The Multiop Single-band score leaders included the crew at KB8RQ with 1,162,800, the ops at OH2PO with 552,000, and the gang at OH2AXH with 195,300 points on 144, 432 and 1296 MHz respectively. There were 113 single band entries on 144-MHz, making it the most popular band. A special tip-o'the-hat to W5LUA for completing a contact on 10 GHz, a great accomplishment under any circumstances. Entries were received from 33 entities on the DXCC list, making this a truly international event.

Because of the split nature of the 1998 contest, an additional noncompetitive microwave EME weekend was held November 7-8 1998. This experiment seemed to attract a great deal of interest. Read the sidebar by Joel Harrison, W5ZN, for an

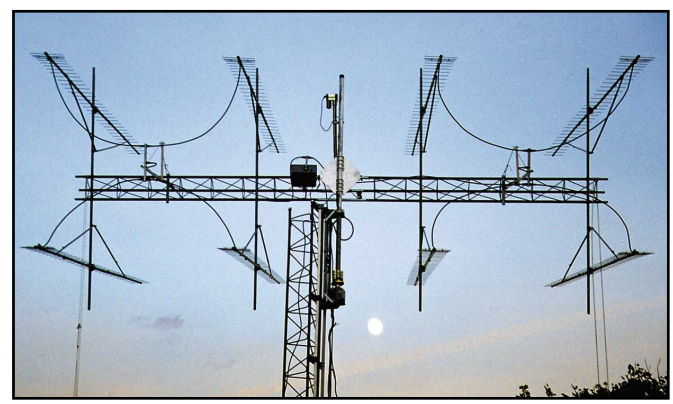
My First Moonbounce Experience

I heard F3VS, SM5FRH and IK3MAC during Moonrise and tried to contact them. But alas, I was not running much power. Saturday during Moonset I concentrated on W5UN. Lo and behold he came back to me after a few attempts but he didn't have my call sign correct. I tried again but time ran out. Frustrated, yet encouraged, I vowed to try again the following day.

Dave was there again at Moonset. I noticed I could hear him when the Moon was lower than 15° (no elevation control here). His signal started to come up below 12° Moon elevation. As luck would have it, Dave was ending a contact just as ground gain was increasing for me. Gosh, Dave was a full S2 on my meter. It was now or never.

I called him and—bang!—he came back! (There *is* a God!) He sent me his Os and I sent RSs. He sent me Rs and 73 and that was that. Unbelievable! I measured the output on my FT-847 with my Bird wattmeter and it was only 45 W. EME *can* be done with low power! Thanks to WA9KRT and K6MYC whose advice helped me get hooked on this mode. And thanks to Dave for your dedication to EME. It was truly a dream come true for me.— *Rees W. Roberts, K9UUT*

DJ5MN obviously doesn't have to deal with deed restrictions or zoning ordinances.



The KB4CNI antenna system has the target in its sights.

John, N2PBY, and Al, NX2Q, trying to get the shuttle from the Starship Enterprise ready for operation in the EME contest.

account of this noncontest weekend.

Start planning now for the 1999 ARRL International EME Competition. Check the ARRL Contest Branch home page on the Web at **http://www.arrl.org/contests** for rules and information. Maybe this will be the year I am able to make my trip to the Moon via Amateur Radio!

The Microwave EME Noncompetitive Weekend

The first ARRL-sponsored Microwave EME weekend was a great success. The event took place on November 7 and 8 and concentrated on EME activity at 2300 MHz and higher. Entries indicated that about 30 stations from 15 countries participated. Twenty stations were active on 13 cm, 11 on 6 cm and 8 on 3 cm. Two stations were active on 9 cm but no two-way QSOs were recorded. Two days is not enough time to operate four microwave amateur bands on EME!

Participating stations included: CT1DMK, F1ANH, F2TU, G3LTF, HB9SV, I6PNN, IK2RTI, JA4BLC, JA8IAD, JA7BMB, NU7Z, OE9ERC, OE9PMJ, OE9XXI, OE9YTV, OH2AXH, OH2DG, OK1KIR, OZ4MM, S57UUU, SM3AKW, SM4DHN, VE4MA, VE7CLD, W4HHK, W5LUA, WA7CJO, WA8WZG, WD5AGO (SWL report), and ZS6AXT

The first/second/third place single-band, single-operator entries on each band are as follows: on 13 cm, OE9ERC/ZS6AXT/W5LUA, on 6 cm, OE9PMJ/OE9ERC/W5LUA and on 3 cm, WA7CJO/W5LUA/VE4MA. OK1KIR was on top as the only multioperator entry. First/second/third place multiband entries went to W5LUA/OE9ERC/VE4MA.—*Joel Harrison, W5ZN*

Soapbox

Operating without polarity control on 432 MHz is like having both hands tied behind your back and one foot in a cast (K1FO)… I must be the weakest signal on the band (WO9Z)… The weather was no problem at all this year, but high return loss on the 70 cm dipoles limited me to 23 cm the first weekend. After too many cokes, brownies and cookies, I had a great time (N2IQU)… It's nice to see how my results improved with a better receive system and improved operating practices (PE1LWT)… Conditions were bad for small system owners (WW2R/5)… I still enjoy EME but it's getting harder every year as the "village" becomes more crowded (PE1OGF)… Today I could recognize 2 call signs listening to the morning shower, a QRZ made my car's door open, and at least 3 complete CQs were heard from the car engine (CT1DMK)… Two meters sounded like 20 on the first day of the contest (W4AD)… Even my own echoes were moving the S meter, which is something I seldom have seen (HO3A)… These were my first EME QSOs ever. I am very excited and can't wait until next year (9A3PA)… We did pretty well this year, as we had more power and new coax (VE2JWH)… Brutal winter weather conditions gave us severe problems in the 2nd part of the contest (DJ5MN)… I am building a 4-bay antenna with elevation for 144. It will be ready for 1999 (W9JN)… Absolutely fantastic contest. Station improvements over last year were rewarded. Bigger and better next year (VE3KDH)… Having polarity flexibility is definitely an advantage (K6MYC)… Kiruna is at 68° N, about 100 km north of the Arctic Circle. Guess that makes me the northernmost station active on EME at the present (SM2BYA)… I had made only 12 EME contacts before the contest. Doubled that over the weekend without much effort. What a rush! (N3FA).

Scores

Each line score lists call sign, score, stations worked, multipliers, and band (A= 50 MHz, B = 144 MHz, C = 222 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2304 MHz, I = 10 GHz).

Single Operator, Multiband

OE5EYM	1,757,200	68	35	B
		65	29	D
		58	28	E
OZ5MM	1,081,600	110	34	D
		59	30	E
N2IQU	967,200	95	32	D
		61	30	E
SM3AKW	966,000	12	9	B
		70	28	D
		58	32	E
VE1ZJ	825,500	73	31	B
		12	11	D
		42	23	E
F6CGJ	765,600	20	13	B
		30	18	D
		66	35	E
CT1DMK	542,800	40	26	B
		19	16	D
		33	17	E
W7HAH	480,200	77	34	B
		21	15	D
VE1ALQ	469,800	31	25	D
		50	33	E
G3LTF	469,200	42	21	D
		49	29	E
		1	1	F
F5AQC	436,800	29	20	D
		55	32	E
KD4LT	396,900	33	21	D
		48	28	E
EA3DXU	313,900	53	28	B
		20	15	D
WD5AGO	289,800	27	17	D
		42	25	E
OZ6OL	222,000	17	15	D
		43	22	E
OH2DQ	163,200	26	16	D
		24	15	E
		1	1	F
JA4BLC	151,800	25	16	B
		18	14	D
		3	3	F
W5LUA	134,400	33	17	E
		30	3	F
		1	1	I
JA5NNS	105,000	8	8	B
		34	17	C
WA8WZG	48,600	4	4	B
		23	14	E
YO2IS	47,500	10	7	B
		15	12	D
K9BCT	41,800	12	10	E
		10	9	D
S51ZO	27,200	5	5	B
		12	11	D
WL7U	400	1	1	B
		1	1	D

Single Operator, 144 MHz

W5UN	1,815,000	330	55	B
SM5FRH	1,793,000	326	55	B
SM5BSZ	930,000	186	50	B
VE3KDH	614,900	143	43	B
K2GAL	396,000	99	40	B
K6MYC	356,400	99	36	B
I3DLI	329,000	94	35	B
LZ2US	321,900	87	37	B
EA2LU	316,200	93	34	B
W0HP	298,800	83	36	B
PA2CHR	268,800	84	32	B
OZ9AAR	250,800	76	33	B
WA6PEV	227,200	71	32	B
7K3LGC	210,000	70	30	B
EA6VQ	204,800	64	32	B
F6BSJ	180,000	60	30	B
JH2COZ	162,400	56	29	B
K8BHZ	156,600	54	29	B
IV3GBO	150,800	52	29	B
N2WK	147,900	51	29	B
K0FF	145,600	52	28	B
EA2AGZ	142,800	51	28	B
UA3PTW	139,200	48	29	B
N0AKC	115,000	46	25	B
IK2DDR	112,500	45	25	B
WA1JOF	105,600	44	24	B
I1ANP	103,500	45	23	B
AA7A	78,200	34	23	B
W4AD	78,200	34	23	B
JH5FOQ	70,400	32	22	B
PE1LCH	69,000	30	23	B
UA4AAV	69,000	30	23	B
9A9B	65,100	31	21	B
GM4JJJ	63,800	29	22	B
SP7DCS	54,000	27	20	B
K1CA	53,300	41	13	B
SM2BYA	52,000	26	20	B
WB4JEM	46,000	23	20	B
DJ3WA	42,500	25	17	B
Z30B(Z31RQ,op)	36,800	23	16	B
KC7YVZ	36,800	23	16	B
W0PT	36,000	20	18	B
F9HS	33,600	21	16	B
JH0ISW	30,000	20	15	B
SM7SJR	29,900	23	13	B
EA1ABZ	28,600	22	13	B
PE1OGF	26,600	19	14	B
YO2AMU	24,000	20	12	B
KJ7F	22,100	17	13	B
WA7TDU	17,600	16	11	B
PE1LWT	17,600	16	11	B
EA1YV	15,000	15	10	B
JH0WJF	14,400	16	9	B
JK1HIX	14,000	14	10	B
UA3DJG	12,600	14	9	B
N3FA	10,800	12	9	B
W0EKZ	9,900	11	9	B
W1AIM	9,000	10	9	B
F9DO	8,400	14	6	B
KO6RD	7,000	10	7	B
9A3PA	6,300	9	7	B
W7OE	4,200	7	6	B
K7MAC	4,200	7	6	B
JR3REX	3,600	6	6	B
SM4HFI	3,500	7	5	B
K5AM	3,000	6	5	B
N0KQY	3,000	6	5	B
W8TN	3,000	6	5	B
WA3BZT	2,500	5	5	B
WA1OUB	2,400	6	4	B
W9JN	2,000	5	4	B
W0RT	2,000	5	4	B
W5UWB	2,000	5	4	B
JH0BBE	2,000	5	4	B
YO2DM	1,600	4	4	B
VE3EQQ	1,600	4	4	B
W8/NP4C	1,200	4	3	B
N4CNN	1,200	4	3	B
W3SZ	900	3	3	B
G4BRK	900	3	3	B
LY2SA	600	3	2	B
N8XA	400	2	2	B
IZ5BXF	400	2	2	B
N6ZE	400	2	2	B
K9DTB	400	2	2	B
KB9MLA	400	2	2	B
SV4BGY	100	1	1	B
PA3BUT	100	1	1	B
W9JJ	100	1	1	B
N8ZAT	100	1	1	B
N0UK	100	1	1	B
W8GP	100	1	1	B
WA8RJF	100	1	1	B
K9UUT	100	1	1	B
WO9Z	100	1	1	B

Single Operator, 432 MHz

DL9KR	524,000	131	40	D
DJ6MB	414,200	109	38	D
UR5LX	381,600	106	36	D
K1FO	346,800	102	34	D
N4GVZ	346,500	105	33	D
N9AB	279,000	90	31	D
JA5OVU	252,300	87	29	D
HA1YA	210,000	70	30	D
G4ERG	170,100	63	27	D
K0RZ	141,600	59	24	D
DL4MEA	81,400	37	22	D
W7QX	77,900	41	19	D
JH1XUJ	76,000	38	20	D
7M2PDT	74,100	39	19	D
K5WXN	69,700	41	17	D
W8MQW	62,900	37	17	D
ON5OF	50,400	28	18	D
DL3EAG	43,200	27	16	D
W7FN	43,200	27	16	D
JH4JLV	43,200	27	16	D
JS3SIM	31,200	24	13	D
IK5QLO	30,400	19	16	D
K1OR	28,000	20	14	D
I5TDJ	27,000	18	15	D
KV6J	26,600	19	14	D
JJ1NNJ	22,000	20	11	D
S52CW	20,400	17	12	D
JA2TY	16,500	15	11	D
HO3A	15,400	14	11	D
N7LQ	15,000	15	10	D
W7KK/6	14,400	12	12	D
UT3LL	14,300	13	11	D
SV1BTR	13,200	12	11	D
WB2VVV	11,000	11	10	D
IK5WJD	6,400	8	8	D
JJ3JHP	3,600	6	6	D
WW2R/5	3,000	6	5	D
ZS6PT	900	3	3	D

Single Operator, 1296 MHz

K5JL	291,600	81	36	E
HB9BBD	258,400	76	34	E
OK1DFC	204,000	60	34	E
F5PAU	150,000	60	25	E
K4QI	148,200	57	26	E
JH5LUZ	122,400	51	24	E
W2UHI	119,600	46	26	E
F2TU	110,400	48	23	E
K2DH	103,500	45	23	E
DF4PV	103,400	47	22	E
JA6CZD	80,000	40	20	E
HA5SHF	78,200	34	23	E
EA3UM	76,000	38	20	E
DC6UW	70,300	37	19	E
W7CS	68,400	38	18	E
F5PL	58,800	28	21	E
W6HD	54,000	30	18	E
K3HZO	51,000	30	17	E
JF3HUC	12,000	15	8	E
K9ZZH	100	1	1	E

Single Operator, 2304 MHz

OE9ERC	18,200	14	13	F
ZS6AXT	8,000	10	8	F

Multioperator, Multiband

K5GW (K5GW,K5PW,WD5AGO)				
	2,888,400	234	53	B
		98	34	D
JL1ZCG (JH1DYV, JR4ENY, JE8IVF)				
	881,600	100	38	B
		52	20	D
DJ5MN (DL5MAE, DJ3MY, DL2MHS, HA1BC, DK5MV, DH5MFD, DJ5MN)				
	828,000	105	36	B
		25	17	D
		8	7	E
GD4IOM (GD0TEP,GD4GNH,G4XUM, G4VUO,G1GEY)				
	336,000	60	27	B
		20	15	D
N2HLT (N2HLT, NS9E, N2JDQ,N2OLB	6,400	2	2	B
		6	6	D

Multioperator, 144 MHz

KB8RQ (N8DFN)				
	1,162,800	228	51	B
F5VS (F5JTA, FB1PKC)				
	1,087,800	222	49	B
IK3MAC (IK3MAC, I3YXQ)				
	1,078,000	220	49	B
HB9Q (HB9CRQ, HB9DBM)				
	704,000	160	44	B
I2FAK (I2FAK, IK2LZT)				
	697,500	155	45	B
RU1A (RU1AA, RW1AC, RN1AM)				
	686,400	156	44	B
W1XE (W1XE, N0KE)				
	137,800	53	26	B
S52LM (S52LM, S53VV)				
	113,400	42	27	B
VE2JWH (VE2JWH, VE2AAY, VE2GUQ, VE2PSU)	52,000	26	20	B
S53J (S51XO, S52VE)				
	25,200	21	12	B
KK5IH (KK5KK, W5AL)				
	11,700	13	9	B
W6YX (KV3H, N3EEN, AC6TR)				
	7,000	10	7	B
SM2LKW (SM2LKW, SM2ELN)				
	5,600	8	7	B
SM7UFW (SM7UFW,SM7THS)				
	5,600	8	7	B
I2RV (I2RV, IW2MNU)				
	2,000	10	2	B
N2PBY (N2PBY, NX2Q, NG2N, KC2AIU)				
	1,600	4	4	B
WD5AGO/5 (WD5AGO, KC5LHH, KD5APJ)	900	3	3	B

Multioperator, 432 MHz

OH2PO (OH2PO, OH6DD)				
	552,000	138	40	D
F5FLN (F5FLN, F4ARU)				
	178,200	66	27	D
KB4CNI (K2VJ,KB4CNI)				
	42,500	25	17	D
F5KDK (F5IVP, F4SDD, F1CH, F4CJV)				
	6,000	15	4	D

Multioperator, 1296 MHz

OH2AXH (OH2BNH, OH2BSH, OH2LCT)				
	195,300	63	31	E
S59DCD (S54X, S50X, S57RTH)				
	132,600	51	26	E
ON5RR (ON5RR,ON7EH)				
	76,000	38	20	E
W4JSS (W4JSS, KB4FEM, N4SZ, KJ4X, KK4SO, N4AK)	3,000	6	5	E

ARRL 1999 June VHF QSO Party Rules

1. Object: To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2. Date and Contest Period: The second full weekend of June. Begins 1800 UTC Saturday, ends 0300 UTC Monday (June 12-14, 1999).

3. Entry Categories:

3.1. Single Operator.
3.2. Single Operator, QRP Portable.
3.3. Rover.
3.4. Multioperator
3.5. Limited Multioperator.

4. Exchange: Grid-square locator (see April 1994 *QST*, p 86).

4.1. Exchange of signal report is optional.

5. Scoring:

5.1. QSO points:

5.1.1. Count one point for each complete 50 or 144-MHz QSO.

5.1.2. Count two points for each 222 or 432-MHz QSO.

5.1.3. Count three points for each 902 or 1296-MHz QSO.

5.1.4. Count four 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.

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. Stations may be worked for credit only once per band from any given grid square, regardless of mode. This does not prohibit working a station from more than one grid square with the same call sign (such as a Rover).

6.2. Only one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

6.3. Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station (transmitter, receiver and antenna) must exist for each QSO made under these conditions.

7. Awards:

7.1. Plaques (if sponsored) will be awarded in the following categories:

7.1.1. Top 10 single operator scorers

7.1.2. Top five single operator QRP portable scorers

7.1.3. Top five rover scorers

7.1.4. Top 10 multioperator scorers

7.1.5. Top five limited-multioperator scorers

7.2. Certificates will be awarded in the following categories.

7.2.1. Top single operator in each ARRL/RAC Section.

7.2.2. Top single operator on each band (50, 144, 222, 432, 902, 1296 and 2304-and-up categories) in each ARRL/RAC Section where significant effort or competition is evident. (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 endorsements.) For example, if WB0TEM has the highest single-operator all-band score in the Iowa Section and his 50 and 222-MHz scores are higher than any other Iowa single operator's, he will earn a certificate for being the single-operator section leader and endorsements for 50 and 222 MHz.

7.2.3. Top single-operator, QRP portable in each ARRL/RAC Section where significant effort or competition is evident. (Single-operator, QRP portable entries are not eligible for single-band awards.)

7.2.4. Top rover in each ARRL Division and Canada where significant effort or competition is evident. (Rover entries are not eligible for single-band awards.)

7.2.5. Top multioperator score in each ARRL/RAC Section where significant effort or competition is evident. (Multioperator entries are not eligible for single-band awards.)

7.2.6. Top limited multioperator in each ARRL/RAC Section where significant effort or competition is evident. (Limited multioperator entries are not eligible for single-band awards.)

Submission of Entries

8.1 Electronically generated logs should be e-mailed to **junevhf@arrl.org**.

Paper logs should be mailed to June VHF QSO Party, ARRL, 225 Main Street, Newington, CT 06111.

All entries must be postmarked or e-mailed no later than July 14, 1999,

Other: See General Rules for All ARRL Contests and General Rules for ARRL Contests on Bands above 50 MHz (both in November 1998 *QST* and available at **http://www.arrl.org/contests/**). QST

How to Get Entry Forms

Entry forms for ARRL Contests are available in several different ways.

- Send an SASE stating the specific contest you are requesting to: Contest Branch, ARRL, 225 Main St, Newington, CT 06111
- Download all forms and rules from the Contest Branch Web page at **http://www.arrl.org/contests/forms/**.
- Send an e-mail request to the ARRL InfoServer at **info@arrl.org**. The Subject line is ignored. Enter the following text in the body of your message:

HELP
SEND VHFQSO.FRM
QUIT

New Products

TUNABLE MEASUREMENT FILTER FOR SWR ANALYSERS

◊ If you've ever struggled to use an SWR analyzer in the presence of strong nearby transmitters, MFJ now offers a new analyzer accessory that you'll definitely want to add to your tool kit.

The MFJ-731 *Tunable Measurement Filter* easily attaches to the antenna input of nearly any antenna analyzer and traps unwanted signals, allowing accurate SWR and impedance measurements on frequencies between 1.8 and 30 MHz.

The MFJ-731 is priced at $89.95 and is covered by MFJ's "No Matter What" one-year limited warranty. For more information, see your local Amateur Radio products dealer or contact MFJ, PO Box 494, Mississippi State, MS 39762; tel 800-647-1800, fax 601-323-6551, **http://www.mfjenterprises.com**. QST

Strays

FOUR DAYS IN MAY

◊ The QRP Amateur Radio Club, International (QRP-ARCI) proudly announces the fourth annual "Four Days In May" QRP conference commencing Thursday, May 13, 1999—the first day of four festive days of Hamvention activities—in Dayton, Ohio.

Amateur Radio QRP presentations, workshops and demonstrations will be the focus of the Thursday QRP symposium to be held at QRP-ARCI Hamvention headquarters—the Days Inn Dayton South Hotel. The "Four Days in May" QRP extravaganza continues with the annual Friday evening QRP-ARCI awards banquet. And don't forget to attend the Saturday evening social that culminates with a fascinating "building contest."

Send your $10 registration fee (US check, money order, international money order) payable to "QRP ARCI" and an SASE by May 1 to Philip Specht, 925 Saddle Ridge, Roswell, GA 30076, USA, or e-mail **k4pqc@bellsouth.net** for information. Along with your registration check, please provide the name, surface mail address, telephone number and e-mail address of each attendee. Check the Four Days in May site on the Web at **http://www.qrparci.org/fdim99.html**.

To register for the awards banquet, send $25 (US check, money order, international money order) payable to "QRP ARCI" and an SASE by May 1st to Scott Rosenfeld NF3I, QRP ARCI Banquet Tickets, 2250 Paterson, Suite 50, Eugene, OR 97405-2988, USA. As mentioned above, include the name, surface mail address, telephone number and e-mail address of each attendee. You'll find banquet information on the Web at **http://w3eax.umd.edu/~ham/1999banquet.html**.

Next Stray

By **Dan Henderson, N1ND**
Contest Manager

1999 Field Day Rules

1. Eligibility: Field Day is opened competitively to all amateurs in the ARRL/RAC Field Organization (plus Yukon and Northwest Territories). Foreign stations may be contacted for credit, but are not eligible to compete.

2. Object: To work as many stations as possible on any or all amateur bands (excluding the 30, 17, and 12-meter bands) and, in doing so, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed on skills and equipment developed to meet the challenge of emergency preparedness and to acquaint the public with the capabilities of Amateur Radio.

3. Date and Field Day Period: Always held on the fourth full weekend of June. Begins 1800 UTC Saturday, ends 2100 UTC Sunday (June 26-27, 1999).

3.1. Class A and Class B (see below) stations who do not begin setting up until 1800 UTC Saturday may operate the entire Field Day period of 27 hours.

3.2. Others must begin their setup no earlier that 1800 UTC Friday, and may operate no more than 24 consecutive hours, ie, once on-the-air Field Day operation has started, it must end 24 hours from that point.

4. Entry Categories: Field Day entries are classified according to the maximum number of simultaneous transmitted signals, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for the purpose of determining transmitter class. Switching devices are prohibited.

4.1. (**Class A**) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for Field Day use. Stations must be operated under one call sign (except when the Novice/Technician Plus position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for one reason or another, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

4.1.1. Any Class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician Plus operating position (Novice bands only) without changing its basic entry classification. For Field Day purposes only, any Canadian Amateur HF licensee, who has been licensed for less than six months prior to Field Day, shall be considered a "Novice" to provide a means for Canadian Field Day Class A stations with two or more transmitters to participate with a "Novice/Technician Plus" operating position. This "Canadian Novice station" is restricted to the US Novice subbands and power/mode restrictions. The Novice/Technician Plus station (including antennas) should be set up and operated by Novice and Technician Plus licensees and should use the call sign of one of the Novice/Technician Plus operators.

4.1.2. Any Class A group whose entry classification is two or more transmitters may also use one station that operates exclusively on any band or combination of bands above 50 MHz (VHF/UHF bands) without changing its basic entry classification. This station may be operated for the entire Field Day period, and all contacts count for QSO points credit.

4.2. (**Class A—Battery**) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day and all contacts are made using an output power of 5 W or less and the power source is other than commercial mains or motor-driven generator (eg, batteries, solar cells, water-driven generators). Other provisions are the same as for Class A.

4.3. (**Class B**) One or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A. One and two-person Class B entries will be listed separately in the results.

4.4. (**Class B—Battery**) One or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs and all contacts are made using an output power of 5 W or less and the power source is other than commercial mains or motor-driven generator (eg, batteries, solar cells, water-driven generators). Other provisions are the same as for Class A. One and two-person Class B—Battery entries will be listed separately in the results.

4.5. (**Class C**) Mobile: Stations in vehicles capable of operating while in motion and normally operated in this manner, including antenna. This includes marine and aeronautical mobiles.

4.6. (**Class D**) Home stations: Stations operating from permanent or licensed station locations using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points.

4.7. (**Class E**) Home stations—emergency power: Same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D and E.

5. Exchange: Stations in any ARRL/RAC Section will exchange their Field Day operating class and ARRL/RAC Section. For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." Foreign stations send RS(T) and QTH.

6. Miscellaneous Rules:

6.1. Operators participating in Field Day may not, from any other station, contact for point credit the Field Day portable station of a group with which they participated.

6.2. A station used to contact one or more Field Day stations may not subsequently be used under any other call during the Field Day period. Family stations are exempted.

6.3. Each phone, each CW, and each digital (non-CW) segment is considered as a separate band. (A station may be worked once on each band.)

6.4. All voice communication contacts are equivalent.

6.5. Crossband contacts are not allowed.

6.6. The use of more than one transmitter at the same time on a single band is prohibited, except that a Novice/Technician Plus position may operate on any Novice band segment at any time.

No repeater contacts.

6.7. Batteries may be charged while in use. Except for Class D, batteries must be charged from a power source independent of the commercial mains.

7. Scoring: Scores are based on the total number of valid contact points times the multiplier corresponding to the highest power used at any time during the Field Day period, plus bonus points.

7.1. Phone contacts count one point each.

7.2. CW and digital contacts count two points each.

7.3. Power multipliers:

7.3.1. If all contacts are made using an output power of 5 W or less **and if a power source other than commercial mains or motor-driven generator is used (eg, batteries, solar cells, water-driven generators), multiply by 5**.

7.3.2. If any or all contacts are made using an output power of 150 W or less, multiply by 2.

7.3.3. If any or all contacts are made using an output power more than 150 W, multiply by 1.

7.4. **Bonus points:** The following bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Just check the box on the Field Day summary sheet to indicate that you qualify for the bonus, and attach the necessary proof.

7.4.1. **100% emergency power:** 100 points per transmitter for 100% emergency power. All equipment and facilities at the

Field Day site must be operated from a source independent of the commercial mains. Example: A club operating 3A, using 100% emergency power may claim 300 bonus points.

7.4.2. **Public relations:**

7.4.2.1 100 points for media publicity. Publicity must be obtained or a bona fide attempt to obtain publicity must be made. Evidence must be submitted in the form of a newspaper clipping, a memo from a BC/TV station stating that publicity was given or a copy of the material that was sent to the news media for publicity purposes.

7.4.2.2. 100 points for physically locating in a public place (eg, shopping center, parks, etc) with significant access by the public. The intent here is for Amateur Radio to be on display to the public.

7.4.2.3 An additional 100 points can be earned by such display stations in public places actively conducting an information booth for the visiting public, and dispensing information handouts, maintaining visitor's log, etc, as an information/recruiting tool for Amateur Radio. Evidence submitted for both (B) and (C) may consist of copies of handouts, visitor's log, brief report on activities conducted, photos, etc.

7.4.3. **Message origination:** 100 points for origination of a message by the club president or other Field Day leader, addressed to the SM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the Field Day period, and a fully serviced copy of it must be in standard ARRL message form or no credit will be given.

7.4.4. **Message relay:** 10 points for each message received and relayed during the Field Day period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the Field Day report.

7.4.5. **Satellite QSO:** 100 points can be earned by completing at least one QSO via satellite during the Field Day period. The repeater provision of Rule 7C is waived for satellite QSOs. A satellite station (one) does not count as an additional transmitter. On the summary sheet, show satellite QSOs as a separate "band."

7.4.6. **Natural Power:** Field Day groups making a minimum of five QSOs without using power from commercial mains or petroleum derivatives can earn 100 points. Intuitively, this means an "alternate" energy source of power such as solar, wind, methane or grain alcohol. This includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not wish to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate list of natural-power QSOs should be enclosed with your entry.

7.4.7. **W1AW message:** A bonus of 100 points will be earned by copying a special ARRL Field Day bulletin sent over W1AW on its regularly announced frequencies just before and during Field Day. This message can be received directly from W1AW or by any relay method. An accurate copy of the received message should be included in your Field Day report.

8. Reporting: Entries must be postmarked by July 27, 1999. No late entries can be accepted. A complete entry consists of an official ARRL summary sheet (or reasonable facsimile) and a list of stations worked on each band/mode during Field Day, plus bonus proof. The list of stations worked on each band or mode may take the form of official ARRL dupe sheets or an alphanumeric listing of call signs worked per band and mode. This list may be computer-generated. Incomplete or illegible entries will be classified as checklogs. A copy of Field Day logs should be kept by your Field Day group, but should not be sent in unless specifically requested later by ARRL.

9. Miscellaneous:

9.1. The list of bulletin times for W1AW is included in this announcement. While W1AW does not have regular bulletins on weekends, the Field Day message will broadcast according to the accompanying schedule.

9.2. See *General Rules for All ARRL Contests* and *General Rules for ARRL Contests on bands below 30 MHz (HF)* at the Contest Web Page at **http://www.arrl.org/contests/** or the November 1998 issue of *QST*.

9.3. The complete Field Day packet, including forms, may be obtained by:

9.3.1. Sending a 9 by 12 SASE with four units of postage to: Field Day Packet, ARRL, 225 Main Street, Newington, CT 06111;

9.3.2. Downloading from the Contest Home Page.

9.4. Electronic entries should be submitted to: **FieldDay@arrl.org**

9.5. Paper entries should be sent to Field Day Entries, ARRL, 225 Main Street, Newington, CT 06111

QST

W1AW FIELD DAY BULLETIN SCHEDULE

Day	*Mode*	*Pacific*	*Mountain*	*Central*	*Eastern*
FRIDAY	CW	5:00 PM	6:00 PM	7:00 PM	8:00 PM
	Teleprinter	6:00 PM	7:00 PM	8:00 PM	9:00 PM
	Phone	6:45 PM	7:45 PM	8:45 PM	9:45 PM
	CW	8:00 PM	9:00 PM	10:00 PM	11:00 PM
SATURDAY	CW	7:00 AM	8:00 AM	9:00 AM	10:00 AM
	Phone	8:00 AM	9:00 AM	10:00 AM	11:00 AM
	CW	5:00 PM	6:00 PM	7:00 PM	8:00 PM
	Teleprinter	6:00 PM	7:00 PM	8:00 PM	9:00 PM
	Phone	6:45 PM	7:45 PM	8:45 PM	9:45 PM
SUNDAY	CW	7:00 AM	8:00 AM	9:00 AM	10:00 AM
	Phone	8:00 AM	9:00 AM	10:00 AM	11:00 AM

For the first time, the ARRL is making available annual Field Day pins to show your participation in the 1999 event. No minimum number of contacts to make, no score levels to achieve: just **PARTICIPATE** in the most popular annual operating event in the US and Canada. The cost is $5 each. Field Day groups should collect the money for the pins and send a single order stating the number of pins needed to: ARRL Contest Branch Attn Field Day Pins, 225 Main Street, Newington, CT 06111. We will ship the pins back to the club for distribution. These attractive pins are sure to become popular items. Show your Field Day spirit by displaying the very first Field Day participation pin.

Armed Forces Day 50th Anniversary Military/Amateur Communications Test

The Army, Air Force, Navy, Marine Corps and Coast Guard are cosponsoring the 50th annual Amateur Radio communications tests in celebration of Armed Forces Day. The celebration features traditional military-to-amateur crossband communications test and message receiving test. These tests give Amateur Radio operators an opportunity to demonstrate their technical skills and receive recognition from the Secretary of Defense or the appropriate military radio station for their proven expertise. Special commemorative certificates will be awarded to anyone who receives and accurately copies the Armed Forces Day digital message from the Secretary of Defense. All contacts must acknowledge by QSL card or certificate.

Military-to-Amateur Crossband Contacts

Military-to-amateur crossband operations will take place from 1300 UTC 15 May to 0500 UTC 16 May 1999. Operations will include operations in single sideband voice (SSB) and digital modes (RTTY, PACTOR and AMTOR). Some stations may not operate the entire period, depending on propagation and personnel. Participating military stations will transmit on selected military frequencies and listen for Amateur Radio stations in the amateur bands (amateur frequencies will be announced by individual stations).

Digital Modes Transmitting Test

Digital message broadcasts will take place as follows:

RTTY: 1540 and 2340 UTC
(100 WPM, 170-Hz shift)
PACTOR: 1640 and 0040 UTC
AMTOR: 1640 and 0140 UTC

A 10-minute call for tuning purposes will begin just before each broadcast. The secretary's message will be transmitted from the following stations on the frequencies listed above. (Note: Not all stations may necessarily operate on all the frequencies listed, depending on propagation and available equipment.)

Digital Transmitting Test Frequencies

Station	*Frequency (kHz)*
AAH ARMY HF/MARS radio station Fort Lewis, WA	6988.0, 14488.5
AIR 789th Communications Squadron Andrews Air Force Base Washington, DC	13986.5
AIR-2 Los Angeles AFB MARS Station EL Segundo, CA	4490.0, 6996.0, 14405.0
NNR NAVMARCORMARS Radio Station Camp Lejeune, NC	7346.5, 14480.0
NAV-2 NAVMARCORMARS Radio Station N Charleston, SC	7365.0, 14471.5
NAV-3 NAVMARCORMARS Radio Station Corpus Christi, TX	7393.0, 13975.5
NAV-4 NAVMARCORMARS Radio Station Great Lakes, IL	7375.0, 14468.5
NBL NAVMARCORMARS Radio Station Groton, CT	7370.0, 14393.0
NMH USCG Telecommunication and Information Systems Command Alexandria, VA	7385.0, 14385.0
NPL NAVMARCORMARS Radio Station San Diego, CA	7350.0, 14465.0
NUW NAVMARCORMARS Radio Station NAS Whidbey Island, WA	7380.0, 13530.0
WAR ARMY MARS Radio Station Fort Detrick, MD	13514.0

Submission of Test Entries

Transcripts of the RTTY, PACTOR, or AMTOR receiving test should be submitted "as received." No attempt should be made to correct possible transmission errors. Provide time, frequency and call sign of the military station copied, including name, call sign, and address (including ZIP code) of individual submitting the entry. Ensure this information is placed on the paper containing the test message. Each year a large number of acceptable entries are received with insufficient information, or necessary information was attached to the transcriptions and was separated, thereby precluding issuance of a certificate. Entries must be sent to following military addresses:

Stations copying AAH, or WAR

Armed Forces Day Celebration
Chief, Army MARS
HQ, USASC
ATTN: AFSC-OPE-MA (MARS)
Fort Huachuca, AZ 85613-5000

Stations copying AIR

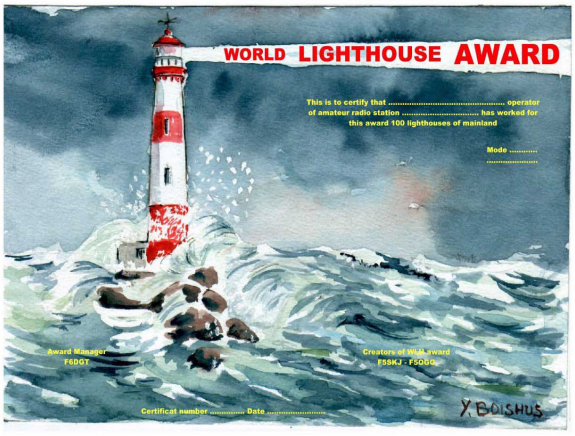
Armed Forces Day Celebration
789CS/SCOJM, Alabama Ave.,SCS-3
Andrews Air Force Base
Washington, DC 20672

Stations copying AIR-2

Armed Forces Day Celebration
SMC/61ABG/DOM (MARS)
2430 E. EL Segundo Blvd Ste Bsmt
El Segundo, CA 90245-4677

Stations copying NNR, NSS-6, NAV-2, NAV-3, NAV-4, NBL,NHM, NPL or NUW

Armed Forces Day Celebration
Chief, Navy-Marine Corps MARS
4401 Massachusetts Avenue N.W.
Washington, DC 20394-5460



Strays

WORLD LIGHTHOUSE DX CLUB

◊ The first convention of the World Lighthouse DX Club will be held on June 12, 1999 near Strasbourg, France, not far from the German border. The purpose of the club and this meeting is to urge hams to develop Amateur Radio expeditions to lighthouses, and to encourage hams to make radio contact with lighthouses around the world.

In conjunction with the convention, club members Philippe, F5OGG and Bruno, F5SKJ, have created a challenging international award. The World Lighthouse Award is available for working 100 amateur stations operating from offshore or island lighthouses around the globe. (More than 820 lighthouses have been recognized as being valid for the award.) Complete award rules and additional information about the Strasbourg convention can be obtained by sending a self-addressed envelope and $2 US to Guy Maillard, F6DGT, Avenue Chanzy, 44000 Nantes, France, or by going to the World Lighthouse Club site on the Web at **http://www.infini.fr/~tquere**.

By **Dan Henderson, N1ND**
Contest Manager

1998 ARRL 160-Meter Contest Results

This year's 160-Meter contest marks the final event for Billy Lunt, KR1R, at the ARRL HQ Contest Branch. After 14 years at Headquarters, Billy has moved on to new opportunities. We thank him for his years of service and wish him well in his future endeavors.

A great heavyweight champion is not just born—he trains and pays his dues. He works at his art, developing the skills of the jab and the counter-punch. He hones his skills against all comers if he is truly to be called "champion." Analysts and commentators will evaluate all challengers. Predictions on who the "next great hope" in the ring will be bantered around—but the mark of the true champion is the ability to come through in crunch time.

The editorial by K7BV in the March/April edition of the *National Contest Journal* "handicaps" the 1999 heavyweight contesters with this comment about K1ZM: "Has a great station—it is just a question of which category he chooses to do. He will win whatever he chooses." Well, he was certainly on the money with Jeff Briggs, K1ZM. Jeff once again showed his dominance and won the 1998 ARRL 160-Meter Contest. Not only did he outscore all of the contenders in the Single Op categories, he also finished ahead of every Multi-Op station as well.

Jeff racked up 327,175 points off of his 1241 Qs and led the way with 115 multipliers as the Single Op High Power winner. Second and third place finishers in the category were K9DX and W9lT who had a close race—256,215 to 255,360. More DX QSOs helped K9DX overcome W9IT's QSO totals. A tight race also emerged in the Single-Op Low Power category with K1PX Jim edging K1KY and WA1LNP 145,665 to 141,600 and 138,915.

In 1997 N0TT set a new QRP record with 95,025 points. The record stood for only one year as Dick Eshelman, WK3I, reclaimed the record he had lost the previous year. The new QRP record for the 160-Meter Contest is now 104,025—the first time the 100K threshold has been crossed in this category. Rounding out the winners were the operators at W8JI who were the only Multi-Op group to crack the 300K boundary this year.

Division records were also set during the event. KU7Y set a new QRP Pacific mark with 29,174. W4WA, with K9AY as the op, now holds the Southeastern QRP record with 87,150 points and N7IR now sits atop the Southwestern QRP ranks with 45,136. K1KY set the lone new Low Power record with a new Delta Division standard of 141,600. K9DX's effort of 256,215 is the new Central Division High power record, while N6RO upped the ante in the Pacific High Power category to 155,652 points. No new records were set in any division in the Multi-Op category.

The Club competition saw a three-way battle to win the Medium category. In the end Potomac Valley Radio Club delivered a decisive "knock-out." They triumphed over two of their traditional rivals—the Society of Midwest Contesters and the Frankford Radio club. PVRC was the only

Affiliated Club Competition

	Score	Entries
Medium Category		
Potomac Valley Radio Club	2,388,274	41
Society of Midwest Contesters	1,506,794	15
Frankford Radio Club	1,180,986	36
Yankee Clipper Contest Club	852,374	22
Mad River Radio Club	813,167	7
Minnesota Wireless Assn	673,596	9
North Coast Contesters	531,426	7
Salt City DX Assn	355,155	4
Texas DX Society	343,737	10
Rochester (NY) DX Assn	327,051	7
Northern California Contest Club	300,767	11
Oklahoma DX Assn	272,263	3
South East Contest Club	240,110	7
Florida Contest Group	192,192	6
North Texas Contest Club	148,018	4
Southern California Contest Club	139,067	4
Kentucky Contest Group	66,435	5
Mother Lode DX/Contest Club	24,209	3
Western Washington DX Club	21,792	3
South Jersey Radio Assn	6,114	3
Local Category		
Hudson Valley Contesters and	248,277	6
River City Contesters	96,172	3
West Park Radiops	59,440	4

Top Ten

Single Operator, QRP

WK3I	104,025
W4WA (K9AY,op)	87,150
KE0FT	77,250
W3TS	63,120
K8LJQ	62,436
N4ROA	47,080
N7IR	45,136
K9OM	44,240
KV8S	43,888
N9NE	36,162

Single Operator, Low Power

K1PX	145,665
K1KY	141,600
WA1LNP	138,915
N4ZI	128,972
WX9U	124,662
W2LC	121,828
W2TZ	109,158
AD4TJ	108,864
WA8YRS	100,302
WA8TMK	94,720

Single Operator, High Power

K1ZM	327,175
K9DX	256,215
W9LT	255,360
W4MYA	239,372
KE9I	215,469
K4WX	204,864
N5DX	204,077
K5NA	198,380
AA8U	194,558
K8OQL	176,968

Multioperator

W8JI	310,194
K8XXX	268,593
WB9Z	264,992
K8MK	241,242
N0NI	210,270
N5ZS	185,045
W0AIH	180,892
K0KX	176,126
NA5B	174,505
W0AH	166,992
NU4Y	164,064

The Secret of K1ZM's Success

In 1998 Jeff Briggs, K1ZM, made a major change in his 160-meter contest strategy—he operated from Cape Cod instead of his home in southeast New York. "From the Cape in December, I can work Europe on 160 for at least 20 hours a day," says Jeff. Location is a major factor in his 160-contest success, but it isn't the only factor. "You have to have the right transmitting antenna for the prevailing conditions."

In New York Jeff uses an inverted-**V** antenna with the apex at 197 feet and the ends stretched way out. This creates a high-angle radiation pattern for those early "close-in" QSOs. At about 0500 UTC, as conditions improve for long-haul work, Jeff makes the most of low-angle radiation by switching to a quarter-wavelength shunt-fed tower (with tons of radials) or a 4-square array. For listening purposes, K1ZM uses combinations of two 1000-foot beverages, assorted loops, slinky beverages or his 4 square.

As far as the Cape station is concerned, "It is a special place. I started looking for it the day after I purchased my first house there and spent 10 years trying to find it." Jeff uses similar strategies at the Cape as he does in New York, but only has two transmitting antennas. He gets particularly good results from an array of four-inverted **L**s. "The array looks like a kid's kite, but it has 6.91 dB gain to Europe." Jeff employs an assortment of beverages and loops for receiving, but perhaps his most powerful station asset is its location just a few hundred feet from the Atlantic.

Let all of us "lightweights" be warned: The Top Band Heavyweight Champion is already making improvements to his Cape Cod station. With a grueling tower ordinance battle behind him, Jeff's primary goal is getting the station in shape for next season. The rest of us will need considerable luck next December as we struggle to make headway against one of the acknowledged "best of the best."

Northeast Region
(New England, Hudson and Atlantic Divisions; Maritime and Quebec Sections)

WK3I	104,025	A
W3TS	63,120	A
N1RL	27,388	A
N3BNA	21,804	A
N1TM	18,860	A
K1PX	145,665	B
WA1LNP	138,915	B
W2LC	121,828	B
W2TZ	109,158	B
K1NK	87,584	B
K1ZM	327,175	C
K3SV	163,968	C
KA2RDO	154,406	C
K8FC	153,296	C
W1SJ	151,146	C
K3WW	156,112	D
K2DS	154,230	D
AA2PQ	151,697	D
W9XR	141,100	D
K5KG	124,983	D

Southeast Region
(Delta, Roanoke and Southeastern Divisions)

W4WA	87,150	A
N4ROA	47,080	A
KV8S	43,888	A
W4TMR	23,556	A
K4ZRA	22,034	A
K1KY	141,600	B
N4ZI	128,972	B
AD4TJ	108,864	B
N4DU	86,412	B
WO4O	79,800	B
W9LT	255,360	C
W4MYA	239,372	C
K4WX	204,864	C
N5DX	204,077	C
K8OQL	176,968	C
W8JI	310,194	D
N5ZS	185,045	D
NU4Y	164,064	D
W5WMU	145,140	D
NT4D	111,419	D

Central Region
(Central and Great Lakes Divisions; Ontario Section)

K8LJQ	62,436	A
K9OM	44,240	A
N9NE	36,162	A
WA8RCN	34,265	A
W8RU	26,784	A
WX9U	124,662	B
WA8YRS	100,302	B
WA8TMK	94,720	B
N9JF	85,083	B
N8AA	83,625	B
K9DX	256,215	C
KE9I	215,469	C
AA8U	194,558	C
K8CC	175,056	C
K1AO	161,112	C
K8XXX	268,593	D
WB9Z	264,992	D
K8MK	241,242	D
W0AIH	180,892	D
WN9O	154,640	D

Midwest Region
(Dakota, Midwest, Rocky Mountain and West Gulf Divisions; Manitoba and Saskatchewan Sections)

KE0FT	77,250	A
W5TEN	11,421	A
N0UR	11,180	A
KI0II	8,240	A
WJ0Z	4,814	A
W0UY	66,748	B
KI6DY	64,032	B
N0BB	50,904	B
W0ETT	50,853	B
NT5D	44,823	B
K5NA	198,380	C
K5RX	115,344	C
N5LZ	95,440	C
K5DX	93,440	C
W7SE	91,800	C
N0NI	210,270	D
K0KX	176,126	D
NA5B	174,505	D
W0AH	166,992	D
K0DU	150,156	D

West Coast Region
(Pacific, Northwestern and Southwestern Divisions; Alberta, British Columbia and NWT/Yukon Sections)

N7IR	45,136	A
KU7Y	29,174	A
K7FR	11,172	A
AA7UN	6,020	A
NI6G	5,832	A
W6JTI	50,048	B
AC7A	49,032	B
K0DI/6	48,106	B
N6CMF	46,376	B
K6ME	33,264	B
N6RO	155,652	C
K4XU/7	102,858	C
W7RM (KI7Y,op)	94,380	C
K6SE	65,160	C
KA6BIM	63,288	C
KH7R	108,498	D
N7KE	78,400	D
K6ZZ	71,558	D
N6KB	64,021	D
K7RST	58,146	D

club to top 2 million points, 2,388,274 to SMC's 1,506,794 and FRC's 1,180,986. The Hudson Valley Contesters and DXers win the gavel for the Local category with 248,277 points. Congratulations to all of the clubs whose members entered the gavel competition.

The 1999 ARRL 160-Meter Contest is set for December 3-5, 1999. Use the summer to get in training. Instead of "rope-a-dope" maybe roping a new top-loaded 160 vertical might be in order. Perhaps putting down new radials will be better preparation than hours spent sparring on the heavy bag. A new champion of the top band will be crowned in the wee hours of the approaching December. The reigning champion is hard at work upgrading his station even more (see the sidebar, "The Secret of K1ZM's Success"). Who's ready to step forward and be handicapped as the rising new contender?

Soapbox

Was excited when I worked both WY and UT, which were hard ones during SS (W9YS)…My apologies to those callers that I couldn't pull out of the heavy line noise. Disappointed to miss AK for WAS during the contest (K5RX)…Worked KH6 for a first. Maybe I should try for a 160 WAS! (W3CP)…Band conditions were low average the first night and abysmal on the second (K9NX)… Heard no one from Europe this year—or SD or AK (W0TM)… First time in the zany 160 contest. Surprising results with just an 80-meter inverted **V** (NV3V)…All things considered, I feel pretty good about the score. I spent almost no time doing search and pounce or hunting DX (K8ND)…Great contest. The balloon vertical works great. Now I need ears (N4DU)…The second evening it seems it took divine intervention to get west of the Mississippi (K8FC)…Boy, this was a tough, gritty one. Only DX in the window were the DX "cops" telling somebody to get out (VE6EX)… Heard Europe early on Friday evening, assumed it would hang in there. Wrong! (KJ9C)…Things worked better after I discovered that I had selected the wrong transmit antenna (W1TE)…As always, I enjoyed this contest, though conditions were noticeably poorer than last year (K6SE)…Played in the contest less the second night and turned spectator watching the UT Vols beat Ole Miss for the SEC Championship (WO4O)…This has always been my favorite contest since the early 70s. The Texas noise is much harder to deal with than the noise levels from my previous years in NY (K5NA)… Somehow I convinced myself the contest started on Saturday. No wonder people were asking my section as I made a few pre-contest Qs Saturday night! (K9BG)…No matter how good conditions may become, I am going to need more antenna, more power and more coffee next year (KQ6ES)… Another great 160 Contest. Bands were much better the first night due to an approaching winter snowstorm (WA7LNW)…First operation from the new rural QTH. Noise levels never above S-2 (K5PC)

Scores

Scores are listed by DXCC Countries and ARRL\RAC Sections. Within each Country or Section, scores are listed in descending order, by power categories, followed by multioperators. Line scores list call sign, score, QSOs, multipliers, power (A = QRP, B = Low Power, C = High Power, D = Multioperator.

Asia

Japan

JE1SPY	126	9	7	B
JE3HHT	18	3	3	B
JQ1UKK/7	8	2	2	B
JI3IVL	2	1	1	B
JH1HGC	128	8	8	C
JA4YPE (JF3EBO,op)	18	3	3	C
JA4HIX	18	3	3	C
JH0ZHQ (JH1BBT,JH1GNU,JH1MDJ, JK1GKG,ops)	32	4	4	D
JA1YNE (JP1OGL,JJ8DEN,ops)	2	1	1	D

Europe

Fed. Rep. of Germany

DF2PY	2,160	40	27	C

Spain

EA5BY	900	25	18	C
ED1RCW (EA1FAE,EA1AUI,EA1JO,ops)	8,528	104	41	D

Balearic Islands

EA6ACC	1,080	30	18	C

Scotland

GM3POI	12,000	150	40	C

Italy

I3VHO	966	23	21	C

Lithuania

LY2VAD (LY1FZ,op)	374	17	11	C

Bulgaria

LZ1DFP	8	2	2	C

Czech Republic

OK1DQT	2,268	42	27	C

Poland

SP7GIQ	1,200	30	20	C

Ukraine

UU4JMG	198	11	9	B
UY1HY	2	1	1	C

Yugoslavia

YU1RA	8	2	2	B

North America

Cuba

CO8TW	672	21	16	B

St. Lucia

J6A (KI6T,N8BJQ,K9LU,S50R,N9AG, N8NR,ops)	82,368	572	72	D

Cayman Islands

ZF2AH	57,816	438	66	C

Oceania

Hawaii

KH6/WB6FZH	12	3	2	A

Australia

VK5GN	336	14	12	C

South America

Aruba

P40I (KR3I,op)	4,416	69	32	B

1

Connecticut

N1RL	27,388	334	41	A
N1TM	18,860	230	41	A
N1MT	15,600	200	39	A
W1BRS (NM1K,op)	5,270	85	31	A
K1PX	145,665	858	83	B
W1WEF	39,494	308	62	B
WB8IMY/1	11,628	160	36	B
NX1Q	10,040	124	40	B
W1GM	8,820	126	35	B
N1TKS	6,930	99	35	B
K1BTD	3,640	67	26	B
N1MD	14,534	163	43	C
K1JN	12,384	141	43	C
K1KI	12,048	124	48	C

Eastern Massachusetts

W1AX	13,065	166	39	A
K1QM	2,142	51	21	A
W1VIV	32,936	358	46	B
N1DM	32,595	306	53	B
K1NTR	28,560	280	51	B
K1DC	26,850	267	50	B
AA1RO	16,842	199	42	B
WG1Z	13,080	162	40	B
AA1O	7,260	121	30	B
K1EP	5,668	109	26	B
K1TH	2,200	55	20	B
K1ZM	327,175	1241	115	C
K2LP	20,250	189	50	C
WR1P	5,270	85	31	C
W1BB (K1VV,op +NET)	35,154	315	54	D

Maine

N1ZPC	4,250	85	25	B
K1DRV	4,200	70	30	B
K1MV	1,824	38	24	B
K1TGS	35,746	278	61	C
K1PQS	6,660	111	30	C
W1CEK	176	8	8	C

New Hampshire

WA1LNP	138,915	838	81	B
W1XV	7,200	100	36	B
WB1GEX	918	27	17	B
KZ1O	644	23	14	B
W1ECT	81,120	600	65	C
W1AB	14,400	157	45	C

Rhode Island

K1DFT	42,891	416	51	C
KS1J	20,825	205	49	C
W1OP (W1GS,W1IUX,K1JNJ,K1DT,ops)	86,792	550	76	D

Vermont

AA1SU	58,446	573	51	B
N1MEZ	20,124	192	52	B
W1SJ	151,146	921	81	C

Western Massachusetts

W1TE	76,358	505	73	B
KZ1M	53,592	468	56	C
K5ZD	44,160	302	69	C
K1AE	25,800	252	50	C
W1CSM	17,702	161	53	C
W1TO (+NET)	57,889	383	73	D

2

Eastern New York

N2IX	4,590	85	27	A
K2UF	49,140	452	54	B
K2DW	38,171	388	49	B
K2YR	22,484	254	44	B
AA2DY	20,034	237	42	B
AA2QR	1,794	39	23	B
WB2PUH	1,406	37	19	B
W2XL	104,181	657	77	C
K2ONP	29,260	263	55	C
N2DBD	23,435	271	43	C
W2ENY	14,792	172	43	C
K2DS (+WA2JQK)	154,230	753	97	D
N2SA (+KE2SD)	99,974	665	74	D
NA2M (+NET)	49,932	330	73	D
W2RE (+NET)	7,502	121	31	D

NYC-Long Island

WB2DLA	3,358	73	23	B
N2VE (W3EH,op)	1,886	41	23	B
K2QMF	17,505	190	45	C

Northern New Jersey

KB2EBL	15,170	205	37	A
K2JT	15,078	178	42	A
W2JEK	7,020	117	30	A
K1NK	87,584	638	68	B
W2CG	24,462	219	54	B
W2ZK	11,610	126	45	B
W2VQ	6,600	110	30	B
N2KJM	6,400	100	32	B
N2LKF	5,264	94	28	B
W2EN	37,024	350	52	C
N2CG	21,888	228	48	C
K2WK	17,190	182	45	C
W2HCA	9,252	127	36	C
WA2VYA	3,750	75	25	C
K5KG (+NET)	124,983	755	81	D
K2TW +packet	37,386	261	67	D
W1GD (+NET)	15,100	142	50	D

Northern New York

K3KYR	456	19	12	B
W2NNY (N4TW,N2MD,ops)	47,135	427	55	D

Southern New Jersey

AA2WN	16,324	184	44	B
W2III	8,384	131	32	B
W5KI	7,595	107	35	B
KE2G	5,874	89	33	B
W2BE	5,280	80	33	B
K2VT	2,240	56	20	B
K2VS	2,080	52	20	B
K2WB	1,122	33	17	B
W2UL	992	31	16	B
N2MM	134,904	779	84	C
WK2G	46,656	429	54	C
W2GE	1,794	39	23	C
N2VW +packet	21,384	192	54	D
K3JGJ +packet	15,064	130	56	D
K2OWE +packet	12,452	137	44	D

Western New York

W2LC	121,828	794	76	B
W2TZ	109,158	788	69	B
K2JL	51,216	382	66	B
W0VU	34,017	332	51	B
WD5T	33,420	274	60	B

KU2X 30,414 390 37 B
K1PY 24,205 256 47 B
N2UM 16,054 173 46 B
N2CU 13,720 170 40 B
WA2RZJ 13,600 170 40 B
WA2EYA 4,312 77 28 B
K2FR 2,678 50 26 B
N2CK 1,160 29 20 B
KA2RDO 154,406 925 82 C
K8FC 153,296 841 88 C
WF2W 114,683 775 73 C
K2FU 95,978 638 74 C
KW2J 46,648 409 56 C
W2YRH 15,975 176 45 C
AA2PQ (+K2ZJ) 151,697 805 91 D
W2SEX (K2ZR,K2YW,W2TPC,ops) 92,872 605 76 D
W2RW (+WB2KAO) 20,500 250 41 D

3

Delaware

N9GG 176 11 8 A
N8NA 51,507 435 59 B
NY3C +packet 12,000 150 40 D

Eastern Pennsylvania

W3TS 63,120 523 60 A
N3BNA 21,804 237 46 A
K3AN 6,090 105 29 A
NY3A 71,064 558 63 B
WF3M 35,917 365 49 B
W3EHZ 27,166 283 47 B
K3PP 19,646 209 47 B
K3SWZ 18,228 183 49 B
WT3P 11,076 142 39 B
WT3W 6,417 102 31 B
N3RM 5,508 81 34 B
W8IJ 504 21 12 B
K3SV 163,968 955 84 C
W3BGN 105,520 619 80 C
W8FJ 48,106 350 67 C
K3TEJ 43,470 401 54 C
AA3B 41,268 353 57 C
K3OQF 25,542 235 54 C
N3FA 22,419 210 53 C
W3KM 12,210 165 37 C
AA3TT 8,940 149 30 C
K3OO 3,782 58 31 C
K3WW (+NET) 156,112 860 88 D
K3ATO 50,654 401 62 D
NN3Q (+NET) 41,139 313 63 D
K3II +packet 27,755 223 61 D
K3NZ +packet 22,412 208 52 D
NE3H (+NET) 14,976 150 48 D
KE3VN +packet 14,560 134 52 D
N3MKZ +packet 9,163 83 49 D

Maryland-DC

WK3I 104,025 686 75 A
K3SA 41,776 373 56 B
N1WR 37,895 340 55 B
W3CP 34,397 287 59 B
AD3F 16,380 179 45 B
WB8YYY 11,100 150 37 B
N3WK 2,850 57 25 B
NV3V 2,142 51 21 B
K3MM 85,004 529 79 C
K3ZO 77,824 500 76 C
W3TMZ 67,087 452 73 C
W3ZZ 40,424 320 62 C
W3GN 35,796 311 57 C
K3EI 26,500 250 53 C
N3HUV 10,260 135 38 C
N3AM (+NET) 71,488 554 64 D
W2GG (+NET) 69,496 496 68 D
K3DI (+NET) 55,918 374 73 D
N3NT (+NET) 20,400 194 51 D

Western Pennsylvania

AA3GM 8,400 120 35 A
K3WWP 3,750 75 25 A
NB4J 25,376 208 61 B
W3IA 21,736 209 52 B
AD8J 18,228 186 49 B
N3EQF 18,000 186 48 B
W3AG 11,000 136 40 B
W3HDH 8,228 121 34 B
NA3V 7,320 122 30 B
W3TWI 2,376 44 27 B
W3ZA 968 43 22 B
W3GH 136,000 776 85 C
W9XR (+K3UA,W3GH) 141,100 815 85 D

4

Alabama

W4DEC 9,120 117 38 A
K4IQJ 23,199 202 57 B
W4YNG 11,840 148 40 B
KS4YT (+KV4T) 80,343 501 79 D

Georgia

W4WA (K9AY,op) 87,150 572 75 A
N4DU 86,412 561 76 B
NN4S 44,064 297 72 B
K2UFT 17,600 157 55 B
K4BAI 17,434 188 46 B
K4PK 8,120 116 35 B
W4DD 2,162 47 23 B
AD4J 26,040 208 60 C
W8JI (+ops) 310,194 1227 114 D

Kentucky

AA2GS 80,703 636 63 B
KT4ZX 23,640 194 60 B
KM4CH 16,464 196 42 B
K4FU 9,720 108 45 B
K4WW 4,800 80 30 B
K1AO 161,112 947 84 C
N4LQ 111,306 703 78 C
WB4ZDU 16,896 176 48 C
N4XM 3,304 59 28 C

North Carolina

W4TMR 23,556 225 52 A
N4BNO 60,417 472 63 B
KS4S 60,099 435 67 B
KE4QZB 9,906 127 39 B
N4CW 5,600 100 28 B
W1UO 3,420 57 30 B
AE4EC 3,016 58 26 B
K3KO 111,520 685 80 C
NY4A (N4AF,op) 90,139 545 79 C
K4MA 71,288 511 67 C
N4UH 19,926 177 54 C
NT4D (+NET) 111,419 710 77 D
K4PB (+NET) 57,519 360 77 D

Northern Florida

K4ZRA 22,034 232 46 A
W4ROM 25,056 229 54 B
WB4IHI 18,450 180 50 B
N4EK 13,860 148 45 B
W8IM 3,600 60 30 B
W7QF 2,520 42 28 B
K4LDR 70 7 5 B
WC4E 15,600 150 50 C
NU4Y (+K4EB,N4KE,NN2S) 164,064 814 96 D

South Carolina

VE7CPN/W4 65,728 506 64 B
WC4CW 17,850 177 50 B
N1CC 3,312 72 23 B
AA4NN 63,403 445 71 C

Southern Florida

KR4U 2,250 45 25 B
W6BXQ 286 13 11 B
N4BP 151,800 810 88 C
N8PR 37,012 221 76 C
K4LM 28,152 189 68 C
K1TO 8,342 94 43 C

Tennessee

N4UW 12,580 170 37 A
WA4HLV 2,156 49 22 A
K1KY 141,600 873 80 B
N4ZI 128,972 844 76 B
WO4O 79,800 523 75 B
NA4K 31,488 325 48 B
N5OR 29,184 253 57 B
AC4ZD 25,200 300 42 B
WB3JKQ 6,020 86 35 B
W4TDB 4,640 80 29 B
KE4OAR 600 20 15 B
K4WX 204,864 1140 88 C
N4IR 137,760 849 80 C
W4CBX 120,456 702 84 C
K4LTA 109,417 700 77 C
N4DD 98,112 669 73 C
K0EJ 65,675 461 71 C
K4RO 55,428 444 62 C
AG4V 30,866 250 61 C
W4PA 14,022 171 41 C

Virginia

N4ROA 47,080 425 55 A
AD4TJ 108,864 750 72 B
K4BAM 48,922 395 61 B
W4UQ 38,178 291 63 B
N4GU 33,300 330 50 B
W4HJ 27,132 263 51 B
K4ORD 27,075 230 57 B
K4MX 26,163 255 51 B
W4SNH 16,356 174 47 B
N3TG 16,031 194 41 B
W4VG 11,700 150 39 B
N3JT 11,628 150 38 B
K4UK 8,505 120 35 B
W4SD 7,770 111 35 B
N4PD 6,232 82 38 B
KA4DAU 6,204 94 33 B
WB4DNL 3,224 62 26 B
W4MYA 239,372 1069 103 C
K4OAQ 123,200 761 80 C
W4YE 104,829 615 83 C
N3JB 60,572 385 76 C
K4IQ 51,870 363 70 C
W4DF 37,632 333 56 C
W2YE 23,485 206 55 C
K4VV 13,545 146 45 C
K4IX 13,455 148 45 C
K4UX 5,412 66 41 C
WA4QDM (+ops) 36,568 325 56 D
K1GG (+NET) 16,115 142 55 D

5

Arkansas

KJ5WX 74,304 510 72 B
N5DX 204,077 1127 89 C
K5LG (+N5OE) 39,058 331 59 D
N5ZS (AB5SE,K5OY,ops) 185,045 1075 85 D

Louisiana

W5OT 48,484 352 68 B
AE5T 35,728 305 58 B
W5XV 19,584 204 48 B
K1DW/5 11,000 136 40 C
W5WMU (+K5UA) 145,140 870 82 D
WM9M (WA7YHK,WD8LLR,ops) 30,567 211 69 D

Mississippi

AB5YY 25,774 263 49 B
N5UE 7,416 103 36 B
WA5NYG (+AB5XP,KC5FQZ) 101,515 629 79 D

New Mexico

N5UL 81,776 532 76 C
W6PU 69,715 467 73 C
NA5NM (N5IA,op) 47,450 362 65 C
K5AM 39,798 300 66 C
W5JRP 7,840 98 40 C

North Texas

W5CWQ 44,590 314 70 B
K9MK 25,152 189 64 B
K5KJ 19,602 180 54 B
WK5K 17,992 173 52 B
W4YOK 15,718 131 58 B
K5PC 14,476 154 47 B
N5NJ 140 10 7 B
K5RX 115,344 700 81 C
N5TY 12,932 119 53 C
K6AZA (+KD5FUM) 676 26 13 D

Oklahoma

K5HP 37,224 279 66 B
WB5GMK 11,070 123 45 B
K5YAA 48,930 342 70 C
NA5B (+ops) 174,505 1007 85 D
K5TT (+NET) 48,828 298 78 D

South Texas

W5TEN 11,421 120 47 A
WA8GHZ 228 19 6 A
NT5D 44,823 330 67 B
N5DU 41,736 273 74 B
W5MJ 35,526 285 62 B
K5NZ 29,402 238 61 B
K5IX 13,583 143 47 B
N5TU 9,476 103 46 B
AJ4F 3,696 66 28 B
AF5Z 2,688 48 28 B
KZ5MM 162 9 9 B
K5NA 198,380 1060 91 C
N5LZ 95,440 580 80 C
K5DX 93,440 572 80 C
N5RP 21,276 194 54 C
NX5M 2,632 47 28 C
K5QLP (+K5IUA,N5OB,WX5DX, WA5SNL,WD5KBY,N5QWF) 51,544 373 68 D
K5AB (+AA5TZ,K5XB) 43,884 312 69 D
K4NR (+NET) 31,960 232 68 D

West Texas

NZ5M 2,068 47 22 B

6

East Bay

AE6C 9,476 103 46 B
N6RO 155,652 805 84 C

Los Angeles

WA6BIL 20,574 189 54 B
K0INT 15,435 170 45 B
N6GL 8,645 122 35 B
KQ6ES 8,460 116 36 B
KU6T 8,424 108 39 B
ND6P 5,814 84 34 B
N6HY 4,192 58 32 B
N6MD 644 23 14 B
KQ6TI 572 22 13 B
K6SE 65,160 436 72 C
KH6DX 58,950 384 75 C
N5BF 20,088 180 54 C
N6ED 10,943 175 31 C
W6YRA WA6AYI, KD6KKQ, AC6YV, KU6T 22,525 211 53 D

Orange

N6CMF 46,376 329 68 B
KG6O 8,600 100 43 B
N6PE 36,040 256 68 C
K6NR 18,603 174 53 C
W6HG 10,868 103 52 C

Pacific

N0KE/KH6 4,864 76 32 B
KH7R (KH6ND,KH7U,ops) 108,498 619 78 D

Santa Barbara

W6GL 2,100 50 21 A
WA6FGV 25,272 234 54 B
W6VM 19,188 183 52 B
W6OUL 9,618 113 42 B
W6ND 5,535 66 41 B
W6JEO 3,770 71 26 B
W6JU 2,856 58 24 B
W7CB 31,740 227 69 C
N6KB 64,021 425 73 D

Santa Clara Valley

N6NF 27,120 226 60 B
KB6FPW 27,018 237 57 B
N7FF 6,112 94 32 B
K6III 4,031 68 29 B
W6PRI 572 22 13 B
N6IV 2 1 1 B
KI6CK 34,650 272 63 C
K6XX 15,861 151 51 C
K6MO 14,161 140 49 C
AJ6V 11,180 130 43 C
KG6AO 10,120 115 44 C
W0YK 8,140 110 37 C
K6GL 3,844 62 31 C

San Diego

K0DI/6 48,106 356 67 B
NR6R (N6KI,KM3G,ops) 54,936 377 72 D

San Francisco

W6JTI 50,048 365 68 B
K6UM 4,140 69 30 B
K6CTA 13,442 140 47 C

San Joaquin Valley

NI6G 5,832 81 36 A
K6MI 3,200 50 32 A
WA6YEE 10,922 127 43 B
KI6PG 1,612 31 26 B
KA6BIM 63,288 429 72 C
N2KK 50,954 340 73 C
K6ZZ (+NET) 71,558 476 74 D

Sacramento Valley

K6ME 33,264 264 63 B
W6UT 25,758 240 53 B
W6RKC 14,716 140 52 B
ND6S 7,881 105 37 B
W6NKR 5,824 91 32 B
N0RM (WB6RVR,op) 3,770 71 26 B
N6JV 38,674 308 61 C
K6NO 31,740 260 60 C
W6EU 20,680 185 55 C
K6UT 19,470 156 59 C
K6FO 12,015 132 45 C

7

Arizona

N7IR 45,136 361 62 A
AC7A 49,032 336 72 B
W7YS 33,858 255 66 C
W7ZT 1,722 41 21 C
K7RST (KK7Z,K0DVH,ops) 58,146 439 66 D
NM7I (NU7I,K7ON,ops) 24,585 222 55 D

Eastern Washington

K7FR 11,172 133 42 A
W7UB 31,416 235 66 C
WW7CC (K7FR,op) 11,172 133 42 C

Idaho

AA7UN 6,020 86 35 A
W7ZRC 20,500 205 50 B
WO7Y 17,650 175 50 B
KK7A 12,052 131 46 B
WX7G 6,372 87 36 B

Montana

K7PGL 10,080 120 42 B
KS7T 21,580 206 52 C

Nevada

KU7Y 29,174 250 58 A
KK7PU 6,846 80 42 B
K7BV 20,120 250 40 C
K7GJ +packet 43,677 312 69 D

Oregon

K4XU/7 102,858 621 79 C
W7IMP 690 23 15 C
W7LT (K7ZUM,AL7W,ops) 57,794 398 71 D

Utah

W7HS 17,658 162 54 B
K7OA 10,363 119 43 B
NJ7A 5,168 68 38 B
WA7ITZ 480 20 12 B
WA7LNW 83,400 544 75 C
NC7X (N7XJ,NC7W,ops) 110,625 733 75 D
NS7K (+NS7B,KB7RUQ,KC0PA,K8QD) 49,104 369 66 D

Western Washington

K7SY 5,456 88 31 A
AD7U 2,964 57 26 A
W7LD 32,364 276 58 B
N7WA 4,686 71 33 B
W7RM (KI7Y,op) 94,380 566 78 C
N0AX 5,934 69 43 C
N7KE (+KB7N) 78,400 551 70 D

Wyoming

W7SE 91,800 606 75 C
W7CA (+K0HP) 147,159 873 83 D

8

Michigan

K8LJQ 62,436 470 66 A
W8RU 26,784 279 48 A
K8CV 12,996 171 38 A
K8MJZ 46,438 373 62 B
K8VT 37,637 307 61 B
N8IA 16,195 196 41 B
N8VEN 13,280 166 40 B
W8WVU 11,232 156 36 B
W8IC 9,546 124 37 B
W8ROV 1,210 26 22 B
AA8U 194,558 1036 91 C
K8CC 175,056 1027 84 C
N8EA 119,228 712 82 C
W8ROS 6,474 80 39 C
K8DD 4,340 70 31 C
K8XXX (N8CC,NU8Z,K8AQM,K8KS, K8KB,KG8CO,K8JJC,N8JF,ops) 268,593 1347 97 D
ND5S/8 (+NET) 53,900 376 70 D

Ohio

WA8RCN 34,265 310 55 A
K8OUA 17,640 210 42 A
WB8ZWY 15,990 205 39 A
K8MR 10,619 142 37 A
KD8FW 10,336 152 34 A
WA8YRS 100,302 687 73 B
WA8TMK 94,720 634 74 B
N8AA 83,625 550 75 B
W8KTQ 82,484 605 68 B
W8EH 73,150 518 70 B
NO8C 70,618 521 67 B
K9TM 47,377 400 59 B
W8DHG 39,390 300 65 B
W8IDM 30,268 322 47 B
WT8P 18,800 200 47 B
W8PN 13,692 163 42 B
AF8C 11,160 155 36 B
W8FDN 9,438 143 33 B
KA8OKC 7,776 108 36 B
K8KR 6,000 100 30 B
K8ME 4,320 72 30 B
AA8BV 1,722 41 21 B
K8ND 138,225 920 75 C
W4NTI 85,612 622 68 C
W8FAX 46,900 338 67 C
WZ8A 37,968 333 56 C
WA8TNO 35,168 311 56 C
N8TR 34,435 232 71 C
K8LN 23,667 240 49 C
K8MK (+KU8E,N8VW,WR8C) 241,242 1252 93 D

West Virginia

KV8S 43,888 422 52 A
K8OWL 4,930 85 29 A
W9LT 255,360 1126 105 C
K8OQL 176,968 974 88 C
K2UOP 73,150 509 70 C
WA8WV 67,008 519 64 C

9

Illinois

K9OM 44,240 392 56 A
WX9U 124,662 783 79 B
N9JF 85,083 531 79 B
KG9X 77,404 520 74 B
K9ZO 54,808 400 68 B
N9VVV 45,120 351 64 B
K9QVB 30,400 304 50 B
KO2R 26,488 235 56 B
WO9S 23,585 221 53 B
K9SB 22,842 210 54 B
KJ9O 18,400 200 46 B
K9PPW 13,500 150 45 B
W9YS 3,078 57 27 B
N9GH 2,208 96 23 B
K9DX 256,215 987 95 C
KI9A 67,525 455 73 C
K9AB 30,744 243 61 C
WB9Z (+K9NR,K9CS,K9IFO,AK9F) 264,992 1301 98 D
NO9Z (+KX9X,W9SZ) 113,286 702 79 D
K9BG (+NET) 70,522 472 74 D

Indiana

KJ9C 66,576 450 73 B
K9AF 34,914 250 69 B
N9FD 32,147 259 61 B
K9MI 9,030 129 35 B
K9CUN 1,444 38 19 B
KE9I 215,469 1191 89 C
W9RE 67,360 400 80 C
WN9O (+NET) 154,640 959 80 D
KG9AP (+NZ9R,K9HIA,K9TFP, WA2KVX) 103,234 724 71 D

Wisconsin

N9NE 36,162 287 63 A
AF9J 2,982 71 21 A
WA1UJU 82,745 635 65 B
K9OSH 52,000 400 65 B
KA9FOX 7,208 106 34 B
WA9IRV 147,654 939 78 C
K9NX 134,895 780 85 C
WT9Q 127,269 801 79 C
W0AIH (K0TG,K9ALP,ops) 180,892 1094 82 D

0

Colorado

KI0II 8,240 103 40 A
W0ETT 50,853 367 69 B
W9KV 13,720 140 49 B
WA3COS 6,845 91 37 B
W0RA 60,620 430 70 C
W0AH (+KF7MD) 166,992 979 84 D
K0DU (+K0UK,N0ZA) 150,156 852 86 D
W0TM (+K0CL) 142,074 865 81 D

Iowa

KE0FT 77,250 512 75 A
N0BB 50,904 352 72 B
WT0D 31,680 264 60 B
W0OF 13,590 151 45 B
WB0B 2,800 50 28 B
K0SRL 2,744 49 28 B
WA0QMU 82,573 577 71 C
N0NI (+WO0V,N0AC) 210,270 1209 86 D

Kansas

W0UY 66,748 445 74 B
KI6DY 64,032 464 69 B
K0BJ 34,254 258 66 B
K0RY 26,274 225 58 B
W0WPL 9,024 96 47 B
KU0KU 1,634 43 19 B
W0RT 19,544 164 56 C

Minnesota

N0UR 11,180 130 43 A
W0QF 2,592 54 24 A
W0ZQ 14,400 160 45 B
W0UC 14,210 145 49 B
KI0F 12,300 150 41 B
W3FAF 69,336 480 72 C
W0HW 68,324 445 76 C
WA0RBW 22,140 205 54 C
K0IR 10,672 116 46 C
K0KX (+K0MX) 176,126 1049 83 D
KR0B (+N0BKL,KS0T,KJ0B,AE0F, AF9T,KB0KQA) 117,496 770 76 D

Missouri

AA0RT 720 24 15 B
KM0L 28,304 229 61 C

Nebraska

WJ0Z 4,814 83 29 A
KK0DX 5,082 77 33 B

Maritime-Newfoundland

VE1KB 11,046 127 42 B

Quebec

VE2ZP 59,136 456 64 B
CG2AWR 23,908 275 43 B
VE2BWI 2,640 55 24 B
VE2FFE 1,020 30 17 B

Ontario

VE3OSZ 74,451 529 69 B
VE3KP 64,675 496 65 B
VE3ABG 21,344 232 46 B
VE3UZ 15,050 175 43 B
VE3WZ 9,648 134 36 B
CF3TEE (VA3TEE,op) 3,360 60 28 B
VA3DX 108,000 660 80 C
VE3EJ (+NET) 94,371 546 83 D

Manitoba

VE4AAU 8,800 100 44 B
VE4JB 30,807 243 63 C

Saskatchewan

VE5SF 13,113 138 47 B
VE5CPU 3,596 62 29 B
VE5RA 88,627 568 77 C

Alberta

VE6EX 21,560 220 49 B
VE6SW 112 8 7 C
VE6JY (+NET) 1,160 29 20 D

British Columbia

VE7XF 10,416 124 42 B
VE7VV 44,019 321 67 C
VE7NS 17,690 151 58 C

Checklogs

K4VUD, VE3BR, W5AN, KC8GTA, WA2QQF, W9GXR,

*Edited by **Steve Ewald, WV1X** • Assistant Field Services Manager*

The ARRL Field Organization Forum

Field Organization Abbreviations

ACC	Affiliated Club Coordinator
ARES	Amateur Radio Emergency Service
ASM	Assistant Section Manager
BM	Bulletin Manager
BPL	Brass Pounders League
DEC	District Emergency Coordinator
DXFR	DX Field Representative
EC	Emergency Coordinator
LGL	Local Government Liaison
NCS	Net Control Station
NM	Net Manager
NTS	National Traffic System
OBS	Official Bulletin Station
OES	Official Emergency Station
ORS	Official Relay Station
OO	Official Observer
OOC	Official Observer Coordinator
PBBS	Packet Bulletin Board Station
PIC	Public Information Coordinator
PIO	Public Information Officer
PSHR	Public Service Honor Roll
SGL	State Government Liaison
SEC	Section Emergency Coordinator
SM	Section Manager
STM	Section Traffic Manager
TCC	Transcontinental Corps
TA	Technical Advisor
TC	Technical Coordinator
TS	Technical Specialist
VC	Volunteer Counsel
VCE	Volunteer Consulting Engineer
VE	Volunteer Examiner

ATLANTIC DIVISION

DELAWARE: SM, Randall K. Carlson, WB0JJX—e-mail: WB0JJX@arrl.org—Web site: **http://gographics.com/staff/randall/secpage.htm.** The 1999 Delaware QSO party is now over, and the logs are coming in. While still a small affair, those that participate have a lot of fun with it. In fact we are starting to get a core of regulars from outside Delaware that work it every year. One comment that was present in almost all the logs was the request that more Delaware stations participate. So we want to get the word out early and get it on your calendar. The Delaware QSO Party for the Year 2000 will be Feb 5-6, 2000. I hope everyone can take the time to get on the bands. Even if only for an hour or two. Traffic (Feb) DTN QNI 122 QTC 10 in 20 sess; DEPN QNI 26 QTC 1 in 4 sess.; KCARC Net QNI 53 QTC 2 in 4 sess. K3JL 27. 73 Randall.

EASTERN PENNSYLVANIA: SM, Allen R. Breiner, W3TI—SEC: WB3FPL. STM: W3KOD. OOC: W3DZI. SGL: KI6NJ. TC: N3HTZ. ACC: N3KYZ. ASM: WY3K, K3TX, N3KYZ, WB3FQY. Pennsylvania Governor Tom Ridge issued a proclamation for the whole month of June 1999 as "Amateur Radio Awareness Month" in commemoration of the more than 24,000 citizens of the Commonwealth who have been licensed by the FCC as Amateur Radio operators and for their dedication to volunteer service in providing vital supplemental communications during times of natural disasters, in local emergencies and for public events since the earliest days of wireless radio. At the time of this entry, we are having snow flurries and it is bitter cold here in the Poconos, but the Mobile Six'ers Radio Club have begun making plans for Field Day in June. They will be joining the Marple Newtown Amateur Radio group. The Chester Co ARES/RACES group will be utilizing the West Bradford Fire Co site for Field Day. Susquehanna Valley ARC officers for 1999 are: N3CVQ president; N3VDP vp, K3SI secretary, and N3VTE treasurer. Holmesburg ARC 1999 officers are: president WA3PZO, vp KB3AKK, treasurer W3KZA, secretary N3UBY. Congratulations are in order for N3RU who has achieved the level of Eagle Scout. License upgrades went to N3YTK for Tech Plus, KB3CFV to General and N3KCK made Advanced. The 3 RF Sniffers, N3AO, WT3P, and N3SAM trucked their way to the Pottstown Muncipal building to determine the cause of the 2-meter interference. Source of the problem was 2 paging transmitters. WT3P and N3AO then took time out from their busy schedule for a vacation in KP2-land. New call N3BGA is W3MBH. Is your radio club looking for some additional activity? Contact your local Boy Scout troop, you might be surprised how many would be interested in getting in Amateur Radio. By now, the spring walk-a-thons, bike-a-thons and spring sprints will be in full bore. Tell us about them, and send us a report of the event and who assisted in the activity. NE3I will hold demonstrations on the use of packet in emergencies at the May meeting of the Montgomery Co RACES group. There are various grants available for your club or emergency communications group to outfit or update that communications vehicle. If interested, contact Assistant Section Manager J. Yogi Bear, WB3FQY, at 209 Stone Creek Rd, Lancaster, PA. Don't forget the ARRL EPA Section Convention at Bloomsburg, June 12. The annual EPA section family picnic will be at Knoebles Grove on July 10. Tfc (Feb): W3KOD 599, N3DRM 529, N3EFW 262, W3IVS 159, N3HR 84, N3YSI 73, W3IPX 60, NR9K 56, N3SIN 46, WA3EHD 35, AD3X 22, N3AT 20, K3TX 19, W3JKX 17, W3DP 14, K3ARR 11, W3TI 10, N3DCG 9, W3ZQN 8, N3KYZ 7, WA3CKA 5, N3AS 4, W3BNR 4, KA3KMH 4, W3NNL 4, W3TWV 3, WB3GCK 1. Net reports: EPA 262, PTTN 156, EPAEP&T 141, PFN 78, MARCTN 16, SEPTN 11, D5ARES 10, LCARES 6, EPAS 4, WARES 3, D8ARES 2.

MARYLAND/DC: SM, Bill Howard, WB3V, 410-551-6775, **wb3v@arrl.org**—ACC: Tony Young, WA3YLO 301-262-1917. ASM: Jerry Gavin, NU3D, 410-761-1423 (**k2ilq@aol.com**). ASM/RACES, Al Nollmeyer, W3YVQ (**alyvq@juno.com**). BM: Al Brown, KZ3AB, 301-490-3188 (**kz3ab@arrl.net**). SEC: Mike Carr, WA1QAA, (**bamcc@erols.com**) 410-799-0403. STM: Bruce Fleming 301-863-6582 (**MEGASWOOP@aol.com**) TC: Bob Bruninga, WB4APR, 410-553-6021 (**bruninga@greatlakes.nadn.navy.mil**). MDC Section web homepage **http://www.erols.com/wb3v/mdc/**. ANAR EC N3QXW reports 34 members, 4 nets on 147.805 with liaison to EPA, WVA, MEPN, MDD, BTN, and NCAC, 1 training session and 1 drill. OES reports received from: N3QXW NU3D W3CA W3VVN KO4A. ALLE EC KO4UU reports 13 members, 4 nets on 146.88, and 1 drill. GARR EC N3KAT reports 12 members, 4 nets on 147.105, and 1 meeting. Jerry has recently become a certified EMT-8 and hopes to be listed on the National Registry. The last thing most of us expected was nearly a foot of snow in March! Oh well, so much for the mild winter. Our link of the month is: **http://www.qsl.net/marc/index.html** for the Montgomery Amateur Radio Club. 73 - Bill, and with the nets: Net/Net Mgr/QND/QTC/QNI: MSN/KC3Y/28/45/318, MEPN/KE3OX/ no report, MDD/WJ3K/56/210/395, MDD Top Brass KJ3E 476, AA3GV, 280, K3JL 236, BTN/AA3LN/28/48/333, SMN/KE3OX/no report/, January late entry MDD/WJ3K/59/212/680, MDD Top Brass: KJ3E 486, K3JL 318, AA3GV 218. Tfc: KK3F 647, KJ3E 139, KO4A 92, AA3GV 87, W3YVQ 82, KC3Y 56, N3WKE 50, N3WK 42, KB3AMO 36, AA3SB 36, WJ3K 34, N3ZKP 27, N3EGF 14, WA1QAA 7, KG6TU 7, KD3JK 6, WA3WRT 5, WA3GYW 3, KE3FL 2. PSHR: KK3F 199, KO4A 154, W3YVQ 148, N3WKE 139, AA3GV 137, KJ3E 130, AA3SB 126, KG6TU 124, N3WK 113, KD3JK 96, N3ZKP 94, KC3Y 86, WA1QAA 81, KE3FL 76.

NORTHERN NEW YORK: SM, Les Schmarder, WA2AEA—ASMs: KD2AJ, WB2KLD, N2ZMS, WA2RLW. ACC: WZ2T. BM: KA2JXI. OOC: N2MX. PICs: N2SZK, WA2RXO. SEC: KF2GC. STM: N2ZGN. TC: N2JKG. Website: **http://www.northnet.org/nnyham**. February BBS Reports, B/P/T: KA2JXI 2235/435/24, KD2AJ 1908/446/63. Net Reports, QNI/QTC/QND: BILL'S GERITOL 226/20/20, CARRIER 563/42/30, CVARCCPN 59/0/8, CVARCSN 16/0/2, CVARES 26/4/4, KIDS R US 11/0/3, MVARC 24/0/3, NNYARES 293/1/28, NNYESN 218/8/28, Q NET 509/4/28, SCRN 74/0/4, SIRR 738/38/28, W2UXC SWAP 41/0/4. SCRN is a new one, Schoharie County RACES Net, Tuesdays @ 1930, 146.61 Cobleskill. JCRAC has scheduled a Spring Flea Market on May 15. Try 146.70 (nr Watertown) for TI. Latest station apptsOES, ORS and/or OBS: KB4CMF, KC2ALG, KB2LML, N2PRD. Your participation is welcomed and appreciated. CU all in Rochester June 4-6. 73, Les, WA2AEA.

SOUTHERN NEW JERSEY: SM, Jean Priestley, KA2YKN (@K2AA) e-mail:ka2ykn@arrl.org ASM: W2BE, K2WB, W2OB, N2OO, KB2TME. SEC: KB2TME. STM: WB2UVB. ACC: KB2ADL. TC: W2EKB. SGL: KB2WKY. OOC: K2PSC. PIC: N2YAJ. TS: W2PAU, W2BE, AB2Y, K2JF, WB2MNF, KD4HZW, WA2NBL. In light of recent FCC activity and the dedicated work of Riley Hollingsworth, keep on hand the following: Riley Hollingsworth 1270 Farifield Rd, Gettysburg, PA. 17325. e-mail is rholling@fcc.gov or 717-338-2502. They are not only our bands but our children's bands. We need to keep their legacy clean and respectable. Garden State Amateur Radio ASSN seeks ARRL DXCC members in Ocean and Mercer Counties interested in involvement with new DX group. 732-774-1095. Old Barney ARC will be celebrating their 10th anniv of the Lighthouse Special Event on Aug 7-8, 1999. On March 8, 1999. SNJ lost a great amateur, WB2ERI. Larry Schweizer died suddenly at 82. Accomplishments are Eagle Scout, Explorer leader, volunteer ambulance driver, fireman, first aid squad and Freemason. Traffic: Feb 1999: WB2UVB 167, K2UL 78, N2WFN 44, K2UL-4 42, KB2RTZ 29, N2VQA 18, KA2CQX 16, W2AZ 9, WA2JSG 6, KB2CDB 3, N2FHK 2. 1 each KB2YBM KB2VSR KB2HHT N2SOE N2ZMI N2WOT N2FHJ KB2YJD NN2Y N2JXG.

WESTERN NEW YORK: SM, William Thompson, W2MTA—WNY Leadership Officials: ACC N2EH, BM K2KWK, OOC K2DYB, PICs KB2UQZ & WA2PUU, SGL N2KYZ, TCs K2QR & WB2VUO, ASMs K2BCL, K2EY, K2BCL, K2DN, K2OC, K2ZR, N2EH, W2BCH, W2LC, WA2UKX. CLUB NEWS: Fort Herkimer ARC plans are humming with APRS in the wind; MOARC Ham-of-Year is N2DLG; WNYDXA will beam K2L at Buffalo Lighthouse in mid-August; check out WNY affiliated clubs for any update needed on our Web site at http://www.dreamscape.com/phaedrus/WNY. CLUB OFFICERS: CCAFMA N2HBI N2ZIJ KE4TSS N2MQ N3DZO N3JBG KB2ZXM KC2EML. HAMFESTS: Owego May 1, Rochester June 4-6, Cortland June 12, Batavia July 10, Utica July 17, New York State Traffic Handlers' Picnic July 31, Auburn Aug. 7, Rome Aug. 14, Lancaster at Depew Aug. 15, Finger Lakes at Tompkins Co. Airport Aug. 21, WNY Convention at Hamburg Fairgrounds Sep. 18, Elmira International at Horseheads Fairgrounds Sep. 25, Eastern Area Traffic Handlers Picnic at Annapolis, MD Oct. 1-2, RAGS at Pompey Oct 2. Appointments: (OES) N2OJI WA2BSF; (OO) WV2B; (TS & LGL) KB4CMF. THANKS for recent contributions to the ARRL Foundation Memorial Scholarship Fund in memory of Ed Little, W2PHQ, who was a Central New York Amateur Radio pioneer (8BOA) and Dryden's boy wizard of local fame. Silent Keys: RARA lost a prime mover with passing of K2NC. We all will miss JY1. Are you ready for the end of year transition? TCARC is preparing for New Years Day 2000—remember, it may require several days of your attention at home and local area. Your sources of electric energy for several days should also be considered.

Net	*QNI*	*QSP*	*QND*	*Net*	*QNI*	*QSP*	*QND*
Early Bird Net-FM	508	000	20	#STAR-FM	410	044	28
NYS RACES-SSB	067	008	04	#WDN/E-FM	503	087	28
NYS RACES-CW	020	004	04	#NYS/E-CW	355	181	28
#NYS/M-CW 3677	214	097	28	TIGARDS-FM	028	004	04
CHN-SSB 3925	201	045	28	BRVSN-FM	305	006	28
#WDN/M-FM	530	091	28	STTHN-FM	043	011	08
#NY PHONE-SSB	219	371	28	#CNYTN-FM	349	051	28
#NYPON-SSB	338	202	28	#OCTEN/L-FM	622	176	28
ESS-CW 3590	279	117	28	#WDN/L-FM	455	038	28
NYSPT&EN-SSB	342	033	28	#NYS/L-CW	243	226	28
VHF THIN-FM	013	000	01	OARC-FM	040	005	04
OCTEN/E-FM	1247	186	28	[# NTS net]			

ARES (Feb): OMEN 019-000-02. [* Public Service Honor Roll] Traffic (Feb): N2LTC*1108, KA2ZNZ*490, W2MTA*360, KF1L*359, WB2IJH*325, K2BCL*309, NN2H*165, W2FR*145, WI2G 142, WB2QIX*128, N2OJI*111, W2PII*105, NY2V*103, KA2QIK 88, N2CCN*63, KB2VVD*63, AF2K*55, AA2ED*43, KB2ETO*41, KG2D*38, KB2UQZ*38, W4BNY*31, K2DN*30, N2IKR*22, N2WDS*20, WA2GUP*9, W2RH 13, WA2UKX*10, KB2WII*9, KA2DBD 7. (Jan.) N2OJI 51. Datalink (Feb): NY2V R0/T18, N2LTC R308/T170. BPL (Feb) N2LTC. See you in Rochester! 73.

WESTERN PENNSYLVANIA: SM, Bill Edgar, N3LLR—ASM: N3MSE. ACC: N3SJR. ASM-ARES: WB3KGT. SEC: N3SRJ. ASM-Packet: KE3ED. ASM-Youth & Education: KE3EE. PIC: W3CG. STM: N3WAV. TC/OOC: WR4W. DEC-SO: KD3OH. DEC-N1: N3QCR. DEC-N2: KA3UVC. DEC-S1: KA3HUK. DEC-S2: KB3AQA. It gives me great pleasure to announce the following WPA Section awards: Ham-of-the-Year: Kent Badger, N3KB; Club of the Year: Wireless Association of South Hills; Educator of the Year: Leonard Budd, KD3QQ; EC of the Year: Mary Housholder, N3QCR; Official Observer of the Year: N3FLR; NTS Participant of the Year: John Guthrie, W3GJ. No doubt by this time your ham club is well on its way in plans for this year's Field Day activities. Field Day this year is scheduled for June 26-27. If you don't belong to a club or haven't been to a Field Day event, you are missing one of the biggest events in the hobby. If you know someone who is checking out the hobby, by all means invite them to your site. Many hams got interested in the hobby or got more interested in the hobby after visiting such a site. Several years ago, Nate Graham, KD3OH, and I had the pleasure of a 20-minute QSO during Field Day with a CNN correspondent (also a ham) who was in an area of political unrest and got a more personal account of what was going on in that area. The correspondent had just strung a wire out of his hotel room before answering our CQ. We are looking for invitations to visit from clubs holding Field Day activities to visit. Simply send me a message with the location of your site. Something to think about this year's Field Day exercise. Will we need to, and can we, do this for real after December 31, 1999? Congratulations to those receiving their EC Certification awards at the Butler training session! 73 and One more for '99.

CENTRAL DIVISION

ILLINOIS: SM, Bruce Boston, KD9UL—SEC: W9QBH. SGL: WA9AQN. ACC: N9KP. STM: K9CNP. PIC: N9EWA. TC: N9RF. OOC: KB9FBI. DEC-Central: N9FNP. The Suburban Technical Amateur Radio System (STARS) reports that its net is active and meets at 7:00 PM each Wednesday evening on 146.64 MHz. The Sangamon Valley Radio Club

Continued on page 108.

ANAHEIM, CA
(Near Disneyland)
933 N. Euclid St., 92801
(714) 533-7373
(800) 854-6046
Janet, KL7MF, Mgr.

BURBANK, CA
2492 W. Victory Bl., 91506
(818) 842-1786
(800) 854-6046
Marv, K6VIV, Mgr.
Victory Blvd. at Buena Vista
1 mi. west I-5

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

SAN DIEGO, CA
5375 Kearny Villa Rd., 92123
(619) 560-4900
(800) 854-6046
Tom, KM6K, Mgr.
Hwy. 163 & Claremont Mesa

SUNNYVALE, CA
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94086
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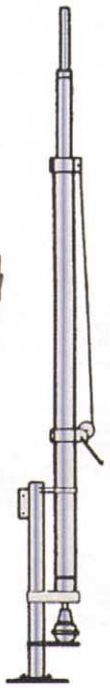

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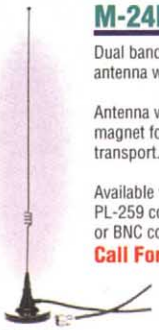

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has announced that it will hold a hamfest again this year at the State Fair grounds on Saturday, June 5. The Princeton hamfest will be held the following day. According to the newsletter *Bandbits*, noted amateur Gordon West, WB6NOA, will be the featured speaker at the 1999 Peoria Superfest banquet September 18. District EC N9FNP has been considering the possibility of holding an ARES meeting for ECs in the Lincoln NWS district to discuss the Y2K issue. The Lake County RACES newsletter *Radiogram* will be issued in an electronic version to members who can receive e-mail beginning this month. The group is on the Internet at www.races.org. Williamson County EC WA9APQ reports several amateurs in the area attended a severe weather seminar hosted by a local TV station. The column is running short, so we have room to run the listing for traffic and training nets. If you have access to HF and want to try something new, give traffic handling a try. You might enjoy the experience and help others at the same time! ISN 3.905 1800 Daily. ILN 3.665 1830 & 2200 Daily ITN 3.680 1900 Daily. CTN 147.090+ 2100 Daily. ILARES 3.905 1630 1st & 3rd Sunday. Macon Co ARES 442.25+103.5 Hz 2100 Wednesday. IEN 3.940 0900 Sunday. ILPN 3.855 1645 M-F; 0830 Sunday NCPN 3.912 0700 Monday-Saturday. NCPN 7.270 1215 Monday-Saturday. Tfc: W9HLX 94, N9DT 53, WB9TVD 31, NC9T 24, W9FIF-8, WA9RUM 6. Ninth region C4 report for Feb de W9FC—traffic 227—time 335 min—avg 4.93—rate .677—percent rep 97%—QNI—ILN K9CNP KF9ME NS9F. D9RN Cycle 1&2 report de AF9FA Sessions-52, QTC-182, QNI-44, QTR-786 min. ISN report de WB9TVD QNI-266, QTC-115, sessions 27. W9VEY Memorial Net de K9AXS 6 with 202 check-ins. ISN via WB9TVD 115 in 27 sessions. ILN via K9CNP 13 in 28 sessions. ITN via KF9ME 23 in 25 sessions. NCPN via W9OUF 44 in 24 sessions. IPN via KA9CYJ 18 in 24 sessions. IEN via K9HEZ 6 in 4 sessions.

INDIANA: SM, Peggy Coulter, W9JUJ—SEC: K9ZBM. ASEC: WA9ZCE. STM: AA9HN. OOC: KA9RNY. SGL: WA9VQO. TC: W9MWY. BM: KA9QWC. ACC: N9RG. Sympathy extended to the families and friends of Silent Keys, 1/7, William A. Davidson, W9SIQ, Mishawaka; 1/28, Charles L. McKinney, KA9FNX, Boonville; 1/30, John V. Weinhardt, WA9IAL, LaFayette; 2/6, William R. Taylor, WA9VJA, Crawfordsville; 2/8, Edward L. Hurdle, KA9SVY, Muncie; 2/13, Carmon Brown, N9KBO, Evansville; 2/23, Frank R. Anderson, K9BGF, Bedford; and 3/8, John Tripcony, N9DWU, Columbia City. They will be missed. I want to remind you to send in your Amateur-of-the-Year nominee to me before 1 June, marking on envelop Amateur-of-the-Year. I will forward to the committee. Send them now before you forget. It is never too early but it can be too late. If you don't have an ORS certificate and would like one and you are an ARRL member contact Gale, AA9HN IN STM on either ITN, ICN or QIN for application. Also if interested in being an OBS contact Don, KA9QWC, on QIN for application. They are nice certificates to line your shack wall. ECs reporting to SEC were WB9NCE, WB9UNL, N9EYG, N9IOD, KB9OLZ, N9ADS, WA9DOL, KG9LX, N9YNF, KA9LXG, N9KQD, N9JPX, N9SFW and K9GPS. NMs ITN/W9ZY, QIN/N9PF, ICN/AA9HN, WN/AB9AA, VHF/AA9HN.

Net	*Freq*	*Time/Daily/UTC*	*QNI*	*QTC*	*QTR*	*Sess*
ITN	3910	1330/2130/2300	2650	477	1057	84
QIN	3656	1430/0000	141	117	581	37
ICN	3705	2315	63	27	279	28
IWN	3910	1310	2045	–	280	28
IWN VHF Bloomington			457	–	420	28
IWN VHF Kokomo			653	–	140	28
IWN VHF Northeast			827	–	560	28
Hoosier VHF nets(9 nets)			497	26	656	47

D9RN QTC 182 in 48 sessions IN reps WB9QPA, K9GBR, W9UEM, N9ZZD, and KB9NPU. 9RN QTC 227 IN reps KO9D, N9PF, K9PUI, WB9UYU, WA9QCF, AA9HN and W9FC. Tfc: W9FC 276, K9GBR 139, KO9D 134, W9ZY 127, WB9QPA 90, N9ZZD 87, K9PUI 72, N9PF 69, W9UEM 62, AB9AA 47, KA9QWC 44, KB9NPU 42, W9JUJ 42, K8LEN 40, KA9EIV 30, W9BRW 24, N9WNH 18, N9JAI 11, AB9A 9, W9CSJ 8, K9DIY 8, W9EHY 7, K9RPZ 6, W9RTH 5, WB9NCE 4, K9CUN 4, K9CIV 2.

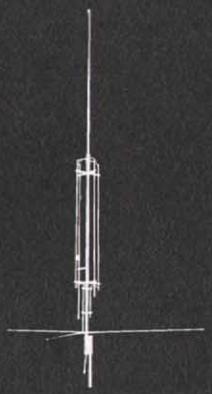
WISCONSIN: SM, Roy A. Pedersen, K9FHI—SEC: WB9RQR. STM: KA9KLZ. ACC: KF9ZU. SGL; W9RYA. OOC: W9RCW. PIC: K9ZZ. TC: K9GDF. ASM: W9CBE, K9UTQ. BM: WB9NRK. Field Day is June 26-27 are you and your club ready for a good time? CWRA Swapfest is scheduled for June 6 at Stevens Point University. The correct officers for Pinery Road ARC are as follows: N9TD Pres. KB9NEL V. Pres. KF9ZU Sec/Trea K9VSO and W9EIL Trustees. Officers for FLARC are as follows: N9DMS Pres; KF9ZB V Pres; KB9LIE Sec; K9SAM Trea; Directors K9EMG, KB9RRM and NS9L. (FLARC newsletter) New officers for ORC are as follows: Pres K9GCF; V Pres WA9JOB; Sec KG9NH; Trea KA9DDN; Rptr V Pres KA9QLR. (Ozaukee Radio Club). I regret to report the following Silent Keys: K9UXP, W9RNX, WB9HSW,WA9CMV. 9RC4 had W9CBE, K9LGU, N9KHD, N9CK, W9UW, W9YCV, NIAI for checkins. Thanks, fellows. Sorry to hear King Hussein, JY1, passed away. Bob Johnson, W9XY, was a guest at his place many times. Bob gave RRRC a presentation on his trips there. Richard Lee is new EC for Crawford County. New ham Eau Claire area KB9UDN. Swapfest in Manitiowoc by Mancorad Radio Club is May 8. West Allis Radio Club Swapfest is January 8, 2000. Our new SEC WB9RQR has some outstanding goals for the ECs, please give him your full support. There is a group in Madison called the W9YT Nightowls. They meet every night at 11:00 PM on 146.680, at present they have 17 members and those that checkin regular are called "Regular Hoots," why not join them. Looks like a lot of fun. Those who check in regularly — 5 times— will get a certificate. Tfc: K9JPS 758, W9RCW 623, K9RTB 536, K9GU 479, W9IHW 442, WB9YPY 402, W9CBE 333, N9KHD 197, N9IAI 113, AG9G 88, W9YCV 87, N9CK 78, KA9KLZ 74, W9UW 61, N9BDL 59, KE9VU 55, KA9BHL 40, KA9FVX 38, K9FHI 32, K9HDF 30, KG9B 28, AF9FA 27, WB9ICH 22, AA9BB 20, N9JIY 20, WD9FLJ 17, K9LGU 14, K9UTQ 12, W9ODV 11, W9PVD 1.

DAKOTA DIVISION

MINNESOTA: SM, Randy "Max" Wendel, N0FKU—Y2K.Y2K.Y2K. It seems as though we have really gotten our fill on this issue. Certainly we have heard of the many ways the millennium can affect our everyday lives if clock-

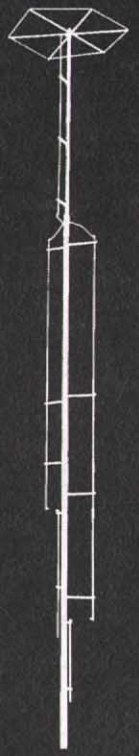
GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX

Challenger DX



Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

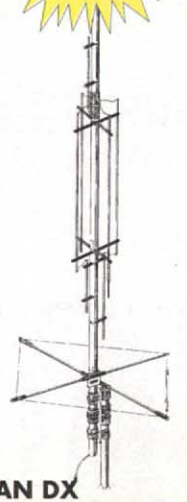
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

Celebrating 10 Years 1989-1999



TITAN DX

This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$279
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$289
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$319
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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date based computer systems are not compliant to the 2000 switch. Power outages, telephone service disrupted, stop lights stuck on red, no running water, no plane flights at the stroke of midnight...you've heard them all. Is the threat of Y2K real? Certainly there will be some affects of various kinds but we may not know what they are until 12:01 AM on 1/1/2000. Will the blue fall from the sky? I think we can bet that's a little far fetched. We know our ancestors lived by candlelight and plowed with horses. Seems we could probably adjust to primitive conditions if needed, but I think we all are assured this won't happen. Considering the overall picture, however, does present the challenge of how Amateur Radio fits into an emergency-scenario. Whether it is needed of Y2K, a tornado, ice storm, major power outage, and such. Again, we are forced to review how our resources might provide a service in any circumstance. With Y2K, we should consider what the possible real affects could be and how Amateur Radio might again fill a need. We, in ARES and the general Amateur Radio community, should always consider the possible scenarios, and stand trained, prepared, and ready to help in any way we can under whatever scenario is thrown our way. We will always be challenged by band conditions, choosing between voice and digital, and how long and where our resources will be needed. The bigger challenge is how many of us will be there when needed. Can we count on you to help? 73 de N0FKU. Public service reports were submitted by these stations in Feb '99: WB0WNJ, KB0AII, W0LAW, W0GRW, WA0TFC, K0PIZ, W0HPD, KN9U, W3FAF, KB0AIJ, WO0A, W0WVO, K0WPK, N0BM, KB0OHI, K0OGI, N0JP.

NORTH DAKOTA: SM, Bill Kurtti, WC0M—PHRA (Stanley) is hosting the Peace Garden Hamfest this year to be held July 9-11 at the International Peace Garden. Planned activities include meetings, women's and children's activities, transmitter hunts, Saturday night dance, Sunday breakfast, flea market and much more. The PHRA picnic is planned at Wilson Park on June 13 at Stanley. Contact e-mail PHRA_arc@hotmail.com, or www.qslnet/phra_arc. Talk-in on 146.61 repeater. RRRA has acquired Ernie Anderson's call sign, W0RRW, for the146.97 repeater as a memorial to Ernie. The repeater was owned and operated by him for many years. Bismarck Hamfest went well with good attendance in their new location. Net reports: WX 47/1017/48; DATA 28/692/20; Goose River 4/49/1.

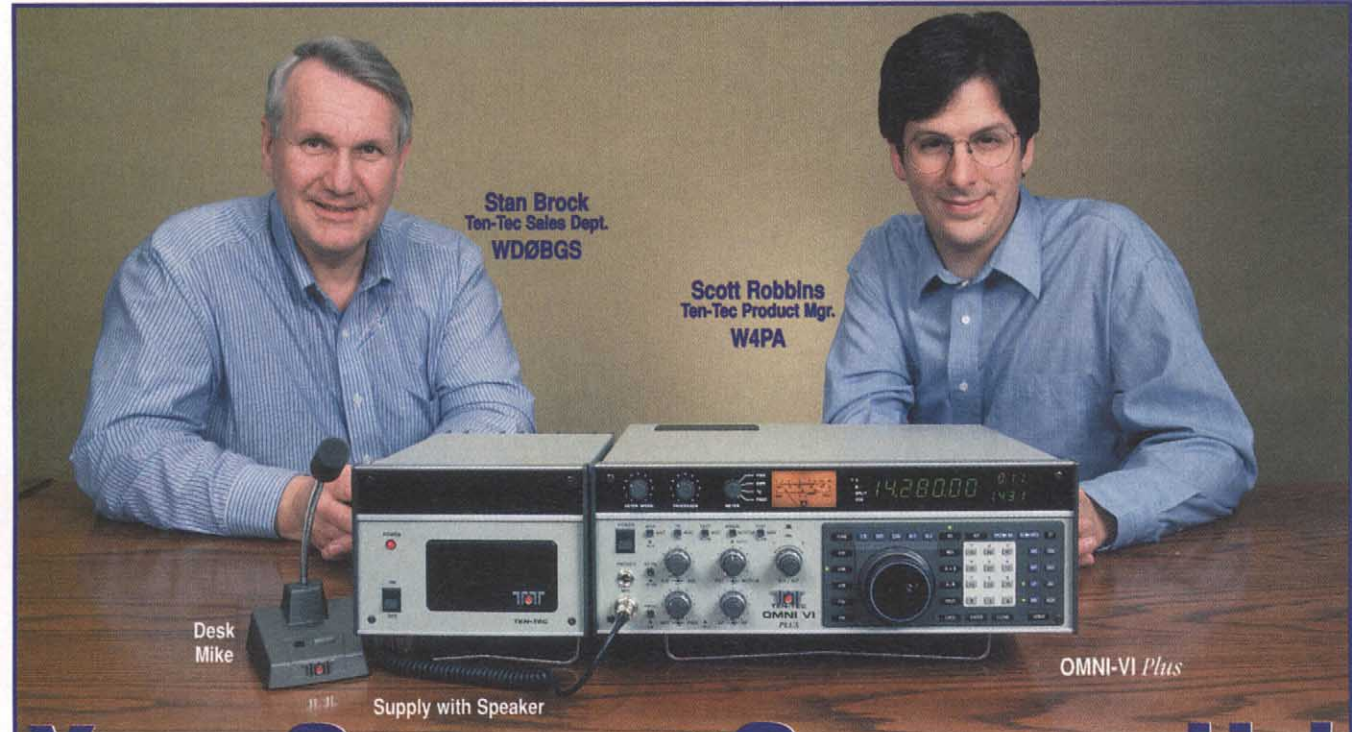
SOUTH DAKOTA: SM, Roland Cory, W0YMB—Huron ARC will have VE testing on April 24, Sept 25 and Nov 26. Pierre ARC will have testing on April 17, June 26, and Nov 13. Dakota Chapter 102 QCWA special-event station was a big success with 347 contacts. The event celebrating their birthday has become an annual event in February. Feb 20 testing at Black Hills ARC at Rapid City resulted in 4 candidates earning Tech and 3 candidates earning Tech Plus with 9 tested. In the afternoon, they had their annual auction with many good buys. Regret to report Silent Key: Jessie English, W0EDV, from Hot Springs. At Aberdeen, their 70 cm repeater is up and running on 448.400 TX and 443.400 RX. HUB ARC also working on a history of their club. The Huron ARC swapfest has been suspended for 1999, and they have put their support to the Dakota Division convention at Watertown, Aug 6-8. Feb tfc: 733.

DELTA DIVISION

ARKANSAS: SM, Roger Gray, N5QS, e-mail n5qs@arrl.org—As I write this, I have just returned from another storm spotter course. The new course the weather service is giving is much better than the one a couple of years ago. I was very surprised at the 150 person turn-out for this one. We usually have around 30. I will mention that TORNADO SEASON JUST STARTED, and we have already confirmed over twice the yearly average of 21 for tornadoes in Arkansas this year (49 on Jan 21). I try to look at the good side of everything and the recent disasters have one here. The county officials are listening and preparing for another disaster and finally realize that we are not immune to a disaster HERE. Our one freak storm of the year has now passed, and we can expect mild weather for the rest of the year. With this thought in mind, on March 5 it happened again. A 3- or 4-county area of Arkansas around Russellville was the center of an area of several tornadoes and considerable damage. We may not be out of the woods yet. Earlier this month I attended the Russellville hamfest and had a great time. The overall attendance was good. There were several dealers and a good flea market. The ARRL forum was, as usual for this hamfest, a full room and Division Director Rick Roderick, K5UR, gave a good program about the renewed enforcement actions recently taken by the FCC. This is the second good hamfest that I have attended this year. I hope it is a picture of the activity for the rest of the year. Tfc: K7ZQR 51, K5BOC 43, W9YCE 30, AB5AU 19, KA5MGL 8, W5HDN 7, AB5ZU 5, KC5UEW 2.

LOUISIANA: SM, Lionel A "Al" Oubre, K5DPG, e-mail k5dpg@arrl.org Web Page **www.aisp.net/k5dpg** ASM: KB5CX, K5MC. ACC: KA5IJU. BM: K5ARH. TC: KE5FZ. SEC: N5MYH. OOC: WB5CXJ. PRC: KB5QVI. STM: KG5GE. NM LTN: WB5ZED. NM LCW: W4DLZ. During this past month there has been a rash of severe weather storms in Louisiana. This already makes two major disasters this year, and the year is still young. To date these disasters have been localized, and have not required much outside support. The major bad weather threat, hurricane season, is upon us. Have you made your preparations? Regardless of what you will do during a storm, you must first be prepared. There are some good suggestions on the Red Cross Web site. **http://www.redcross.org**. As we move back to more outside activities, do not forget to check into your local and section nets. Up coming hamfest: Baton Rouge April 30-May 1, August 27-28 New Orleans International DX Convention. Go out and support our area hamfest events. Louisiana Section Net Schedule: LTN 6:30 PM, local, 3910 kHz, nightly, WB5ZED, mgr. LCW 6:45 PM local 3673 kHz, nightly, W4DLZ, mgr. Reports for February 1999: LTN QNI 334 QTC 243 in 28 sessions. LCW QNI 209 QTC 109 in 28 sessions. PSHR K5WOD 101, WB5WBZ 102, KG5GE 111, K5IQZ 118, W5CDX 122, K5DPG 126, WB5ZED 193, K5MC 353. Tfc: K5WOD 4, K5DPG 10, KG5GE 22, WB5WBZ 39, W5CDX 52, K5IQZ 135, WB6ZED 386, K5MC, 541 BPL.

MISSISSIPPI: SM, Malcolm Keown, W5XX—ASM: AB5YY, N5EZX. ACC: N5JGK. BM: W5EPW. STM: KD5P. Welcome to WB5OCD as EC for Lauderdale/Clarke Counties and KC5TVI as EC for Union County. Congratulations to the



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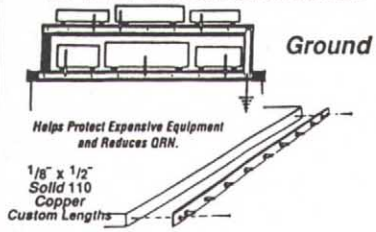

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2 ft. $24.95 3 ft. $29.95 4 ft. $35.95
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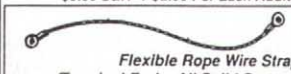

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new officers of the Meridian ARC: W5OQY Pres; KD5CBK VP; KB5ASR Sec; WB4ZIK Treasurer; and W5MAV Editor. EC KB5ZEA, N5YCK, and KC5VTE activated the Attala County ARES during the recent outbreak of tornadoes and passed critical info to the Jackson NWS. JARC SKYWARN was also active with N5MZX, KC5OSM, KD5FEX, AB5WF, N5VVH, KC5SOZ, and KD5CDM manning the HF/VHF stations at the NWS. OO Report: K5XQ. EC Report: WB5OCD, N5XXX, KB5ZEA. MSPN: 27/2554/62, MTN: 28/165/105, MSN: 28/1081/9, PBRA: 26/948/0, Jackson Co ARES/RACES: 28/526/29, MSSN: 20/111/4, MLEN: 4/93/0, MBHN: 4/29/0, Stone Co ARES: 4/56/0, MCARAN: 4/60/0, JARCEN: 4/94/3. PSHR: KB5W 148, N5XGI 140, K5VV 110, KD5P 94, and W5XX 79. BPL: KB5W. Tfc: KB5W 503, K5DMC 90, N5XGI 64, K5VV 39, KD5P 31, and W5XX 11.

TENNESSEE: SM, O. D. Keaton, WA4GLS—ACC: WA4GLS. ASM: WB4DYJ. SEC: WD4JJ. STM: WA4HKU. OOC: AD4LO. TC: KB4LJV. The regular morning session of the Tennessee Phone Net has new leadership. Milton Fanning, WA4GZZ, resigned as the net manager and Sunday morning net control station due to personal reasons. We wish Milton and his wife, Mary Alice, all the best for the future. Terry Hatchett, W4SYE, has accepted the position as Net Manager vacated by WA4GZZ. Terry has been a net control station for several years and very supportive of the Tennessee traffic nets for a long time. I am sure that Terry will manage the net in a very efficient way. Pam Hale, Executive Director of the Johnson City Chapter of the American Red Cross, addressed the JCARA at its January meeting. Those in attendance were N4IYQ, WB8RZJ, KB4ZVA, WD4PIW, KF4STI, N7JAS, K5OGF, KF4IIL, WX4S, K4TIV, K4ZHK, KE4WGW, WS4Z, WU4W, KT4OR, KB4NVD, KD4UZR, KU4NI, KD4INB, KF4INF, WD4FUT & W4VJ. Thanks to the RACK members: KB4BLO, KE4WFM, KB9EBA, KE4HID, KF4YWX, KB4FZK, ND4F, N4OQJ, KD4LDL & KD6FBT for assisting with the '99 Strawberry Plains Half Marathon. BMRC/KARC presented Paul Marcum, AC4QZ, a plaque for his service as *Zero Beat* editor from 1995 to 1998. Howard Waldron, of NOAA, Morristown office, will be presenting classes at the basic, intermediate and advanced levels in SKYWARN spotting. DARC officials have been very busy during the beginning of this year dealing with the club's budget. OARC was forced to cancel its annual hamfest because there were no facilities available. DRN-5 rpt 56 sess, 538 mess, TN rep 82% by N4LA, W4SQE, KF4GQN & N4PU. Net sess/QTC/QNI: TEPN 24/165/2858; TSCWN 26/10/123; TMPN 28/40/2114; TCWN 23/27/215. TEMPN 20/27/680. Tfc: NZ4O 404, WB4GIJ 125, N4LA 80, W4SQE 64, N4PU 60, WA4HKU 40, WB4DYJ 33, KA5KDB 21, W4SYE 19, WA4GLS 17, KI4V 14, WA4GZZ 10, N4ZXM 9, WD4JJ 8, W4PSN 2, W4IKK 2, W4HZD 2.

GREAT LAKES DIVISION

KENTUCKY: SM, Bill Uschan, K4MIS—ASM: Tom Lykins, K4LID. SEC: Craig Still, KD4PWK. STM: John Farler, K4AVX. SGL: Bill Burger, WB4KY. TC: Scotty Thompson, KI4AT. ACC: John Embry, K4AT. BM: Ernie Pridemore, KC4IVG. PIC: Steve McCallum, W2ZBY. I surely hope the decision for the Owensboro ARC to cancel its hamfest will not be the trend for other hamfests in Kentucky. Remember the Northern KY hamfests will be held on June 13, 1999, and will be held in Independence, KY. Other hamfests dates can be found on the ARRL Web page. Also the Centeral KY hamfest will be held in Lexington this year and not Frankfort. I believe this will be held at the National Guard Armory. April 1, we will need another SEC and an ACC. If anyone is interested please let me know.

Net	*QNI*	*QTC*	*Sess*	*Mgr*
KRN	609	20	20	N4AFP
MKPN	1247	64	28	K4LID
KTN	1241	67	28	K4LID
KSN	223	53	28	KO4OL
CARN	387	30	26	KD4SS
TSTMN	519	48	28	WB8GWL
4ARES	30	30	28	WA4RR

Tfc: K4AVX 53, KF4EBC 5, N4GD 33. AE4NW 29, KO4OL 44, KF4RBK 47, K4YKI 16.

MICHIGAN: SM: Dick Mondro, W8FQT (**w8fqt@arrl.org**)—ASM: Roger Edwards, WB8WJV (**wb8wjv@centuryinter.net**). ASM: John Freeman, N8ZE (**n8ze@arrl.net**). SEC: Deborah Kirkbride, KA8YKK (**ka8ykk@concentric.net**). STM: James Wades, WB8SIW (**wb8siw@aol.com**). ACC: Sandra Mondro, KG8HM (**kg8hm@arrl.net**). OOC: Donald Sefcik, N8NJE (**fdsmith@tir.com**). PIC: David Colangelo, KB8RJI (**dcolangelo@ameritech.net**). SGL: Ed Hude, WA8QJE (**edhude@juno.com**). TC: Dave Smith (**DSmith@smithassoc.com**). Section Newsletter Editor: Dave Colangelo, KB8RJI (**dcolangelo@ameritech.net**). *QRV Bulletin* Editor: Mike Pearsall, N8MP (**n8mp@concentric.net**). A wonderful time was enjoyed by all that attended the Great Lakes Division Convention in Cincinnati and I would like to thank the Ohio Section Staff and their SM Joe Phillips, K8QOE, for the wonderful hospitality they exhibited. My thanks also go out to Bill Tittle, KA8LAY, the convention chairman for making us all feel at home. Let's not forget that it is once again time to make the pilgrimage to the Dayton Hamvention. I would like to thank Gary Des Combes, N8EMO, DARA President for the fine hospitality at their February Dinner/Meeting and I'm sure that they will again provide us with a great time at Hamvention '99. Don't forget to get on your club's activity rosters for Field Day coming up in June. It's not too early to begin the final plans for the big weekend and let's remember to get those new members involved. While you're at it why not invite some students from the local schools out to see Amateur Radio at its finest? It might also be a good opportunity to invite some of those science teachers out as well. We must remember that the future of Amateur Radio lies with our youth and we must give them a firm foundation to continue building it as a viable public service into the new millennium. Congratulations go out this month to the new officers of the Firebird Amateur Radio Club. President: N8XLS Dennis L. Simmons, Vice-President: WB8COG Myron L. Orman, Treasurer: K8VW Verle Winningham, Secretary: WD8ANZ Darrel O. Baxter and Officer at Large: WA8UXN Jack E. Walters. Traffic reports for February 1999: K8LJG 201,

MFJ 1.8-170 MHz SWR Analyzer™

Reads complex impedance . . . Super easy-to-use

***New** MFJ-259B reads antenna SWR . . . Complex RF Impedance: Resistance(R) and Reactance(X) or Magnitude(Z) and Phase(degrees) . . . Coax cable loss(dB) . . . Coax cable length and Distance to fault . . . Return Loss . . . Reflection Coefficient . . . Inductance . . . Capacitance . . . Battery Voltage. LCD digital readout . . . covers 1.8-170 MHz . . . built-in frequency counter . . . side-by-side meters . . . Ni-Cad charger circuit . . . battery saver . . . low battery warning . . . easy access battery panel . . . smooth reduction drive tuning . . .*

***The** world's most popular SWR analyzer just got incredibly better and gives you more value than ever!*

MFJ-259B gives you a complete picture of your antenna's performance. You can read antenna SWR and Complex Impedance from 1.8 to 170 MHz.

You can read Complex Impedance as series resistance and reactance (R+jX) or as magnitude (Z) and phase (degrees).

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You can read SWR, return loss and reflection coefficient at any frequency simultaneously at a single glance.

You can also read inductance in uH and capacitance in pF at RF frequencies.

Large easy-to-read two line LCD screen and side-by-side meters clearly display your information.

It has built-in frequency counter, Ni-Cad charger circuit, battery saver, low battery warning, easy access battery panel and smooth reduction drive tuning.

Super easy to use! Just set the bandswitch and tune the dial -- just like your transceiver. SWR and Complex Impedance are displayed instantly!

Here's what you can do

Find your antenna's true resonant frequency. Trim dipoles and verticals.

Adjust your Yagi, quad, loop and other antennas, change antenna spacing and height and watch SWR, resistance and reactance change instantly. You'll know exactly what to do by simply watching the display.

Perfectly tune critical HF mobile antennas in seconds for super DX -- without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on one band, or analyze multiband performance over the entire spectrum 1.8-170 MHz!

Check SWR outside the ham bands without violating FCC rules.

Take the guesswork out of building and adjusting matching networks and baluns.

Accurately measure distance to a short or open in a failed coax. Measure length of a roll of coax, coax loss, velocity factor and impedance.

Measure inductance and capacitance. Troubleshoot and measure resonant frequency and approximate Q of traps, stubs, transmission lines, RF chokes, tuned circuits and baluns.

Adjust your antenna tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259B is a complete ham radio test station including -- frequency counter, RF signal generator, *SWR Analyzer*™, RF Resistance and Reactance Analyzer, Coax Analyzer, Capacitance and Inductance Meter and much more!

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MFJ's comprehensive instruction manual is packed with useful applications -- all explained in simple language you can understand.

Take it anywhere

Fully portable, take it anywhere -- remote sites, up towers, on DX-peditions. It uses 10 AA or Ni-Cad batteries (not included) or 110 VAC with MFJ-1315, $14.95. Its rugged all metal cabinet is a compact 4x2x6¾ inches.

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MFJ *SWR Analyzers*™ work so good, many antenna manufacturers use them in their lab and on the production line -- saving thousands of dollars in instrumentation costs! Used worldwide by professionals everywhere.

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MFJ-249B, $229.95. Like MFJ-259B, but reads SWR, true impedance magnitude and frequency only on LCD. No meters.

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MFJ-219B, $99.95. UHF *SWR Analyzer*™ covers 420-450 MHz. Jack for external frequency counter. 7½x2½ x2¼ inches. Use two 9 volt batteries or 110 VAC with MFJ-1312B, $12.95. *Free* "N" to SO-239 adapter.

SWR Analyzer Accessories

Dip Meter Adapter

MFJ-66, $19.95. Plug a dip meter coupling coil into your MFJ *SWR Analyzer*™ and turn it into a sensitive and accurate bandswitched dip meter. Save time and take the guesswork out of winding coils and determining resonant frequency of tuned circuits and Q of coils. Set of two coils cover 1.8-170 MHz depending on your *SWR Analyzer*™.

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MFJ-29C, $24.95. Tote your MFJ-259B anywhere with this *genuine* MFJ custom carrying case. Has back pocket with security cover for carrying dip coils, adaptors and accessories.

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MFJ-224 **$159.95**

MFJ 2 Meter *FM SignalAnalyzer*™

Measure signal strength over 60 dB range, check and set FM deviation, measure antenna gain, beamwidth, front-to-back ratio, sidelobes, feedline loss in dB. Plot field strength patterns, position antennas, measure preamp gain, detect feedline faults, track down hidden transmitters, tune transmitters and filters. Plug in scope to analyze modulation wave forms, measure audio distortion, noise and instantaneous peak deviation. Covers 143.5 to 148.5 MHz. Headphone jack, battery check function. Uses 9V battery. 4x2½x6¾ in.

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K8GA 196, KB8ZYY 162, N8FPN 129, AA8PI 113, WX8Y 112, WB8SIW 89, K8AE 80, K8GXV 60, WI8K 44, W8RNQ 42, WA8DHB 40, K8AI 36, WR8F 34, K8ZJU 27, N8OSC 27, K8UPE 27, AA8SN 21, KC8GMT 18, W8YIQ 18; K3UWO 11, W8YZ 3, WD8OEP 3. Please support the following Section Traffic Nets: February NTS Net Reports.

Net	*QNI*	*QTC*	*Sess*	*NM*
QMN	601	268	56	WB8SIW
MACS	309	49	28	W8RNQ
MITN	403	110	20	KA9EIZ
UPN	1178	56	32	WA8DHB
GLETN	541	62	28	VE3SCY
SEMTN	215	53	28	WI8K
WSSBN	737	43	28	

OHIO: SM, Joe Phillips, K8QOE, Fairfield, (to contact me, see page 12; for other Cabinet members, send their mail through me). ASM-NE Ohio: Bob Winston, W2THU, Cleveland. ASM-NW Ohio: Ron Griffin, N8AEH, Findlay. ASM-Central Ohio: Mary Carpenter, N8OAM, Columbus. ASM-SW Ohio: John Haungs, W8STX, Cincinnati. ASM-SE Ohio: Bill Creighton, K8TUT, Athens. SEC: Larry Solak, WD8MPV, Mantua. STM: Jack Wagoner, WB8FSV, Hilliard. ACC: Joanne Solak, KJ3O, Mantua. TC: Mike Brown, W8DJY, Middletown. PIC: Beverly Priest, N8VZV, Dayton. OOC: Carl Morgan, K8CM, Middletown. SGL: Jeff Ferriell, K8ZDA, Columbus. Before we start, remember this is Dayton Hamvention (May 14-15-16) month....Now for the last in a series of spotlighting section appointments. May is for Affiliated Clubs (the others were: Jan, TCs; Feb LGLs; March PIOs; and April, ORS). While the other appointments were for individual stations, the Affiliated Club honor is for clubs with above 50% membership in the League. Clubs with such ARRL designations can enhance the club treasury by having members join the ARRL—$5 for each new member; $2 for each membership renewal. Affiliated clubs regularly get a free list of new hams in their area (perspective new members) and club records are kept at Headquarters. Reporting (now done every two years instead of annually as previously required) can be done on-line. Is your club interested? Contact the Ohio Affiliated Clubs Coordinator, Joanne Solak, KJ3O, at (330-274-8240). Ohio congrats to Sue Kelley, N8WLB, as our newest EC for Ashland County. Great time to remind Ohio hams to check out the Web page of the division and also Ohio Section. Available at **http://facops.albion.edu/arrl/** the Internet. Glad to see Fox Hunting is getting popular throughout Ohio—I'm reading your newsletters. Fox Hunting brings ham radio back to rig building, designing and operating enthusiasm. Please remember it isn't too soon to begin to plan your June Field Day effort. It is June 26-27. By now the Spring edition of the *Ohio Section Journal* is out. Read your copy and pass it along to other hams so they can catch up on ham exams, hamfests, traffic nets and other news of Ohio. Is there anyone in ham radio who needs reminding that this is Dayton Hamvention month (May 14-15-16)? Remember that the Year 2000 Dayton Hamvention is the site for the annual ARRL National Convention. de K8QOE. Now for our February traffic reports.

Net	*QNI*	*QTC*	*QTR*	*Sess*	*Time*	*Freq*	*Mgr.*
BN (E)					1845	3.577	WD8KFN
BN (L)	207	75	329	28	2200	3.577	NY8V
BNR	109	15	860	27	1800	3.605	W8LDQ
OSN	139	38	432	28	1810	3.708	WB8KQJ
OSSBN	1833	466	2006	84	1030,1615,1845	3.9725	KF8DO
OH Section ARES Net					1700 Sun	3.875	WD8MPV

Tfc: W8PBX 244, K8DHD 158, KF8DO 129, KD8HD 124, W8STX 122, NS8C 115, KA8FCC 107, N8FWA 99, WR8G 94, KA8VWE 89, WA8EYQ 82, WA8SSI 75, N8TNV 68, N8CW 66, WA8HED 57, K8JA 49, K8WOQ 47, KD9K 47, W8JWW 46, K3RC 46, W8BO 41, WB8HHZ 40, N8IIP 38, K8OUA 37, N8RRB 37, N8DD 36, W8LDQ 35, WB8FSV 35, KB8VXB 33, KB8UEY 30, NY8V 28, WD8MIO 27, WD8JAY 26, KC8FWU 25, WB8KBW 24, KC8DWM 22, K8IG 22, KI8O 20, K8QIP 19, N8WCT 19, W2INO 18, N8YWX 18, KB8ESU 16, N8WLE 15, KB9GGA 14, KF8FE 13, KC8KYP 13, N8YXL 13, KB8TIA 2, KC8HTP 11, N8QAI 11, WB8KWD 10, WB5ZJN 9, W8GAC 9, KB8ESY 8, N8GOB 8, W8DYF 6, N8RAK 6, AA8XS 5, K8WC 5, KC8HFV 4, WB8IOW 4, W8GDQ 3, KB8SIA 3, WD8XL 3, KC8UR 2, KE8FK 1, KA8OQS 1.

HUDSON DIVISON

EASTERN NEW YORK: SM, Rob Leiden, KR2L—STM: Pete Cecere, N2YJZ. SEC: Ken Akasofu, KL7JCQ. ACC: Shirley Dahlgren, N2SKP. SGL: Phil Bradway, KB2HQ. PIC: John Farina, WA2QCY. BM: Ed Rubin, N2JBA. OOC: Hal Post, AK2E. TC: Elmer Sharp, WA2YSM. ASM: Tom Raffaelli, WB2NHC. ASM: Bob Chamberlain, N2KBC. ASM: Andrew Schmidt, N2FTR. ASM: Richard Sandell, WK6R. Net Reports (February 1999) Check-ins (QNI)/Traffic handled (QTC+QSP): AES 49/6 CDN 314/120 ESS 279/234 HVN 447/220 NYPHONE 219/750 NYPON 338/409 NYS/E 355/373 NYS/M 214/211 NYS/L 243/452 SDN3 31/140. Section News: ENYCON is 4/25 at Beaconfest. I look forward to meeting you. N2YJZ for BPL (again!) STM Ken, KL7JCQ, OOC Hal, AK2E and STM Pete, N2YJZ, have made some great Capital District Club presentations. Thanks to all. 73 de Rob, KR2L. PSHR: N2YJZ 191, N2JBA 161, WB2ZCM 140, K2CSS 140, K2BTP 121, W2AKT 109, KB2YUR 88, W2JHO 86, KC2DNO 79. Tfc: N2YJZ 566, K2CSS 79, KC2DNO 79, N2JBA 67, K2BTP 48, WB2ZCM 46, KC2BUV 20, KB2YUR 20, W2JHO 15, N2AWI 13, KC2DAA 12, W2AKT 9, N2MCS 6, KC2DMB 5, KL7JCQ 2, NM2M 2, N2TWN 1.

NEW YORK CITY / LONG ISLAND: SM, George Tranos, N2GA. ASM: KA2D, N1XL, K2YEW, W2FX, KB2SCS. SGL: N2TX. SEC: KA2D. ACC: K2EJ. PIC-East: N2RBU. PIC-West: K2DO. TC: K2LJH. BM: KG2M. OOC: N1XL. STM: WA2YOW. Len Battista, W2FX, is the new ASM for Suffolk County. Len brings experience in ARES, education, clubs and more and will be a great asset to the section. Thanks and good luck, Len! Also, joining the staff this month is Diane Ortiz, K2DO, as PIC West. Diane will be coordinating section publicity with Roberta N2RBU. The Nassau Long Island Marathon is May 2, contact DEC Nassau George, WA2WKV, to help out. Check the section Web page, **www.arrlhudson**

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MFJ uses super heavy duty components to make the world's finest legal limit tuner

MFJ uses super heavy duty components -- roller inductor, variable capacitors, antenna switch and balun -- to build the world's most popular high power antenna tuner.

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The rugged world famous MFJ-989C handles 3 KW PEP SSB amplifier input power (1500 Watts PEP SSB output power). Covers 1.8 to 30 MHz, including MARS and WARC bands.

MFJ's *AirCore*™ roller inductor, new *gear-driven* turns counter and weighted spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax, random wire or balanced lines.

You get everything you've ever wanted in a high power, full featured antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, massive transmitting variable capacitors, ceramic antenna switch, built-in dummy load, *TrueCurrent*™ Balun, *scratch-proof* Lexan front panel -- all in a sleek compact cabinet (10¾Wx4½Hx15D in).

MFJ AirCore™ Roller Inductor gives high-Q, low loss, high efficiency and high power handling.

MFJ's exclusive *Self-Resonance Killer*™ keeps damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives good low-resistance connection. Solid 1/4 inch brass shaft, self-align bearings give smooth non-binding rotation.

MFJ *No Matter What*™ Warranty

MFJ will repair or replace your MFJ-989C (at our option) *no matter what* for one year.

More hams use MFJ tuners than all other tuners in the world!

MFJ-986 Two knob *Differential-T*™

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$329.95

Two knob tuning (differential capacitor and *AirCore*™ roller inductor) makes tuning foolproof and easier than ever. Gives minimum SWR at only one setting. Handles 3 KW PEP SSB amplifier input power (1.5 KW output). Gear-driven turns counter, lighted peak/average Cross-Needle SWR/Wattmeter, antenna switch, balun. 1.8 to 30 MHz. 10¾Wx4½Hx15 in.

MFJ-962D *compact* Tuner for Amps

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A few more dollars steps you up to a KW tuner for an amp later. Handles 1.5 KW PEP SSB amplifier input power (800W output). Ideal for Ameritron's AL-811H! *AirCore*™ roller inductor, gear-driven turns counter, pk/avg lighted Cross-Needle SWR/Wattmeter, antenna switch, balun, Lexan front, 1.8-30MHz. 10¾x4½x10⅞ in.

MFJ-969 300W *Roller Inductor* Tuner

MFJ-969
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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.

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$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.

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MFJ-945E
$109.95

Extends your mobile antenna bandwidth so you don't have to stop, go outside and adjust your antenna. Tiny 8x2x6 in. *Lighted* Cross-Needle SWR/Wattmeter. Lamp and bypass switches. Covers 1.8-30 MHz *and* 6 Meters. 300 Watts PEP. **MFJ-20, $4.95,** mobile mount.

MFJ-971 *portable/QRP* Tuner

MFJ-971
$99.95

Tunes coax, balanced lines, random wire 1.8-30 MHz. Cross-Needle Meter. SWR, 30/300 or 6 Watt QRP ranges. Matches popular MFJ transceivers. Tiny 6x6½x2½ inches.

MFJ-901B *smallest* Versa Tuner

MFJ-901B
$79.95

MFJ's smallest (5x2x6 in.) and most affordable wide range 200 Watt PEP Versa tuner. Covers 1.8 to 30 MHz. Great for matching solid state rigs to linear amps.

MFJ-16010 *random* wire Tuner

MFJ-16010
$49.95

Operate all bands anywhere with MFJ's reversible L-network. Turns random wire into powerful transmitting antenna. 1.8-30 MHz. 200 Watts PEP. Tiny 2x3x4 in.

MFJ-906/903 *6 Meter* Tuners

MFJ-906
$79.95

MFJ-906 has lighted Cross-Needle SWR/Wattmeter, bypass switch. Handles 100 W FM, 200W SSB. **MFJ-903, $49.95**, Like MFJ-906, less SWR/Wattmeter, bypass switch.

MFJ-921/924 *VHF/UHF* Tuners

MFJ-921 or MFJ-924
$69.95

MFJ-921 covers 2 Meters/220 MHz. **MFJ-924** covers 440 MHz. SWR/Wattmeter. 8x2½x3 inches. Simple 2-knob tuning for mobile or base.

MFJ-922 144/440 MHz Tuner

MFJ-922
$79.95

Ultra tiny 4x2½x1¼ inch tuner covers VHF 136-175 MHz and UHF 420-460 MHz. SWR/Wattmeter reads 60/150 Watts.

MFJ-931 *artificial* RF Ground

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 from MFJ

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FAX: (601) 323-6551; **Add s/h**
Tech Help: (601) 323-0549

.org/nli for more current information, happenings and contacts. Send your announcements and info to Webmaster Tom, KA2D (ka2d@qsl.net). Let me know about your club's field day site so my ARRL staff can visit in June. ARRL Section senior staff are available to speak before your club on many different topics, contact me for more information. NYC/LI VE exam list follows: Islip ARES, 1st Sat 9 AM, Slip Town Hall West 401 Main St. Slip, Addison Levi, KD2YA, 516-234-0589. Bears VE: ABC Bldg Cafeteria, 125 West End Ave at 66th St. Call Hotline 212-456-5224 for exact dates & times, Jerry Cudmore, K2JRC. Grumman ARC (W5YI) 2nd Tues 5 PM. Northrop-Grumman Plant 5 S Oyster Bay Rd via, Hazel St Bethpage, NY. Bob Wexelbaum, W2ILP, 516-499-2214, LIMARC, 2nd Sat 9 AM NY Inst of Tech, 400 Bldg Rm 409, Northern Blvd. Old Westbury, Al Bender, W2QZ, 516-623-6449. East Village ARC, 2nd Friday 7 PM, Laguardia HS, Amsterdam Ave and West 65 Street, Manhattan. Robina Asti, KD2IZ, 212-838-5995. Great South Bay ARC, 4th Sun 12 PM, Babylon Town Hall, ARES/RACES Rm 200 E Sunrise Hwy N Lindenhurst, Michael Grant, N2OX, 516-736-9126. Hellenic ARA: 4th Tues 6:30 PM; Pontion Society, 31-25 23rd Ave, Astoria, NY, George Anastasiadis, KF2PG, 516-937-0775. Larkfield ARC: 3rd Sat 9 AM, Huntington Town Hall, 100 Main St, Huntington, NY, Joe Coffield, W2DDZ, 516-266-3192, Columbia U VE Team: 3rd Mon 6:30 PM, Watson Lab 6th.floor 612 W 115th St NY, Alan Crosswell, N2YGK, 212-854-3754 PARC: exams held every three months at Southold School Oaklawn Ave, Southold, NY, on next to last Friday of the month. 6:30 PM all classes of licenses. For info contact Ralph Williams/N3BT 516-323-3646. Mid-Island ARC, Last Tue. 7 PM, Brookhaven Rec Ctr, 20 Wireless Rd, Centereach, NY. Mike Christopher, KG2M, 516-736-9126. Report all changes to N2GA before the 12th of the month. Tfc: WB2GTG 327, N2AKZ 202, W2RJL 90, KC2ACL 65, N2XOJ 64, KB2KLH 41, WA2YOW 21, AA2NX 13.

NORTHERN NEW JERSEY: Nets and station activity reports submitted by Section Traffic Manager Dave Streubel, WB2FTX. Traffic (February 1999): N2XJ 155, W2MTO 95, N2OPJ 72, KC2AHS 66, K2PB 63, N2QAE 42, N2RPI 42, N3RB 29, W2CC 15, WB2CZW 13, N2TTT 4. WB2FTX 2RN Digital NTS station received 51 NTS, forwarded 511 NTS. WB2FTX-4 NTS/packet hub 143 messages. February nets:

Net Mgr	*Sess*	*QNI*	*QTC*	*QSP*	*QTR*	*Stations*
NJM	WA2OPY	28	134	80	67	282
NJPN	W2CC	32	142	43	36	191
NJSN	K2PB	28	107	0	0	285
NJN/E	AG2R	28	209	140	97	373
NJN/L	AG2R	28	144	64	45	212
CJTN	N3RB	28	277	51	39	211
NJVN/E	N2RPI	27	318	38	25	200
NJVN/L	N2OPJ	28	240	52	52	239

MIDWEST DIVISION

IOWA: SM, Jim Lasley, N0JL @ KE0BX—ASM: N0LDD. SEC: NA0R. ACC: N0IJP @ KE0BX. BM: K0IIR @. W0CXX. SGL: K0KD. TC: W0DIA. Are you getting your Midwest Division newsletter via e-mail? Contact K4VX@nemonet .com. I get several that way, including CAARC. SEITS has a full page of suggestions for introducing Amateur Radio to school students. Might check with KE0BX. I regret to note the passing this month of WA6JCF, KA0QPD, WA0ESF, W0SVD. CVARC notes that they will be 50 years old in November. They are trying to decide how to celebrate! Thought you might like to know how the nets in the section are doing. The list is net/QNI/QTC/# sessions/ listed manager. I75NN/811/19/24/W0CON; I75EN/865/34/24/K0BRE; TLCN/165/101/55/KA0ADF; Tenth Region Net (Iowa)/98%rep/251/56/W0SS; Benton County ARES Net/68/0/4/KL7BZ; Page County ARES Net/132/ 2/4/WB0IGI; O'Brien County ARES Net/101/0/4/W0CON. OK. I admit I'm short of material this month. But there is good data here and it is typical. The ARES nets have lots of check-ins and very little traffic. The section SSB nets have lots of check-ins and very little traffic. The section CW net has about two pieces of traffic for three check-ins and represents us in the mid to high 90% range to the region net. I am hearing that several are working a good bit of DX. One I know is nearing a 100 countries on QRP CW. Newsletters were received from CAARC, NIARC, SARA, SEITS, CVARC, IIARC, DMRAA. Traffic: KA0ADF 97, W0SS 81, N0JL 50, NR0E 16.

KANSAS: SM, Orlan Q. Cook, W0OYH, ASM/ACC/OCC: Robert Summers, K0BXF—SEC: Joseph Plankinton, WD0DMV, SGL: Marshall Reese, AA0GL. Hi gang. You know by now the FCC has backed up what they said on enforcement of the rules. I see where hams have been delicensed, fined or pending litigation, temporarily off the air & some re-testing because of questionable tests. Get your pencil out and mark your calendar for the Salina ARRL State Convention Aug 22. HR needs your help letting more then 7000 KS hams know if they don't attend, it may be our last. Clubs need to publish it in their newsletters and stress the need for attendance and send a few freebies. You may notice this column is now 25 lines. ARRL has had to shorten all sections 16 percent. The number of lines are determined by many things one being the number of members in the section. Tnx to ARES, NTS, BBS, Repeater, and other public service groups for serving your neighbors & nation. Jan Kansas Nets sessions/QNI/QTC, KSBN 31/2227/100 KPN 23/ 299/27 KMWN 31/651/571,KWN 31/1062/641,CSTN 26/2089/98 QKS 58/291/166 QKS-SS 6/12/0.SEC AA0HJ BBS 66/W1AW Bul 856/per 4/NTS: SEC reports QNI 317 QTC 30 QNS KB0ABN KB0AMY WD0DDG WD0DMV AA0HJ AA0IQ K0JJV N0LJR KF4LM W0PBV KB0WEQ: TEN rep 323 msgs 62 sessions KS stns 69% QNS AC0E AA0FO KX0I K0PY NB0Z WB0ZNY. Tfc: N0KJ 370, WB0ZNY 203, K0PY 108, W0OYH 83, NB0Z 56 KX0I 46, W0WWR 8, KB0DTI 10, AC0E 10 KB0GUS 10, K0BJ 5, KB0NTD 3.

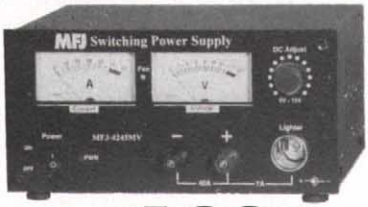
MISSOURI: SM, Charles Boyd, KE0K—I'm starting to get a few monthly club newsletters now. I see there are many activities going on related to ham radio. Good Amateur Radio activities, boosting the image of Amateur Radio. There are many ways to bring ham radio to the public, but the one that comes to mind is Field Day. Field Day isn't that far away. If you have never done Field Day, try it. If you have done Field Day, then you know the fun and friendship

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 . . .

NEW!



MFJ-4225MV 25 Amp **$149.95** Add s/h

MFJ-4245MV 45 Amp **$199.95** Add s/h

MFJ's new adjustable voltage switching power supplies do it all! You can power your HF transceiver or 2-Meter/440 MHz mobile or base and accessories.

MFJ's *MightyLites*™ are so lightweight 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 power supplies that can give you a painful backache, pulled muscle or hernia.

MFJ's 25 Amp *MightyLite*™ weighs just 3.7 lbs. -- that's *5 times lighter* than an equivalent conventional power supply. MFJ's 45 Amp version is even more dramatic -- *8 times lighter* and weighs just 5.5 pounds!

No RF hash!

These babies are clean . . .

Your buddies won't hear *any* RF hash on your signal! *You* won't hear any in your receiver either!

Some competing switching power supplies generate objectionable RF hash in your transmitted and received signal.

These super clean MFJ *MightyLites*™ meet all FCC Class B regulations.

Low ripple . . . Highly Regulated

Less than 35 mV peak-to-peak ripple under 25 or 45 amp full load. Load regulation is better than 1.5% under full load.

Fully Protected

You won't burn up these power supplies! 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. Easily replaceable fuse.

MightyLites™ . . . Mighty Features

MFJ *MightyLites*™ feature a front-panel voltage control. It lets you vary the output voltage from 9 to 15 Volts DC and gives you a highly regulated voltage output.

You get an easy access front-panel with five-way binding posts for heavy duty use and a cigarette lighter socket for mobile accessories. The MFJ-4245MV has two sets of quick-connects on the rear for accessories.

Large 3 inch dual meters are brightly illuminated to make it easy to 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 inches.

MFJ-4245MV, $199.95. 45 Amps maximum or 40 Amps continuous. Weighs 5.5 pounds. Measures 7½Wx4¾Hx9D inches.

MFJ No Matter What™ Warranty

MightyLites™ are covered by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your power supply for one full year.

MFJ 35/30 Amp *Adjustable* Regulated DC Power Supply

Massive 19.2 pound transformer . . . No RF hash . . . Adjustable 1 to 14 VDC . . .

NEW!

MFJ-4035MV **$149.95** Add s/h

MFJ's heavy duty conventional power supply is excellent for powering your HF or 2 Meter/440 MHz transceiver and accessories.

A massive 19.2 pound transformer makes this power supply super heavy duty! It delivers 35 amps maximum and 30 amps continuous without even flexing its muscles. Plugs into any 110 VAC wall outlet.

It's highly regulated with load regulation better than 1%. Ripple voltage is less than 30 mV. *No RF hash* -- it's super clean!

Fully protected -- has over voltage protection, fold back short circuit protection and over-temperature protection.

You get front panel adjustable voltage from 1 to 14 VDC with a convenient detent set at 13.8 VDC. A pair of front-panel meters let you monitor voltage and current.

Three sets of output terminals include a pair of heavy duty five-way binding posts for HF/VHF radios, two pairs of quick-connects for shack 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. 9½Wx6Hx9¾ inches.

Your MFJ-4035MV is protected by MFJ's famous *No Matter What*™ one year limited warranty. MFJ will repair or replace (at our option) your power supply for one full year.

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 **$69.95** Add s/h

MFJ-1116 **$44.95** Add s/h

MFJ-1112 **$29.95** Add s/h

MFJ-1118, $69.95. This is MFJ's most versatile and highest current *Deluxe Multiple DC Power Outlet*. It lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC power 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. "ON" LED.

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 an "ON" LED indicator.

Built-in 0-25 VDC voltmeter. You get 6 feet of 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 inches.

MFJ-1116, $44.95. Similar to MFJ-1118. No 30 amp posts. Has "ON" LED and 0-25 VDC voltmeter. 15 amps total.

MFJ-1112, $29.95. Similar to MFJ-1116. No on/off switch, LED, meter, fuse.

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MFJ . . . the world leader in ham radio accessories

that comes from this event. Keep up the good work and work for Amateur Radio. Nets reports: CARL 3/23/0 KC0MV; QCWA#35 4/99/0 K0YML. AUDRAIN ARC 5/41/1 WB0SEN. HARC 4/173/0 N0YLF. Paul Revere 4/456/0 N0IWA. MOTN 28/652/115 K0IPM, ROLLABILLBOARD 28/299/4 NA0V. WAARCI 4/127/0 KB0VZP. SWMO SKYWARN 5/120/4 N0UAM. JCARES 4/52/0 K0UAA. MON 1&2 52/187/58 W0WFF. 1880 GOBNET 50/413/3 WL7YM. ST LOUIS REPEATER 26/136/0. 10 56//251 MO 100% W2RRX,N0NKJ, KI0PH, W0WFF, WO0X, W0SS. Tfc: KI0JO 672, KE0K 82, KG0IV 30. PSHR: KG0IV 94, KI0JO 94, KE0K 82, KI0BM 71.

NEBRASKA: SM, Bill McCollum, KE0XQ—It is with deep regret to inform you of the following Silent Keys: Roger Plantz, WA0OQX, became a Silent Key on February 25. He held several ARRL appointments over the years. Jay McAleer, WC0R, became a Silent Key on March 4. Jay was a member of the ARRL, VE and a life member of the AK-SAR-BEN ARC. In 1971, he organized the Great Plains Chapter of the Paralyzed Veterans of America. As part of his work with the group, he helped design a way of lowering floors in vans to accommodate wheelchairs. I am pleased to announce that Wayne Jorns, KE6DZD, has been appointed as an Official Observer. The Nebraska State Convention attracted about 450 hams this year. Thanks to EVARC for such a fine event. I want to thank all of those who nominated yours truly for "The Nebraska Ham-of-The-Year Award." Net Reports: Lincoln/Logan ARES: QNI 157, QTC 4 & 12 sessions. NMPN: QNI 1468, QTC 18 & 28 sessions. NE CW Net: QNI 133, QTC 6 & 19 sessions. NE Storm Net: QNI 966, QTC 26 & 28 sessions. Mid NE ARES: QNI 356, QTC 5 & 28 sessions. W0IRZ Mem. Net: QNI 71, QTC 2 & 4 sessions. NCHN: QNI 453, QTC 27 & 28 sessions. Tfc: K0PTK 106, KE0XQ 30, W0AP 14, WY0F 8, WC0O 2, W0EXK 2, AA0KQ 2, K0SW 2, KA0DOC 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Betsey Doane, K1EIC— Asst. SMs: N1API, NK1J, K1STM, KZ1Z; BM KD1YV; OOC: WA1TJT. PIC: W1FXQ. SEC: WA1D. SGL: K1AH. STM: K1HEJ. TC: W1FAI. By now you have, no doubt, heard that I have appointed Darrow, WA1D, as CT's new Section Emergency Coordinator. Coincidentally, he is from Guilford and is working very closely with Assistant SEC Don, N1HAX, and me to make the transition as smooth as possible. I am sure that Darrow will be glad to fill you in on his experiences working with Civil Preparedness some years ago. With the help of Joe, K1IKE, an ARES e-mail reflector has been established. The purpose of the Conn ARES e-mail reflector is for amateurs in CT to inform others in CT about anything ARES/SKYWARN related. This might include weather warnings, upcoming ARES drills and public service events. If interested, you can point your browser to **http://www.onelist.com/subscribe.cgi/connares** or send an e-mail message to any one of the following: **wa1d.darrow@snet.net, joecheck@snet.net**. CT will be visited by Tuck Miller, K6ZEC, SM of San Diego. He has never been to Headquarters so he is making this trip as part of his vacation plans! While here, he plans to visit The Newington ARL. At this writing, I am hoping to spend some time with Tuck and exchange ideas. Our condolences to the Greater Fairfield ARA on the loss of two active members—newsletter editor Vic Martin, N1SKJ, and George Dlugos, W1JRV, both of whom were very active members. The Meriden ARC is saddened by the loss of a former club president, Manny, W1STT. This hobby is all about making friends so losses such as these are always difficult. It's great to hear K1EIR back on the air regularly—Barb is enjoying her new NTS skeds! You'll never lose that superb CW fist, Barb! Net sess/QNI/QTC: WESCON 28/293/139. NVTN 28/222/152. ECTN 28/211/160. CPN 28/213/116. CN 26/82/39. Tfc: NM1K 1741, KA1VEC 525, KA1GWE 217, WA4QXT 184, K1STM 164, WA1D 122, N1VXP 94, KE1AI 76, N1ZYD 47, W1GPS 12.

EASTERN MASSACHUSETTS: SM, Larry Ober, W1MW—ASMs: WA1IDA, KB1BCF, N1GTB, N1UGA, N1SGL. ACC: N1AKG. BM: N1IST. OOC: K1LJN. PIC: N1PBA. SEC: W3EVE: K3HI. STM: WA1TBY. TC: W1SVU. EMA ARRL: voice: 978 567-0942. Packet bulletins: ARRL@EMABBS. e-mail: **w1mw@arrl.org**. e-mail list: **ema-arrl@netcom.com**. Web: **ttp://www.qsl.net/ema-arrl**. The Boston ARC is organizing support for the Multiple Sclerosis Walk on April 11th. Organization for the Boston Marathon continues under the direction of WA1IDA. The Framingham ARA has made its first shipment of recycled 386 class computers to Grenada. They went with the AA1IZ DXpedition. The club intends to continue the recycling of now obsolete computer hardware to places where they are high tech. The Whitman ARC reported on member's special event last June from Mount Washington. The group operated from inside the "Tip Top House" near the observatory. The Algonquin ARC reports that the February flea market was very successful. A reminder to club newsletter editors—please send newsletters to my new home address as it appears in the front of *QST*. My *Callbook* address is a post office box that is only visited periodically. This month's short column attests to that fact. Also, several newsletters received via the PO Box were mutilated beyond use as the USPS stuffed them in on top of numerous super market circulars. My home mail has, so far, suffered no such indignity. Until next month 73 de W1MW. Tfc: WA1TBY 365, NZ1D 230, WA1FNM 152, W2EAG 186, K1SEC 102, N1LKJ 103, WA1LPM 79, N1LAH 51, K1UGM 48, KD1LE 44, K8SH 43, K1BZD 42, N1SGL 42, N1TAT 37, KB1EB 35, N1TDF 34, N1AJJ 33, N1IST 33, KA1VAX 28, KB1DHG 19, N1XQC 3, W1ON 2.

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. Help Wanted: The SEC, N1KGS, is looking to fill a few EC positions for ARES. If you are a Tech or higher class and an ARRL member and live in York, Somerset, Kennebec, Sagadahoc, or Franklin Counties, and are interested in emergency communications, contact Max at 207-564-8943 or e-mail at: **n1kgs@arrl.net**. Also, still looking for a TC, if you can help in either case, it would be greatly appreciated. With all the good weather we are enjoying, lots of tower work will be performed. Be sure to work smart! Use a full-body harness and 100% tie off while on the tower. Keep the ground crew safe by insisting on the use of hard hats and

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.

60 dB Null *wipes out* noise and interference

NEW!

MFJ-1026

$169.95

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, $12.95. 6½x1½x6¼ inches.

MFJ-1025, $149.95. 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, $12.95. 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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safety glasses. There is no reason to see anyone end up in the SK list as a result of negligence. Tfc: NX1A 148, AF1L 84, W1LIC 56, N1HYF 52, W1JTH 52, W1QU 50, W1KX 48, W1JX 35, N1JBD 26, K1UNQ 25, KA2ZKM 21, KA1RFD 19, WA1YNZ 3. 73, Bill, N1KAT.

NEW HAMPSHIRE: SM, Al Shuman, N1FIK—ASMs: W1NH, N3CLZ, N1FIL, N1KIM. TC: WA1HOG STM: WA1JVV. PIC: KA1GOZ. OOC: W1GTA. SGL: K1KM. BM: KH6GR. ACC: NA1E. SEC: N3CLZ **www.nh.arrl.org**. By now most of you should have heard that Mike Graham, K7CTW, of Merrimack and the President of Nashua Area Radio Club has been named to succeed me as SM for NH for the 2-year term beginning July 1, 1999. It was very difficult in deciding not to run for a 4th term. Like many of us, family and work commitments forced me to reconsider. I believe Mike will serve us proud. I look forward to working with him during the transition period. I know I speak for all hams in welcoming Mike to the helm, and hope everyone pledges to work with him for the betterment of NH radio. My final thanks and farewells next month. The NH QSO Party results will be posted on the NH Web site during May. While on the Web site, check out the newly designed QSO Party certificates. Sorry to announce the passing of Hank Hagman, W1OKU, a former EC and ARES member in Strafford County. We will see you on May 7-8 at HOSSTRADERS. For the most up-to-date information, check out **www.hosstraders.nhradio.org**—73 Al. Net Mgr/sess/QNI/QTC/Time: GSFM N1RCQ/28/217/50/415; GSPN K1ZO 32/128/58/278; TSEN N1VFM 4/47/4; VTNH WA1JVV 28/183/141/512. Tfc: W1PEX 960, K1TQY 266, W1FYR 215, N1CPX 121, WA1JVV 89, K1ZO 53, KA1OTN 42, W1ALE 33, WB1GXM 17.

RHODE ISLAND: SM, Rick Fairweather, K1KYI, e-mail k1kyi@juno.com—Sad to report the passing of Jack Titterington, W1EOF. Jack was the SM from 1977 to 1981, and was very active in traffic handling in the section. A ham since 1932 he was a member of QCWA, OOTC, and SOWP in addition to several local clubs. He assisted in installing RI's first TV station. After his retirement as a broadcast engineer at channel 10, Jack went back to URI and graduated at the age of 80, the school's oldest graduate. He was always a warm, friendly person and will be missed a great deal on our bands. Our sympathies are extended to his family and all his ham friends. The RIAFMRS, sponsors of the 76, 94, 223.76, and 447.425 repeaters, will have their auction and flea market on May 15 in Slatersville. Hope to see many of you there. N1JMA and N1YKH met with Warwick officials recently to establish contact and offer ARES services to the city. Cranston has also been contacted and we expect to have more information soon about our involvement with them. Don't forget the ARES training nets on Wednesday nights at 8:30 local time. Listen to KA1BNO's Swap net on 146.70 on Saturdays at 9:00 AM for the repeater to be used for the net for that week. Tfc: KA1JXH 65, K1KYI 5. PSHR: KA1JXH 133.

VERMONT: SM, Bob DeVarney, WE1U—Just got back from the Milton Hamfest/Vermont ARRL Convention. Attendance was up a little this year. Somewhere over 600. Things seemed to wrap up early, though, and looked like a ghost town by 1 PM. This coming weekend (March 13-14), AMSAT celebrates its 30th birthday. Congratulations to them!! I plan to go down for the festivities at Goddard Space Flight Center. 73 de WE1U. Sessions/Checkins/Traffic: Vermont/New Hampshire Net (VTNH)/28/183/141. Vermont Phone Emergency Net (VPEN)/4/ 31/4. Green Mountain Net/24/669/18. Tri-State FM Emergency Net (Keene)/4/47/4/Windham County ARES Net/1/6/2. Public Service Honor Roll Stations: KT1Q 166, N1DHT 116. Traffic: KT1Q 425, N1DHT 141, KA1YLN 5. Vermont had the 100% representation on 1RN/ Cycle 2.

WESTERN MASSACHUSETTS: SM, William C. Voedisch, W1UD, **w1ud@arrl.org**—ASM: N1LZC. ASM (digital) KD1SM. STM: W1SJV. SEC: K1VSG. OOC: WT1W. The Mohawk Club of Gardner had its auction yesterday and I had the opportunity of attending. Met many of the crew. Paul, W1SEX, did a marvelous and humorous job as auctioneer. One thing I was impressed with was the lack of boat anchors. Found out that much of the equipment was donated by relatives of deceased past members. That seems like a great idea. What better way to help an organization that you have enjoyed attending all your life? Something to think about. By the time you read this, there will be only a couple of club meetings left before Field Day. Plans should be finalized by now under an able committee chairman. Remember, Field Day is the last outing before the summer hiatus. Also, it is not a contest, but a test of our ability to install an emergency station. Set up a table with informative literature about your club and have it staffed by able personnel. The League will furnish material if requested. It's also an ideal time to advertise your club and recruit new members. Propagation is great on all bands—especially 10 meters. Tfc: W1ZPB 87, KD1SM 9, W1SJV 22, W1UD 212.

NORTHWESTERN DIVISION

ALASKA: SM, David Stevens, KL7EB—OOC: KL7IKX. SEC: NL7DL. DEC: KL7JBV. DEC: WL7GK. TC: AL7CE. TS: KL7CC. ASM: WL7BJ. ASM: KL5T. Sniper Net 3920 daily 1900 AST, Bush net 7087 daily 2000 AST, Motley Group 3933 daily 2100 AST and Alaska Pacific Net 14.292 M-F 0830 AST. Many thanks goes to the Yukon Quest hams, especially Dianne Marshall, AL7FG, and Ed Dennis, KL7YX. Ken Delp, KL7FD, with Mark Kelliher, KL7TQ, did a great job coordinating communications for the Iditarod Dog Race. Randy Vallee, AL7PJ, reports the Alaska QSL Party March 20-21 at KL7Y went well. Ed Trump, AL7N, sends and receives National Traffic Systems messages. His message phone is 907-479-9633. Ralph, VE7OM, and Ken, VE7CTW, help pass NTS messages. January PSHR: KL5T 122, AL7N 71. February PSHR: KL5T 145, AL7N 74.

EASTERN WASHINGTON: SM, Kyle Pugh, KA7CSP—Recent on-the-air visits on HF by FCC's Amateur Radio enforcer Riley Hollingsworth, K4ZDH, are long overdue. Hams who need to report interference or violations can e-mail to **rholling@fcc.gov**, or you may telephone at 717-338-2502. Sorry to report Gale Cress, KB7GRY; Robert Soth, KG7RM; and John R. Baird, K7JFJ, of Wenatchee as Silent Keys. ICOM 706 users: The "706 Tune Control" from The BetterRF Co utilizes the Tuner/Call button and works well for tuning antennas, checking SWR, etc. The Yakima Hamfest is May 22-23. 2 EWA OOs out of 12 sent reports for February. Net

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 you high efficiency for more power radiated. The result? 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.

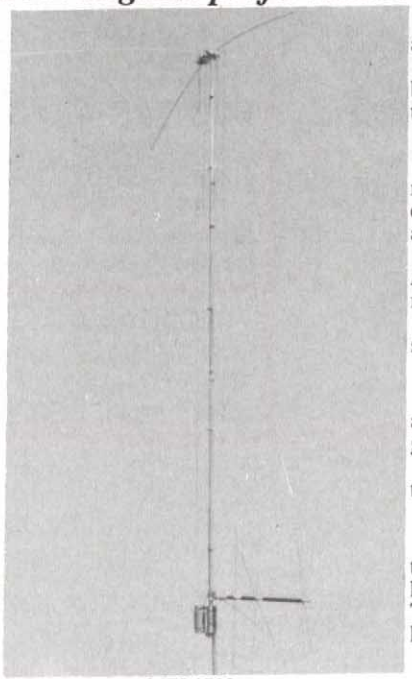
Full size performance is achieved by using separate full size radiators for 2 through 20 Meters and highly efficient end loading for 30, 40 and 75 /80 Meters.

Get very low radiation angle for exciting DX, automatic bandswitching, omni-directional coverage, and 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 frequency of other bands.

Self-supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to tower top -- on small lots, backyards, apartments, condos, roof tops, tower mounts.



MFJ-1798
$269.95

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.

These radiator stubs provide automatic bandswitching -- there is 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 used in the main structure.

Efficient high-Q coils are wound on tough *low loss* fiberglass forms using highly weather resistant Teflon® covered wire.

Teflon® is registered trademark of Dupont

MFJ *Super Hi-Q Loop*™

MFJ-1786
$319.95

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

It's ideal where space is limited -- apartments, small lots, mobile homes, attics, motor homes.

Enjoy both DX and local contacts when you mount it vertically. You 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-1786 *Super* Remote Control has *Auto Band Selection*™. It auto-tunes to your desired band, then beeps to let you know. No control cable is needed.

Fast/slow tune push 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 *superb* tuning capacitor is welded for low loss and *polished* to prevent high voltage arcing. It's welded to the radiator, has nylon bearing, anti-backlash mechanism, limit switches and a continuous *no-step* DC motor for *smooth precision* tuning.

A heavy duty 1/8 inch thick ABS plastic housing with ultraviolet inhibitors protects it.

MFJ-1782 $289.95. Same as MFJ-1786 but remote control has only fast/slow tune buttons.

NEW! **MFJ-1788**, $379.95. Same as MFJ-1786 but covers ***40 Meter through 15 Meter*** continuous. Includes super remote control.

Super 80/40M Vertical

MFJ-1792
$159.95

Designed as a *high performance* antenna for 80 and 40 Meters, the MFJ-1792 features a *full size* quarter wave radiator for 40 Meters - - that's a full 33 feet of ruthless radiating power.

End loading -- the most efficient form of loading -- is used for 80 Meters. It's accomplished by a virtually lossless 4½ foot capacitance hat and a high-Q coil wound with Teflon® wire on a *low-loss* fiberglass form.

The *entire length* radiates power.

High strength 6061-T6 aluminum tubing, super strong solid fiberglass insulator, *Frequency Adaptive L-Network*™, heavy duty *swing* mount. Handles 1500 watts PEP. Requires guying and radials, counterpoises or ground screen.

MFJ-1793, $179.95. Same as MFJ-1792 but includes *full size* 20 Meter quarter wave radiator.

MFJ *halfwave* Vertical

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

MFJ-1796
$199.95

Operate 6 bands -- 40, 20, 15, 10, 6 and 2 Meters -- with this MFJ-1796 *ground independent halfwave* vertical antenna! No radials or ground ever needed!

It's only 12 feet high and has a *tiny* 24 inch footprint! Mount it anywhere from ground level to tower top -- on apartments, condos, small lots, even motor homes. Perfect for vacations, field day, DX-pedition, camping.

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

Automatic bandswitching, low radiation angle, omni-directional, handles 1500 watts PEP. Goes together in an afternoon.

Box Fan Portable Loop

MFJ-1780
$229.95

No, it's not a fan -- it's a high efficiency portable loop antenna that's about the same size and shape as a 2x2 foot box fan, complete with carrying handle.

Carry it like a suitcase, tuck it in a corner of your car or check it as baggage on a plane.

When you get there, set it on a table or desk and enjoy ragchewing or DXing.

All welded construction, covers 14-30 MHz *continuously* including WARC bands, handles 150 watts. Remote control has fast/slow tune buttons. Separate control cable not needed.

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Activity (for Feb): WSN: QNI 784, tfc 264; Noontime Net: QNI 8142, tfc 327; WARTS: QNI 3235, tfc 138. Tfc: W7GB 277, K7GXZ 246, KA7EKL 83, K7BFL 67. PSHR: W7GB 138, K7GXZ 124.

IDAHO: SM, M.P. Elliott, KF7ZQ — OOC: N7HGV, SEC: AA7VR, STM: W7GHT. It's HAMFEST time! Idaho Falls held a successful hamfest on April 17. The next hamfest is in Caldwell on May 15 (contact is Paul Ferris, AB7XM). Field Day 1999 will be on us soon. Two section Field Day awards will again be given for the highest club and individual scores! W7GHT achieved BPL level for four months in a row and was presented a Traffic award. On the club front, the Kootenai club celebrated its 25th birthday in February—congratulations! The Pocatello club is currently working to increase their health and welfare activities and is seeking affiliation with a local emergency response agency. 73—Mike, KF7ZQ. Tfc: W7GHT 554, KB7GZU 107, WB7VYH 82, and N7MPS 42. PSHR: W7GHT 128, WB7VYH 78, and N7MPS 61. Net (SESS/QNI/QTC/ Mgr.): FARM—28/2344/27/ W7WJH; NWTN—28/1488/60/ KC7RNT; IDACD 20/561/22/ K7UBC; IMN 28/468/431/ N7MPS.

MONTANA: SM, Darrell Thomas, N7KOR—A great big thank you is in order to all of those amateurs in the Montana Section who donated their time and equipment in support of the checkpoint communications during the Montana Race to the Sky Sled Dog Race. A more detailed report of the efforts by these folks may appear elsewhere in *QST*. The Great Falls Area Amateur Radio will host a Special event station at the Glacier/Waterton International Hamfest July 16-18, 1999. The call sign W7G has been reserved for this event marking the 65th annual gathering of Glacier/ Waterton. Attendees at the event will be welcomed to operate the station as they wish. Net: QNI/QTC/NM: MSN 105/ 0 W7OW; MTN 1989/56 N7AIK; IMN 468/431 N7MPS. PSHR: N7AIK 111.

OREGON: SM, Bill Sawders, K7ZM—ASM: KK7CW, ASM: KG7OK. SEC: WB7NML. STM: WA7EES. SGL: N7RFM. OOC: NB7J. STC: AB7HB. ACC: K7SQ. The ARRL Oregon Section has an opening for a Public Information Coordinator. If you have PR experience and would like the challenge, this is your opportunity. Contact me for complete details. Everybody likes a party...and the Oregon QSO Party takes place on Saturday, May 8! Just get on ANY band...call "CQ the Oregon QSO Party," give the other station a "signal report, and tell them what COUNTY you're in. That's it! Thousands of stations across the country and around the world will be looking for Oregon Counties. More information and details are in ALL ham magazines this month, under "Contesting." The Central Oregon DX Club, and the newly formed, Ham Operators Group, (every ham wants to be a hog!) are going to drive their motor homes to some of the "rare counties" to operate. Sounds like a "mini Field Day"....and lots of fun! Section ACC, Joe Barry, has awarded the Hoodview ARC of Sandy, and the Central Oregon Radio Amateurs, of Bend, the ARRL Special Service Club designation, for their support of Amateur Radio in their communities. Congratulations! Nothing is more fun and exciting than a club that DOES SOMETHING! Is your club active? Keep in touch! NTS traffic totals for February: WA7EES 158, K6AGD 130, KA7AID 122, N7DRP 121, and W7VSE, 121.

WESTERN WASHINGTON: SM, Harry Lewis, W7JWJ—ASM: W7QGP. OOC: AA7KE. SEC: N7NVP: Have you ever received a notice of violation of the Communications Act of 1934 from the FCC? The monitoring service provided by Official Observers helps prevent this from happening. One of the friendly reminders that might be received from an OO is a failure to identify properly or not at all. Let's look at traffic totals for February and we find that George, K7BDU, leads the way earning BPL once again: K7BDU 1121, N7AJ 16, W7LG 123, K7YOH 8, N7PIP 34, W7NWP 132, W7TVA 288, N7YSS 103, KA7TTY 7, KD7ME 60, W7ZIW 316, K7MQF 253 and K7SUQ 14. Digital report gives K7BDU a total of 463. Mgr of the Puget Sound Traffic System is WA7LQV reporting a QNI of 506, QTC 25 in 26 sessions. KC7HYJ, reporting via SEC N7NVP, relates that Jean, KC7AVP, has visited the homes of hams that can't get out to receive control operator training. John, KC7NUE, and Don, KC7TYM, have put the final touches on the Radio Relay Truck that will be used as a back-county relay station. Medical DEC Marina Zuetell, N7LSL, and City of Seattle Team Leader Mark Sheppard, N7LYE, coordinated a well put together two day training event that drew over 50 hams from King and surrounding counties. Speakers were emergency managers and well qualified hams. The event fulfilled many of the training requirements of their teams and was well received. Welcome aboard to Rick Hodges, KB7TBF, now serving as King Co EC.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, KF6RCO. SEC: KE6NVU. DECs: WA6TGF/Alameda County, KO6JR/Contra Costa County, WA7IND/Napa County, K6HEW/Solano County, N6UOW/Training, KE6HCI/Administration, W6CPO/Technical Services. STM: K6APW. OOC: W6NKF. TS: KF6NY. Check out the EB WWW Page at **http://www.pdarrl.org/ebsec/**. Web-master is KB6MP. Many changes in the Section Emergency Communications Staff: Mark Keiser, N4OGL, has resigned as SEC, to take a new job in Chicago. Thanks for your good works, Mark, and best wishes in your new position. Taking Mark's SEC slot is Paul Carlin, KE6NVU, a long-time member of the team. The new Solano County DEC is Bob Hewitt, K6HEW. Bob replaces Darwin Thompson, K6USW, who is now ASEC for Public Information. Gene Gottfried, KQ6OL, is the new EC for Orinda, replacing Bob Williams, N6UTX, who will be devoting all of his time to a new career. Thanks to Bob for a job well done. SARS had 29 members and guests at their last meeting. ORCA (Oakland ARES/RACES) 2-meter net has been active since 1985. EBARC congratulates KF6BYN on upgrading to Advanced. Their club station, W6CUS, can now run on battery power in the event of an emergency. VVRC's *Repeater* featured a profile of member KD6JSB. LARK welcomes new members W6UPD & KF6SIO. CCCC's newest Life Members are KA6OFR, W6RMY, & N6SPY. HRC's *The Chewed Rag* is now published in pamphlet format. MDARC has an e-mail address for info on this year's PACIFICON: topaccon99 @pacbell.net. February tfc: W6DOB 565, WB6UZX 17. PSHR: W6DOB. BPL: W6DOB.

MFJ 6 Meter SSB Adventure Radio™

Incredibly low $259.95 . . . for No-code Techs and Veterans alike . . . Explore the world . . . Ragchew with locals . . . 10 Watts Out . . . Super Hot Receiver . . .

MFJ-9406
$259.95
MFJ-9406X
$269.95 with mic

Work exciting 6 Meter DX from all over the world on ham radio's *"magic band"*!

It's an adventure every time you turn on your MFJ-9406 six meter SSB transceiver.

Distant stations come rolling in loud and clear with crystal clear armchair copy. You'll have fun exploring exotic 50 MHz band openings -- Tropo, Sporadic E, F2, TE, Aurora, Meteor Scatter, and more.

Ragchew with locals, hunt down new grid squares from far-away places from home, car or mountain top.

***Special Offer!* MFJ-9406X, $259.95!**
Includes MFJ-9406 & MFJ-290 microphone.

Here's what you get . . .

Full SSB/CW coverage: 50.0-50.3 MHz covers SSB, CW, propagation beacons.

Potent signal: 10 Watts PEP output. MFJ's exclusive *Constant-Current*™ syllabic speech processing gives you up to 6 dB more punch to cut thru noise, fading, QRM.

Hot receiver: Crystal-mixed single-conversion superhet with low-noise preamp digs deep into the noise to capture weak signals. If a station is there, you'll hear it!

Easy to operate: No microprocessor mumbo-jumbo . . . just turn on and tune in.

Low power drain: Mountain-top all day on lightweight NiCads or operate from home on 110 VAC with MFJ-4110, $39.95.

Excellent selectivity: Sharp *HF proven* SSB crystal ladder filter reduces QRM and passband noise.

TVI protection: Seven element low-pass filter knocks out TVI -- lets you operate when *you* want to!

Real S-meter: Give meaningful signal reports, accurately steer your beam, monitor speech processing.

Smooth tuning: Vernier reduction drive makes tuning precise and easy.

External amplifier: Jack provides a key-line for activating 6 Meter SSB amps.

Built to last: Premium PC board, quality components, brushed-aluminum panel and tough vinyl-clad case gives years of service.

Compact: At only 2½x6½x6 inches, the MFJ-9406 fits in just about anywhere.

Fully guaranteed: MFJ's exclusive one-year *No Matter What*™ warranty. We will repair or replace (at our option) your MFJ-9406, no matter what happens, for 1 full year.

MFJ-9406 Accessories

Handheld dynamic SSB microphone: Specially matched to compliment the *Constant Current*™ speech processor used in the MFJ-9406. **MFJ-290, $29.95.**

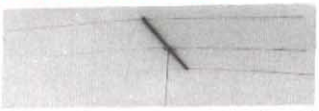
CW Module: Install this and operate CW -- a must for DXers. Provides semi-QSK break-in and sidetone. **MFJ-416, $39.95.**

Power Supply: Heavy duty wall transformer and voltage regulator delivers 13.8 VDC for MFJ-9406. Powerful, yet small. Fits in your coat pocket! **MFJ-4110, $49.95.**

Portable Battery/AC Power Pack: Use Ni-Cad, Alkaline, regular D cells or 110 VAC. Charges Ni-Cads. Fastens to MFJ-9406. Batteries not included. **MFJ-4112, $69.95.**

6 Meter Antennas

MFJ 3 element 6 Meter Yagi



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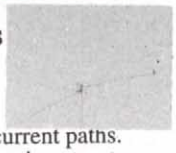

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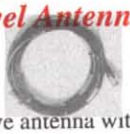

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NEVADA: SM, Bob Davis, K7IY—ASM: Jan Welsh, NK7N. SEC: N7JEH. TC: NW7O. ACC: N7FFP. STM/SGL: N7CPP. PIC: WW7E. OOC: N7ELV. Hello to the Nevada Section. As we approach a summer full of many ham related activities, it is apparent that our hobby is also full of many changes. We may not agree with all that is happening in Amateur Radio today, and all the more reason for us to stick together and support the League. In the past few months we have been advised of the FCC's crackdown on illegal activities on the bands, and the ARRL OO/AA teams have assisted in gathering information, and continue to do so. In many parts of our section, the Beginning of Fire Season is of major concern. Now may be a good time to get involved with your local ARES, RACES or other Emergency Communications team. There are several Simulated Emergency Exercises scheduled throughout the section during the summer and fall, and most organizations will welcome additional help. Saturday mornings, RARA check-in's welcome, 3965, 7:35 AM. Nevada ARES net follows at 8:30. Hi to Dick, K7PQ. Thanks and 73, Bob, K7IY.

PACIFIC: SM, Ron Phillips, AH6HN—SEC: Dennis Carvalho, KH7H. ASM: Harry Nishiyama, KH6FKG. ASM: Lee Wical, KH6BZF. ASM: Jim Reid, KH7M. ASM: George Heloca, Sr. KH6ANA. ASM: Mel Fukunaga, KH6H. TC: Chuck Cartwright, AH7Y. PIC: Russ Roberts, KH6JRM. ACC: Bob Schneider, AH6J. It is with deep regret that I report the passing of Maynard Vance Friend, 82, KH6JAW. Vance was a long-time member of BIARC and an active ham. He will be missed by his many friends and associates. Dean Manley, KH6B, reports that Larry and Olga (formerly AH6EQ and KH6XD) are now AL0AA and KL0CT are living in Fairbanks, Alaska and doing fine. Their son & daughter, Abe and Rebekah are new Technicians KL0LZ and KL0MA. Good luck to all. Maui ARC reports the club is off to a good start with many new ideas for 1999. We all look forward to many interesting things including the repeater on Haleakala. BIARC is holding Amateur Radio classes for Novice and Tech. To include 5 WPM code. Our delivery of *QST* has not improved as yet. Thanks to all for sending me your reports on delivery. So far, HQ does not have any suggestions for improvements. 73, Aloha, Mahalo.

SACRAMENTO VALLEY: SM Jettie Hill, W6RFF—Field Day is fast approaching, is your group ready? This is an event the whole family can enjoy and maybe some new hams will be born. Ham Swaps: River City ARCS April 24 and North Hills RC May 23, both held at Bella Vista High School on Madison Ave., in Fair Oaks. See you there! Those of us that knew and worked with Doc Gmelin, W6ZRJ, in traffic handling, ARRL and Amateur Radio in general know what a champion he was for ham radio. He will be greatly missed. Sacramento ARC has formed a special interest group for APRS. For information call Mike, KF6RUQ, at 682-6994. I have been asked for a list of speakers for club meetings. If you have a talk or could give one, let me know about it and how far you would be willing to travel to a club meeting and I will put you on the list. River City ARCS has changed their meeting time to 7:30 PM (1st Tues/mo). K6ARU gave a talk on Ham Radio repairs to RCARCS. Nevada County ARC had the county Sheriff as a speaker. Mother Lode DXCC was top club entry in the Calif. QSO Party! K6KAY took 1st place as US Rookie on 28 MHz and 2nd place WW in 1998 CQWW WPX SSB. Congrats Kay! Golden Empire Amateur Radio Society's 60th Anniversary Celebration, Hamfest and Swapmeet will be held August 7 in Chico. GEARS reports KC6SNR and K6LUZ as Silent Keys. Have you signed up for your e-mail address at ARRL? See Members Only on **www.arrl.org**. 73.

SAN FRANCISCO: SM, John Wallack, W6TLK—ASMs: N6KM, KE6EAQ. OOC: KD6VWD. PIC: N6BWS. SEC: WB6TMS. TC: N1AL. I regret to report that WD6CKP is a Silent Key. Many thanks to N6MHG, PIO, for hosting the SF section **pdarrl.org** Web site. Check it out if you haven't already. Congrats to N6PTM who was recently awarded a Lifetime Membership from the Sonoma County RA for many years of dedicated service. W6AVT reports that Lake County ARS is forming a close alliance with the American Red Cross. Radio amateurs in San Francisco are also requested to support Red Cross disaster activities. Contact KD6YDY, DEC, for more info. Congrats to the Willits ARS, W6MMM, for receiving First Place, Limited Multioperator, SF Section, 1998 ARRL June VHF QSO Party Award. Contest ops were WB9NJS, WA6OEM, KB6OFY and N2GFF. Congrats to N7LMX for receiving a Certificate of Recognition from the Willits ARS for his club activities. Field Day is rapidly approaching. Make your plans now to participate in the most popular annual ham radio operating event. Field Day this year will be the weekend of June 26-27. Traffic: W6JCG, ORS, 66.

SAN JOAQUIN VALLEY: SM, Donald Costello, W7WN—ASM: Mike Siegel, KI6PR. ASM: John Lee, K6YK. ASM: Pat Fennacy, W6YEP. SEC: Kent LeBarts, K6IN. ACC: Chuck McConnell, W6DPD. OOC: Victor Magana, N1VM. Elmering is alive and well in the San Joaquin Valley Section and here are some of the stories. Charles Mathis, KE6NUE, of Mateca has given a class leading to five new licensed amateurs. Charles was recruited by his friend Bill Talbot, KF6ISI, to help his wife to become a ham. Charles decided if he could Elmer one perspective amateur why not more so, the word got out to some interested people through other amateurs and Charles' church. The result of Charles class is five new amateur ops. and perhaps more soon. Charles plans another class in the future. The Stanislaus ARC has some motivated members who ran and will soon run again an Amateur Radio course of study. The last course had five students and all passed their license exams. The Elmers of the course are Ed Hanna, KF6FIR; Paul Owen, W6UHF; and Lewis Thomas; KF6NPG. Kent LeBarts, K6IN, of Merced has long been an Elmer of the Section teaching classes that have contributed many operators to the Amateur Service.

SANTA CLARA VALLEY-- The famous Foothill Flea Markets are finally in full swing again, second Saturday March through October, at Foothill College in Los Altos Hills. The SPECS ARES/RACES group in northern Santa Clara County is re-organizing and becoming more active. Their net is on 145.27- (100Hz) at 8:00PM local on Mondays. The Santa Cruz County Amateur Radio Club heard from Kit, WA6PWW, on the subject of "Amateur Radio Satellite Communications Engineering and Design Operations." Kit stepped in when Prof Twigg (of Stanford) was unavoidably detained. The club meets at 7:30 PM on the third Friday or each month (except December) in the Education Building of the Dominican Hospital in Santa Cruz. More stuff next month! 73 de Glenn, WB6W.

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten. AB4W—ASMs: AB4S, KE4ML, KC4ACE. SEC: K4MPJ. ASECs: WA4MOK, N4UCO, KD4RYE. STM: K4IWW. ASTM: W4EAT. TC: K4ITL. SGL: KI4AN. OOC: W4ZRA. PIC: KN4AQ. ACC: W4CC. BM: KD4YTU. Section Web site **http://www.ncarrl.org**. You missed a great opportunity if you didn't attend the Carolinas Public Service Conference at the Roanoke Division Convention/Charlotte Hamfest. John Covington, W4CC, our Section Affiliated Club Coordinator (ACC) organized this meeting that featured an impressive group of speakers. NC Em Mgt was represented by Clay Benton, Communications Mgr for the State Emergency Response Team (SERT) and Tim Miller, Western Branch Mgr. They said that ARES mission is expanding within the SERT organization. They consider the back-up communications provided by ARES an essential resource. John Fleming, WD4FFX, former Iredell County ARES EC and County Em Coord represented FL Em Mgt. He has used his experiences in North Carolina to help ARES grow into a very important part of Florida's emergency response plans. John stressed the importance of emergency communications to the future of our Amateur Radio privileges. He felt that all amateurs should be involved in ARES and expressed regret that the conference did not have a larger audience. Wayne Jones from the Greer, SC NWS office spoke about the role of NWS and SKYWARN in protecting the public through earlier warnings. Joyce Blackmon and Gunther Schwarz from the NC/SC American Red Cross Carolinas Chapter Disaster Committee discussed the importance of Amateur Radio communications to their missions of feeding, sheltering, and damage assessment. They recommended that amateurs take intro. ARC classes to better understand their mission. They suggested that these classes could be scheduled for ARES groups. They also recognized the importance of retaining the separate identity of ARES as communicators and avoiding the temptation to recruit amateurs as ARC volunteers. Thanks to all who attended and all who support ARES. DurHamfest May 29; Winston-Salem Hamfest Jun 12. Feb tfc: W4EAT 386, AB4E 296, K4IWW 191, KI4YV 146, KE4JHJ 87, W3HL 85, AA4YW 83, AC4DV 52, K4AIF 38, KE4AHC 37, W4IRE 35, WA4SRD 34, AB4W 31, KF4OZF 24, NT4K 22, WD4MRD 20, KF4VDW 19, W4CC 14, KE4YMA 8, KB4USN 6, KF4PAK 6, KR4ZJ 6, KT4CD 6, WA4ZWC 6, K2EZX 4, KF4YHG 4, W4DYW 4, N2JLE 3, KB8VCZ 1.

SOUTH CAROLINA: SM, Les Shattuck, K4NK—ACC: AE4JZ. OOC: N4ENX. SEC: K8AFP. TC: KM4TN PIC: K4LEO. Greetings and thanks to all that sent me cards and notes during my stay at the hospital and my recuperation. I had heart attack on Feb 25 and they went in and cleared me out the next day. After many years as an ARRL OBS station Bill, WT4F, has asked to resign. Citing health reasons, bill has done more than his share. Our hats are off to Bill! Charles Campbell, AI4CC, has offered to take Bill's place , thanks and welcome aboard. If you've noticed my signal has been down on the SC SSB net, I lost my 75-meter antenna and have yet to find a young fellow to skinny up my tower. Joyce's little ICOM 706 rig is still giving us great fun on 6 meters, worked Michigan the other night. That's the news from here. How about news from your station? I keep asking for tid bits, if you want something covered just write or call me. Remember my e-mail is **K4NK@aol.com**. Tfc: (Feb) KA4UIV 110; W4DRF 94; KA4LRM 74; KT4SJ 55; KT4FP 38; WA4UGD 35; WD4BUH 19; KA4SLQ 17; W4CQB 16; KQ4SY 9; K4GDL 9. PSHR this month to KA4UIV, KA4LRM and KT4SJ.

VIRGINIA: SM, Lynn Gahagan, AF4CD—ASM: W4TLM. SGL: KK4IY. TC: W4IN. OOC: KR4UQ. PIC: W2MG. STM: AF4CD. SEC K4EC has appointed W4IN Ed Foreman, as the Area "C" ASEC. Ed will be busy reorganizing this area which covers Districts 1 through 5. Also the SEC will be doing some realigning of the districts as to which area they will fall into. The late winter storms have been keeping the section's SKYWARN people busy. NC and VA spotters teamed up recently with the Wakefield NWS to track tornadoes which ran from NC through VA The response from ARES/RACES members throughout Districts 6 & 7 (and the North Carolina crew through Doug) was truly outstanding. I would like to thank all involved for their help. It's heart-warming to have organizations such as NWS and K-9 Alert to tell us Amateur Radio is appreciated and the great work we have been doing for them. Morris Jones, NM4R, after many years of service to ARES has decided to step down as the DEC 3 of Charlottesville/Albemarle. Morris held this position since 1980. Thanks Morris for your many years of service to the VA. Section. Dave Damon, K4DND, EC Charlottesville/Albermarle Co. has accepted the DEC 3 position and also remains the EC. A surprise SET was held in D13 in March. Over 100 hams supported this SET and all were in place at the shelters and EOCs in less than 48 minutes from the time of the first call-up. This is a huge district that stretches for miles. Many thanks to Bob Ham DEC 13 and everyone in D13 that participated on that cool and rainy Saturday. Giles Co. has really come to life! All of you have done an outstanding job! At the Winterfest ARES meeting KR4UQ and K4EC discussed and answered questions about the new RACES ID cards and tags. (For more details go to **www.aresva.org/** Va.ARES News) For those who attended the meeting free gel cell batteries were given away to anyone who wanted one. Also I presented our SEC, Frank Mackey with a "Certificate of Merit" for his outstanding work in completely turning around the VA. Section's ARES/RACES program. This is one of the highest awards that I can give out as SM. Thanks again Frank! On Feb. 25th Earl Evans, KE4NBX, of Gloucester DEC 7 headed up a reorganization meeting in Hampton. The main topic was to help the City of Hampton get their ARES/RACES program up and running. ARES members from all over D13 came out to help support Hampton. This is what it's all about "Team Work." Tfc:K4DOR 704, K4MTX 320, KR4MU 232, W4CAC 198, WA4DOX 177, K4YVX 122, W4UQ 116, KE4PAP 83, WB4ZNB 81, AA4AT 78, WB4UHC 50, KE4NYY 44, W4YE 44, K0IBS 38, AF4CD 36, K4IX 31, W3BBQ 29, N4ABM 26, W4JLS 20, WA4JSW 18, K4ISM 16, KF4HJW 12, W4HDW 11, KB4CAU 6, W4TZC

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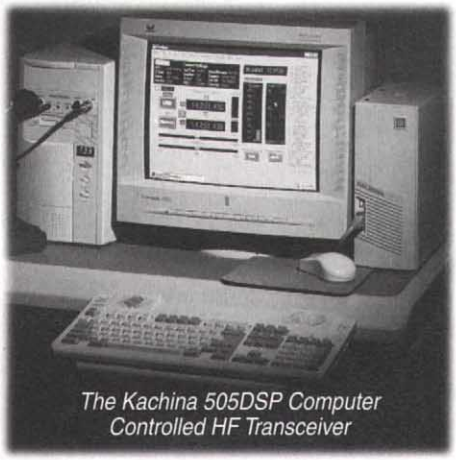

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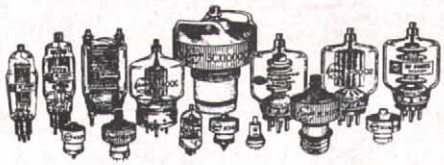

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ROCKY MOUNTAIN DIVISION

COLORADO: SM, Tim Armagost, WB0TUB—ASM: Jeff Ryan, N0WPA. SEC: Mike Morgan, N5LPZ. STM: Mike Stansberry, K0TER. ACC: Ron Deutsch, NK0P. PIC: Erik Dyce, W0ERX. OOC: Karen Schultz, KA0CDN & Glenn Schultz, W0IJR. SGL: Mark Baker, KG0PA. TC: Bob Armstrong, AE0B. BM: Jerry Cassidy, N0MYY. Bob, AE0B has returned as Section Technical Coordinator. Thanks to him for volunteering and congrats on his re-appointment. Nice to see everyone at the ARA Swap in Brighton where, even though it was February, we were all walking around in shirt sleeves. I see many familiar faces at most of the Front Range swaps—if you haven't been to one, you're missing a good time. I frequently attend just to visit with friends. I heard on the statewide ARES VHF Net that the City/County of Denver is going to be looking for Amateur Radio support for Y2K—word is they want about 100 hams to staff all city emergency service locations. District 13 can't do it alone, so ascertain your own district's needs. Then, if you can help out in Denver on New Year's Eve, let Mike, N5LPZ, know via your local EC. Metro area ARES groups: now's the time to gear up recruiting efforts. Hams in Arapahoe, Douglas and Elbert counties participated in the 1999 regional Odyssey of the Mind competition. A job well done and it looks like they'll be asked to do regional and state meets next year. The MS-150 bicycle tour is coming in July and is one of the largest public service events in Colorado. IF you're in Arapahoe, Douglas, El Paso or Fremont counties and want to help, listen to the state ARES Net Sundays at 8:00 AM local time. Do you have an item for this column? You can send e-mail to me at **n0wpa@arrl.net**. 73, de N0WPA.

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 122 msgs with 1125 checkins. New Mexico Breakfast Club handled 201 msgs with 1023 checkins. Yucca 2-mtr Net handled 16 msgs with 793 checkins. Caravan Club 2-mtr Net, handled 5 msgs with 68 checkins. SCAT Net handled 14 msgs with 584 checkins. Four Corners Net handled 31 msgs with 485 checkins. GARS Net handled 4 msgs with 44 checkins. Rusty's Net handled 87 msgs and 638 checkins. Valencia Co Net handled 9 msgs with 32 checkins. Boy, we have never seen a February this warm. We don't know what happened to our winter, but we have certainly had wonderful weather. Now we can get ready for forest fires around the state. It is so dry already that we have had several grass fires. Unless we get some moisture, we are in deep trouble. Will be attending a Y2K meeting with several state officials to explain what we amateur operators can do to help in the event of a problem. The NM State Police have reported 4 SAR missions in the ABQ District for February. We are so very sorry to report the passing of N5OBL, a longtime friend and member of the ABQ DX Club. Don't forget the ABQ Spring TailGate April 24 and the Mesilla Valley Bean Feed, April 25. Very best 73, W5PDY.

UTAH: SM, Jim Rudnicki, NZ7T—Greetings. Many times, we hear of hams who work long and hard behind the scenes for the benefit of ham radio. Sometimes, we find out about them too late, and never get to say thanks. Here's one case: Van Nichols, N7PYV, became a Silent Key this past Feb 20th. After his death, I learned about how active he had been in Navy MARS, and that he had spent many long hours behind the scenes. Van will be sincerely missed. In other news, by the time you read this, Daryl Duffin, NU7X, should be well on his way to recovering from surgery this past March. Hopefully he will be back working on DCARC repeaters real soon. Also this past February, Davis County ARES responded to a train derailment in Woods Cross. Evacuation centers were established, along with an incident command center. As the County EC Hall Blankenship, KC7RAF put it: "This was definitely a wake-up call for both local city leadership along with all ARES personnel." He's right. Be ready! That's all from Utah. 73 de NZ7T.

WYOMING: SM, Bob Williams, N7LKH—We have reached the time of the year when the subject becomes the State Hamfest and the various Ham Picnic campouts around the Wyoming Section. The first is the Wyoming State Hamfest in Casper on May 29-30 at the Hilton Inn with programs, swap tables and VE testing. Next is the Glacier-Waterton International Hamfest at Three Forks Campground south of Glacier National Park on July 16-18. Then comes the Meadowlark Ham Picnic on August 19-22 at Willow Park next to Meadowlark Lake in the Bighorn Mountains. Finally, there is the High Plains Roundup on September 9-12 at Yellow Pines Campground in the mountains between Cheyenne and Laramie. In the meantime, remember that communicators are needed to support the Tour de Wyoming Bicycle Tour between Dubois and Laramie on July 25-30. It was fun to work last year and this time should be even more so. The planning will be a topic of discussion at the State Hamfest. Net Reports for February: Cowboy- 820/0, Jackalope-302/0.

SOUTHEASTERN DIVISION

ALABAMA: SM Bill Cleveland, KR4TZ—ASMs: N4ZNO KB4KOY KT4XA KT4JW KX4I KA4PKB KC4RNF. STM: WB4GM. BM: KA4ZXL. SGL: KE4RPX. ACC: K4LI. Hello. As you know by now, I replaced Scott Johnson (N4YYQ) as the Alabama Section Manager. Scott had to leave because of job and family requirements. If you haven't done so already, say thanks to Scott for hanging in there as long as he did and for the fine job he has done. I would like to congratulate Buddy L. Smith, KC4URL for being the new Emergency Coordinator (EC) for Marshall County. With the spring storm season upon us, our section is ready and able to serve our community. If you do not participate in ARES or a local emergency net, please think about joining their effort. Contact your local EC and volunteer your services. If you don't know your EC and you would like to participate, contact me at 334-661-3892. I hope everyone enjoyed the Birmingham Hamfest. As usual, they did a fine job at a new location. I would like to thank all those that participated in the annual Anniston Army Depot Chemical Exercise. Also, I am planning to have a state-wide section meeting. Hopefully, someone knows of a place centrally located in the state. Please call me with your suggestion. 73, Bill, KR4TZ. Tfc: WB4GM 335, W4PIM 183, W4ZJY 129, W4CKS 115, WA4GQS 82, KL7Q 59, KC4VNO 49, KU4IJ 42, W4ZBA

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GEORGIA: SM, Sandy Donahue, W4RU—ASM/So GA: Marshall Thigpen, W4IS. ASM/Legal: Jim Altman, W4UCK. SEC: Tom Rogers, KR4OL. STM: Dick Baxter, K5TF. SGL: Charles Griffin, WB4UVW. TC: Eddie Kosobucki, K4JNL. ACC: Jud Whatley, W4NZJ. OOC: Monroe Gaines, KF4NXD. PIC: Chuck Calmbacher, AD4JU. Our numbers are growing. In March, the Georgia Tech ARC graduated a ham class that produced 12 new amateurs. Usually a class might produce one or two new hams. Are young people getting hooked on ham radio again? Congrats to new club in Watkinsville, the Oconee County ARC. Don't forget the Statesboro Hamfest on May 15. Yes, it is Dayton's weekend but Statesboro is much closer. June 5 is the Atlanta Hamfest at Jim Miller Park, Smyrna, followed by hamfests in Albany and Rome on June 12. In March we had a leadership meeting for the Metro Atlanta District of ARES. District ECs, the SEC, and yours truly, met in DEC, KS4EL's office to chart ARES progress. Thanks to the warm hospitality of the Ellijay ARC when I was there recently for a club talk. ACC, K4SZ was there also. I have an informal presentation called "The Gospel According to the ARRL" which is available for any club within an hour or so from Atlanta. I will be at the Carrolton ARC, May 11. Several clubs in the Peach State will be helping with the communications for Sunrayce '99, a competition among solar-powered cars, which will pass through Georgia on the way to Florida in late June. Moultrie ARC and GA Tech ARC are two clubs I know about that are helping. No traffic totals this month, we will double up next month. 73 Sandy.

NORTHERN FLORIDA: SM,Rudy Hubbard, WA4PUP—ASM-APRS: WY8O. ASM-Youth, KO4TT, ACC: WA4B. BM: N4GMU. OOC: WB4GHU. PIC: KF4HFC. SEC: WA4NDA. SGL: KC4N. STM: WX4H. TC: KO4TT. Packet: N4GMU. The National Hurricane Conference is to be held week of March 21st. I know this will be in *QST* after the date, but hopefully, the amateurs in the Orlando and surrounding area will have attended the workshop on March 30. The Governor's Hurricane Conference will be held in Tampa around the June 1. The amateurs are urged to attend this workshop. The Orlando Hamcation was better, as the forum was well attended. The group seemed more interested and concerned about the various programs of the League. Several of the staff appointees were present, and answered many questions, and expressed support for the Northern Florida Sections' operations. The clubs were well represented and held discussions with the ACC WA4B. The OOC, WB4GHU, came in late, but the OO program was discussed as the FCC is now focusing on enforcement. The Chairpeople of the Hamcation, particularly Tim Starr, and Ken should be commended for their outstanding efforts. It is a pleasure to work with people that go all out to make things pleasant and enjoy the activites. The Northern Florida Section Staff congratulates these fine gentlemen for their efforts. Duval County in the FI Crown District now has two ECs: WA4RGO, and N4RYX. Both of these fine gentlemen have been former ECs, and I know they will do a terrific job. It is good to welcome them back. The 42 hams participated in the Blue Angel Marathon with the US Navy in Pensacola. 1057 runners also participated. The Navy has expressed that the marathon could not be done without the hams. The Florida Governor has been invited by the Lake Monroe Amateur Radio Society to participate in Field Day. At this time, no commitment, but let's hope he does attend. 73, de Rudy. Tfc: WX4H 1348, KE4DNO 840, KE4OAV 395, NR2F 379, N0ZO 334, KE4PRB 283, WB8NER 174, N4ORZ 137, AD4DO 132, KF4TOX 116, KF4TM 77, KF4NFP 73, AF4GF 68, W4KIX 53, W5MEN 53, KF4GUA 52, WB2FGL 50, AD4BL 47, KJ4HS 43, WA4EYU 37, WA4PUP 36, KB4DCR 35, WB2IMO 30, KC4FL 27, AB4PG 19, N4GMU 11, N4JAQ 11, K4VRS 10, WB9GIU 8, KM4WC 6, W8IM 6, WX4J 5, KF4YHK 4.

SOUTHERN FLORIDA: SM, Kevin "KB" Bunin, 561-496-5257—ASM/STM: KA4FZI, 941-574-3467. ASM for Youth Activities: WB9SHT 561-336-5608. SEC: W4SS, 561-967-1477. Asst SECs: WB2WPA 941-775-2397, KD4GR 954-778-0775. TC: KI4T, 954-791-4275, BM: KE4WU, 941-465-8176. PIC: WA4ATF, 813-733-9441. OOC: WB4GHU 941-665-6708. ACC: W3BLW 813-541-2895. SGL: KC4N 904-385-5924. Pkt Mgr: KB4VOL@N4EXO. The National Hurricane Conference in Orlando will be history by the time this is published. The Amateur Radio Operators met on March 30, 1999, between 1 PM and 5 PM. Manny Papandreas, W4SS, helped organize and participate in the conference. The Governor's Hurricane Conference will be in June. Gary Arnold, WB2WPA, is organizing the Amateur meeting (workshop). More next month. The Veterans' Hospital Radio Club, KF4VEX, has applied for league affiliation (K2GNZ). Richard Gallant, KF4HVT, was appointed the Training Specialist for Palm Beach ARES/RACES. He organized and held a training session at the new EOC on working together taught by Sean Smith, K9SRT, and net procedures and NTS traffic handling. South County held the same session at Florida Atlantic University one-week later organized by Ron ,W2DO, and John, KE4IDW. Harry Pilafian, W4SQG, reports Dade County ARRL ARPSC was active with 15 to 20 radio operators at the Odyssey of the Mind state competition. Operators participating in OM were Camillo, KQ4AI; W3AKI, Frank; KF4GQC, Althea; WA2OMT, Randy; N4PBF, Rick; W4SQG, Harry; N4TCW, Lee; K4VSC, Virgil; and KB4ZQU, Audrey. Tampa ARC, W4DUG, has established its own e-mail reflector for its members (KT4JJ). The Platinum Coast ARS is planning a Hamfest on September 11-12, 1999 (KI4TG). The Palm Beach Repeater Assoc. is holding a Hamfest October 16-17, 1999 (KD4CTG). The Sarasota ARS plan ahead with a Hamfest on January 15-16, 2000 (KI4ZJ)! The Charlotte ARS is planning a hamfest in the near future, but no date has been selected yet (KE4IM). Lakeland ARC member Walt Farley, K4QE, took First Place, Florida, CW, Low Power in the Florida QSO Party (K4LKL). The next Florida QSO Party is the last full weekend of April 1999. Joe Pirkle, AD4IH (Lakeland), has been nominated for the ARRL 1998 Herb S. Brier Award (Education Radio Instructor). STM, KA4FZI, Phyllisan West, is looking for more Station Activity Reports (SAR) each month. The Southeast Florida Traffic Net is holding a contest for message origination and attendance (KD4GR/KB4WBY). The ARRL Information Net (AIN) meets Saturday Mornings on 3.940 MHz at 7:30 AM.

or right after the FPTN, whichever occurs first. The South Florida ARES Net (SFAN) meets after AIN at 8:00 AM on the same frequency. 73 de K4PG. Tfc: WA9VND 626 (BPL), K4FQU 605 (BPL), KA4FZI 479, K4SCL 405, W7AMM 308, KB4WBY 286, KC4ZHF 252, KD4HGU 165, KD4GR 150, WA4EIC 125, K4PG 121, KD4JMV 115, KE4IFD 114, WB4PAM 109, KJ4N 84, WA4CSQ 58, K4RBR 57, W4DL 47, KT4XK 42, AA4HT 40, AA4BN 33, W4WYR 22, W6VIF 9, K4OVC 7, K4ENA 6, W3JI 4, AA4WJ 4, KF4QEL 4, (January AA4HT 115, AA4WJ 5).

VIRGIN ISLANDS: SM, John Ellis, NP2B—St Croix, ASM: Drew, NP2E. St Thomas. ASM: Mal, NP2L. St John. SEC: Vic, WP2P. St Croix. PIC: Lou, KV4JC. St Croix. ACC: Debbie, NP2DJ, St Thomas, NM. Bob VP2VI/W0DX, Tortola. The 3rd annual "8 tuff mile race" from Cruz Bay to Coral Bay on St John was held on Saturday, Feb 27. Members of St. John ARC providing communications from the start, finish and at many watering stations were: NP2L Mal, NP2DQ Scotty, NP2JC Bill, KP2CN David, N3RDL Jody, W0NB Jim, KE3QL Marie, NP2IW Terry, NP2FO Sam, and KP2G George. Tnx KP2G for report. "Team Ritty" starring Drew, NP2E; Ron, KP2N; Bernie, NP2W; Nick, W5TTY; Pete, NP2DZ & Bert NP2GM scored high with some 2.3 M points. Tnx, NP2E, for report. Good work, Guys! Lou, KV4JC, has new Web site, **http://www.viaccess.net/~kv4jc**. Site is maintained by Jeanette, NP2C, XYL of NP2B. Check out the pix including Nikko, the net mascot! VI repeaters, 146.63 St. John, 146.73 Tortola, 146.81 St Thomas, 146.91 & 147.25, St Croix. 73 to all, John, NP2B.

SOUTHWESTERN DIVISION

ARIZONA: SM, Clifford Hauser, KD6XH—This last month has been very busy, and it was not Amateur Radio. I had to spend 10 days in Torrance on business and this interrupted many other activities. The Yavapai ARC operated a special event station on February 14, 1999, from Sharlot Hall Museum in Prescott. This was to celebrate Arizona's statehood day. Radio Society of Tucson operated a special event station on March 13, 1999, from the SR-71 and JFK's Air Force One airplane located at the Pima Air Museum. Also, the spring hamfest was very well done. We have a new ARRL Affiliated Club here in Arizona. The Venture Out Amateur Radio Association in Mesa has been approved for Club ARRL affiliation. For those people who like to surf the Web, try this Web site, **www.ac6v.com**. This has a lot of good information from HF to UHF, to include active DX-expeditions. I have been using it to keep up with several activities. The ARRL member's only Web site is also a good source of information. Mr. Hollingsworth, of the FCC, is still active on the HF bands, and has been very helpful in stopping interference and illegal activities. Most of us will say, "Keep up the good work." I have mailed out the revised list of Amateur Radio club listings to each of the clubs. If your club has not received a new mailing from me by now, please contact me and I will make the necessary corrections. The Southwest Division Convention for 1999 will be held in October on the first weekend (01-03) in Long Beach, California, on the Queen Mary. Don't forget the Sierra Vista Hamfest on May 1 1999. I plan to be at this event and hope to see you all there. Fort Tuthill Hamfest is coming up in July. I have started making the rounds to various clubs to give presentations. Contact me if your club would like me to attend one of your meetings. 73, Clifford Hauser, KD6XH. Tfc: K7VVC 586, AB7NK 212, W7EP 115.

LOS ANGELES: SM, Phineas J. Icenbice, Jr., W6BF – FCC action against the high priority violators of our rules has now started on the West Coast. Those of you who have wanted FCC action can now realize that action is finally taking place. You can be involved, if your favorite FCC violator is not listed among the top 10 of the FCC's hit list, your vote may help put his or her name there. You can send an e-mail directly to the FCC, or talk to K4ZDH, Riley Hollingsworth, on 75 meters SSB. Riley is doing a great job for the Compliance and Information Bureau of the FCC. See details in *QST* or issue #9 of that great up-to-date news publication, *World Radio*, March 1999. FCC e-mail can be sent to Riley, K4ZDH, at **rholling@fcc.gov**. Help with interference problems is always available from our expert OOC (official observer coordinator) Joe Provenza, W6UPN, who has a new e-mail address. **w6upn@net 999.net**. I have been a great promoter of the"Differential GPS" System design since 1978. My research and publication of technical papers about system accuracy show that the measurement of time-delay is the key element to accuracy. This paper was presented in June of 1978, in anticipation of the emphasis shift from the Naval Navigation Satellite System to GPS. GPS offers much greater versatility and shorter measurement response-time, which many applications require. This paper *Transit Position Accuracy Extrapolated to GPS*, was presented at the "Institute of Navigation," 34th Annual Meeting in Arlington, VA. APRS questions may be sent to our Section Emergency Coordinator Hank, K6YMJ or his right-hand man and Cellular Engineer Dennis, KA6GSE. APRS users may not fully appreciate the subtle difference between "Differential GPS" and plain GPS. Measurement errors can be many meters vs. a few centimeters for over-line-of-sight distances. Plus, differential measurements can negate many different types of accuracy degradation. You may have noticed that the Coast Guard is using differential GPS, now. Traffic totals for our two most reliable traffic handling volunteers: Jerry, AD0A, 163 and Hank, W6SX, 34. Our LAX Web site is **qsl.net/arrlsw/lax** use it and keep it up-dated. 73 de W6BF, Phineas.

ORANGE: SM, Joe H. Brown, W6UBQ—ASMs: Riv Co-Joe, KO6XB, 909-685-7441. Org Co-Art, W6XD 714-556-4396; SB Co-James, KE6LWU, 909-824- 2454. Sec News/PIC-Gwyn, KE6JOF, 909-685-7441. SEC Ted, N6RPG, 909-947-1769. All clubs need volunteers for Field Day! Don't forget to register early and get your Early Bird pen for the '99 S/W Div Conv, *Queen Mary*, Long Beach, CA. Or Sec Tech Coord, Art Sutorus, KQ6HF, writes that on Fri, 10/1/99, a series of Conv Side Meetings will be held aboard the *QM*. The OR Sec has been assigned the responsibility for formulating an agenda and conducting an hour-long meeting at 2 PM for the SWD Technical Coordinators, Specialists and interested persons. The new officers for Lee DeForrest ARC are pres, Mat, N6WQH; vp, Glen KD6NZV; sec, Bob, KA7VJD; and tr, Mark, KE6KOE. Congrats! CA State Govt Liaison for RACES, Ed, N6IIE, advises State RACES members at the Patton Station, Paul, N6IID; Harv, WB6CZT; Ed, N6IIE; Jim, KD6RRP; and Alan

KD6NXF, from County RACES have been helping the Calif School for the Deaf in Riverside set up their Em Radio Station. Penny Valentine, KF6KSE, Dir of Student Support Services is in charge of the operation and has been instrumental in getting the station set up. OCCARO is sponsoring a booth at the OC Fair, July 9-July 25, and CLARA hopes to have enough volunteers for an entire "CLARA Day." CNARC recognized Scott N6CLU, as their 1998 Ham-of-the-Year, and awarded their pres, Ed, KE6DQL; with the "Ground Loop Award" for the most unrepeatable event in 1998. STM N6GIW reports for Feb 99: Tfc totals: KC6SKK 161, W6QZ 90, KO6RZ 85, KJ6NK 60, N3IVO 15, AD6HR 63, KD6EYI 21. Digital tfc: W6QZ NTS BBS 243. N6GIW NTS MAILBOX 97. PSHR: W6QZ 129, KC6SKK 128, KC6SKK 128, AD6HR 86, KO6RZ 84. SCN/V Net Mgr, KO6RZ, reports 28 Sess, QNI 240, QTC 99. Check into NTS each eve at 9 PM on 146.820, neg offset, no PL. A vital training for H/W tfc. Vy 73, KE6JOF for W6UBQ.

SAN DIEGO: SM, Tuck Miller, K6ZEC, 619-475-7333. The Amateur Radio Club of El Cajon will be hosting ARRL night on May 13 at 7 PM. Southwestern Division Director Fried Heyn, WA6WZO, and Vice Director Art Goddard, W6XD, and I will be in attendance to answer any questions you might have regarding the American Radio Relay League. We have special events coming up where we could use YOUR help! The Special Olympics Greater Games will be held in June, and about 25 operators are needed each day for communications. The El Cajon Club traditionally handles the Sunday event, so it would be great if one of the larger clubs would help out and take over the Saturday event. Listen to 146.265 every Sunday evening at 7 PM to the ARES net to keep informed of all upcoming events. The North Shores Club meets the 1st Tuesday of each month, 7 PM at the South Clairemont Rec Center. The Southbay Amateur Radio Society has lost a long-time member, Jim Murphy, KK6KZ, who became a Silent Key on March 7. Jim was very active as a Volunteer Examiner, and also as an instructor for the SOBARS ham school. Ian Thurston KE6CBL, a Technician was heard on 20 meters during March, however he was operating on his job with the Coast Guard. He was helping a ship in distress. Tom, N6JOJ, Eric, W6LKK and Galen, N6YBK, have advised me that they will be happy to handle any estate sales at no cost. Ham items will be sold at the Santee Swap meet and all monies will be given to the family. Southwestern Division Convention on the *Queen Mary* in Oct. Tfc: KT6A 798, KD6YJB 275, WA6ODQ 238, KD4WMI 9, KO6BU 2. BPL: KT6A 798. PSHR: KT6A 138, WA6ODQ 128, KD6YJB 94. Until next month. Remember, Helping Others.....Always Worthwhile!! 73, Tuck, K6ZEC

SANTA BARBARA: SM, Rob Griffin, K6YR, 805-543-3346 & **k6yr@arrl.org**—SEC: Jack Hunter, KD6HHG. AAC: Michael Atmore, KE6DKU. BM: (vacancy). OOC: Tom Perkins, KD6BXM. PIC: Jeff Reinhardt, AA6JR; TC, Warren Glenn, KM6RZ; ASMs: Don Milbury, W6YN. DECs: SB - Dave Lamb, WA6BRW; SLO - Bill Peirce, KE6FKS, & Ven - Dave Gilmore, AA6VH. The Section Emergency Communications Leadership, under the new SEC, Jack, KD6HHG, held a successful meeting at the SBARC Station in the Red Cross Building in Santa Barbara on March 6. ECs not able to attend, contact your DEC for details of discussions. The Ventura County ARC publishes a consistently fine newsletter under the chief editing of Jack, AD6AD. Jack is the senior club editor in the Section and has set high standards for all editors to attain. Jack began editing for VCARC in 1992, and has decided to turn the job over to a successor. Jack: well done, OM! We hope your travel plans pan out very soon. Speaking of the VCARC, they have a traded in K6MEP for W6VC, thanks to Don, W6YN, ASM. Check out the Santa Barbara Section Web Site: **qsl.net/arrlsb**. QNI SCN/SB NTS Net:PM 147.000+ (131.8), 224.90-(131.8) & 448.875-(100). PSHR/Tfc: K6YR 176/307 KE6MIW 100/39 KF6OIF 155/- & KM6RZ -/6.30, K6YR.

WEST GULF DIVISION

NORTH TEXAS: SM, Don Thomas, KA1CWM—SEC: K5UPN. STM: KC5OZT. TC: W5CWO. BM: KB5YAM. SGL: N5GAR. OOC: WB5UDA. ASMs: W5GPO, K5RE, W5FB, KK5QA, KK5NA, KC5ECM, AD5X. **http://www.lsic.net/net/ntexas.html** Please note that W5IWE is missing from the list of the Section's ASMs. Ray Hennington, has been an ASM for many years and contributed greatly to the organization, ARRL and ham radio in general. Ray has asked to be relieved from his ASM position and we certainly respect his wishes, but reluctantly. He will be missed, however you can bet that Ray will continue to help us in the section, even though it may be in an unofficial capacity. Thank you, Ray, for all of your years of service and dedication to the hobby. Added to the list is another fellow that is not a stranger, having held the position of ASM and SEC in the past and currently holds a DEC position. We are referring to Charlie Byars, W5GPO, who lives in Wichita Falls and will be taking care of things in the far northwest portion of the section. Also being added is Jess Freer, KD5ECM, who lives in Brookstone and will be taking care of things in the Northeastern Part of the section. Jess, currently holds an EC position in Lamar County. Phil Salas, AD5X, is another new ASM and will be involved with the Corporate Clubs in the Richardson, Telecom Corridor area. Please welcome these new appointees. Section Bulletin Manager Don Mathis, KB5YAM, is always looking for active, interested people to appoint as Official Bulletin Stations. It is an interesting and essential position, so contact Don on e-mail at **dmathis@lsic.net** and he will fill you in on all of the activity and requirement of a OBS. Well, I hope everyone has been saving their money getting ready for all of the good buys on new equipment at the annual big event in North Texas HamCom. We urge all of you to spend time with your on-the-air friends and make this annual event a happy one for each of those attending. Also, I urge all of you to take a few minutes out and visit as participate in as many of the programs as possible. Especially would like to see all of you attend the ARRL Forum and visit with ARRL Officials, Director Jim Haynie and Coy Day, the new Vice Director, and the North Texas Section Personnel. If you can't attend the forum, drop by the ARRL booth and say hello! Traffic: (Feb 1999) KB5WEE 182, KC5OZT 148, K5MXQ 143, KC5VLW 128, WA5I 84, KC5QGI 80, KB5TCH 77, KB5YAM 72, K5UPN 27, KC5SMC 10, KD5AHW 8, KF5BL 2, N8QVT 1. Congratulations to N5JZ, James Dye, who qualified for Brass

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OKLAHOMA: SM, Charlie Calhoun, K5TTT—ASMs: N6CL, K5CPZ. SEC: W5ZTN. STM: AB5RV. ACC: KB5BOB. PIC: WA9AFM. OOC: K5WG. SGL: W5NZS. TC: KB5RV. I really enjoyed my trip to Elk City for their hamfest. Got to meet a lot of neat people and look forward to it again. Field Day will be coming up soon, so be sure to send me information on your operation as I will be touring the state visiting as many sites as I can. The City of Moore Department of Emergency Management and Communications and Cleveland Co SKYWARN (a joint effort of SCARS and OUARC) sponsored a successful National Weather Service weather spotter school at the Moore-Norman Technology Center on March 9. RCWA will be having its annual antenna contest and picnic at CLAREMORE LAKE, May 29, 1999. Our thoughts and prayers are with Al West, AB5WK. His wife Sandy, KD5BNP, unexpectedly became a SK in February. Donations are being accepted to help defray the cost of funeral expenses and can be sent to PO Box 8863, Altus, OK 73521. The Broken Arrow Club now has an online presence. There is a lot of interesting information located at **http://clubs.yahoo.com/clubs/okham**. The Enid ARC will hold their annual tailgater party this month. Hams across Oklahoma should be interested in State Bill 671, which, if passed, would allow hamfests, and other NPOs to legally raffle prizes to raise money. For more information check out the Web site. **http://www.busprod.com/k5ttt** That's it for this month. 73, Charlie.

SOUTH TEXAS: SM, E. Ray Taylor, N5NAV—ASMs: NR5ED, N5WSW, W5GKH, K5DG, N5LYG, WA5UZB, KK5CA, WA5TUM, KB5AWM, WA5JYK, K5PFE, and K5SBU. STM: W5GKH. SEC: K5DG. ACC: N5WSW. PIC: KA5WSS. TC: KJ5YN. BM: W5KLV. OOC: W5JAM. SGL: KM5HY. Here it is May and since my last SM news we had flooding on the Sabine River. The Red Cross called K5SUB for communications assistance in the Newton County, as they began evacuating 148 people into shelters. Assisting K5SUB were K5VY, KA5VMF, KK5GV, WA5LFS, W5UHG, W5GKH and N5NAV. N5ECP and N5UOA were on standby in Houston with their mobile communication unit. February 20 was another short- lived disaster, when a cable was cut near Houston, causing 7 counties to be without phones, and cell phone service. That surprised me. I thought cell phones would never fail and would replace ham radio. KJ5ZU called me after he was alerted on Navy MARS at 12:15. We brought up a net on 7290 that lasted until 15:59. Assisting hams were AB5X, N5SCR, N5SKB, N5SRC, N5YEM, KB5WEE, and WC5AAH. The last few days in February, we had smoke-filled air in Comal County as 3000 acres burned. The Red Cross was called in to set up shelters. KC5NUW, N5DAR, KB5ZZV, and REACT provided the communication links. March 2 a tornado touched down near Nacogdoches, with 2½ -inch hail stones, destroying 3 chicken houses, reported by AC5Z and KB5WEE. Later that night tornadoes ripped Jasper apart, damaging or destroying 24 homes. At this date, I have not received a report as to the hams involved. I do hope none of the hams had any damage. The South Texas hams have really made themselves known for public service. This is one reason I think HB1345, The Texas Tower Bill for Hams, went through committee so easily. You say what is HB1345. For those that are not aware, we all owe our gratitude to Karl Silverman, N0WWK, for being alert enough, when The Ham Tower Bill went through in Virginia, to contact his State Representative, Gray, and presented her with a bill to allow hams to have antennas in the communities that violate Federal Law PRB-1. Rep. Gray not only introduced the bill but she got it put on emergency status. I want to thank those who were there for the Committee hearing and spoke in behalf of ham radio. They were N0WWK and his wife, K5UCQ, WA5AAO, N5OUJ, W5WIA, N5LF, KD4HNX, WB5AOH, AB5EK, and KC5LJZ. It still has to go through the House and Senate. I spoke to Jim Robinson, K5PNV, at the Emergency Management Conference, he will try to get the bill through the House without a vote, to rush it along. We sure need this in the State of Texas. I hope to see you at the 7290 picnic, April 24, 25, and 26. K5VY is the new net manager of TTN, and will have our yearly meeting on Saturday at the 7290 picnic, at 1 PM. Let's all be there and support him. N5KQZ became a Silent Key March 7. Tfc: W5YQZ 587, NR5ED 361, W5SEG 297, W5KLV 243, KA5KLU 167, N5NAV 135, W5GKH 97, W4RRX 95, N5OUJ 68, W5ZX 66, WA5FXQ 56, K5UCQ 49, K5VY 37, KD5GM 16, N5LF 9, KG5CX 8, N5HK 4, N5JUU 3.

WEST TEXAS: SM, Charlie Royall, WB5T, 915-944-0469, **cnroyall@wcc.net**—ASMs: Cley, K5TRW; Ron, KB5HGM; Jerome, K5IS; Fred, W6VPI, Sandy, W5MVJ. SEC: Alex, N5LRH. OOC: John, KO5D. OBM: Frank, N5WT. This column is dedicated to Floyd Gravitt, W5ERT. Licensed since 1936, Floyd has been a part of NTS for over 50 yrs. He's also a WW II vet-Army Air Corp, POW 3 yrs, and survivor of Batan Death March. Other news: I'll be your SM another 2 yrs. Persons holding field appts will continue uniting the section and provide service to all area hams. Canyon Hamfest was good for a first-time event. Enjoyed meeting old friends and making new ones! Ref Sec newsletter contest, most improved is *The Relay*, WTARC, Odessa, Tom McCain, KC5ETW, Edtr. Best newsletter is *The KiloWhat*, SAARC, Glenn Miller, AA5PK, Edtr. Congratulations Editors! Keep the newsletters coming in; we're looking for winners for 2000! Check the new West Gulf Div Web page at **www.telepath.com/n5ok/txant.html**. Four new hams in Feb: Gilbert Sadler, KD5GIN, Pampa; Pat Wittle, KD5GJV, Snyder; Steve Troxel, KD5GHM; and Carlos Soto, KD5GHL, El Paso. Welcome!

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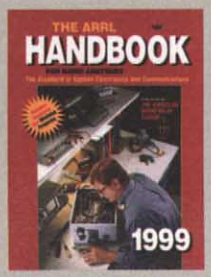

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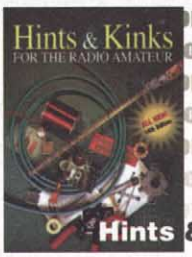

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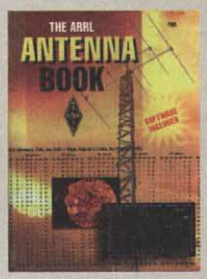

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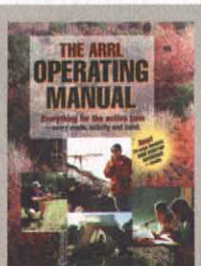

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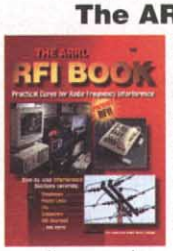

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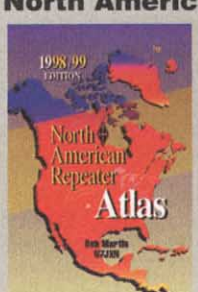

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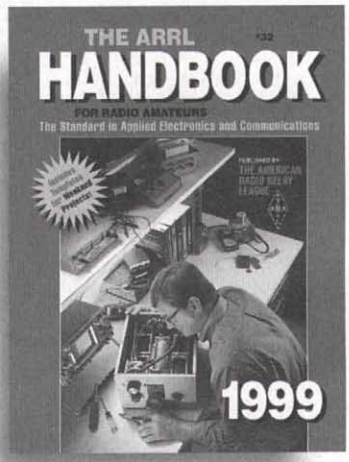

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1) Advertising must pertain to products and services which are related to Amateur Radio.

2) The Ham Ad rate for commercial firms offering products or services for sale is $1.00 per word. Individuals selling or buying personal equipment: ARRL member 50¢ per word. Non-ARRL member $1 per word. **Bolding** is available for $1.50 a word.

3) Remittance in full must accompany copy since Ham Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8½" x 11" sheet of paper.

4) Send ads to: the ARRL, 225 Main St., Newington, CT 06111 ATTN: Ham Ads. Or via fax 860-594-0259 or e-mail: hamads@arrl.org Payment must be included with ads (check or any major credit card accepted).

5) Closing date for Ham Ads is the 15th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received April 16th through May 15th will appear in July *QST*. If the 15th falls on a weekend or holiday, the Ham Ad deadline is the previous working day. Please contact Robin Micket, N1WAL at 860-594-0231 for further information.

6) No Ham Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

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SPRINGFIELD, ILLINOIS SVRC HAMFEST, Saturday June 5, Illinois State Fairgrounds. 100,000 square feet of covered flea market, open 6 AM, dealers open 8 AM, testing 9 AM. Tables $5, tickets $5. Contact Ed Gaffney, KA9ETP, 13997 Frazee, Box 14A, Divernon, IL 62530. 217-628-3697 or egaffney@fgi.net

THE ARRL LETTER — The League's news digest for active amateurs, professionally produced and edited and now available in weekly electronic edition via the World Wide Web at http://www.arrl.org/arrlletter

THE Veteran Wireless Operators Association, a 74-year old, non-profit organization of communications professionals invites your inquiries and application for membership. Write VWOA, Edward Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863. Visit our web site for activities, history, membership: http://www.vwoa.org

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TELEGRAPH MUSEUM/COLLECTOR'S INFORMATION: http://w1tp.com

TELEGRAPH: PERERA'S COLLECTOR'S GUIDE: $12 ppd. Artifax, Box 88-Q, Maynard, MA 01754. http://home.fiam.net/tfrench/artifax.htm

WANTED: BC-375 or BC-191 transmitter. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

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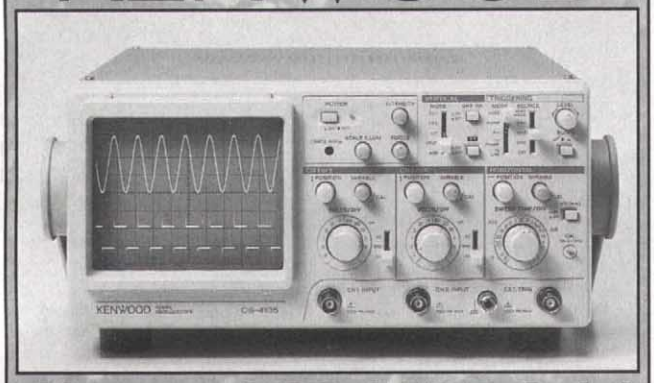

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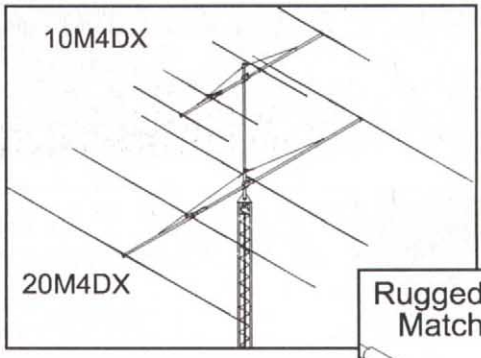
12M4DX	24' 6"	8.6 dBd	28 lb	$399
10M4DX	24'	8 dBd	20 lb	$399



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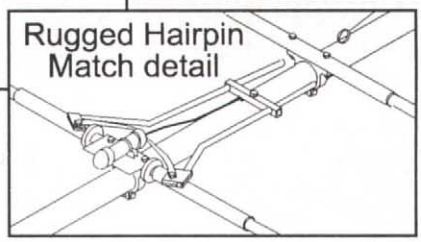

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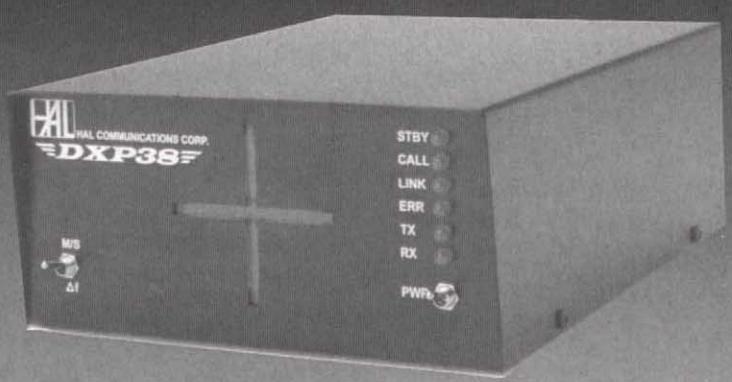

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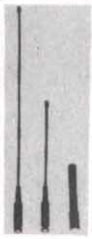

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MFJ-1734 *Dual Band* Glass Mount

MFJ-1721, $14.95. 2 Meter *UltraLite™* weighs 2 ounces and has tiny but powerful 1 1/8 inch diameter mobile magnet mount. Thin 20 inch stainless steel whip bends to fit smallest briefcase. 9 feet of thin RG-174RU mini coax with BNC.

MFJ-1722, $18.95. 144/440 MHz dual band *UltraLite™*.

MFJ-1734, $39.95. *Glass Mount* dual band antenna is easy-to-install on glass windows. 26 inch stainless steel removable radiator adjusts for angled surfaces. Handles 50 Watts. Low SWR. Has 12 feet coax, cleaning pad, mounting hardware, SWR tuning tool. Free BNC handheld adapter.

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Window clip mounts your HT duck antenna outside on top edge of your rolled-up car side window. Your duck radiates effectively and is firmly held in place. Works with all HTs with BNC. 10 feet flexible mini coax.

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HM-102 wattmeter, $35; Heath coax switch, $20; two Heath Cantenna 50-ohm resistors, $5 each; 137 WXFAX preamp, $10; homebrewed antenna tuner, $20. Buyer ships. Paul Pagel, N1FB, ppagel@arrl.org; tel. 860-594-0296, 8 AM-4 PM EST.

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MOSLEY .....The Tradition *"A Better Antenna"* M.E.I.

Mini Mono 3 Element Beams For 10 or 15 Meters

MB-10, MB-15

Specification and Performance Data

Forward Gain:	10 Meter	
	15 Meter	**Call**
Front-to-Back:	10 Meter	
	15 Meter	
Power Rating:	CW	.5 KW
	SSB	1.2 KW
SWR at frequency:	1.0/1 to 1.6/1	
Boom Length:	10 Meter	9'
	15 Meter	12'
Turning Radius:	10 Meter	6' 10"
	15 Meter	9' 10"
Mast Size:		1-1/4
Maximum Element Length:		
	10 Meter	10' 11"
	15 Meter	16' 11"
Assembled Weight:	10 Meter	6 lbs.
	15 Meter	10 lbs.
Wind Surface Area (sq.ft.):		
	10 Meter	1.30 sq. ft.
	15 Meter	2.09 sq. ft.
Wind Load (EIA, 80 M.P.H.):		
	10 Meter	28 lbs.
	15 Meter	42 lbs.
Shipping Weight:	(UPS Oversize	35 lb. rate)
Warranty:		2 Years
Price: MB-10		$119.95
MB-15		$159.95

Mini and MY-Series Mast Plate

The MB-Series gives you a reduced size single frequency antenna for 10, or 15, Meters. On average, the overall size of the antenna is reduced by 34%. This gives you a very low profile and a very light weight antenna, which can be rotated with a TV rotor.

The MINI-33

A Very Small Tri-Band Beam

This is the ***SMALLEST*** true beam performing antenna for 10, 15, and 20 meters.

Use a roof mount and a TV rotor for a great time on 10, 15, and 20 meters. Bring back the fun to ham radio with the Mini-33 and a 100 watt transceiver, without all of the room and headaches required for larger installations.

Specification and Performance Data

Gain:	10M	
	15M	**CALL**
	20M	
Front to Back: (Avg.)		
Power: CW		500 w
SSB		1,000 w
RTTY		250 w
AM/FM		250 w
Turning Radius:		8' 9"
Longest Element::		16.8'
Sq.Ft.:		2.5sq.ft.
Wind load:(@ 80 M.P.H.)		38 lbs.
Assembled Wt.:		10 lbs.
Mast Size:		1-1/2"
Coax:		RG-8/RG-213
Boom:		1.25" x .058" x 6'
Tubing: (Drawn)		6061T6/6063T832
Warranty:		2 Years
Shipping:		UPS/Oversize
Price:		**$339.95**

All of the Mosley antennas use stainless steel hardware, are pre-drilled, color coded, and have a 2 year warranty. Mosley, "A Better Antenna"

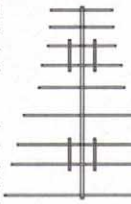
(–... ...–)

Web Info: ***Mosley-Electronics.com***

Mosley VHF/UHF

The "2N6"

Get "two" beam antennas on "one" boom. This is an excellent 5 element 2 meter beam and a 4 element 6 meter beam all in one! The 2N6 uses two separate feed lines, which allows individual use, but only requires one mounting system!



The 2N6 is rugged built. Made out of aircraft tubing and uses stainless hardware and 1/4-20 stainless U-Bolts. The antenna is pre-drilled and color coded, which makes assembly a "snap"! Check it out!

Specification and Performance Data

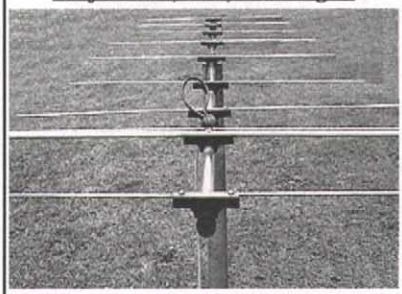
Forward Gain:	6 Meter	
	2 Meter	**Call**
Front-to-Back:	6 Meter	
	2 Meter	
Power Rating:	CW	1.5 KW
	SSB	3.0 KW
SWR at frequency:		1.0/1 to 1.6/1
Boom Length:		14 ft.
Turning Radius:		8' 9"
Mast Size:		1-1/2"
Maximum Element Length:		9 ft. 8"
Assembled Weight (approx.):		21 lbs.
Wind Surface Area (in sq. ft.):		2.5 ft.²
Wind Load (EIA standard 80 M.P.H.):		50 lbs.
Shipping Weight (approx.):		35 lbs.
Price: (Regularly $449.95)	Sale:	$309.95

"A" Series, SIX Meter Mono Band Beams

Specification and Performance Data

A-503-LS		3 Element
Forward Gain:		**Call**
Front-to-Back Ratio:		
SWR at resonance:		1.1/1
Max. Element Length:		9 ft. 9 in.
Boom Length:		6 ft.
Turning Radius:		6 ft. 5 in.
Matching:		Gamma
Wind Load:		1.3 sq. ft.
(EIA standard 80 MPH):		22 lbs.
Assembled Weight:		7.5 lbs.
Price:	Sale!	$79.95
A-504-LS		4 Element
Forward Gain:		**Call**
Front-to-Back Ratio:		
SWR at resonance:		1.1/1
Max. Element Length:		9 ft. 9 in.
Boom Length:		12 ft.
Turning Radius:		7 ft. 5 in.
Matching:		Gamma
Wind Load:		1.65 sq. ft.
(EIA standard 80 MPH):		31 lbs.
Assembled Weight:		12.5 lbs.
Price:	Sale!	$119.95
A-505-LS		5 Element
Forward Gain:		**Call**
Front-to-Back Ratio:		
SWR at resonance:		1.1/1
Max. Element Length:		9 ft. 9 in.
Boom Length:		14'
Turning Radius:		8' 6"
Matching:		Gamma
Wind Load:		1.85 sq. ft.
(EIA standard 80 MPH):		39 lbs.
Assembled Weight:		17 lbs.
Price:	Sale!	$124.95
A-506-LS		6 Element
Forward Gain:		**Call**
Front-to-Back Ratio:		
SWR at resonance:		1.1/1
Max. Element Length:		9 ft. 7 in.
Boom Length:		24 ft.
Turning Radius:		12 ft. 10 in.
Matching:		Gamma
Wind Load:		2.15 sq. ft.
(EIA standard 80 MPH):		49.5 lbs.
Assembled Weight:		21.5 lbs.
Price:	Sale!	$229.95
A-507-LS		7 Element
Forward Gain:		**Call**
Front-to-Back Ratio:		
SWR at resonance:		1.1/1
Max. Element Length:		9 ft. 10 in.
Boom Length:		28 ft.
Turning Radius:		18 ft. 6 in.
Matching:		Gamma
Wind Load:		2.85 sq. ft.
(EIA standard 80 MPH):		51.0 lbs.
Assembled Weight:		29.5 lbs.
Price:	Sale!	$299.95

Mosley Ultra Light Weight, Low Profile 144, 220, 440 Yagis.



Shown is an earlier MY-144-9, which had been up for 26 years in the mid-west and is in no need of repair, except for new coax!

The Mosley MY-Series VHF/UHF beams are capable of 80 mph winds and 1KW of output power, but are ultra lightweight and low square footage. These antennas are perfect for stacking above your existing system without hardly increasing the wind load on your tower or mounting system. The MY-Series of antennas are also great for chimmey or othe light mounting sytems. These antennas can be turned with a standard TV rotor.

For just a few dollars you can have a complete VHF/UHF "super station" without going broke, and as with all Mosley antennas the MY-Series comes with a two year warranty, stainless hardware and aircraft boom tubing and 6061T6 element rods.

The MY uses a folded dipole driven element, which gives you excellent bandwidth and a consistent radiation pattern. Our driven element was designed over 40 years ago and just in the past few years other manufacturers have discovered the value of it's design and have started using the Mosley concepts. ***Mosley...still "A Better Antenna!"***

Specification and Performance Data

Model:	MY-144-5	MY-144-9	MY-220-9	MY-430-14
Freq.	144 to 148	144 to 148	220 to 225	430 to 450
Power Rating:				
AM/CW/FM	1 KW	1 KW	1KW	1KW
SSB	2 KW	2 KW	2 KW	2 KW
Forward Gain:				
dipole				
isotropic		**Call**		
F/B:				
Feed Pt.:	52	52	52	52
SWR:	1.0/1	1.0/1	1.0/1	1.0/1
Matching:	Folded	Folded	Folded	Folded
Elements:	5	9	9	14
Longest El.	3' 5"	3' 5"	27"	15"
Boom:	4' 6"	9' 0"	8' 2"	6' 10"
Mast Size:	1"/1-1/4"	1"/1-1/4"	1"/1-1/4"	1"/1-1/4"
T. Radius:	2' 10"	4' 10"	4' 2"	3' 10"
Wind Area (sq. ft.):	0.4 ft.²	0.8 ft.²	0.7 ft.²	0.66 ft.²
Wind Load (EIA 80 MPH):	6.6 lbs.	10.5 lbs.	7.0 lbs.	7.0 lbs.
Assembled Wt:	2.0 lbs.	3.5 lbs.	3.5 lbs.	3.5 lbs.
Shipping Wt:	(Oversize 35 Pound Minimum UPS charge)			
Warranty:	2 Yrs	2 Yrs	2 Yrs	2 Yrs
Price:	$49.95	$69.95	$69.95	$59.95

"You can't get a better dollar value, than you can with these antennas advertised in this ad. I have put together a group of products that will meet the increasing needs of low profile, light weight, durable, great performance, and reasonably priced. These antennas will give you years of enjoyment on the bands.

For those of you that have been using Mosley products over the last 60 years, we still have parts that will allow you to bring that Mosley up to "Brand New " status. Just contact our parts department and they will be glad to help you. Thanks for your continued support!" K0VUW, President.

To review our current catalog and price sheet, check out our Web page! Or call or write to: Amateur Sales Department, to receive our current catalog.

(Prices do not include shipping, handling or insurance charges. Prices, materials, and specifications are subject to change without notice or obligation.)

Mosley Electronics, Inc., 1325 Style Master Drive, Union, Missouri 63084
Eng. (314)-583-8595 Fax. (314)-583-0890 Sales (800)-325-4016 or (800)-9-MOSLEY or (Web) Mosley-Electronics.com

608 Gordon Baker Rd. Willowdale,
Ontario, Canada Zip: M2H-3B4
STORE: (416) 490-8865
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VISA AMERICAN EXPRESS

Toronto Surplus & Scientific Inc.

APRIL 1999

****SHIPPING IS NOT INCLUDED IN THESE PRICES, PLEASE CALL FOR RATES.****

"RARE" ROCKWELL-COLLINS HF 2050
COMMERCIAL COMMUNICATIONS RECEIVER

Continuing the tradition of fine professional communications receivers designed and built by Rockwell-Collins Canada. The HF 2050 covers 14kHz-30MHz and features a built-in speaker, DSP, noise blanker, squelch, up to 30 memories, 3 speed 10Hz tuning resolution, keypad for data entry, scan, variable AGC, extensive built-in self test, and a large liquid crystal alpha-numeric display. Very Collectable!!
Price: $3000.00 Including operation/service manual. These are fully tested and burned-in.

HARRIS RF 131-122
EXCITER

It features digital tuning with remote control capability from 2-30MHz. Modes of operation are U/LSB, compatable AM, CW, and ISB.
Price:good condition $750.00ea

HARRIS RF 601A
ANTENNA COUPLER GROUP

Ruggedly designed to meet any weather conditions head-on. This 1kW manual/automatic coupler is solidly constructed and pressurized with inert nitrogen gas. It covers 2-30MHz & comes with the RF-601A/C coupler control unit. No expense was spared at $12K a piece original gov't cost!
Price:good clean cond..... $1,150.00ea
Dirty and scratched but ok $750.00ea

HARRIS RF 551A
PRE/POSTSELECTOR

Covers 2-30MHz via frequency controls on front panel or it can be remotely controlled via digital interface (installed). These units have an average 5dB gain and exhibit excellent rejection outside of the selected frequency. Good Condition!!
Price: $325.00 Quick functional check only.
2Pc's for $595.00 (Fix it yourself, as-is:$145)

HARRIS RF-590
RECEIVER

This receiver meets MIL-STD-188C. This unit *has it all* starting with 1Hz tuning resolution over the entire bandwidth, AGC time constant and BFO offset. The following full compliment of Collins mechanical filters are included: 3.2kHz, USB/LSB/ISB, 16kHz FM, 1.0&0.3kHz CW, 16/6 and 3.2kHz AM. AGC modes are: data/slow/med/fast, in addition it's fully remote controllable via RS-232 or RS-422. All RF-590's are fully checked, burned-in and guaranteed for 30 days.
Very good condition.....$2,250.00
Selected Excellent condition.....$2,750.00
RF590A's give us a call!!!

CAL ASTRONAUTICS
MOBILE SATELLITE "COM" STATION

This is a box chock full of high-end technology. The terminal features a back-lit 4 line LCD display and illuminated keys; one of the transceiver's most impressive features is an "L" Band 1.6 GHz (can be modified for 1296MHz) 60 watt amp and helix antenna with built-in LNA. We consider this the ultimate gadgeteers goodie pack" with all kinds of RF satellite ground technology inside. Best of all they operate on 12VDC. Installation manual supplied (but, there is no subscriber data). Used, good condition, untested.**Price: $185.00ea. or 2 units for $295.00**

NOVA ELECTRIC CORP
GALAXY 2KW INVERTER

These inverters are brand new, unused in the original carton. Input voltage is 22-34Vdc 140A max, output voltage is 120Vac @ 20.8A 60 Hz. These are high efficiency, sine-wave inverters with full logic interface. Great for back-up power!!!
Price: new unused.....$925.00ea

CUBIC-RT1393 HF TRANSCEIVER	$2,900.00
EDDYSTONE RECEIVER 1830	$750.00
IFR 1500S SERVICE MONITOR	$7,450.00
HF 8014A EXCITER	$3,200.00
HF 8023 POWER AMPIFIER	$3,000.00
HF 8032 POWER SUPPLY	$1,500.00
IFR-1200S SERVICE MONITOR	$6,995.00
RF 110A/124 1 KW POWER AMP	$1,750.00
RF-230 100W TRANSCEIVER	$2,500.00
RF 550 HF RECEIVER	$750.00
URC 101 VHF/UHF TRANSCEIVER	$1,900.00
WJ-8716 HF RECIEVER	$2,000.00
WJ-8718 HF RECIEVER	$1,750.00
WJ-8888-12 HF RECIEVER	$2,250.00
WJ 9040 DUAL HF RECEIVER	$2,450.00

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Orders must be prepaid by guaranteed instrument.
Please call if you have any questions.

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www.torontosurplus.com

Manuals available at extra cost.

TS-940SAT $1300, IC-735 (new) $600, SX-117 HT-44 and supply all new $300 U.S. VE6ALN, 6508-87 Ave., Edmonton, AB T6BOL4 Canada.

TUBES for sale, all kinds. Send SASE for price-availability. K9GTK, 2932 W. 99th St., Evergreen Park, IL 60805. Phone/fax 708-423-0528. Email: tivas@xnet.com

TUBES WANTED: Highest prices paid or will trade for all types of industrial, receiving and transmitter tubes. D & C Electronics, 3089 Deltona Blvd., Spring Hill, FL 34606. 800-881-2374.

TUBES WANTED: I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 MacArthur Blvd., Oakland, CA 94602. 510-530-8840.

VHF-UHF-ATV-Microwave. Please visit http://www.parabolic.se. 73 de sm6cku@parabolic.se

VIBROPLEX BUGS with NY address wanted for private collection. Especially want bugs with beige or brown base, 2.5" or 3" wide base, gray base with red knobs, or S/N under 100,000. Other old or unusual keys and bugs and collections from estates wanted. Randy Cole, KN6W, 4540 Fairway, Dallas, TX 75219. 214-521-7041 or cole@netcom.com

W-51 TRI-EX telescoping tower 3 section, self-supporting with HAM IV rotator. Asking $1400. Located near Fort Worth, TX. Carl, K5ROR, 817-579-9555, e-mail: k5ror@juno.com

WANTED: Drake 2B. Very clean. Frank, KB0W, 916-635-4994. frankdellechaie@sprintmail.com

WANTED: Electronic estates, hi-fi, broadcasting. Cash paid. KB8CCY, 419-782-8591.

WANTED: Globe King 500 B or C, Viking Valiant II, Viking Ranger II or Viking 500, clean and working. Frank, KB0W, 916-635-4994. frankdellechaie@sprintmail.com

WANTED: Hi capacity 12 volt solar panels for repeater. kk4ww@fairs.org or 540-763-2321.

WANTED: IC-375H w/manual in good condition. Fair price paid. Reply to pwsharry@bellatlantic.net, 201-933-1727, WB2YZB.

WANTED: Icom IC-970, must be in mint condition, non-smoker. Also wanting Icom sales brochures for IC-970, IC-275, IC-475, IC-575. Randy Ballard, N5WV, 903-687-3002.

WANTED: Info-Tech M300C keyboard. E-mail: tkqr30a@prodigy.com. Phone 301-622-9513. W3QBK.

WANTED: OLD 70's COMPUTER MAGAZINES, Popular Electronics and Radio Electronics 1974-76 $4/issue; Interface Age etc. any pre-80's $2/issue. Steve Gabaly, 607-625-5221. old_computers@yahoo.com

WANTED: OLD 70's COMPUTERS, Altair 8800 $500-$1000+, Mark-8 $2000, Sceibi-8H $2000 or please email what you have and price. Steve Gabaly, 607-625-5221. old_computers@yahoo.com

WANTED: Palstar AT4K antenna tuner. NA6J, 209-966-2405.

WANTED: Tubes. Nobody pays more or faster than us! Mike Forman, 1472 MacArthur Blvd, Oakland, CA 94602, 510-530-8840.

WE FIX BROKEN RADIOS! 18 years experience repairing and aligning Kenwood, Icom, Yaesu, Atlas equipment. International Radio Service, 1118 Raymond Ave., Fort Pierce, FL 34950. intlradio@juno.com. 561-489-6302. www.qth.com/irsd

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CHIEF ENGINEER Needed at Cleveland Medical Devices: Our innovative company develops microcellular voice/data patient monitor systems and other MicroRadio™ products. **Director of Engineering** position in Cleveland, Ohio offers project, design team, and business leadership with strong salary and future stock compensation. We need a "master designer" with BSEE (MSEE and/or MBA preferred), 10 plus years relevant experience with emphasis on wireless design and management, outstanding communication skills, record of innovation, and entrepreneurial attitude. See www.clevemed.com or our ad in www.CareerMosaic.com. Send resume (text or Word) to: Bob Schmidt, President: rschmidt@clevemed.com, jvanalek@clevemed.com, fdacus@clevemed.com

WANTED FOR SUMMER OF 1999: Instructors in electronics, ham radio, computers and all other sciences. Small boys' science camp in Pennsylvania. Apply: Donald Wacker, P.O. Box 356, Paupack, Pennsylvania 18451. 570-857-1401.

CABLE X-PERTS, INC.

JAKE wants you to spruce up your station with this MAY 1999 "FEATURED CABLE SPECIAL!"

RG8/U strd BC foam 95% braid UV resistant jkt USA made. PL259 (Silver, Teflon, Gold Pin) connectors installed soldered & tested.
Lengths: 150ft $64.95, 100ft $44.95, 75ft $34.95, 50ft $24.95. Buy ONE or any combination of these ready-made lengths and enjoy "FREE FREIGHT" (within the 48 states only).

Free Freight valid on this special only. Shipping applies to all other destinations and products listed herein. Sorry NO COD's. Illinois residents add 8.25% state sales tax.

JAKE hopes Dayton is warm.

COAX (50 OHM"LOW LOSS" GROUP)

	100FT/UP	500FT	1000FT
"FLEXIBLE" 9913 STRD BC CNTR FOIL + 95% BRAID 2.7dB@ 400MHz NC/DB/UV JKT...	.58/FT	.56/FT	.54/FT
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	.79/FT	.78/FT	.77/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

COAX (50 OHM "HF" GROUP)

	100FT/UP	500FT	1000FT
RG213/U STRD BC MIL-SPEC NC/DB/UV JACKET 1.2 dB/2500WATTS @ 30MHz	.36/FT	.34/FT	.32/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	1.25/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

LADDER LINE GROUP

	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
1806 18GA STRD 6/COND PVC JACKET Recommended for Yaesu Rotors	.23/FT	.21/FT	.19/FT
Quick disconnects: PS308 KIT (JONES 8/C M/F), or PS309-KIT (JONES to AMP ROUND M/F)... Or we can install either pair for $22.95.	$7.95/pr.		

ANTENNA WIRE (UNINSULATED BARE COPPER)

	100FT/UP	500FT	1000FT
14GA 168 STRD *"SUPERFLEX" (great for Quads & Portable set-ups etc.)*	.14/FT	.12/FT	.10/FT
14GA 7 STRD *"HARD DRAWN" (perfect for permanent Dipoles etc.)*	.10/FT	.08/FT	.06/FT
14GA SOLID *"COPPERWELD" (for long spans etc.)*	.10/FT	.08/FT	.06/FT
14GA SOLID *"SOFT DRAWN" (for ground radials etc.)*	.10/FT	.08/FT	.06/FT
ROPE: 3/16" DOUBLE BRAID *"DACRON"* 770# TEST WEATHERPROOF	.12/FT	.09/FT	.08/FT

FLEXIBLE 2/COND RED/BLK DC POWER "ZIP" CORD

8GA (rated:40 amps)	25FT $16.00	50FT $31.00	100FT $60.00
10GA (rated:30 amps)	25FT $10.50	50FT $19.00	100FT $36.00
12GA (rated:20 amps)	25FT $8.00	50FT $14.00	100FT $26.00
14GA (rated:15 amps)	25FT $6.00	50FT $10.00	100FT $18.00

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COAX CABLE ASSEMBLIES

with USA made Silver/Teflon® Gold Pin PL259 connectors.

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
150ft $99.95 100ft $69.95 75ft $54.95 50ft $39.95 25ft $24.95 6ft $12.95 3ft $11.95

RG213/U strd BC Mil-Spec NC/BD/UV JKT. 1.2dB 2500 watts @ 30MHz.
150ft $69.95 100ft $49.95 75ft $39.95 50ft $29.95 25ft $19.95 6ft $11.95 3ft $9.95

RG8/U strd BC foam 95% braid UV resistant JKT. 0.9dB 1350 watts @ 30MHz.
150ft $64.95 100ft $44.95 75ft $34.95 50ft $24.95 25ft $14.95 6ft $11.95 3ft $9.95

RG8 MINI(X) strd BC foam 95% braid UV resistant JKT. 2.0dB/875watts@ 30 MHz
150ft $34.95 100ft $24.95 75ft $19.95 50ft $15.95 25ft $10.95 6ft $4.95 3ft $3.95 *(3ft & 6ft are China made)*

RG142/U Teflon® 2-95% silver braid 8.6dB 1100 watts. Crush resistant.
18ft $24.95 6ft $14.95

With USA made Silver/Teflon®/Gold Pin male "N" connectors.

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
150ft $110.95 100ft $80.95 75ft $67.95 50ft $54.50 25ft $39.95 6ft $16.95 3ft $15.95

With USA made Silver/Teflon®/Gold Pin PL259 to male "N"

FLEXIBLE 9913 strd BC cntr foil+95% braid 2.7dB 400MHz NC/DB/UV JKT.
6ft $14.95 3ft$13.95

With connectors as noted

3ft RG58/U Right Angle BNC to SO239...$14.95 3ft RG58/U Right Angle BNC to PL259...$14.95
3ft RG174/U male BNC crimp to Male BNC crimp.....$9.95
3ft RG142/U Male SMA crimp to Female BNC crimp.....$9.95
6ft RG8 MINI(X) male BNC to PL259.....$9.95

All terminations are soldered, Hi-Pot® tested @ 5kv for one minute, & completed with UV resistant heat shrink tubing. CUSTOM CONNECTOR WORK TOO. Call for price and delivery.

CONNECTORS

Both connectors fit 9913 types and LMR400 MADE IN USA

PL 259 SILVER/*Teflon*®/GOLD TIP.....10PC $11.00.....25PC $25.00.....50PC $47.50....100PC $90.00
"N" (2PC) SILVER *Teflon*® /GOLD TIP...10PC $32.50.....25PC $75.00.....50PC $143.75..100PC $275.00

For our other connectors and adapters see http://www.cablexperts.com

TINNED COPPER "FLAT" GROUNDING BRAID

1 INCH WIDE (equivalent to 7ga).....25FT $24.00.....50FT $47.00.....100FT $94.00
1/2 INCH WIDE (equivalent to 10ga)..... 25FT $14.00.....50FT $27.00.....100FT $53.00
1/2 INCH x 6FT Copper Plated Ground Rod w/clamp.....$7.00 each

I.C.E. PRODUCTS

180A Beverage/Longwire matching unit.....$39.00/ea
348 Rotor cable Line filter.....$44.00/ea
303U Coax impulse suppressor 8 kW 1.5-200MHz.....$44.00/ea
516R Remote RF power switch for up to 6 antennas.....$184.00/ea
Individual Band Pass Filters.....$35.00/ea

Purchase two or more ICE units and enjoy a 10% discount.
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HELIAX® LDF series from ANDREW® Corporation.

- **Premium electrical performance.**
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- **50 Ω Impedance.**
- **Very Low Loss Foam Dielectric.**
- **Use "N" and/or UHF connectors.**
- **Termination price: $15.00/each.**

CABLE PRICES

Cable	Size	Price/ft
LDF2-50A	3/8"	$1.70
LDF4-50A	1/2"	$2.10
LDF5-50A	7/8"	$5.37

CONNECTOR PRICES

Cable	"N"/Price	UHF/Price ea.
LDF2-50A	$27.00	$41.75
LDF4-50A	$30.00	$27.00
LDF5-50A	$73.00	$70.00

Prices do not include shipping. $20.00 minimum order.

ORDERS ONLY: 800-828-3340

HOURS: M-F 9AM-12Noon, 1-5PM CST.
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TECH INFO: 847-520-3003 HRS: M-F 9AM-5PM CST
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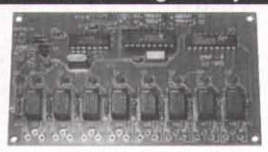
For Complete Catalog, Check Web Site or Mail Request.

CABLE & WIRE CUT TO YOUR SPECIFIC LENGTH • WE STOCK AND INSTALL CONNECTORS TOO.

DTMF decoder board with eight relays

DTMF-8

$119.00
Visa • MC • COD



DTMF-8 is a dual tone multiple frequency decoder board used to control eight devices via radio or other audio source. Four modes of operation: latching, momentary, 1 of 8, and a custom mixture mode make it one of the most versatile DTMF decoder boards on the market today. Use it for repeater operations, home automation, rotor control, video camera switching, anything that requires remote controlling. Password protection against unauthorized entry. Unique board ID allows thousands of devices to be controlled from the same audio source. Comes assembled **with relays.** 4.5" x 2.5". Relays rated at 1 amp (12VDC).

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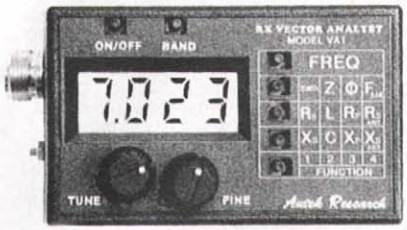

NEW!

VA1 Vector RX Analyst
0.5 to 32 MHz
$199.95 + S/H

The VA1 adds phase detection to our popular RF1

Makes noise bridges obsolete & does more than network analyzers. READS:

- Frequency • SWR • True Impedance • Series R
- Series X • Sign of X • Parallel R • Parallel X
- Series Inductance (L) • Series Capacitance (C)
- Conjugate L&C for Matching • Phase Angle (deg.)

Only the VA1 calculates R/X of an antenna in the air by measuring at the transmitter end of your feedline, and is not limited to 50 ohm line - select any common line 25 to 450 ohms.

RF1 RF Analyst
1.2 to 35 MHz
Frequency SWR True Impendance. RF L & C Can't Be Beat for Basic Measurements
$129.95 + S/H

RF5 VHF Analyst
35 to 75 MHz & 138 to 500 MHz
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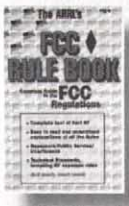

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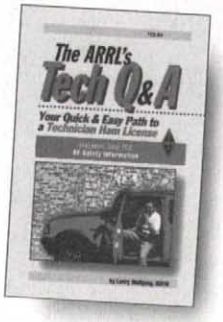

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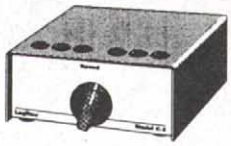

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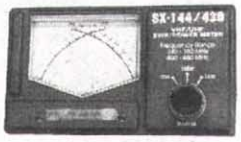

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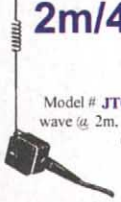

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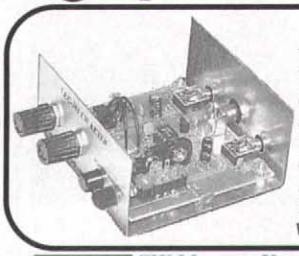

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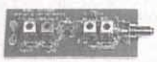
Super CW Audio Filter Kit gives you three bandwidths: 80, 110, 180 Hz. Eight poles gives super steep skirts with no ringing. Pull CW QSOs out of terrible QRM! Plugs into phone jack to drive phones. QRM down 60 dB one octave from center frequency (750 Hz) for 80 Hz bandwidth. Improves S/N ratio 15 dB. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-820K, $19.95.**

Super CW filter/amplifier Kit has powerful 1 watt audio amplifier to drive speaker. Pull CW signals out of QRM with extremely narrow 80 Hz bandwidth without ringing. 8 poles active IC filtering uses cascaded low-Q stages. Razor sharp selectivity. 3 bandwidths: 80,110, 180 Hz. Center frequency: 750 Hz. Up to 15 dB of noise reduction. Auto noise limiter knocks down static crashes, impulse noises. Use 9-18VDC, 300 mA max. 1¾x4 x3½ in. *Simple skill level.* Order **VEC-821K, $29.95.**

Super SSB Audio Filter Kit dramatically improves readability with 8 poles. Optimizes audio bandwidth, reduces sideband splatter, low, high pitched interference, hiss, static crashes, background noise, 60/120 Hz hum. 375 Hz highpass cutoff. 2.5, 2, 1.5 kHz low-pass cutoffs. Plugs into phone jack to drive head phones. Use 9V battery. 1¾x4x 3½ in. *Simple skill level.* Order **VEC-830K, $19.95.**

144/220/440 MHz Low-Noise Preamplifier Kits soup up your antenna system. Helps pull in weak signals. Works wonders for scanner or ham-band receiver. Quality microwave type bipolar device gives great low-noise performance and immunity from damaging electrostatic discharge. 1x1½ in. *Simple skill level.* Order **VEC-1402K** (144 MHz),**VEC-1422K** (220 MHz), **VEC-1444K** (440 MHz), **$17.95.**



High-performance 2 Meter Preamp Kit pulls weak signals out of noise. Solves three reception problems -- boosts signals using a 1-dB noise figure microwave transistor, provides razor-sharp bandpass filtering, eliminates unwanted electrical noises with built-in balun. Uses 9-14 volts DC. Tiny 1½x3x1 in. fits in any size box. *Intermediate skill level.* Order **VEC-1402DK, $59.95.**

2/6/10 Meter FM Receiver Kits let you tune into the world of ham radio. Catch all the action! Each covers the entire FM sub-band and runs off your 9 volt battery. Plug in speaker or headphones for loud clear reception. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-1002K** (2 Meters), **VEC-1006K** (6 Meters), **VEC-1010K** (10 Meters), **$34.95 each.**

2 Meter Monitor Kit receives 144-148 MHz. Low noise, high gain RF preamp gives you excellent 0.1 uV sensitivity. Air variable tuning capacitor has 8:1 reduction. Dual conversion superhet provides selectivity and stability. Automatically eliminates squelch tails. Built-in speaker, squelch, tone, volume controls. 19¼ in. telescopic whip. 9V battery. 2x4¼x4 in. *Intermediate skill level.* Order **VEC-104K, $79.95.**

5 Watt 2 Meter FM transmitter Kit lets you transmit voice and data -- AFSK data (up to 1200 baud) and FSK data (up to 9600 baud). Jumper select reactance or direct FM modulators. Reliable Motorola NBFM transmitter IC and PA transistor. Crystal controlled (x8 frequency multiplication). -60 dBc spurs and harmonics. Use 12-14 VDC, 1.5 amps. 5-pin DIN microphone jack. 1¾x4¾x5¼ in. *Difficult skill level.* Order **VEC-1202K, $99.95.**

All purpose Ni-Cad/Ni-MH Rapid Battery Conditioner Kit safely quick charges expensive batteries -- no overcharging -- many in less than an hour. HTs, cell phones, camcorders, lap top computers. Handles 1 to 12 cells. Charging status LEDs. Discharge before charge function reconditions batteries. Also removes memory effect. Runs on 12-15 VDC. 1¾x4¾x5¼ in. *Moderate skill level.* Order **VEC-412K, $49.95.**

Crystal radio set Kit lets you relive the experience of early radio pioneers. This baby really works! Wind your own inductor, wire up the earliest radio circuit without soldering a thing and listen to the magic of radio that needs no power. Put up an antenna, connect a ground. Stations come in amazingly loud and clear. Includes antenna wire, sensitive earphone. 1¾x5x6½ in. *Simple skill level.* Order **VEC-121K, $19.95.**

Shortwave Receiver Kit lets you listen to the world! Covers 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15 and 13 Meter bands. Explore AM, SSB, CW, WWV, RTTY and Packet signals. Vernier reduction drive, smooth regeneration control, RF stage. *Includes all metal cabinet.* 2 earphone jacks. Use 9V battery. 2½x7x6 in. *Intermediate skill level.* Order **VEC-102K, $59.95.**

Shortwave Converter Kit converts AM or AM/FM radios to shortwave receivers at a push of a button. Hear stations all over the world at various times of the day and year. Choose two 1 MHz bands between 3 and 22 MHz. Popular 13, 16, 19, 25, 31, 41, 49 and 60 Meters international broadcast bands. On/off bypass, NE-602/612 mixer-oscillator IC and tuned input circuit. Use 9 V battery. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-101K, $27.95.**

Aircraft Receiver Kit tunes entire voice aircraft band 118-136 MHz. Picks up air traffic 100 miles away. Track progress of incoming/outgoing traffic in your area, gain advanced weather information, and discover how the National Air Traffic System really works. Great way to learn about aviation. Use 9V battery. Drives external speaker/phones. 1¾x4x3½ in. *Intermediate skill level.* Order **VEC-131K, $29.95.**

AM Radio Transmitter Kit lets you set up your own AM station and broadcast crystal clear programming from your studio with *you* as the disc jockey or talk show host. Play music from CD player, tape deck or other source. Choose clear frequency from 530-1750 KHz. Standard line level or microphone input. Easy to connect to CD, tape deck or mike mixers. Audio level adjustment. Has high level AM modulation for low distortion. 1¾x4x3½ in. *Simple skill level.* Order **VEC-1290K, $29.95.**

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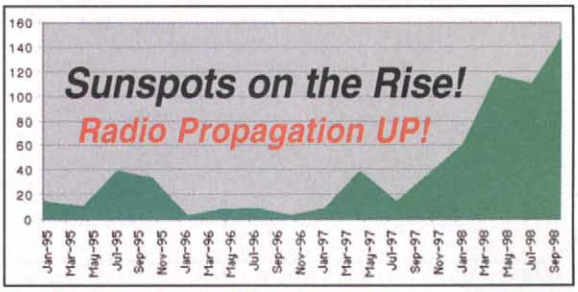

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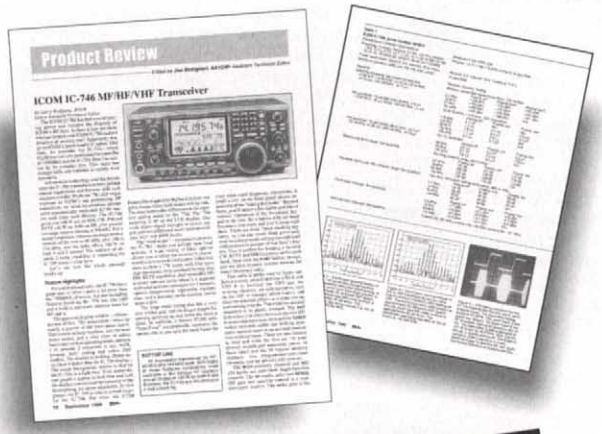

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B-5016-G
$299
Suggested Retail

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*

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35 watts, FM only . . . $69.95

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

MIRAGE Dual Band 144/440 MHz Amp

BD-35
$159.95
Suggested Retail

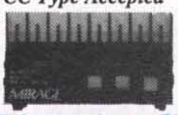
Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	30	40	45	45+	45+	45+	45+
Watts Out (440 MHz)	16	26	32	35+	35+	35+	35+
Watts In	1	2	3	4	5	6	7

- *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

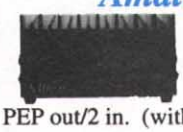


The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 watts out for 10 in. For 1 to 15 watt transceivers.

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.

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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.

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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)

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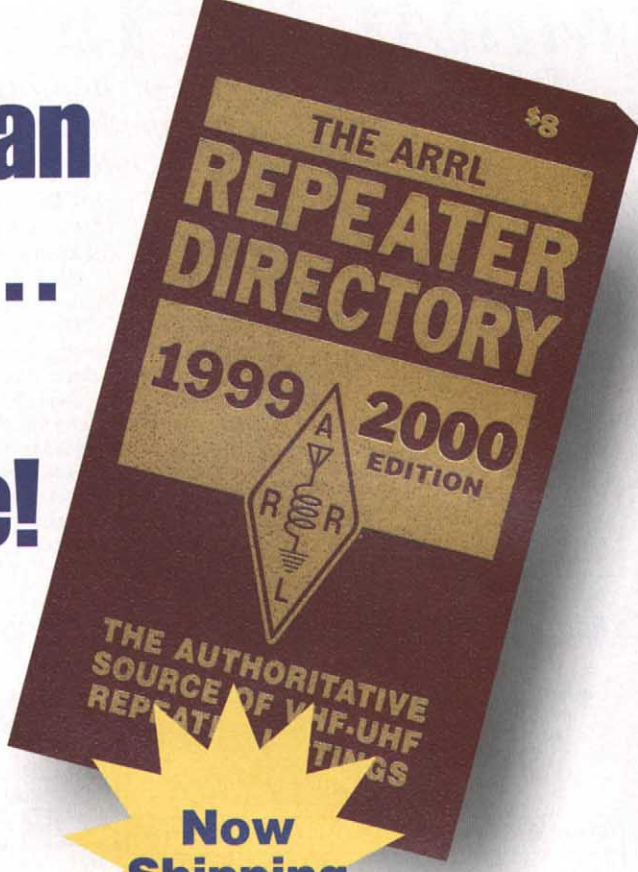

You'll find nearly 21,000 FM voice and ATV repeater listings for North, South and Central America, Europe and the Middle East. The bandplan section has been revised to reflect recent ITU Region 1 changes. Information on repeater general use, locating and dealing with jammers and wilderness protocol are all addressed as well. You'll find lists of ARRL Officers and regional frequency coordinators' contact information.

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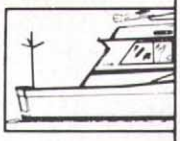

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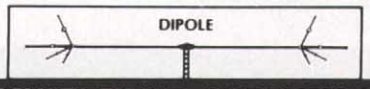

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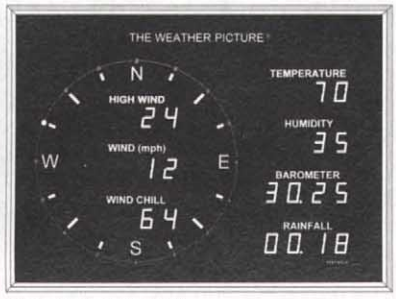

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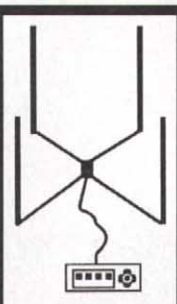

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9140	40 meters	9112	12 meters
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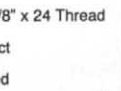

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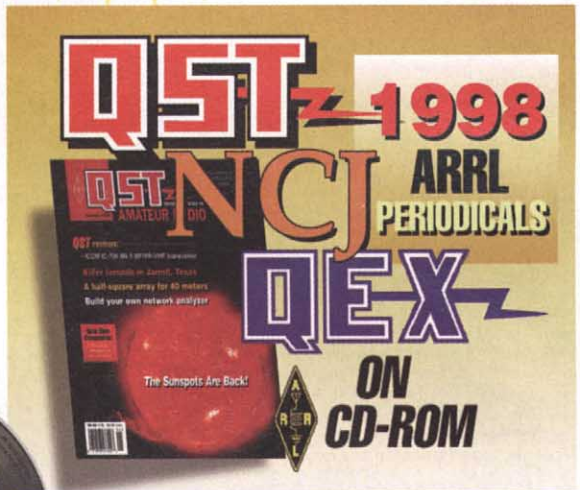

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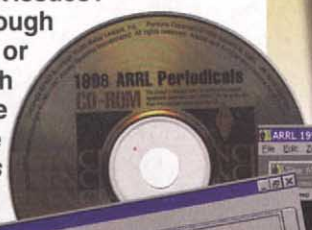

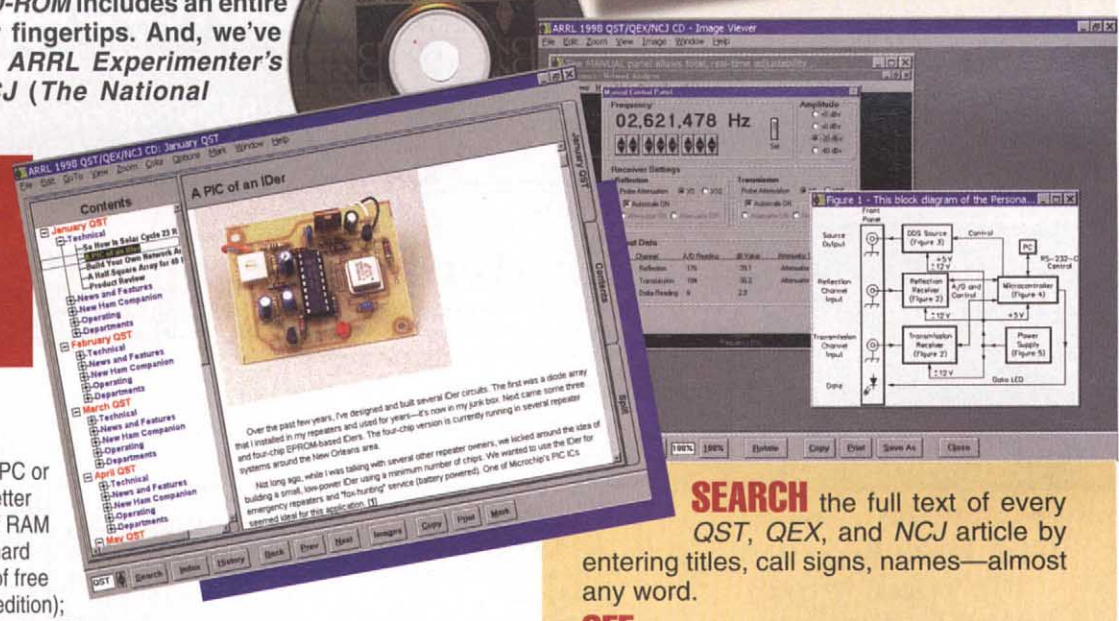

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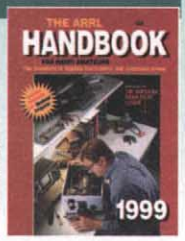

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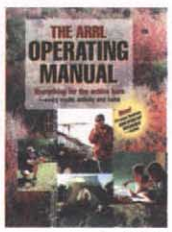

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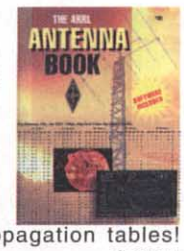

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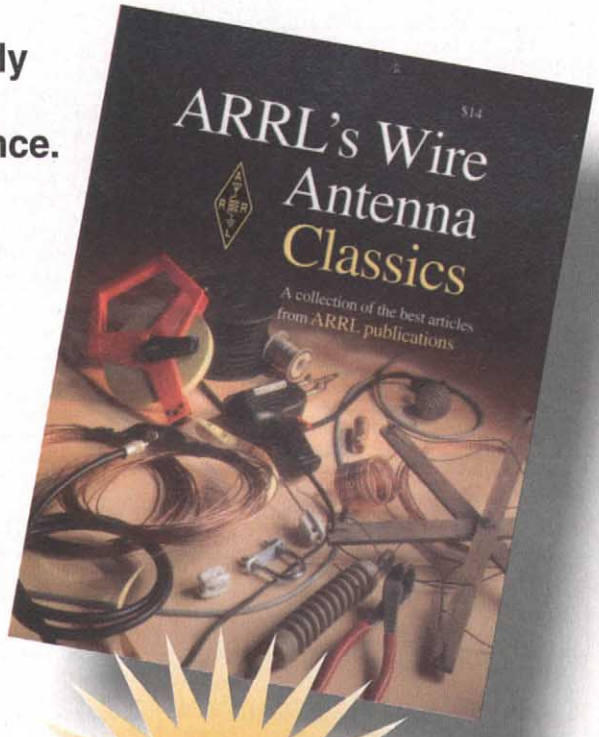

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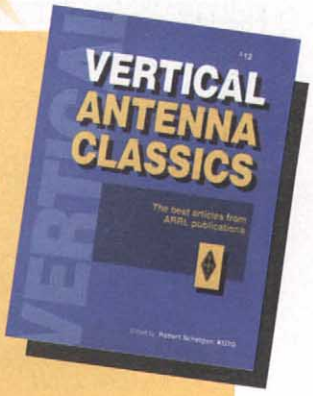

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SG7500NMO/SG7900A	$75/112

More Diamond antennas in stock

MFJ ANTENNAS

259B Antenna Analyzer	$219
1798, 80–2m Vertical	$239
1796, 40/20/15/10/6/2m Vert.	$179
1793, 80/40/20m Vertical	$159
1792, 80/40m Vertical	$145
1788, 40–15m Loop	$399
1786, 30–10m Loop	$349
1780, 14–30 MHz Loop	$229
1768, 2m/70cm Beam	$65
1762, 3 Element 6m Beam	$65

Big MFJ inventory–please call

COAX CABLE

RG-213/U, (#8267 Equiv.)	$.36/ft
RG-8X, Mini RG-8 Foam	$.19/ft
RG-213/U Jumpers	Please Call
RG-8X Jumpers	Please Call

Please call for more coax/connectors

TIMES MICROWAVE LMR COAX

LMR-400	$.59/ft
LMR-400 Ultraflex	$.89/ft
LMR-600	$1.19/ft
LMR600 Ultraflex	$1.95/ft

TOWER HARDWARE

3/8"EE / EJ Turnbuckle	$10/11
1/2"x9"EE / EJ Turnbuckle	$15/16
1/2"x12"EE / EJ Turnbuckle	$17/18
3/16" / 1/4" Preformed Grips	$4/5

Please call for more hardware items

HIGH CARBON STEEL MASTS

5 FT x .12/.18"	$35/59
10 FT x .12/.18/.25"	$65/110/149
15 FT x .12/.18"	$95/160
20 FT x .12/.18/.25"	$120/199/289

GAP ANTENNAS

Challenger DX	$259
Challenger Counterpoise	$25
Challenger Guy Kit	$14
Eagle DX	$269
Titan DX	$299
Eagle/Titan Guy Kit	$22
Voyager DX	$389
Voyager Counterpoise	$49
Voyager Guy Kit	$38

Please specify 80m capacitor when ordering Challenger DX or Titan DX.

LAKEVIEW HAMSTICKS

9106	6m	9115	15m	9130	30m
9110	10m	9117	17m	9140	40m
9112	12m	9120	20m	9175	75m

All handle 600W, 7' approximate length, 2:1 typical VSWR ... $19.95

HUSTLER ANTENNAS

4BTV/5BTV/6BTV	$129/169/189
G6-270R, 2m/70cm Vertical	$149
G6-144B/G7-144B	$109/159

Hustler Resonators in stock–call

ANTENNA ROTATORS

M2 OR-2800P	$1095
Yaesu G-450A	$239
Yaesu G-800S/SDX	$319/399
Yaesu G-1000SDX	$479
Yaesu G-2800SDX	$1069
Yaesu G-550/G-5500	$289/499

ROTATOR CABLE

R51(#20)/R52 (#18)	$.22/.32/ft
R61 (#20)/R62 (#18)	$.28/32/ft.
R81/82/83/84	$.25/.39/.52/.85/ft

PHILYSTRAN GUY CABLE

HPTG1200I	$.39/ft
HPTG2100I	$.52/ft
PLP2738 Big Grip (2100)	$5.50
HPTG4000I	$.79/ft
PLP2739 Big Grip (4000)	$7.65
HPTG6700I	$1.15/ft
PLP2755 Big Grip (6700)	$10.95
HPTG11200	$1.55/ft
PLP2558 Big Grip (11200)	$16.50

Please call for more info or help selecting the Phillystran size you need.

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- Satellite Ready • Optional External Auto Tuner

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FT-8100, 2m/70cm Mobile ..... Call!
NEW LOW PRICE!

Texas Towers has Yaesu specials galore! In addition to our every day low prices, Yaesu is offering additional savings coupons for several of the radios shown on this page. So be sure to give us a call – Texas Towers really does sell for less!

G-2800SDX: Features 34 sq. ft. capacity, 450° rotation, preset control, and more!

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G-450XL (11 sq. ft.) ..... Please Call!
G-5400B Az/Elevation* .... Please Call!
G-500 Elevation Rotor* .. Call for price!
NEW LOWER PRICES!

FT-920 ..... Call For Price
- 160–6m XCVR • 100 W Output • DSP
- Auto Tuner • FM Option • CW Keye

PLUS FREE FM-1!

FT-840 ..... Call For Yaesu Special
- 160–10m XCVR • 100 W Output • FM Option
- Compact Size • LCD Display • Much More

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FT-3000 2M Mobile XCVR, 70W .....Call
NEW LOW PRICES!

VX-1R .....Call!
- Super Compact 2m/70cm FM HT
- 290 Memory Channels
- Alpha Numeric Display
- AM Receive (.5–1.7 MHz)
- Autodial Memory (10 Channels)
- CTCSS Tone Encode/Decode/Scan
- AM/FM/FM Wide RX Modes
- DTS Paging & Squelch
- Yaesu's ARTS System
- DTMF Memory
- Extended RX (76–999 MHz) Cellular Blocked
- Supplied with FNB-52 Li-Ion Battery Pack, Two-Hour Plug-In Wall Charger, Belt Clip, Rubber Duck Antenna, and More!

NEW LOW PRICE!

FT-50RD.....Please Call!
- Compact 2m/70cm HT
- Built to Mil. Spec. MIL-STD 810
- 112 Memory Channels
- CTCSS Tone Encode
- CTCSS Tone Decode
- DTMF Paging
- DTMF Squelch
- Dual Watch
- Extended RX 76–200 MHz 300–540 MHz 590–999 MHz (Cellular Blocked)
- Optional ADMS-1D Software
- Supplied with NiCad Battery Pack, Wall Charger, Belt Clip, Rubber Duck Antenna, and More!

NEW LOW PRICE!

FT-51RH.....Call
- Tiny 2m and 70cm FM HT
- 120 Memory Channels
- Alpha Numeric Display
- AM Receive (110–138 MHz)
- Autodial Memory (10 Channels)
- CTCSS Tone Encode
- CTCSS Tone Decode
- CTCSS Scan (Finds Tone)
- DTMF Paging & Squelch
- 5 Watts RF Output
- Direct Keypad Frequency Entry
- Extended RX (110–180 MHz)
- Extended RX (420–470 MHz)
- Supplied with FNB-31 NiCad Battery, Charger, Belt Clip, Rubber Duck, and More!

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THE HERITAGE CONTINUES

THE TRUE MIL-SPEC TOUGH

US MILITARY APPROVED MIL-SPEC 810

FT-2600M

HEAVY-DUTY VHF FM TRANSCEIVER

The FT-2600M is a deluxe, compact FM mobile transceiver providing high power output and outstanding receiver performance for the 144 MHz band. Included in the FT-2600M's feature complement are:

Features

- 60 Watts of power output, with selection of four power levels for every operating situation.
- Expanded receiver coverage: 134-174 MHz.
- Keyboard entry of operating frequencies from the microphone.
- Excellent protection from receiver intermodulation distortion, thanks to Yaesu's renowned Advanced Track Tuning front end.
- Outstanding packet radio capability at 1200 or 9600 bps with easy interface via a dedicated rear-panel jack.
- 175 memories which can store repeater shifts, odd repeater shifts, CTCSS/DCS tones, and 8-character Alpha-Numeric labels.
- Built-in CTCSS and DCS Encoder/Decoder circuits.
- The Smart Search™ feature automatically sweeps a band and loads active frequencies into a dedicated memory bank.
- The Yaesu-exclusive Omni-Glow™ multi-function LCD display.
- Yaesu's exclusive ARTS™ (Auto-Range Transponder System), which alerts the operator when an "out-of-range" condition exists with another ARTS™- equipped station. This feature is especially valuable during search-and-rescue operations with hand-held units.
- Extensive MENU system, which allows customization of a number of transceiver performance characteristics.
- Additional features include a transmit Time-Out-Timer (TOT), Automatic Power-Off (APO), Automatic Repeater Shift (ARS), plus provision for reduction of the TX deviation in areas of high channel congestion. And an all-new S-Meter Squelch circuit allows the owner to set the squelch to open at a programmable setting of the S-Meter, thus reducing guesswork in setting the squelch threshold.

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INTRODUCING THE MOST DURABLE HT EVER!

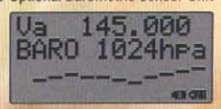
US MILITARY APPROVED MIL-SPEC 810

VX-5R

50/144/430 MHz TRIPLE-BAND HEAVY DUTY FM TRANSCEIVER

Features

- Frequency Coverage
  Wide Band Receive
  RX : 0.5-15.995 MHz 48-728.990 MHz
  800-998.990 MHz (Cellular Blocked)
  TX : 50-54 MHz 144-148 MHz
  430-450 MHz
- 5 W Power Output (430 MHz: 4.5 W)
- AM/Shortwave Receive
- AM Aircraft Receive
- Ultra Compact: 2.4" x 4.1" x 1.3"
- Aluminum Diecast Case
- MIL-STD 810 Rating
- High-Capacity Lithium-Ion Battery: 7.2 V @ 1100 mAh!
- CTCSS and DCS Built In
- Dot Matrix LCD
- Optional Barometric Sensor Unit



- Dual Watch
- Spectra-Scope™ Graphical Display
- 220 Memories plus "Home" Channels
- Ten Pairs of "Band Limit" Memories
- Ten Auto-Scan Weather Channels (North American version)
- 8-Digit Alphanumeric Memory Tags
- Convenient Icon Display Mode
- Smart Search™ Automatic Memory Loading
- Automatic Repeater Shift
- Auto-Range Transponder System (ARTS™)
- Multiple Battery Savers
- Time-Out Timer (TOT)
- Busy Channel Lock Out (BCLO)
- Versatile High-Speed Scanning
- 16-Digit 9-Memory DTMF Autodialer
- One-Touch Emergency Channel
- ADMS Windows™ PC Programmable
- Innovative Multi-Section Antenna
- Full Line of Accessories

Actual Size 5 W Version

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FT-50RD
5 W Heavy Duty
Dual Band Handheld

VX-1R
Ultra Compact
Dual Band Handheld

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MICRO COMMANDER

WORLD'S SMALLEST HIGH-POWER DUAL-BAND MOBILE!

Another Engineering Breakthrough from Yaesu : the FT-90R! Big Power, Big Performance, Micro-Miniature Size!

Actual Size

Features

- Frequency Coverage:
  RX : 100~230 MHz, 300~530 MHz,
  810~999.975 MHz (Cellular Blocked)
  TX : 144-146 MHz or 144-148 MHz (144 MHz)
  430-440 MHz or 430-450 MHz (430 MHz)
- 50 Watts Power Output (430 MHz: 35W)
- Ultra Compact: 100 mm x 30 mm x 138 mm WHD (3.9" x 1.2" x 5.4")
- AM Aircraft Receive
- Built-In CTCSS/DCS Encoder/Decoders
- Selectable TX Power: HIGH (50W), MID1 (20W), MID2 (10W) and LOW (5W)
- Programmable VFO Steps: 5/10/12.5/15/20/25/50 kHz per Step
- 186 Memories with 7-Character Alpha/Numeric Labels
- Direct Keypad Frequency Entry via MH-36A6J DTMF Microphone
- Smart Search™ Automatic Memory Loading
- Programmable Front Panel/Microphone Key Functions
- Battery Voltage Meter
- Auto-Range Transponder System (ARTS™)
- TX Time-Out Timer (TOT)
- Automatic Power-Off Battery Saver (APO)
- Remote-Head Operation using Optional YSK-90 Separation Kit
- 16-Digit 8-Memory DTMF Autodialer (requires MH-36A6J Mic)
- ADMS Windows™ PC Programmable
- Automatic Repeater Shift
- 1200/9600 bps Packet Compatible
- RF-Level Squelch for Quiet Monitoring of Busy Channels
- DCS Code # Search
- Versatile Scanning Features
- Priority Channel Monitoring
- Menu for Feature Customization
- Adjustable Display Brightness and Contrast
- Aluminum Diecast Chassis with Cooling Fan

MICRO COMMANDER

FT-90R

VHF/UHF Dual Band FM Transceiver

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U.S. version includes MH-36A6J DTMF Microphone.

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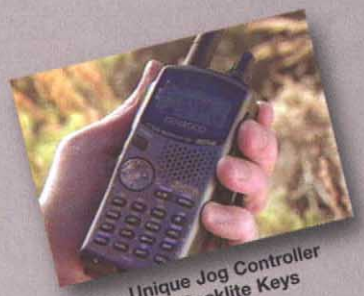
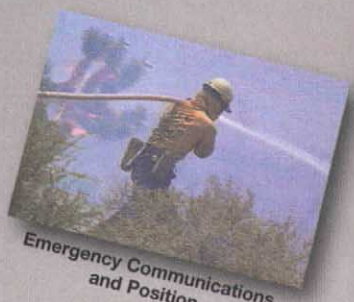
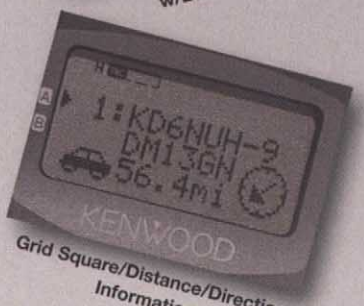
TH-D7A
DATA COMMUNICATOR

A NEW WORLD OF AMATEUR COMMUNICATIONS


Unique Jog Controller w/Backlite Keys

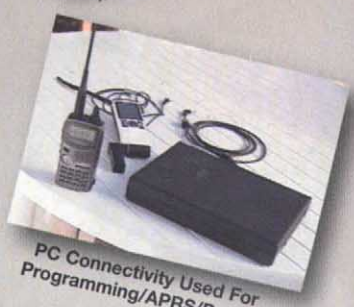

Emergency Communications and Position



Grid Square/Distance/Direction Information

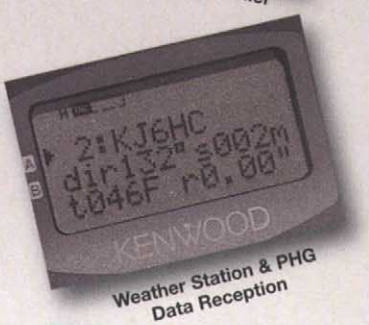
Monitor DX Packet Clusters


Complete Line of Accessories

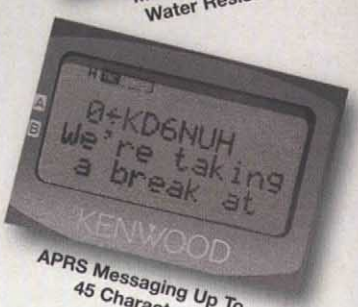

PC Connectivity Used For Programming/APRS/Packet


Advanced VC-H1 Controller

MIL-STD 810 C/D/E Water Resistance



Weather Station & PHG Data Reception



APRS Messaging Up To 45 Characters


Remote Control HF Operation w/SkyCommand


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 CTCSS encode and decode
- Built-in 1200/9600bps TNC (AX.25 protocol)
- Unique cursor key for easy menu navigation
- Built-in APRS (Automatic Position Reporting System) software
- GPS interface for position/directional data (NMEA-0813)
- Manual input of latitude/longitude (No GPS required)
- Large 12 digit x3 line dot matrix display
- 16 backlit keys (laser cut from inside)
- 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
- SkyCommand System (KSS) II for remote control of fixed HF transceivers
- 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

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