QST

January 1990 $3.00

devoted entirely to Amateur Radio



THE '90s:

what does the future hold?

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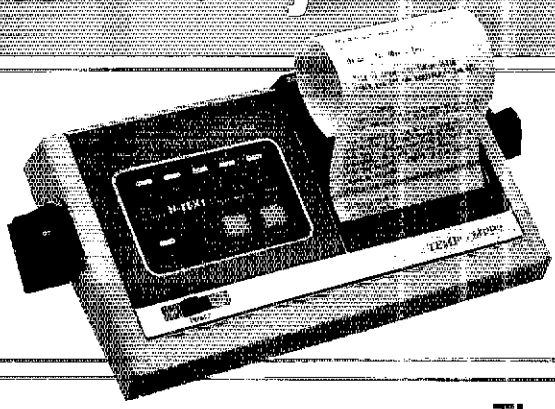
. . . THE BEST PLACE
to fill all your data communications needs.

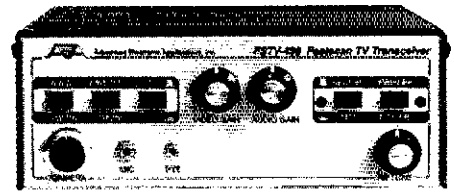


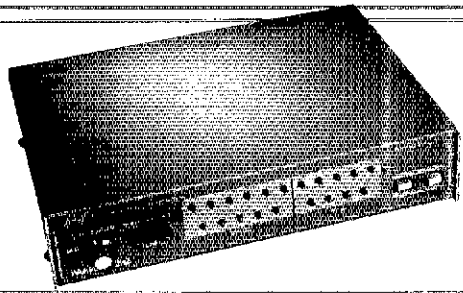
The TEMPO MPP1

. . .a unique new mobile data printer, includes a packet controller and a 13.6 VDC printer that interfaces with any mobile radio. in a recent user test it proved to have about twice as much audio level range tolerance as other TNCs. It is also an ideal unit for emergency work and a commercial version is perfect for dispatching service, emergency and police vehicles.

The FSTV-430, AEA's newest

The exciting FSTV-430 fast scan television transceiver makes getting on ATV easy and inexpensive. . .live or taped. Almost any video camera can be used. Simply plug it into the FSTV-430, connect to your 70 cm antenna and you're on the air. Use a standard TV for receiving signals and, of course, an amplifier will extend your range. It's reliable, portable and light weight and can be used in-station or mobile from any 12 VDC source. The only license required is a technician or higher.

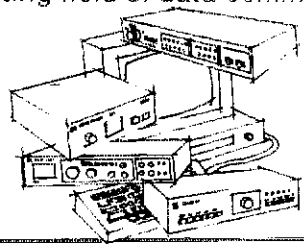




The PK-232 by AEA

. . .the only controller offering Morse Code, Baudot, ASCII, AMTOR, Packet, and facsimile Transmission & Reception plus the ability to monitor the new Navtex marine weather and navigational system. . .7 modes in one controller. The PK-232 makes any RS-232 compatible computer or terminal the complete amateur digital operating position. All decoding, signal processing and protocol software is on ROM. Only a simple terminal program (like those used with telephone modems) is required to interface the PK-232 with your computer.

Obviously, we can fill in a system that you have already started. Or we can furnish a complete system to fit your needs and budget. For example, here's some suggestions for the amateur just entering the exciting field of data communications, or: for the amateur who wants the best available.



NO. 1 For the fun (and very affordable) mode, VHF Packet, AEA PK-88 with personal mailbox, 8K programmable memory and TCP-1P compatability.
For serious 20 M world-wide DXing on Packet, 200 or 600 Hz shift. . .add the superb HAL ST-7000.

NO. 2. . .top of the line! The HAL ST-8000 or HAL ST-6000 and AEA's PK-232 . . .the winning combination. You can't do better for all-mode, all-band enjoyment of hi-speed data communications.

If you have any questions concerning these units, or would like to discuss your requirements with a knowledgeable specialist, please call and ask for George Sanso, AB6A. We also carry a large selection of excellent commercial products for data communications and emergency systems as well as a complete inventory of amateur equipment and linear power amplifiers.

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#1 Rated HF!

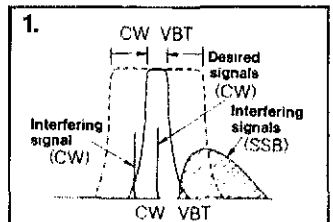


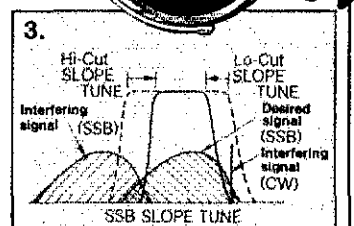
TS-940S

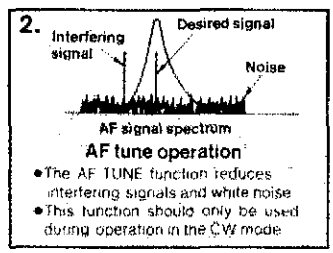
Competition class HF transceiver

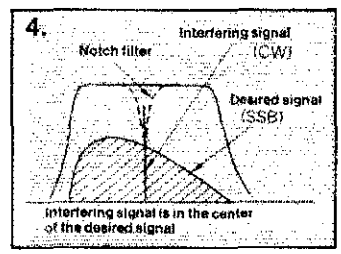
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • IF-232C/IF-10B computer interface.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

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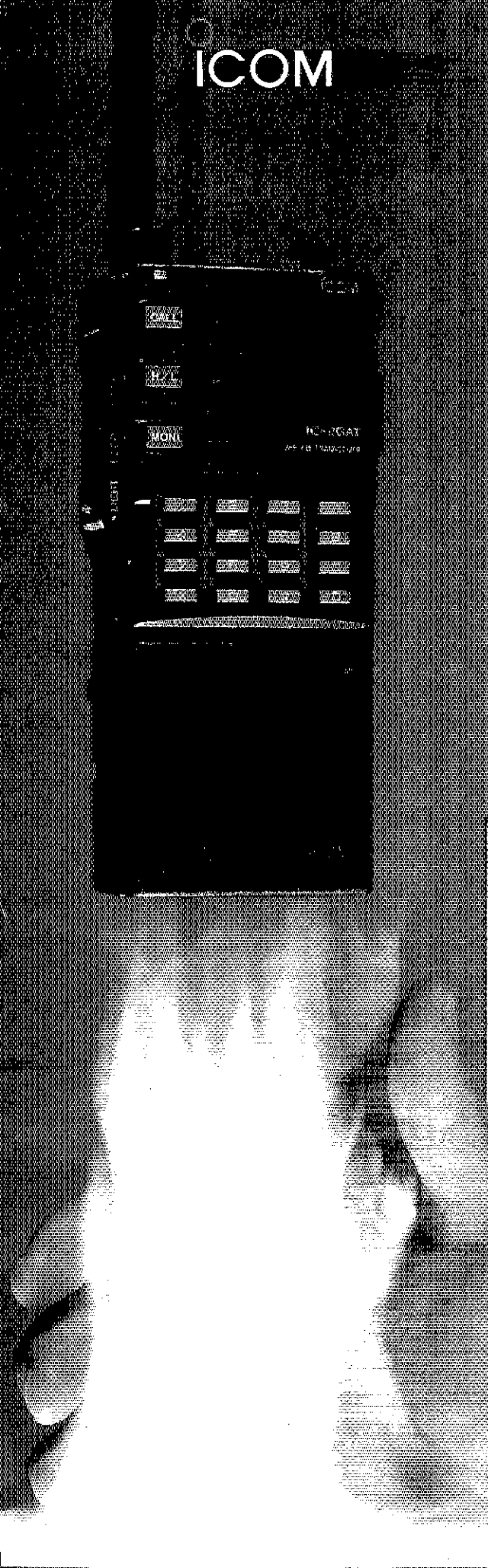
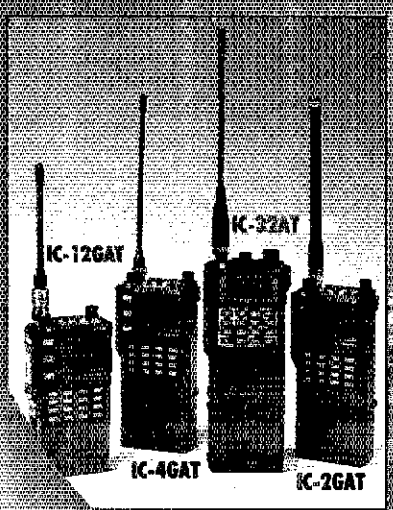


ICOM blasts you from the ultimate power you can feel. ICOM's G-Series and dual band IC-32AT handheld-transceivers pack power to burn.

IC-2GAT: 7 Watts 2 Meters
IC-4GAT: 6 Watts 440MHz
IC-12GAT: 1 Watt 1.2GHz
IC-32AT: 5½ Watts 2 Meters
5 Watts 440MHz

Maximum Frequency Coverage. The IC-2GAT receives 138-174MHz and transmits the 2-meter amateur band, including CAP and MARS frequencies. The IC-4GAT transmits and receives on the 440MHz amateur band while the IC-12GAT operates on the 1.2GHz amateur band. ICOM's dual band IC-32AT gives you full operation on the 2-meter and 440MHz amateur bands.



Today's Most Powerful Handhelds! The IC-2GAT delivers 7 watts of power to reach those distant repeaters! The IC-4GAT is 6 watts, the IC-12GAT is 1 watt and the IC-32AT is 5 watts on 440MHz with 5½ watts on 1 meters. One watt selectable for local QSOs.

20 Memories. Store any frequency, T-offset and subaudible tone in any memory. Total flexibility to meet your needs.

Programmable Scanning. Scan band and memories plus easy lockout and instant memory recall.

Additional Features Include: Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad. An optional UT-40 beeper silently monitors a busy channel for your calls. When the pre-programmed subaudible tone is received, the unit beeps and the LCD flashes.

Compatible Accessories. All ICOM IC-2AT/02AT series battery packs, headsets and speaker mics are interchangeable. With ICOM's power packed handhelds, you'll find yourself reaching new heights in portable operation! All ICOM handhelds are confidently backed by ICOM's excellent warranty at any one of our four North American Service Centers.

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OUR COVER

What will the nineties bring—advanced VHF/UHF and microwave techniques, more uses of Amateur Radio in space, exciting new digital circuits? This month's cover features SM4IVE's EME array, a NASA artist's conception of the shuttle docking with the space station, and a Wintek software computer-graphics display of a double-sided circuit board used in the Microsat power supply.

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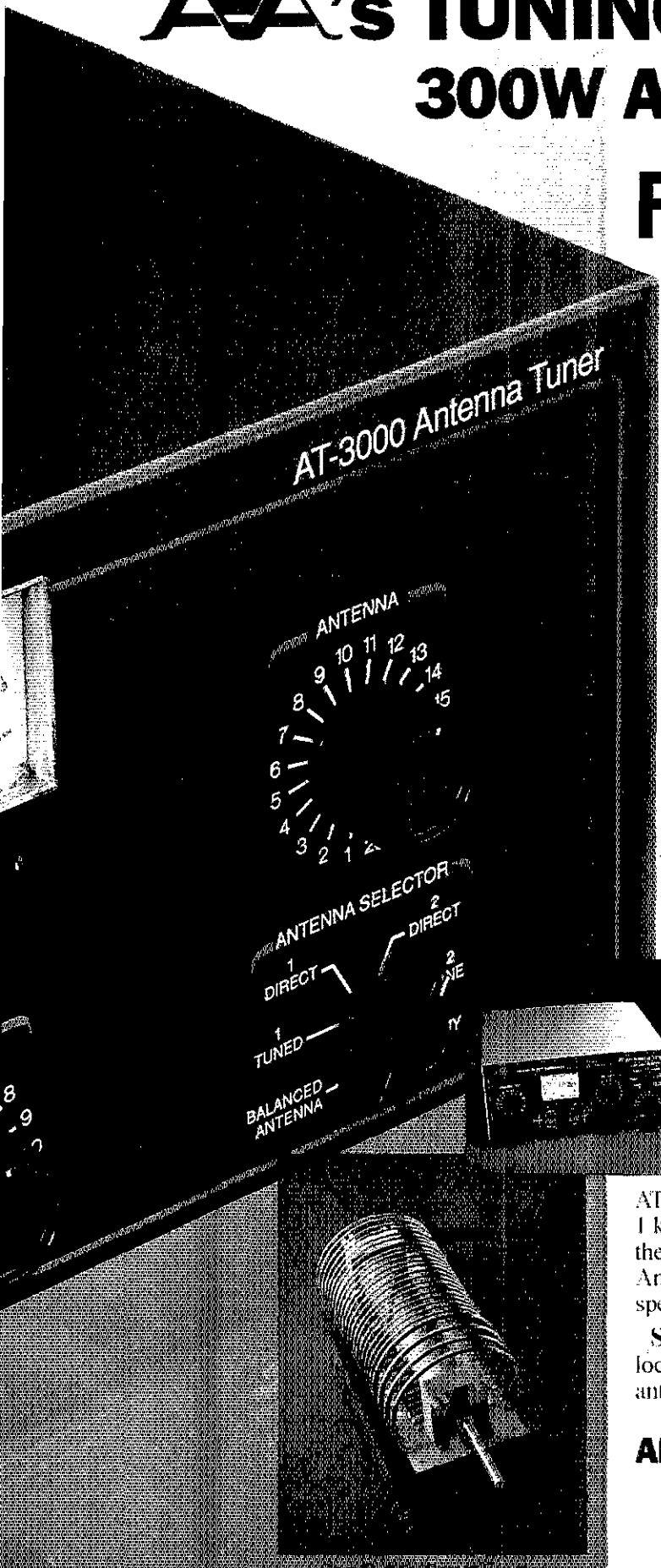
AEA's TUNING PERFECTION
300W AND 3 kW TUNERS



For tuning perfection, choose AEA's AT-300 300 watt or AT-3000 3 kW antenna tuners. Quality and exceptional engineering are built-in for maximum performance.

Easy Operation. The built-in front panel antenna switch allows you to easily select two unbalanced (coax-fed) antennas, a dummy load or a balanced antenna. Both the AT-300 and AT-3000 are easy to use.

Peak Reading Meter. The AT-3000 features a peak and average reading cross-needle meter which shows forward power, reflected power and SWR. High and low power is selected from the front panel to select the proper range for the SWR meter. Minimal SWR is achieved by inductors with 18 (AT-300) and 20 (AT-3000) taps created by AEA's exclusive patent pending CAM switch design for accurate tuning. AEA's tuners also tune a wider range of antenna impedances. There are limitless possibilities to create the best match.

Larger Size. Why are the AT-300 and AT-3000 so large? Because it improves the inductors' Q (quality) factor for high efficiency. High Q means low insertion loss which guarantees that maximum power is delivered to the antenna. Tests with some roller coil antenna tuners show insertion loss as high as 20dB on some amateur frequencies. Don't be fooled into believing that a low SWR is the key reason for using an antenna tuner! The primary reason is for maximum power transfer from the transmitter to the antenna. An SWR of 1.5 to 1 or better is usually all that is necessary to "make the transmitter happy." Remember that you can get 1 to 1 SWR with just a dummy load. AEA's two coil design also provides harmonic reduction, maximum power transfer and a wider range of impedance matches.



300 or 3,000 Watts. The AT-300 watt continuous duty cycle tuner has been tested at 1 kW with a 50 ohm load, so you can rest assured that there's no problem operating the AT-300 at 300 watts. And the AT-3000 is rated at 3 kW. AEA stands behind its specifications.

See the AT-300 and AT-3000 antenna tuners at your local AEA dealer. Get the most from your transceiver and antenna, and tune into top performance and reliability.

AEA Brings You A Better Experience.

Advanced Electronic Applications, Inc.
2006-196th St. SW/P.O. Box 2160
Lynnwood, WA 98036
206-775-7373

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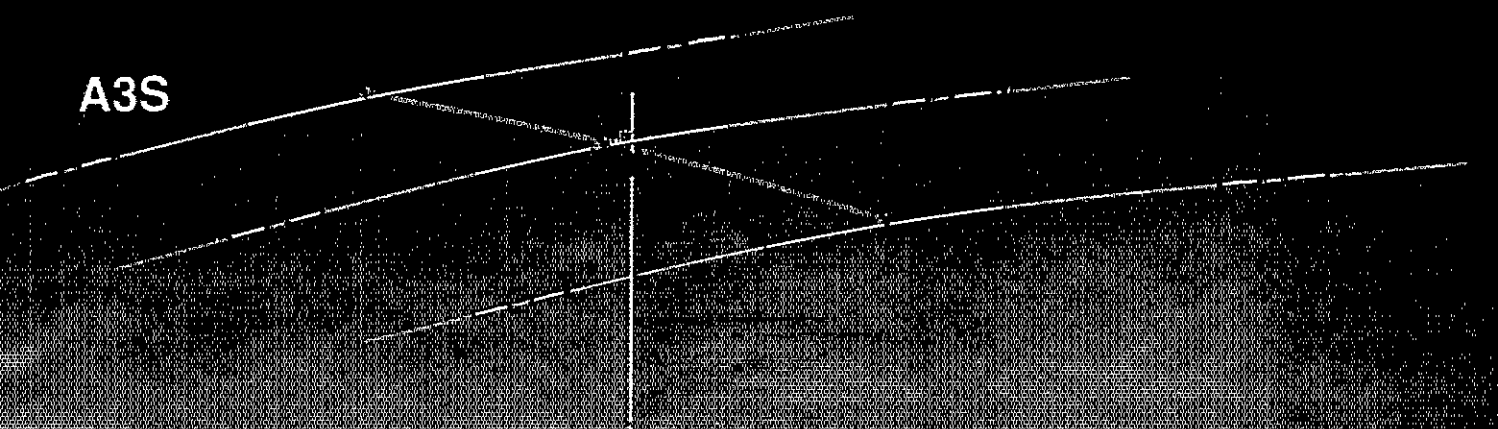
Straight A's!

On 10-15-20 Meters



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Hear them on the air. There is a difference!

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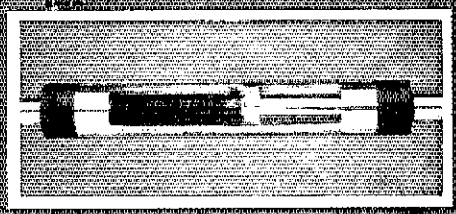

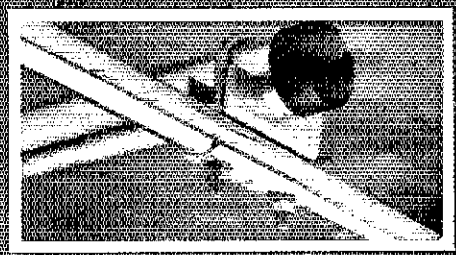

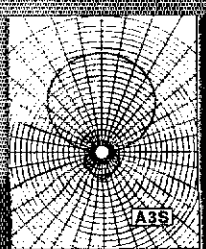

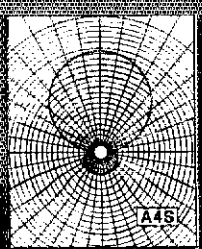

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NEW

Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required).*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.



- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

Optional Accessories:

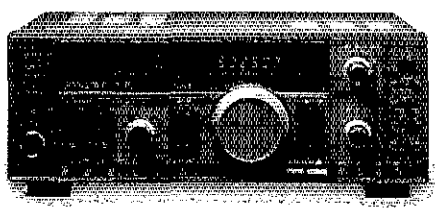
• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics. • **PG-2S** extra DC cable • **PS-430** power supply • **SP-41/SP-50B** mobile speakers • **SP-430** external speaker • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.



TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.



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New 220 MHz

220: FM for All!







Kenwood brings you a wide range of 220 MHz gear designed for every need. Choose from two types of mobile and two types of HT. The TH-315A is a full-featured HT covering 220–225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 VDC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability" choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

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"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

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WARC-92

Another important World Administrative Radio Conference, or WARC, is on the horizon.

What's a WARC? What does the upcoming one mean for Amateur Radio?

WARCs make changes in the international Radio Regulations. They are international meetings of government representatives held under the auspices of the International Telecommunication Union (ITU), a specialized agency of the United Nations headquartered in Geneva. The Radio Regulations which emerge from WARCs have the force and effect of a treaty, and provide the international framework for the domestic rules and regulations which govern every user of radiocommunication at the national level. Member nations of the ITU do not surrender their sovereignty when they join, but they do agree to tailor their domestic radio regulations and operations so as to avoid incompatibility with the international regulations.

Most WARCs are specialized affairs, dealing with the internal regulations of a single radio service or a limited frequency range or geographical area. Usually there are one or two WARCs each year, held without much fanfare because of their limited scope. Rarely, a "general" WARC will be held which has much broader authority. The last such WARC was held in 1979, and it had authority to reallocate the entire radio spectrum and to rewrite most of the other Radio Regulations. Amateur Radio was in preparation for WARC-79 for *15 years* and because of this preparation was able, against great odds, to emerge from the process with three new HF ham bands, improved status in the 160-meter band, new amateur satellite allocations, and retention of most of our access to the UHF and microwave spectrum. There were losses, to be sure, but on balance WARC-79 was a great victory for Amateur Radio and ensured our continued worldwide vitality.

Sometimes, despite considerable efforts by the conferees to find solutions everyone can live with, the results of a WARC are not entirely acceptable to one or more countries and these countries, on signing the Final Acts of the conference, will reserve the right to depart in some respects from the Radio Regulations. The United States and a number of others took such reservations after WARC-79 because the conference did not reallocate any spectrum to the Broadcasting (BC) Service between 2 and 9 MHz.

The governments interested in HF broadcasting have been trying unsuccessfully for more than 40 years to develop a plan for the effective use of the HF BC bands; WARC-79 made the task a bit easier above 9 MHz by reallocating some spectrum from the Fixed Service to HF BC, but the conferees were unwilling to do so in the lower-frequency bands. This set the stage for an HF BC WARC in 1987 to adopt a recommendation calling on the ITU to consider "...the possibility of extending the HF frequency spectrum allocated exclusively to the broadcasting service" at a future WARC. Without specifying the exact frequency range to be considered, the ITU Plenipotentiary Conference held last June agreed to address this issue, and some other allocations issues, at a WARC to be held in Spain in the first quarter of 1992.

Thus, WARC-92 was born. The detailed agenda for WARC-92 will not be adopted until June 1990, when the ITU Administrative Council meets; in the meantime, preparatory work must go forward.

HF is very important to us as radio amateurs, and we're acutely sensitive to the HF BC issue because of our problems communicating in the presence of broadcasters in the upper portions of the 75- and 40-meter bands. HF BC expansion is likely to threaten these bands, and possibly others. But this is not the only issue likely to be addressed at WARC-92, nor is it all that should concern us. Other specialized WARCs, and the Plenipotentiary Conference itself, identified the following allocations issues as also deserving of consideration:

- The introduction of satellite high-definition television somewhere between 12.7 and 23 GHz.
- New space services, and new allocations to these services, above 20 GHz.
- New and/or better allocations for the mobile and mobile-satellite services between approximately 1 and 3 GHz.
- A Sound Broadcasting Satellite Service in the range 500 MHz to 3 GHz.

Except for the first, each of these four issues potentially involves amateur and amateur-satellite bands. We must be sure that in finding suitable allocations for these new services, the ongoing needs of Amateur Radio are not overlooked.

We had 15 years to prepare for WARC-79. We have little more than two years to prepare for WARC-92. In reality, the time available is even less: administration proposals for WARC-92 have to be submitted by the spring of 1991, and technical justifications must be readied even earlier than that! While there is no time to waste, we're better prepared this time around because the International Amateur Radio Union has been kept at a high level of readiness. For example, from the article beginning on page 15 you will find that last September's IARU Region 2 Conference had WARC-92 high on its list of concerns. The US government has only recently begun its own formal preparations; ARRL will participate in these preparations as fully as possible.

WARC-79 was a great challenge for Amateur Radio. For at least some of our most important frequency bands, WARC-92 will be no less a challenge. IARU and ARRL, which served Amateur Radio so well for WARC-79, are ready to do it again. In the months to come, we will be asking for your support of the WARC-92 effort. Please respond as if the future of Amateur Radio depended on it. It does.—*David Sumner, K1ZZ*

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features and options that other manufacturers still have on their drawing boards: Like **200 watts RF power output; Built-in TCXO,** for superior frequency stability; **Independent filter selection; Dual receive with balance control** and **two tuning knobs** for simultaneous reception in tough pile-up situations. Using **BPF-1** allows cross-band dual receive.

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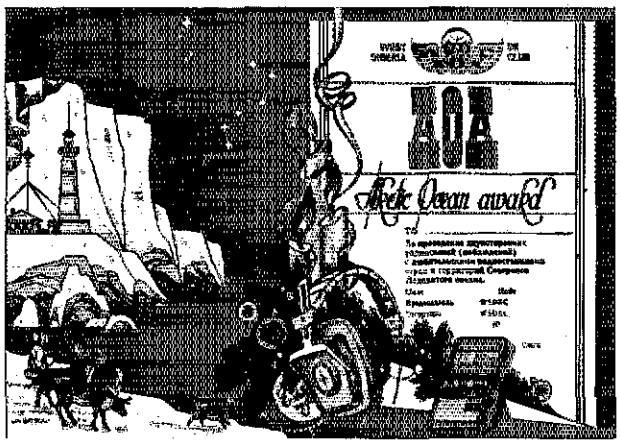
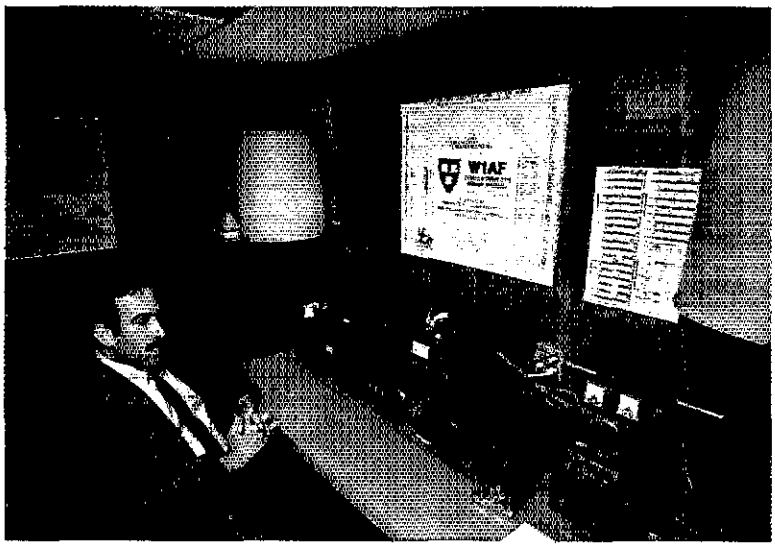


Wintry wallpaper: During a recent visit to New England, West Siberia DX Club President Sergey Kruglov, UA9MC, dropped off several operating achievement awards that his club sponsors. Featured is the Arctic Ocean Award for working the following areas: JW (Svalbard), JW (Bear), JX, KL7, LA, VE, OX, UA1 (Franz Josef Land), UA1 (Novaya Zemlya), UAØ (Severnaya Zemlya), UAØ (New Siberian Island), UAØ (Wrangel Island), oblasts 88, 98, 105, 113, 114, 139, 143, 163, and valid QSOs with up to three drifting stations in the Arctic Ocean. The award has three achievement levels of 10, 15 and 20 areas contacted. The WSDXC sponsors several other awards including Worked All West Siberia, USSR Prefix Award, USSR 1,000,000 Cities, Prefix 9 Award, and West Siberia Award. Details of the club's award program can be obtained by writing Sergey F. Kruglov, UA9MC, PO Box 836, 644099, Omsk-99, USSR.



Police chopper ATV: Mesa Emergency Service Amateur Communication (MESAC) founder Gordon West, WB6NOA (l), shows the capabilities of amateur television to Costa Mesa police helicopter pilot Sgt Bill Betchel. The organization's 30 members, under the direction of club president and police photographer Phil Bettencourt, KB6FRW, work closely with the police department. Their activities include emergency support communications, training, ride-alongs and observation post communications, and ATV disaster communications from the police department's fleet of helicopters. *(AA6LM photo)*

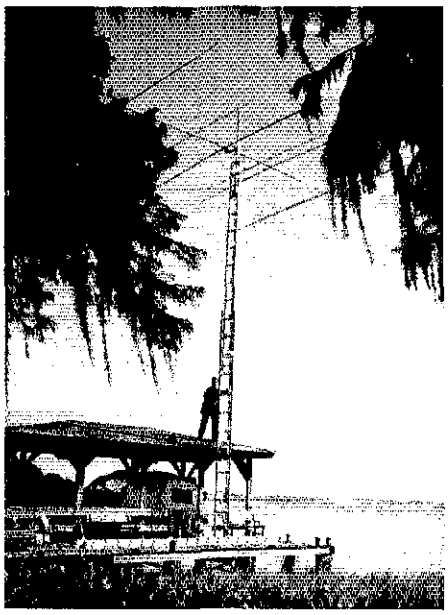




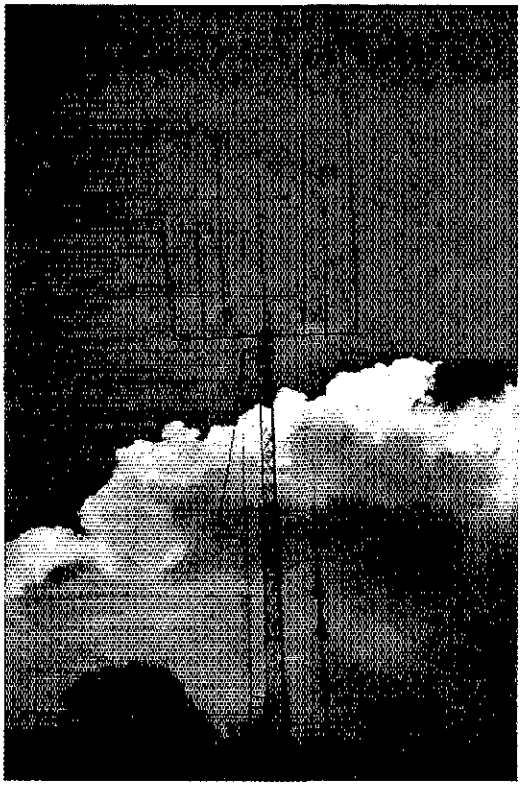
Something old, something new: The Harvard Wireless Club of Cambridge, Massachusetts, celebrated its 80th anniversary with a special-event operation and rededication of its station, W1AF on October 14-15, 1989. The rejuvenated station sports two main operating positions. On the left, Maury Peiperl, WA3ZTW, checks out a position featuring an ICOM '761 and a Kenwood 2-meter all-mode. On the right is a mint condition Heath Mohawk receiver and Apache transmitter. *(KM1G photos)*

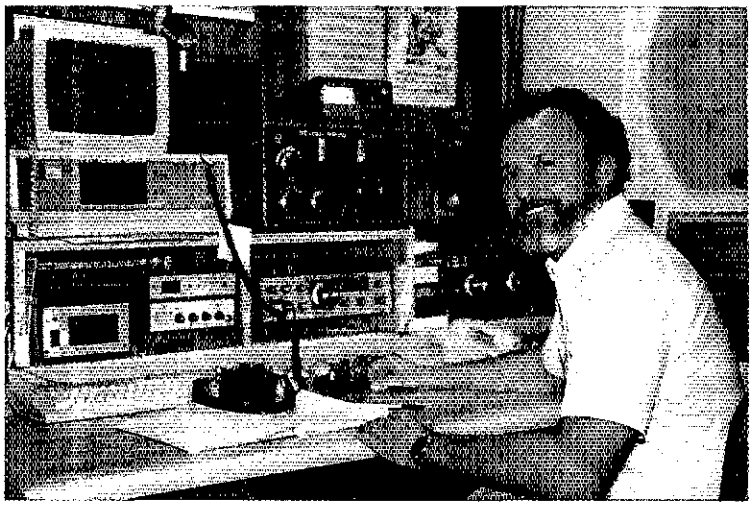


Shanghai welcome: *QST* author and photographer Michael Dale recently returned from a trip to China, and reports that he was well received by the BY4AA staff in Shanghai. Mike says he could feel the excitement the Chinese have about Amateur Radio, and says American amateurs are encouraged to visit BY4AA, but should write to the station in advance at Shanghai Radio Sports Association, No. 444 Guang Zhong Rd, Shanghai, China, Attention: Mr Xu Ru. The large photograph shows a wall display of QSL cards at the station, and the inset photograph is of the BY4AA station staff, (l-r) Mr Ju Song Qing, Coach; Mr Xu Ru, Station Master; and Mr Zhou Yu Hong, Vice Master. *(Michael Dale photos)*



Away from the foliage: Henry Fehrmann, N4EDQ, of Eustis, Florida, stands proudly next to his antenna overlooking Lake Eustis. Henry reports that his old 3-element beam was attached to the house, but when he upgraded his antenna to a 6-element Telrex, the cypress trees interfered. He couldn't cut the trees, because they are protected by Florida law. Instead, he made a 200-foot run to his new tower, which is grounded to the lake bed. How does the new over-the-water setup work? Henry reports that his first contact was with JY5RBM who gave him a 59-plus-30-dB signal report, and his DX net friends can't believe he's running barefoot. *(KB4ZMU photo)*





Doctor DX: Three years ago, Jerry Zitterkopf, WS7T, of Kingman, Arizona, was a Novice who didn't think much about DX. On what he thought was a routine 15-meter CW contact, Jerry worked a station from the Marshall Islands. After that initial taste of DX, Jerry spent his time building this impressive shack and antenna farm, and upgrading to Extra Class. Jerry is a League Volunteer Examiner and a member of the Hualapai Amateur Radio Club. Besides DX, he enjoys RTTY, VHF packet and FM. When he's not working a rare one, Jerry keeps busy as a veterinarian. *(WS7T photos)*

League Lines

As January *QST* went to press, the FCC released a ***notice proposing service rules for the use of 220-222 MHz*** by the Private Land Mobile Service. Service rules must be adopted before Land Mobile operation in this band can begin. Details of the Notice of Proposed Rule Making, numbered 89-552, will appear in February *QST*.

The joint House-Senate Conference Committee, reviewing both versions of the Omnibus Budget Reconciliation Act of 1989, has approved ***deletion of the amateur license fees from the legislation.*** In the early morning hours of November 22, 1989, both Houses of Congress adopted the Conference version of the bill, sending it to President Bush for his signature. In the current budgetary environment, avoiding fees altogether is an enormous accomplishment. ARRL congratulates all who wrote their senators and representatives in this effort. See the article on page 54 for more information.

The FCC has initiated an inquiry, numbered General Docket 89-554, ***inviting comments concerning preparations for the 1992 International Telecommunication Union (ITU) World Administrative Radio Conference (WARC)*** on frequency allocations. WARC-92 is expected to address a variety of allocation issues.

The National Telecommunication and Information Administration (NTIA) has assigned its Ad Hoc Committee 206 the task of preparing for WARC-92 in Seville, Spain. The agenda for WARC-92 probably won't be known until after the next regular meeting of the ITU Administrative Council in June 1990. The means for public input to the WARC preparatory process has not yet been announced. For more information, see "It Seems to Us..." on page 9.

Arianespace officials have informed AMSAT-NA and the University of Surrey that ***the launch date of the Microsats and the UoSat D/E satellites has been advanced.*** The launch date is now planned for January 9, 1990.

The FCC announced that effective January 1, 1990, ***the maximum allowable reimbursement fee for an amateur operator license examination is $4.96.*** This is based upon a 4.3% increase in the Department of Labor Consumer Price Index between September 1988 and September 1989. ARRL VEC Manager Bart Jahnke, KB9NM, announced that the ARRL VEC has set its fee at $4.95.

Volunteer Examiners (VEs) and Volunteer Examiner Coordinators (VECs) may charge examinees for out-of-pocket expenses incurred in preparing, processing or administering examinations for Technician, General, Advanced and Amateur Extra Class operator licenses. No fee is allowed for the Novice Class operator license examination.

The latest version of FCC Form 610, released in September 1987, shows an expiration date of December 31, 1989. It will, however, be valid for some time to come, and is one of five currently valid 610s which include those dated June 1984, July 1985, March 1986, and September 1987. You can obtain single copies of Form 610 from ARRL HQ for an SASE. Larger quantities may be obtained from: FCC Supply Section, Administrative Services Division, 1919 M St, NW, Room B-10, Washington, DC 20554.

The Albert H. Wohlers Company, ***the ARRL Equipment and Liability Insurance Administrator, has a new phone number***: 708-803-3100. The new FAX number is 708-803-4649. Their toll free number (except in Illinois), 1-800-323-2106, remains unchanged.

If you've been waiting for your Worked All States certificate or other operating award for about eight weeks, don't worry. With the activity that we've seen on the bands in recent months, ARRL HQ has a considerable backlog in processing these awards. Please be patient. We'll get your certificate to you as soon as possible.

At its meeting October 21, ***the ARRL Executive Committee awarded the 1988 Technical Excellence Award to John Grebenkemper, KI6WX,*** for his two-part article entitled, "Phase Noise and its Effects on Amateur Communications." John's article appeared in March and April 1988 *QST*.

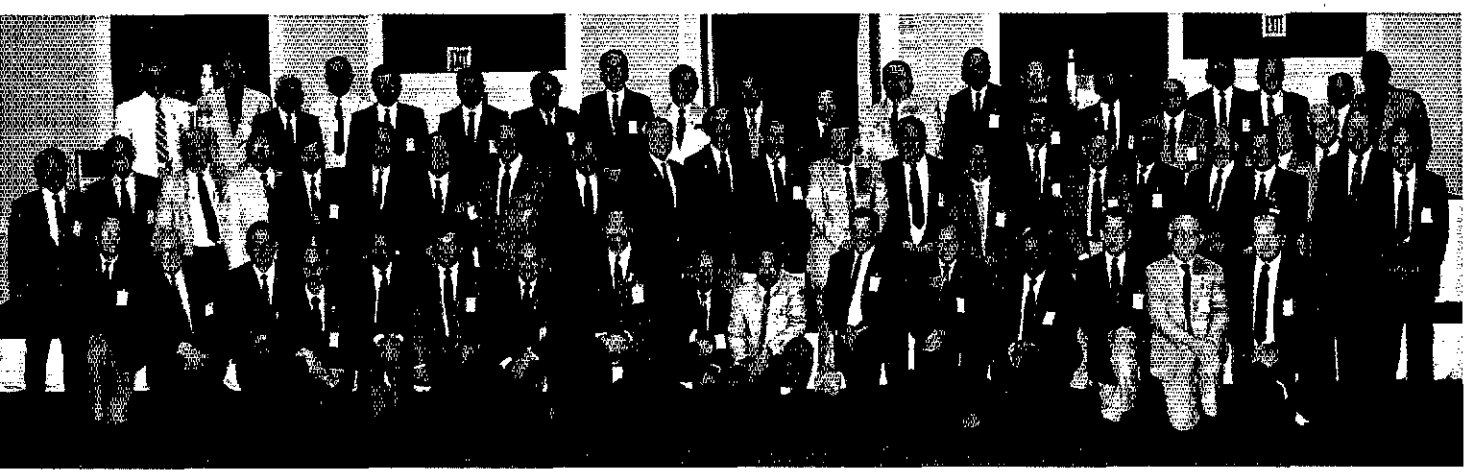
The 67th edition of the ever-popular **ARRL Handbook for the Radio Amateur** ***is here!*** This annual publication has been the amateur's primary reference on technical aspects of Amateur Radio and radio communications technology since 1926. Edited by Kirk Kleinschmidt, NTØZ, the 1990 hardbound edition contains more than 1200 pages and is available from dealers or from ARRL HQ for $23 plus shipping and handling.

Starting a Novice class? If you're not a registered instructor, send for our instructor information packet which includes registration form, and we'll put you on the mailing list. Please direct you request to the Educational Activities Branch at ARRL HQ.

From Spark to Space: A Pictorial Journey through 75 Years of Amateur Radio is here! This presentation-quality, book is printed on high-quality glossy paper, and will make an excellent addition to your library. *From Spark to Space: A Pictorial Journey through 75 Years of Amateur Radio* is a lavishly illustrated pictorial journey through the history of Amateur Radio and the ARRL. At a cost of $20 plus shipping and handling, this book is a memento you will want to own or give to a friend.

An opening exists in the Technical Department at HQ for a Laboratory Engineer. We are looking for a licensed amateur who is ambitious, dedicated and creative. Required is a background in electronics, including digital and/or RF experience. BSEE or ASEE with experience required. Starting salary is from $26,000. Contact Jon Bloom, KE3Z, or Chuck Hutchinson, K8CH, at ARRL HQ.

IARU Region 2 Finds the Magic in Orlando



Central Florida is the setting, as ARRL hosts triennial meeting of Western Hemisphere amateurs.

By David Sumner, K1ZZ
Executive Vice President, ARRL

Had you happened to be passing through Orlando International Airport on Labor Day weekend, you might have spotted a welcoming booth sporting an IARU banner and manned by Orlando-area amateurs eager to greet overseas visitors. You might have overheard chatter between arriving passengers, in English, Spanish, or Portuguese, with a heavy dose of ham jargon. You'd have been seeing and hearing the beginning of the Tenth General Assembly of the International Amateur Radio Union, Region 2, also known as the IARU Region 2 Conference.

Every three years, the leaders of national Amateur Radio organizations throughout the Americas get together to discuss mutual interests, opportunities, and problems under the banner of IARU Region 2. Radio waves do not respect national borders, so it is important that everyone's point of view be heard as the way we use the amateur bands changes and develops.

Even more important, radio amateurs in every member-nation of the International Telecommunication Union must do their share in encouraging their governments to adopt policies favorable to Amateur Radio. When the ITU members hold a World Administrative Radio Conference (WARC) to revise the international Radio Regulations, we want the delegates to be friendly to Amateur Radio and to be carrying instructions from their governments that our interests are to be protected. That kind of support doesn't happen by accident; it takes coordination,



The United States delegates. Seated: W6EJJ, KØTO. Standing: W3ABC, K1ZZ, N4MM, Region 2 EC member W4RH, W4RA.



The bilingual remarks of FCC Commissioner Patricia Diaz Dennis were a highlight of the opening ceremonies.



Simultaneous interpretation speeded the work of the Conference.



Committee C dealt with the thorny issues of VHF, UHF, SHF, and satellites.

discipline, and follow-through. Making it happen is the primary reason the IARU exists.

ARRL had a special reason for wanting to host the Region 2 Conference in 1989: the League's 75th anniversary. It was a particular honor for us to be awarded the Conference by our sister societies in Region 2, because this marked the first time in the 25-year history of the Region that a country has hosted a return engagement. The nine previous Conferences since 1964 were held in nine different countries (see Table 1), including the 1976 Conference in Miami.

There was a similarity in the timing of the Miami and Orlando Conferences, in that they each occurred just three years before a WARC likely to affect Amateur Radio. But the Orlando-89 Conference was more than just a replay of the bicentennial-year Miami gathering. It was a unique opportunity to renew friendships and to make new ones; to attach a face to a voice often heard on the air; and to solve problems in the best way possible, by working to understand others' points of view and to find solutions acceptable to all.

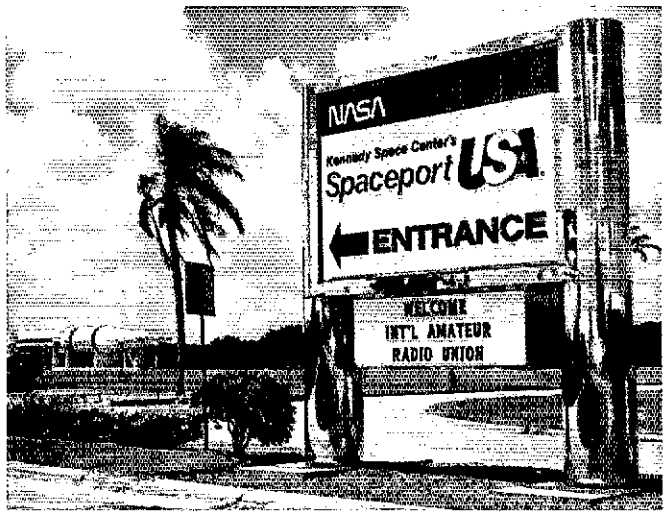
Table 1

The First Ten IARU Region 2 Conferences

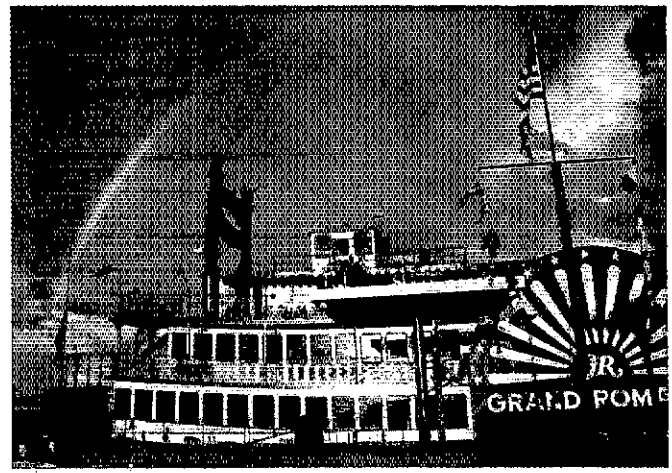
1964—Mexico City, Mexico
1967—Caracas, Venezuela
1970—Ocho Rios, Jamaica
1973—Santiago, Chile
1976—Miami, Florida
1978—Panama City, Panama
1980—Lima, Peru
1983—Cali, Colombia
1986—Buenos Aires, Argentina
1989—Orlando, Florida

Not surprisingly, the Orlando site made this a popular conference. More than 125 attended, representing 23 countries in Region 2, three member-societies outside the Region, and each of the other two IARU regional organizations (see Table 2). IARU Vice President Michael Owen, VK3KI, attending his first regional conference as an IARU officer, was the ranking officer present. Simultaneous interpretation between English and Spanish was provided for the plenary and the major committee meetings, a feature introduced at the Buenos Aires Conference that greatly facilitated the work of the group.

Leading the ARRL delegation was President Larry E. Price, W4RA. The other US delegates were First Vice President Jay Holladay, W6EJJ; International Affairs Vice President Tod Olson, KØTO; Directors Hugh Turnbull, W3ABC, and John Kanode, N4MM; and Executive Vice President David Sumner, K1ZZ. Because Larry Price was elected Honorary President of the Conference, Jay Holladay was the League spokesman during plenary meetings. ANERCOM Chairman Joel Kandel, KI4T, came up from Miami to observe the opening days of the Conference and to discuss emergency communications concerns with delegates. Also attending as observers were ARRL President Emeritus Harry Dannals, W2HD; Carl L. Smith, WØBWJ; and Sandy Donahue, WA4ABY. Arrangements for the social events were handled by Linda Sumner, KA1ZD, and staff assistance was provided by Lisa Clark and Naoki Akiyama, NX1L (ex-N1CIX).



A visit to NASA's Kennedy Space Center was a highlight of the Conference for many delegates.



Nature provided an auspicious start for the banquet marking the League's 75th anniversary and the closing of the conference: a rainbow!

Table 2

IARU Member-Societies Accredited to the 1989 Region 2 Conference

Argentina
Aruba
Bermuda
Bolivia
Brazil
Canada
Cayman Islands
Chile
Colombia
Dominican Republic
El Salvador
Guatemala by proxy to El Salvador
Honduras by proxy to Mexico
Jamaica by proxy to Canada
Mexico
Montserrat by proxy to United States
Netherlands Antilles
Paraguay
Peru
Trinidad by proxy to Venezuela
United States
Uruguay
Venezuela

Other Participants, Observers, and Special Guests

FCC Commissioner Patricia Diaz Dennis
FCC Private Radio Bureau Chief Ralph Haller, N4RH
IARU Vice President Michael Owen, VK3KI
IARU Region 1
IARU Region 3
Deutscher Amateur Radio Club
Japan Amateur Radio League
Radio Society of Great Britain
IARU Monitoring System Region 2 Coordinator M. L. Gibson, W7JIE

Table 3

The IARU Region 2 Executive Committee

Officers

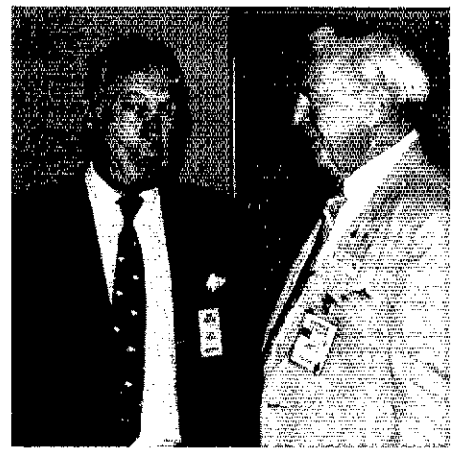
Alberto Shaio, HK3DEU, President
Fabian Zarrabe, YS1FI, Vice President
Tom Atkins, VE3CDM, Secretary
Steve Dunkerley, VP9IM, Treasurer

Area Directors

Frank M. Butler, Jr, W4RH
Guillermo Nunez, XE1NJ
Willy Gravenhorst, PJ2WG
Alfonso Calderon, OA4PQ
Reinaldo Szama, LU2AH



Ron Szama, LU2AH, was elected to the Region 2 Executive Committee.



New Region 2 Secretary Tom Atkins, VE3CDM, is congratulated by the head of the Canadian delegation, George Spencer, VE3OZW. George served as Chairman of Committee A.



Pedro Seidemann, YV5BPG, stepped down as President of Region 2 after six years at that post and a total of 16 years on the Region 2 Executive Committee.



Willy Gravenhorst, PJ2WG, not only won a seat on the Executive Committee—he also succeeded in bringing the next Conference to Curacao!

The Conference was officially opened in plenary session on Labor Day morning, September 4, with words of welcome and inaugural speeches by ARRL President Price, FCC Commissioner Patricia Diaz Dennis, FCC Private Radio Bureau Chief Ralph Haller (see sidebar), Roy Mackey, N4ADI, on behalf of the City of Orlando and Orange County, IARU Vice President Owen, and Region 2 President Pedro Seidemann, YV5BPG. Commissioner Dennis was able to greet the Spanish-speaking delegates in fluent Spanish, making her remarks a highlight of the opening ceremonies.

After lunch, the conferees got down to business. The several committees were named, and each was given assignments according to its terms of reference. Dozens of documents, containing both information and proposals for the consideration of the delegates, had been submitted in advance for translation and distribution by the Region 2 Secretary, Alberto Shaio, HK3DEU. These documents were assigned to the committees as appropriate to serve as the basis of their discussions. Most of the documents went to either Committee A (Administrative); B (Technical and Operational Matters Below 30 MHz); or C (VHF/UHF/SHF/Satellite Matters). The committees met Monday afternoon and all day Tuesday and Wednesday. On Thursday, the Conference Secretariat spent the day preparing the committee reports for consideration at the plenary meeting Friday. (In all, 39,897 pages of documentation were printed by the Secretariat during the week—not including the documents prepared beforehand!) Friday was an all-day plenary, beginning with review and adoption of the committee reports and concluding with election of the officers and other Executive Committee (EC) members to serve until the next Regional Conference, and selection of its venue. Finally, that evening the week-long conference was brought to a close with a gala banquet in honor of the

Inaugural Address by Ralph Haller, N4RH, Chief, Private Radio Bureau of the FCC

Good Morning, delegates and observers. Welcome to the United States. I hope you are having a very enjoyable visit, and I extend my most sincere personal wish for you to have a successful and productive conference.

I want to thank the International Amateur Radio Union for inviting me to be with you during your Region 2 Conference. As an amateur operator myself, I always enjoy meeting with other amateur operators.

This is a particularly timely occasion for me to be speaking with you. We at the Federal Communications Commission, with the valuable cooperation of our amateur service community, have just completed the first complete rewrite of our amateur service rules in forty years. In fact, the new rules just went into effect last Friday.

Our rules are designed to provide an amateur service in the United States that has a fundamental purpose as is expressed in five principles. Every prospective licensee is tested to make certain that he or she understands these principles. Every amendment to the rules must be in agreement with these principles. Let me tell you about each one of them.

First, we want to recognize and to enhance the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications.

Second, we want to make it possible for amateurs to continue and extend their proven ability to contribute to the advancement of the radio art. A highlight of the new rules is a simplified system for consolidating the 1300 possible emission types developed by the CCIR into only nine terms already familiar to most amateurs. This system offers the opportunity to experiment with practically every conceivable type of emission.

The third principle upon which our rules are based is to encourage and improve the amateur service by providing for advancing skills in both the communication and technical phases of the radio art. We have five classes of operator licenses. Each higher class offers a reward in the form of increased operator privileges. Last year, over 77,000 persons reached for a higher rung on that ladder.

Number four is to expand the pool of trained radio operators, technicians, and electronics experts. We have about 460,000 amateur operators in the United States. Another 20,000 persons become new amateurs each year.



Ralph Haller, N4RH, Chief, Private Radio Bureau of the FCC

We hear countless stories of scientists and engineers who were initially attracted to their careers through the amateur service. In fact, that is my very own story. At the age of ten, I became an amateur operator. In so doing, I took my first step toward eventually earning an electrical engineering degree, working in broadcasting and now for the FCC.

The final principle of the rules directly relates to your conference. We want to continue and to extend the amateurs' unique ability to enhance international goodwill. We want to be your good neighbor. For this reason, it is gratifying to see the delegates and observers from amateur organizations throughout Region 2 and elsewhere coming together for this conference.

During the course of the rules rewrite, the American Radio Relay League brought to our attention a most important consideration:

"The amateur service requires, on the one hand, flexibility in the regulations, in order to permit the widest range of experimentation, public service, and emergency communications. On the other hand, the amateur service is unique in requiring protection from encroachment by commercial entities that would exploit the service.

"The noncommercial nature of Amateur Radio is both unique among the radio service, and beneficial in terms of the public service functions it performs. The amateur service is akin to a public park, requiring protection from exploitation so that the public can both use it and benefit from its use."

The amateur service should be allowed to pursue its objectives unfettered by encroachment of commercial interests. Your frequencies should not be taken over by those who would use them as an alternative to the land mobile, broadcast, maritime, or common carrier radio services.

There are, however, certain situations where amateur systems can fill a communications void. The most important exception concerns providing emergency communications. Although there are specific frequencies for use during emergencies for public safety agencies, ships, and aircraft, there are types of emergencies where amateur systems can make an outstanding contribution to the public welfare. The public is well served by having technically qualified amateur operators with transmitting apparatus available in practically every area of the world.

When a disaster strikes such that normal communications systems are overloaded, damaged or completely disrupted, amateur systems can assist immediately with relief operations. They can temporarily help bridge the gap until normal communications systems are restored.

But, one area that is becoming of increasing concern to us is the proper scope of international amateur communications. Section I in Article 32 of the ITU Regulations states:

"When transmissions between amateur stations of different countries are permitted, they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified."

What may begin as a group of well-intentioned amateurs assisting a few persons who are temporarily caught in unavoidable situations may develop into a net that routinely handles commercial traffic.

After a network is established, there seems to be a temptation to use it for less pressing situations to assure its continued existence. The volume of the traffic increases and the nature of the communications grows well beyond unimportant personal remarks until it encompasses communications directly related to the business of organizations and individuals.

One point of view held by some amateurs is that an absence of strict, literal enforcement of the international

requirement by the administrations indicates that it is obsolete and meaningless. But that is simply a rationale for abuse of the amateur service by those who would exploit it.

Our new rules have taken a step to prevent commercialization of Amateur Radio. They prohibit an amateur station licensed by the FCC from transmitting any communications the purpose of which is to facilitate the business or commercial affairs of any party, and from transmitting any communications as an alternative to any other authorized radio service. All types of communications related to business activities, including the advertising, solicitation, ordering, furnishing, delivering, accounting, or billing for any supplies, materials, or services, are prohibited.

I believe that the continued abuse of the international communication privilege will surely erode support for the amateur service.

The amateur service is an international radio communications service. Radio, by its nature, does not automatically recognize international borders.

International regulations, however, should permit an exceptionally high degree of flexibility so amateurs can achieve the fundamental purposes of the amateur service, one of which is the enhancement of international goodwill. On the other hand, your frequencies must be protected through rules and compliance actions that help discourage exploitation of the amateur service. Your input to international conferences and to your administrations help create regulations that balance these conflicting objectives.

It is through conferences like this that informed representatives of the amateur community throughout the world can come together face-to-face and exchange information and ideas. Before I close, therefore, I want to salute you. I want to thank you on behalf of the Federal Communications Commission and on behalf of amateur operators everywhere for your contributions to make this conference a success. Your time and talents help make Amateur Radio a very special radio service to the world.

I now have the distinct privilege of officially opening this conference.

I now declare this conference of the Region 2 International Amateur Radio Union to be open and in session. I wish you a highly successful conference. Thank you.



The Conference gave FCC Private Radio Bureau Chief Ralph Haller, N4RH (left), a rare opportunity to hear overseas concerns firsthand. Here the head of the Bermuda delegation, Tony Siese, VP9HK (right), discusses an interference problem with Mr Haller and with ARRL President Price.



The many presentations to ARRL accepted by President Price included one on behalf of the Japan Amateur Radio League by JARL President Shozo Hara, JA1AN (center), with assistance from Region 3 Secretary Masa Fujioka, JM1UXU.

Some Actions of the Tenth General Assembly, IARU Region 2

- Resolved that the announcement of WARC-92 was of the greatest importance to the conference, and that member-societies should inform their members about WARC-92 and stress that IARU is to coordinate all activities in the defense of Amateur Radio.
- Endorsed the objectives for future allocations conferences developed by the IARU Administrative Council.
- Endorsed the action plan developed by the Administrative Council for WARC preparation.
- Empowered the Region 2 Executive Committee to take all necessary steps for the defense of Amateur Radio at WARC-92, in coordination with the Administrative Council.
- Resolved that no individual or group of amateurs should jeopardize the goodwill of national administrations enjoyed by Amateur Radio, and in particular that all regulations shall be strictly adhered to, such as regulations limiting third-party traffic and regulations governing interference to services entitled to protection.
- Adopted a special budget for WARC preparation and participation.
- Adopted a change in awards policy relaxing restrictions on credits for 10-MHz operation for existing awards, while noting the extreme importance of maintaining the highest operating standards in this shared band.
- Approved an IARU training program in principle, and urged international consideration of the proposed project.
- Adopted a version of "The Amateur's Code" suitable for use in all countries.
- Endorsed the sponsoring of a radio event to commemorate the 500th anniversary of the discovery of America in 1992.
- Endorsed plans to improve communications between the member-societies of the region, particularly during communications emergencies.
- Strengthened the IARU Monitoring System in the region.
- Adopted changes to band plans in light of changing operating patterns.

League's 75th anniversary, on board the riverboat "Grand Romance" as it plied the nearby St Johns River.

Even then, the work was not over for the Region 2 EC members or the members of the IARU Administrative Council; the Region 2 EC met on Saturday, and the Administrative Council met on Saturday, Sunday, and Monday to pursue preparations for that all-important WARC-92.

Unlike Buenos Aires, where the incumbent EC members all were reelected, Orlando saw a number of significant changes in the makeup of the Executive Committee (see Table 3). Pedro Seidemann, YV5BPG, stepped down as President of Region 2 after six years at the post. Alberto Shaio, HK3DEU, who has served as Secretary of Region 2 for the same six-year period, was elected to replace Pedro. Continuing as Vice President is Fabian Zarrabe, YS1FI. Tom Atkins, VE3CDM, moves from Treasurer to Secretary, and taking over as Treasurer is longtime EC member Steve Dunkerley, VP9IM.

Of the five remaining positions on the Executive Committee, the only one to which an incumbent was re-elected was the seat for the United States, held by ARRL Southeastern Division Director Frank Butler, W4RH. The new faces are those of Guillermo Nunez,

XE1NJ; Willy Gravenhorst, PJ2WG; Alfonso Calderon, OA4PQ; and Reinaldo Szama, LU2AH. Leaving the Executive Committee after many years of service are Luis Caamano, HI8LC, and Hugo Coscio, CP5EC. Manuel Winer, LU4AH, is departing after completing the term of Silent Key Carlos Kaufman, LU9CN.

Curacao emerged victorious as the site of the next Region 2 Conference following spirited campaigning by several of the delegations.

More than two dozen presentations were made at the closing banquet, mostly to ARRL in honor of its 75th anniversary. The many plaques and gifts received are on display at League Headquarters; it's an impressive collection! Special recognition was extended on behalf of both IARU and the Region 1 Division to Carl L. Smith, WØBWJ, who retired as IARU Vice President earlier in the year after many years of service to IARU and ARRL.

During the week there were a number of scheduled social events, including an all-day trip to the Kennedy Space Center's Spaceport USA on Thursday while the Secretariat was catching up on the documentation. In addition to welcoming the delegates at the airport and arranging their ground transportation to the conference site, the Orlando Marriott, Orlando-area amateurs under the direction of Northern Florida Section Manager Roy Mackie, N4ADI, manned a special conference radio station with a very special call sign: W1AW/4! This was, as far as we know, the first time W1AW had ever been operated portable from the fourth call area. Thanks to equipment loans from Kenwood USA and ICOM America, more than 1300 contacts were made from W1AW/4.

The FCC cooperated in making the Region 2 Conference a special occasion. By unprecedented action that will not be repeated except for international events of equivalent stature, Section 97.501 of the Commission's Rules was waived and conference participants licensed in their home countries were granted Extra Class operating privileges for the period August 27 through September 16. These arrangements made it possible not only for delegates to apply for and receive operating permission on-the-spot, but also for delegates from countries having no reciprocal operating agreement with the United States to receive temporary operating permission! One such country is Mexico, and Guillermo Nunez, XE1NJ, became the first radio amateur from Mexico to receive operating permission in the United States without passing an FCC exam. We were particularly pleased that this courtesy could be extended, as the Federacion Mexicana de Radio Experimentadores had made similar arrangements for Naoki Akiyama and me to operate from Guadalajara last July as XE1/N1CIX and XE1/K1ZZ, respectively. Such special operating permission has become something of a tradition at major IARU events, a harbinger, we hope, of universal licensing such as is now enjoyed among several European countries.



IARU Vice President Michael Owen, VK3KI, brought greetings from President Richard Baldwin, W1RU, who was unable to attend because of an IARU travel commitment in Africa.

The conferees left Orlando knowing there is much work to be done, and that it must be done quickly. By early 1991, most of the technical support for positions to be taken to WARC-92 will have been completed, and the outcome of WARC-92 will have been largely determined. Yet, the final agenda will not be known until mid-1990! WARC-92 may well be history by the time the Region 2 member-societies of IARU gather for their Eleventh General Assembly. Will we gather in victory, as in Lima after WARC-79? Only when we know the answer, will we be able to measure the success of Orlando-89.

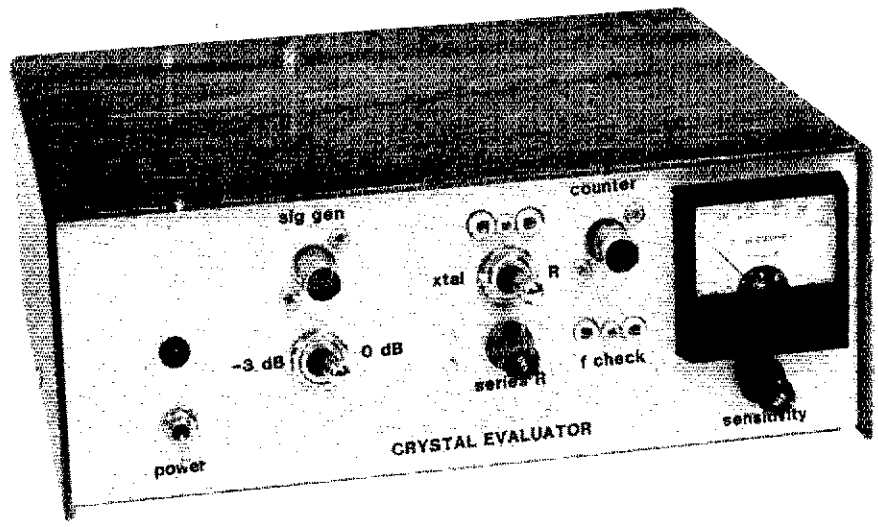
ARRL Publications Acceptance Criteria

ARRL staff and management strive to maintain a balance of material in our various publications to meet the needs of our members. Unsolicited manuscripts are received regularly at ARRL from authors who would like to have their work published. We welcome and encourage these manuscripts, and we rely on them for many of the articles that appear in our periodicals. To reach a decision to accept or return a manuscript, the ARRL editorial staff asks the following questions concerning each submitted article:

(1) Is it pertinent to Amateur Radio?
(2) Is it legal, prudent and in good taste?
(3) It is technically sound?
(4) Is it consistent with ARRL policy and objectives?
(5) Is it free of needless controversy?
(6) Is it of interest to our readers?
(7) Is it original work (or a new twist on an old theme)?
(8) Is it timely (or timeless)?
(9) Is it of appropriate length?
(10) Is the topic treated in sufficient detail?
(11) Is the presentation appropriate and not self-serving?
(12) Is it appropriate to publish the article at this time?
(13) If parts are needed, are they readily available, or can they be made available?
(14) Can we expect to receive adequate author cooperation and support?
(15) Has this material been submitted only to ARRL?
(16) Will this be the first time that this material has been published where it will receive wide circulation?
(17) Do we need it?
(18) If we accept it, will it be published in a timely fashion?

Positive answers to the above questions lead toward an "accept" decision, while negative answers lead toward a decision to return the manuscript. We do not use a mathematical formula for reaching the decision. Rather, the decision is the result of editorial judgment based on the above criteria. These criteria apply to general-interest and technical articles. The editorial judgments and decisions of the editor and publisher are final.—*(Adopted September 1988)*

A Tester for Crystal F, Q and R



This instrument allows you to analyze the crystals you want to use in IF ladder filters. The design is based on Wes Hayward's circuits in his classic *QST* ladder-filter paper.

By Doug DeMaw, W1FB
ARRL Contributing Editor
PO Box 250
Luther, MI 49656

Do you need a CW or SSB filter for a new project? Does the cost of commercial filters curl your hair? You can save dollars and design a filter for your needs by building this tester and following the instructions in Wes Hayward's *QST* articles on this subject.[1]

He described some circuits for crystal analysis in his 1982 article, but no PC-board patterns were offered and the practical data was not complete. I built two units that contained the circuits Hayward recommended, but I found them awkward to use because they weren't assembled for convenience. This third model puts all of the key circuits on one small PC board.[2] I incorporated some circuit changes and added some features you should find useful.

Page space does not permit repeating the high points of the W7ZOI *QST* articles. Emphasis is on how to build and use this instrument. There is nothing tricky about the construction, and the cost is modest, especially if you have a reasonable supply of parts on hand.

Circuit Notes

Fig 1 shows the circuit for the crystal evaluator. A 20-dB, 50-Ω attenuator is used at the input port (J1). This helps to prevent the signal generator from overloading the broadband amplifiers, Q1 through Q4. It also provides a 50-Ω input termination for the crystal under test. These considerations are important if we are to obtain accurate indications of the crystal characteristics. Q1 provides a 50-Ω load for the output of the crystal.

I added S1 to permit switching between the crystal and R4. Originally, I had to plug the potentiometer into the crystal socket from outside the panel. TP1 and TP2 are in parallel with R4 to allow resistance measurements from the front panel of the box. It is vital that the leads from the PC board to the Y1 socket, and from the board to R4, be kept very short. This minimizes stray inductance, which can cause improper readings, especially with crystals above 4 MHz.

Q1, Q2, Q3 and Q4 operate as broadband amplifiers. Total circuit gain is approximately 40 dB. A 3-dB attenuator is located immediately after Q2. The attenuator is switched in and out of the circuit by means of S2. Hayward provided a 3-dB gain reduction by changing the Q2 emitter components with a switch. I discovered that this approach could be tricky, depending upon the particular 2N3904 used. Some tailoring of values was necessary to ensure a 3-dB change. The resistive attenuator at S2 provides a dependable 3-dB drop in signal.

You can use a scope to measure changes in circuit response. J2 is provided for this purpose. If you choose this option, you can eliminate Q4 and the meter circuit. If Q4 is dropped from the circuit, terminate C10 (Q4 side) with a 56-Ω resistor. You can attach a frequency counter to J2. Hayward connected his counter to J1, but I found that my counter was not sensitive enough to trigger at that circuit point. The counter works fine at J2 because of the amplification provided by Q1, Q2 and Q3.

Q4 functions as an amplifier for the metering circuit. D1 rectifies the RF energy to cause deflection of the needle of M1. R32 is a meter-sensitivity control.

I included the test oscillator, Q5, on the PC board. It is used for measuring crystal frequency via J3. This is essential when selecting closely matched crystals for a filter. Q5 functions as a Pierce oscillator. The feedback components (C18, C19) are suitable for 1 to 20-MHz crystals.

Construction Information

Fig 2 shows the interior of the tester. The circuit is housed in a Ten-Tec TW-38 cabinet. It measures (HWD) 3-1/16 × 8-1/4 × 6-1/8 inches. There is a lot of unused space in the box. You may want to miniaturize your version of this tester by choosing a smaller enclosure. The power supply (see Fig 3) can be eliminated if you already have an outboard power source (12 V dc at 100 mA or greater).

The PC board is mounted on metal spacers near the front panel. It is situated for the shortest leads practicable between the board and the related panel hardware. RG-174 miniature coaxial cable is used between J1 and the board; likewise from J2 to the PC board. Ground the shield braid at each end of these cables.

I used a Simpson 100-μA meter for M1 of Fig 1. This is a high-priced component! You can use a low-cost edgewise surplus meter for M1. Most of these units have a 200-μA basic movement, and they are plenty sensitive enough for this circuit. Look for these S meters and battery indicators in the surplus catalogs. It is a simple matter to paste a homemade numbered meter scale over the original one. This will provide better reference marks when checking the −3-dB points of the crystal response.

[1]Notes appear on p 23.

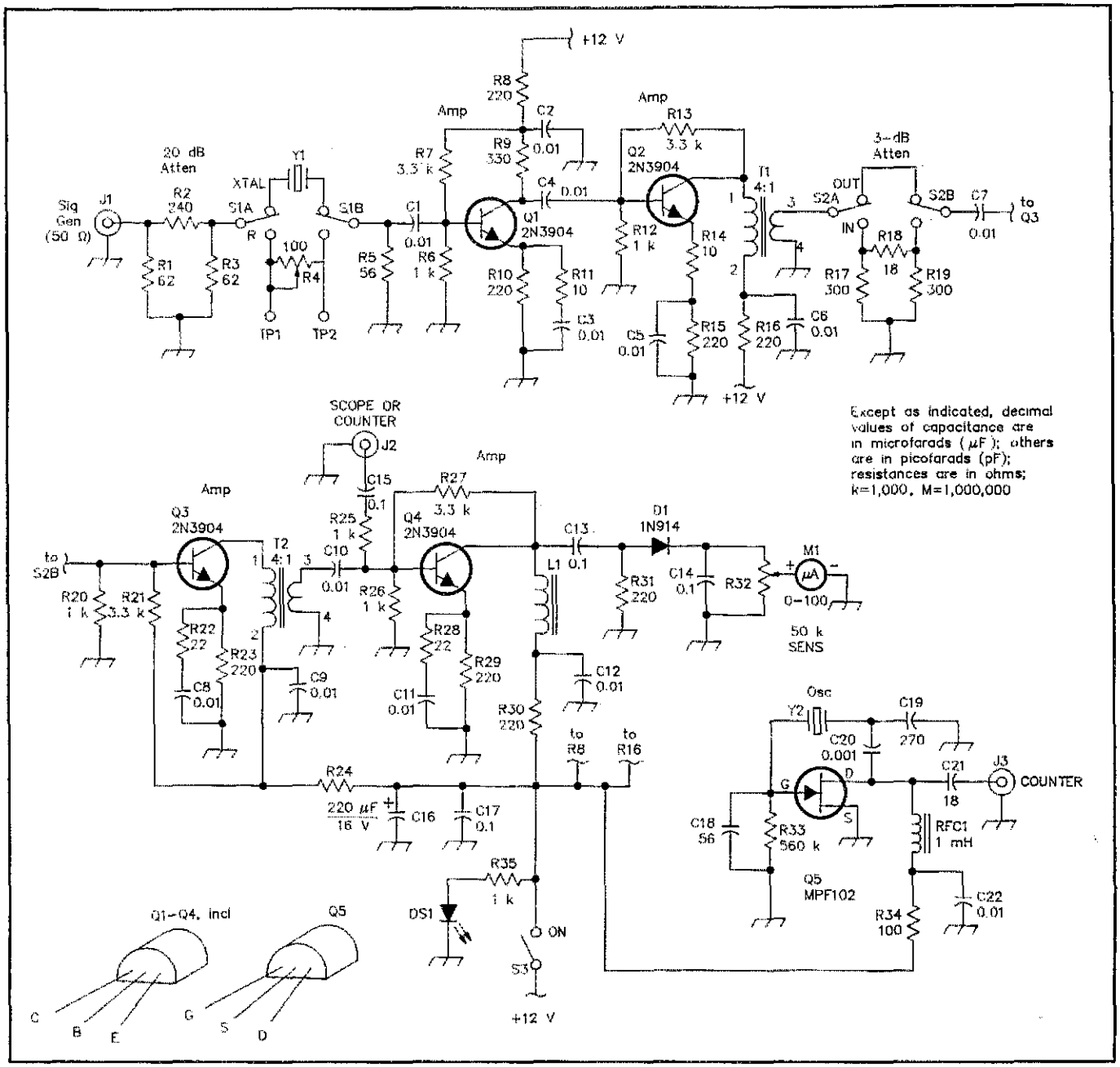


Fig 1—Schematic diagram of the RF portion of the crystal tester. Capacitors are disc ceramic, 100 V. Those with polarity marked are electrolytic or tantalum. Fixed-value resistors are ¼-W carbon composition.

D1—Small-signal diode, type 1N914.
DS1—Red LED.
J1, J2, J3—BNC chassis-mount connector.
L1—RF choke. Use 15 turns of no. 26 enam wire on an Amidon Assoc FT-37-43 (850 μ) toroid.
M1—Small dc meter, 100 or 200 μA (see text).
R4—100-Ω, linear-taper carbon-composition control. A 250-Ω control is also suitable.
R32—50-kΩ, linear-taper carbon-composition control.
RFC1—Miniature 1-mH RF choke.
S1, S2—DPDT toggle or slide switch.
T1, T2—4:1 broadband transformer. Use 12 primary turns of no. 26 enam wire on an Amidon FT-37-43 toroid. Secondary has 6 turns of no. 26 enam wire.
TP1, TP2—Small press-in pin-type feed-through bushing or small binding post.
Y1, Y2—Crystal to be tested. Use crystal socket of choice or parallel sockets for types of holders desired.

T1 of Fig 3 is a surplus 12-V, 250-mA transformer. The output from the bridge rectifier, at the filter capacitor, is 16.9 V. A 12-V three-terminal regulator can be used in place of the LM317T variable regulator I use. Be sure to put a small heat sink on the voltage regulator, U2. My rectifier/regulator module is a unit (modified) I obtained from a surplus dealer. There is no PC pattern for this assembly.

The Basics of Tester Use

Crystals used in ladder filters need to be matched within 100 Hz of one another—the closer the better, of course. Plug the crystal into the Y2 socket and attach a frequency counter to J3. Select a set of crystals that is closely matched.

Next, insert one of the selected crystals into the Y1 socket. Connect a signal generator to J1 and place S1 in the XTAL position. Set S2 for 0 dB and set R32 at midrange. Carefully adjust the generator to the crystal frequency, as observed by a

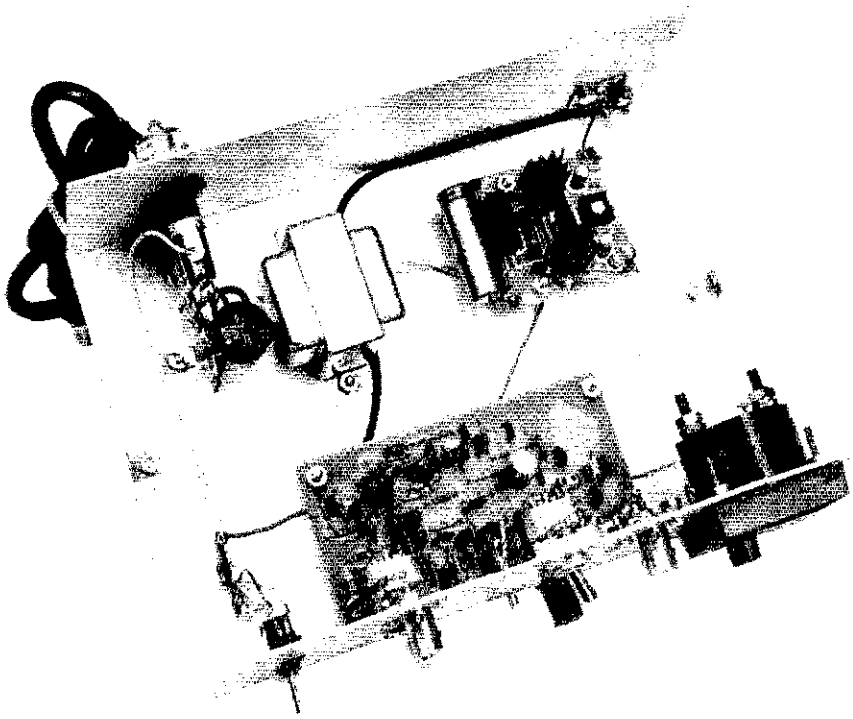


Fig 2—Interior view of the tester. Note the RF PC board close to the front panel to ensure short leads to the panel hardware. J2 is on the rear panel. Terminal strips are used as tie points for the ac line and DS1. R35 of Fig 1 is mounted on one of the terminal strips.

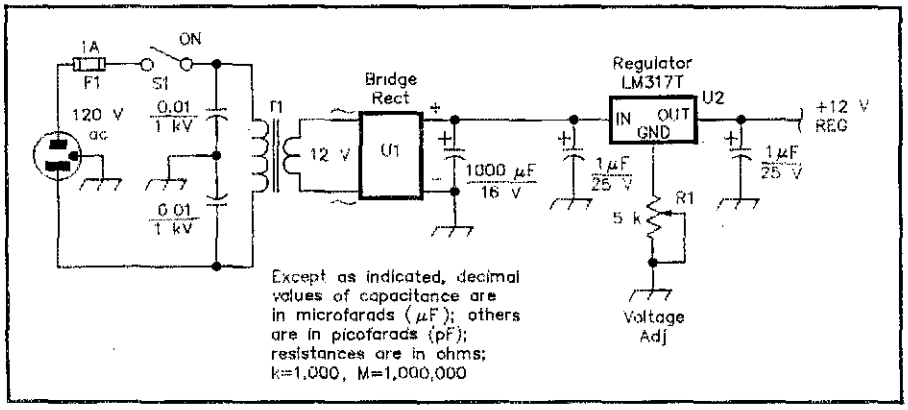


Fig 3—Circuit of the 12-V power supply. Decimal-value capacitors are disc ceramic, 1 kV; those with polarity marked are electrolytic or tantalum.

F1—1-A fuse in panel-mount holder.
R1—Linear taper PC-mount control, 5 kΩ.
S1—SPST toggle.
T1—12-V, 250-mA power transformer.
U1—Bridge rectifier, 50 PRV, 1 A.
U2—Adjustable voltage regulator or fixed-voltage unit (see text).

peak reading obtained on M1. This is a touchy procedure, since you can pass across the crystal series-resonant frequency without seeing the needle of M1 move! A generator with a vernier knob is essential for this test unless you are quite steady of hand. Note the frequency at which peak response occurs.

Now, switch in the 3-dB pad and log the meter reading. It will drop to the left. Remove the 3-dB pad and adjust the generator frequency above and below the crystal series-resonant frequency. Find the two points where M1 reads the same as with the 3-dB pad in the line. These are the 3-dB response points for the crystal. Use your frequency counter to measure the frequency at the 3-dB points. With this information you can determine the crystal Q, in accordance with the Hayward article referenced in Note 1.

The last procedure calls for relocating the crystal series-resonant frequency (maximum M1 reading). Place S1 in the R position and adjust R4 to obtain the same meter reading that was noted with S1 in the XTAL mode. Now, measure the resistance of R4 across TP1 and TP2. This provides the resistive characteristic of your crystal. This data is essential for designing your filter, as discussed in Hayward's article.

Use the lowest signal-generator output amplitude practicable, consistent with a midscale meter reading at crystal resonance. Feeding too much driving power into the tester will lead to inaccurate test results, and excessive drive can damage the crystal under test.

Some Final Remarks

I hope you will be encouraged to build your own crystal filters for transmitters and receivers. Certainly, the Hayward procedure is simple and easy to duplicate. The practical data for this tester is meant to stimulate you toward doing your own thing with crystal filters. Surplus computer crystals are widely available at low cost. Check the surplus catalogs for these units; most are in the $1 class.

Notes

[1]W. Hayward, W7ZOI, "A Unified Approach to the Design of Crystal Ladder Filters," *QST*, May 1982, p 21. Also see Hayward's "Designing and Building Simple Crystal Filters," *QST*, July 1987, p 24.

[2]Drilled and plated PC boards for this project are available from FAR Circuits (N9ATW), 18N640 Field Ct, Dundee, IL 60118, tel 312-426-2431 after 6 PM. Price: $4.25 + $1.50 shipping per order to US addresses.

New Products

ALABAMA AMATEUR ELECTRONICS QUAD ANTENNAS

☐ Quad antennas for the 28- through 420- to 450-MHz ham bands are available from AAE. Fiberglass-boom and -spreader construction provides good strength, as well as resistance to wind, ice and corrosion. No tools are required for assembly of these antennas, and several versions are available. 28 MHz: 2, 3 and 4 elements; 50 MHz: 4 elements; 144 MHz: 3, 4 and 6 elements; 220 MHz: 6 elements; 440 MHz: 6 elements. Prices range from $40 for the 3-element 144-MHz version to $280 for the 4-element 28-MHz model. For more information, contact Alabama Amateur Electronics, 3164 Cahaba Heights Rd, Birmingham, AL 35243, tel 205-967-9292.—*Rus Healy, NJ2L*

Strays

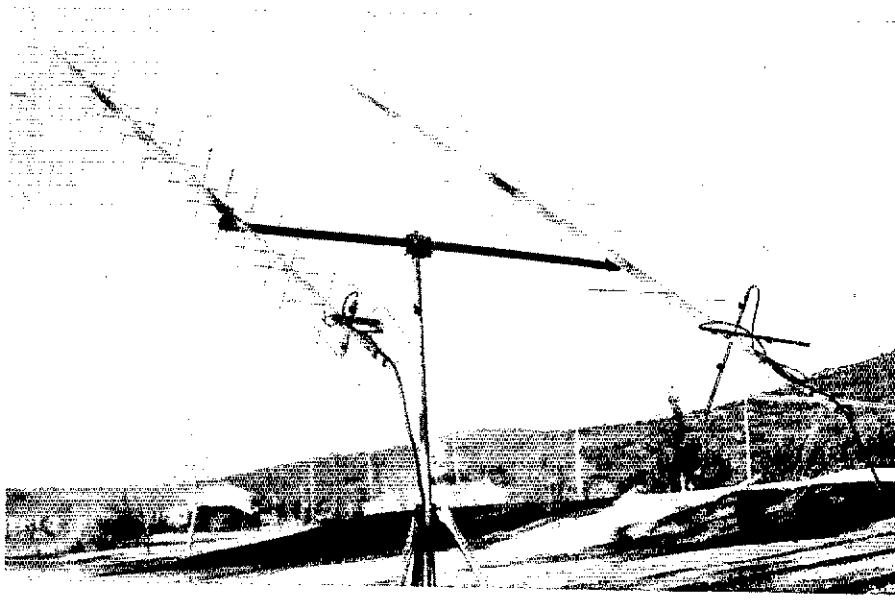
I would like to get in touch with...

☐ anyone who has a schematic or manual for an IM-84/URM-50 field strength meter. W. Clem Small, Rte 1 Box 64A, Weybridge, VT 05753.

Circularly Polarized Quagi Antennas for Space Communications

Activity on OSCAR 13 is booming. This low-cost, one- or two-weekend antenna project can help you gear up for satellite communications.

By Gene Marcus, W3PM/GM4YRE
917 Chatterson Rd SE
Huntsville, AL 35802



(photos by the author)

Worldwide DX is commonplace on OSCAR 13. It's not unusual to hear relaxed roundtable QSOs between Asia, Europe and North America without the congestion of the HF bands—all made with transmitter outputs of less than 50 watts! OSCAR 13 is a handy tool that enables you to keep in touch with the gang back home, even when you're an ocean away. This is exactly what I intend to do on a forthcoming trip to Scotland.

Although the commercial antennas I use for OSCAR 13 are not very large, they are certainly not small enough to carry as luggage on a transatlantic flight. The quagi antenna seemed to be the answer to my problem. The quagi is an easy to build, highly effective antenna design developed by Wayne Overbeck, N6NB, that combines the best features of the cubical quad and the linear-element Yagi-Uda beam antenna.[1,2] A quagi can be built with simple materials and tools at a fraction of the cost of a commercial antenna.

Quagis can be quite portable. If constructed of suitably lightweight stock, a quagi's elements can be removed from the antenna boom and packed in a suitcase for travel. The boom need not be brought along; another boom—made of wood—can be cut and drilled at your destination. Presto—an instant, high-gain VHF or UHF antenna!

The quagi is a linearly polarized antenna, and OSCAR 13 uses circular polarization. This is not a problem if the signals received from the satellite are always circularly polarized. Although OSCAR 13 transmits and receives using right-hand circular polarization, its signals appear to be circularly polarized only when its high-gain antennas are aimed directly at the sub-satellite point.[3] This usually occurs at apogee. At other times, OSCAR 13's signals appear to be elliptically polarized and—especially when received on a linearly-polarized antenna—may vary drastically in amplitude as the satellite spins on its axis. This effect, called *spin modulation*, can seriously reduce signal readability.

After experimenting with linearly polarized quagis for satellite communication, I found that spin modulation makes circular polarization highly desirable. But circular polarization usually involves using bulky, helical beam antennas or crossed Yagis that seem rather difficult to build and adjust. I recalled a *QST* article by D. S. Robertson, VK5RN, that outlined a method of feeding a quad driven element to obtain circular polarization.[4] Why not apply this method to a quagi?

The Birth of the Circular-Mode Quagi

VK5RN used two coaxial feed lines and a 90° delay line to feed a closed loop. Feeding a quad driven element at adjacent corners presents a unique problem, however: Voltage and current maxima exist simultaneously at all four corners of the loop. Because of this, corner-feeding a circularly polarized loop requires that current be driven into feed points where voltage maxima exist. VK5RN solved this problem by using a sleeve balun at both feed points. The balun transformers present a very high impedance to the in-phase voltages. Therefore, current is not driven down the outer conductors of the coaxial feed lines. Turning a circularly polarized loop into a circular-mode quagi requires the addition of only an impedance-matched power divider and orthogonal, parasitic director elements.

Construction of the Circular-Mode Quagi

Circular-mode quagis, like conventional quagis, are quite easy to construct. Simple hand tools used with a moderate degree of skill suffice for the 145- and 435-MHz antennas described here. Careful measurement of element and phasing-line lengths are very important though, especially for the 435-MHz antenna. Strive to make all measurements to an accuracy of ± 1/16 inch.

Tables 1 and 2 give the dimensions for the 145.9- and 435-MHz antennas. The dimensions given assume the presence of nonconductive booms (wood is suitable). (If you use a metal boom, you'll have to recalculate *all* the dimensions!) The 145-MHz quagi uses a 14-ft boom; the 435-MHz version uses a 12-ft boom. In both antennas, the boom consists of clear, 1×2 pine or fir molding stock. Select straight-grained wood that's free of knots; this will minimize warping of the boom. I tapered both antennas' booms to 5/8-inch square at their driven-element/reflector ends and weatherproofed the booms with wood preservative.

The directors consist of 1/8-inch-diameter metal rods or wires. (I used copper welding rod bought at a local welding supply store.) In my antennas, I located the vertical directors 1/8 inch in front of the horizontal ones.

The quad loops are made using no. 12 copper thermal wire (TW). *Leave the plastic insulation on the wire* or you'll have to recalculate the element lengths. The element dimensions specified in the tables are *net* dimensions. Therefore, you must allow extra

[1]Notes appear on p 27.

Table 1

Dimensions and Construction Data for the 145.9-MHz Circular-Mode Quagi

Element Lengths	*Interelement Spacing*
R—85-7/8 in. loop (2.181 m)	R-DE—20-3/4 in. (527 mm)
DE—81-in. loop (2.057 m)	DE-D1—15-9/16 in. (395 mm)
D1—35-5/8 in. (905 mm) (2 reqd)	D1-D2—32-3/4 in. (832 mm)
D2—35-7/16 in. (900 mm) (2 reqd)	D2-D3—17-5/16 in. (440 mm)
D3—35-1/4 in. (895 mm) (2 reqd)	D3-D4—25-7/8 in. (657 mm)
D4—35-1/16 in. (891 mm) (2 reqd)	D4-D5—25-7/8 in. (657 mm)
D5—34-7/8 in. (886 mm) (2 reqd)	D6-D6—25-7/8 in. (657 mm)
D6—34-11/16 in. (881 mm) (2 reqd)	

Boom: 1 in. × 2 in. × 14 ft (25 mm × 51 mm × 4.27 m) pine or fir, tapered to 5/8 inch (16 mm) at both ends.
Driven element: No. 12 TW copper-wire loop in square configuration, corner fed. See text.
Reflector: No. 12 TW copper-wire loop. See text.
Directors: 1/8-inch-diam (3.175 mm) rod passing through boom orthogonally in horizontal and vertical planes.

Table 2

Dimensions and Construction Data for the 435-MHz Circular-Mode Quagi

Element Lengths	*Interelement Spacing*
R—28-in. (711-mm) loop	R-DE—7 in. (178 mm)
DE—26-5/8-in. (676-mm) loop	DE-D1—5-1/4 in. (133 mm)
D1—11-3/4 in. (298 mm) (2 reqd)	D1-D2—11 in. (279 mm)
D2—11-11/16 in. (297 mm) (2 reqd)	D2-D3—5-7/8 in. (149 mm)
D3—11-5/8 in. (295 mm) (2 reqd)	D3-D4—8-3/4 in. (222 mm)
D4—11-9/16 in. (294 mm) (2 reqd)	D4-D5—8-3/4 in. (222 mm)
D5—11-1/2 in. (292 mm) (2 reqd)	D5-D6—8-3/4 in. (222 mm)
D6—11-7/16 in. (291 mm) (2 reqd)	D6-D7—12 in. (305 mm)
D7—11-3/8 in. (289 mm) (2 reqd)	D7-D8—12 in. (305 mm)
D8—11-5/16 in. (287 mm) (2 reqd)	D8-D9—11-1/4 in. (286 mm)
D9—11-5/16 in. (287 mm) (2 reqd)	D9-D10—11-1/2 in. (291 mm)
D10—11-1/4 in. (286 mm) (2 reqd)	D10-D11—9-3/16 in. (233 mm)
D11—11-3/16 in. (284 mm) (2 reqd)	D11-D12—12-3/8 in. (314 mm)
D12—11-1/8 in. (283 mm) (2 reqd)	D12-D13—13-3/4 in. (349 mm)
D13—11-1/16 in. (281 mm) (2 reqd)	

Boom: 1 in. × 2 in. × 12 ft (25 mm × 51 mm × 3.66 m) pine or fir, tapered to 5/8 inch (12 mm) at both ends.
Driven element: No. 12 TW copper-wire loop in square configuration, corner-fed. See text.
Reflector: No. 12 TW copper-wire loop. See text.
Directors: 1/8-inch-diam (3.175 mm) rod passing through boom orthogonally in horizontal and vertical planes.

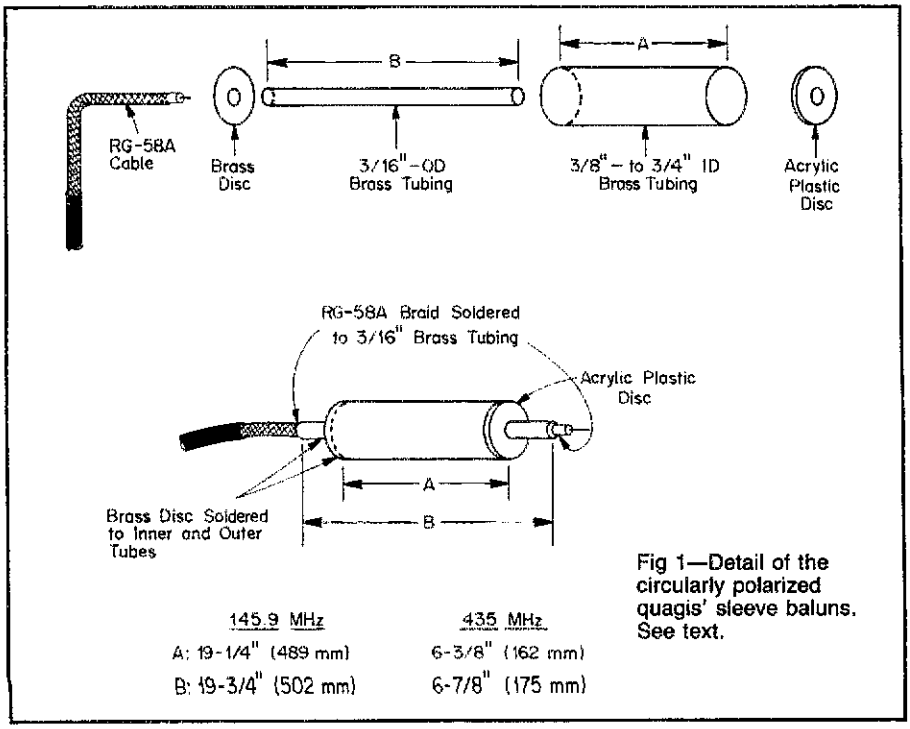


Fig 1—Detail of the circularly polarized quagis' sleeve baluns. See text.

wire length to compensate for overlap where the loop ends are soldered together. Mount the quad loops in a diamond configuration, using strips of acrylic plastic sheet (Plexiglas® is suitable) for support at the loops' corners (voltage maxima). (I used heavy-gage, safety window glazing purchased from a local hardware store.)

Fig 1 shows the sleeve baluns in detail. The baluns consist of brass tubing and sheet stock (available in hobby stores). The tubing is sold in a variety of diameters up to 21/32 inch, in 1/32-inch increments. I used 21/32-inch-diameter stock for the outer tube, and 3/16-inch stock for the inner tube. (RG-58A coaxial cable, with its outer insulation removed, should just fit within the inner tube; this is the case with 3/16-inch-diameter stock.) Larger-diameter brass tubing is usually stocked in 1-ft lengths; I constructed the 2-meter baluns from 5/8-inch-diameter tubing telescoped inside 21/32-inch-diameter tubing—for a total balun length of 19-1/4 inches—and soldered the tubes together. (One-half-inch-diameter copper pipe would probably work well for the outer sleeve-balun tube; the only trade-off would be that copper is heavier than brass. The important thing is to keep the ratio of the outer-tube ID to the inner-tube OD to between 2:1 and 4:1.)

A disc cut from 0.016 × 3/4-inch brass sheet stock centers the 3/16-inch-diameter tubing in the sleeve and shorts it to the bottom of the sleeve. A similar disc, fashioned from Plexiglas and located at the *open* end of the balun, supports the 3/16-inch-diameter tubing in the *center* of the sleeve.

To obtain circular polarization, the power fed to the antenna must be split equally and fed to the horizontal and vertical planes of the antenna. In addition, the RF fed to one plane must be 90° out of phase with the RF fed to the other. To obtain *switchable* right- and left-hand-circular polarization, a phasing line, 90 electrical degrees long, must be added in series with the feed line to either plane. The feed-point impedance of a quagi is assumed to be 50 Ω. Each quagi's feed assemblies are fed in parallel via transformers consisting of 90 electrical degrees of 73-Ω cable (RG-59A).

Fig 2 shows the details of the phasing and impedance-matching system for a circular-mode quagi. The 145-MHz antenna features switched right- and left-hand polarization using an inexpensive, SPDT, 12-V-dc relay (Radio Shack® no. 275-248). The relay exhibits an insertion loss of 0.5 dB at 145 MHz (acceptable) and 2.2 dB (unacceptable) at 435 MHz. Thus, the 435-MHz antenna is designed for *fixed* right-hand-circular polarization. A polarization-switching system similar to that used in the 145-MHz quagi can be added to the 435-MHz model if a low-loss coaxial relay is available.

Table 3 lists the coaxial-cable lengths used in the phasing system. To keep costs down, I did not use coaxial fittings on the cable. If you choose to use coaxial fittings—I recommend N or BNC connectors—keep in mind that the cable lengths shown in Table 3 must be shortened

Table 3
Coaxial Cable Lengths for the Quagi Phasing System

	145.9 MHz	*435 MHz*
73-Ω matching sections (RG-59A cable; electrical length, ¼ λ)	13-3/8 in. (340 mm)	4-3/4 in. (121 mm)
93-Ω phasing line (RG-62 cable; electrical length, ¼ λ)	17-1/10 in. (434 mm)	5-3/4 in. (146 mm)
53.5-Ω L (RG-58A cable)	23-3/4 in. (603 mm)	10-7/8 in. (276 mm)
53.5-Ω L + ¼ λ (RG-58A cable)	37 in. (940 mm)	15-1/4 in. (387 mm)

The lengths listed are *net*; they *do not* allow for conductor overlap when splicing cables together. The listed cable lengths assume velocity factors of 0.66 for RG-58A and RG-59A, and 0.86 for RG-62. If you substitute cable of another type (with foam instead of solid dielectric, for instance), you'll have to recalculate the phasing-line lengths.

to account for the lengths of the fittings.

How you splice the phasing cables is important. Push the braid back and away from the end of the cable, cut the dielectric back about 1/8-inch, and carefully solder the inner conductors together. Wind a thin layer of electrical tape over the dielectric to prevent short circuits, dress the cable braids back over the tape, and bind them together securely with fine wire. Don't solder the braid; you may melt the cable dielectric. Tape the junction to protect it from the weather. I made the T-junctions used for the 435-MHz antenna and the 145-MHz circularity switch using a similar technique. Instead of connecting their cable braids by solderless means, however, I

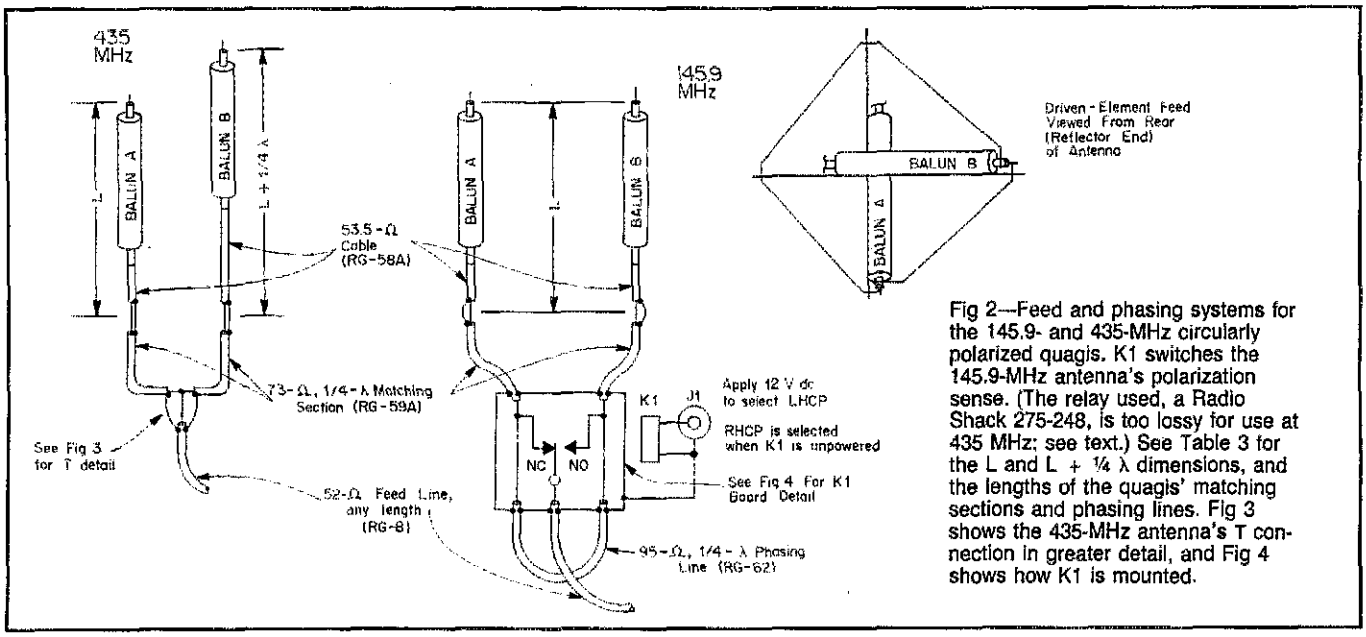


Fig 2—Feed and phasing systems for the 145.9- and 435-MHz circularly polarized quagis. K1 switches the 145.9-MHz antenna's polarization sense. (The relay used, a Radio Shack 275-248, is too lossy for use at 435 MHz; see text.) See Table 3 for the L and L + ¼ λ dimensions, and the lengths of the quagis' matching sections and phasing lines. Fig 3 shows the 435-MHz antenna's T connection in greater detail, and Fig 4 shows how K1 is mounted.

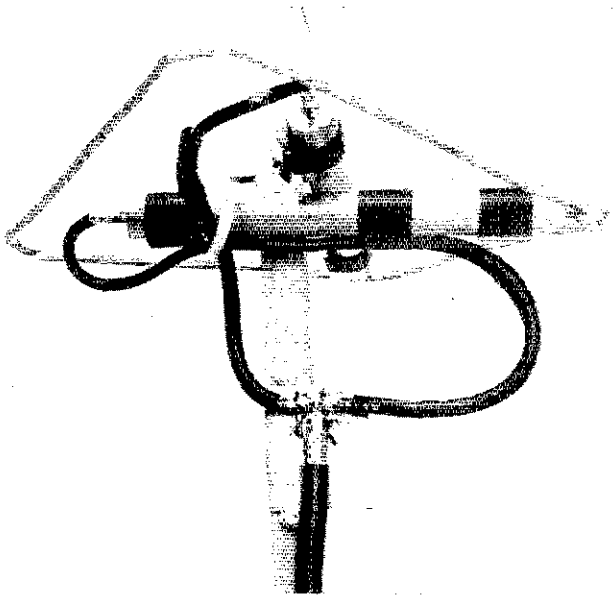


Fig 3—Cable-braid interconnections at the 435-MHz T are made with solder and a piece of copper-clad PC board. This photo also details the 435-MHz antenna's driven-element feed and acrylic-plastic supports. This photo shows the T before it was weather-proofed with RTV sealant.

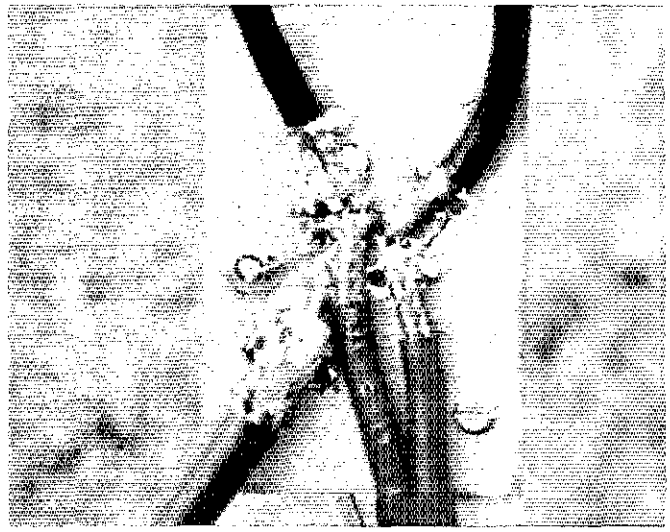


Fig 4—The 145.9-MHz antenna's polarization-sense-switching relay, K1, is mounted on a piece of unetched PC board. The board also serves as a means of connecting the braids of the feed- and phasing-line, and matching-section, cables together with minimal soldering heat. J1, via which 12 V dc can be applied to K1 to select left-hand circular polarization, is at the left side of the board. This photo was taken before the board was weather-proofed with RTV sealant.

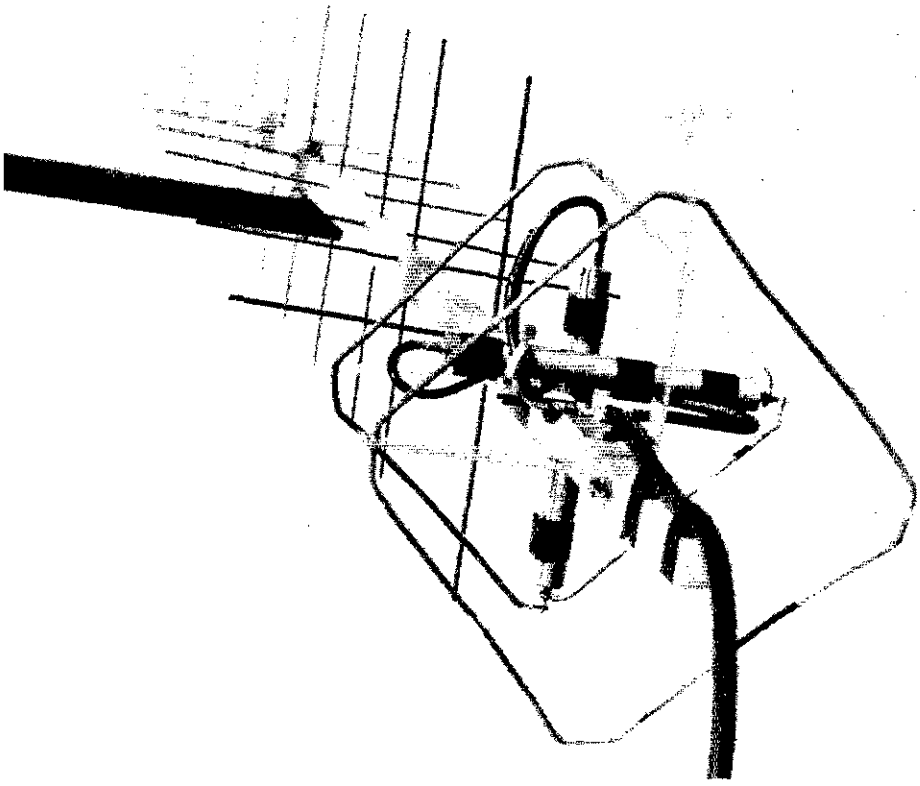


Fig 5—The 435-MHz, circularly polarized quagi in place and ready for action.

quickly soldered the braids to a small piece of copper-clad circuit board (Figs 3 and 4). It's possible to melt the cable dielectric during this operation, but short circuits and dielectric distortion are avoidable with this construction method because they can be seen as they occur.

Mounting and Positioning the Antennas

Before mounting the antennas outside, be certain all of their electrical connections are protected from the weather. A liberal coating of silicone sealant around the T-junction circuit boards, circularity switch and other exposed connections should suffice. A dab of sealant where each director enters the boom prevents director movement.

Because the antennas are intended to generate a circular wavefront, nearby metallic objects, such as a metal antenna mast, may distort the antenna fields and disturb the antennas' gain, patterns and circularity. Because of this, I mounted both antennas on a cross boom made of a 6-ft length of 1-inch-diameter schedule 80 PVC pipe. A wooden broom handle, inserted into the PVC pipe, adds rigidity. A fiberglass cross boom would be a better choice than the wood-supported PVC.

Although satellite antennas do not need to be mounted high above ground, they should be mounted clear of obstructions.[5] At 435 MHz, a large tree with dense foliage acts as an attenuator between the antenna and satellite. On the other hand, mounting the antenna on a tall tower, or far from the transmitter, to clear nearby obstructions, tends to substitute feed-line loss for obstruction loss.

Antenna Performance

Not having access to an antenna test range, I based the performance of my circular-mode quagis on comparisons with popular commercial antennas used for satellite communications. A KLM 435-18C 18-element crossed Yagi served as the 435-MHz reference standard, and a KLM 2M-14C 14-element crossed Yagi served as the 2-meter reference standard. In several on-the-air comparisons made through OSCAR 13, the 435-MHz circular-mode quagi exhibited approximately the same gain and circularity characteristics as the commercial antenna. The gain was somewhat less than expected for an antenna with this boom length, but still quite respectable for an antenna costing one-tenth as much as the commercial antenna! Losses in the balun and phasing system probably contributed to the gain being less than expected.

Conversely, the 2-meter quagi outperformed the commercial antenna by about 1 dB. Switching to the opposite polarization sense, when receiving nearly ideal circularly polarized signals from OSCAR 13, resulted in signal attenuation exceeding 20 dB. This compares favorably with the results obtained using the commercial antenna.

Summary

The antennas described in this article offer a cost-effective alternative to commercial satellite-communication antennas. Anyone capable of using simple hand tools with a moderate degree of skill, and who adheres to the dimensions and construction information I've provided, should have no difficulty reproducing these antennas and obtaining the same results.

No antenna article is complete without some mention of spectacular on-the-air results. In this case, my second two-way OSCAR-13 SSB contact using these antennas (and 50 watts) was with Alan, FO5LQ, in Tahiti. Good signals? Of course!

Notes

[1]W. Overbeck, "The VHF Quagi," *QST*, Apr 1977, pp 11-14.

[2]W. Overbeck, "The Long-Boom Quagi," *QST*, Feb 1978, pp 20-21.

[3]V. Riportella, "Getting on the New OSCAR," Part 2, Amateur Satellite Communications, *QST*, Oct 1988, pp 83-84.

[4]D. Robertson, "The 'Quadraquad'—Circular Polarization the Easy Way," *QST*, Apr 1984, pp 16-18.

[5]V. Riportella, "Getting on the New OSCAR," Part 1, Amateur Satellite Communications, *QST*, Sep 1988, pp 85-86.

Gene Marcus was first licensed as KN3YVP at age 15 in 1963. In 1964, he upgraded to General, receiving the call sign K3YVP. Gene upgraded to Extra in 1968 and obtained his present call sign in 1977. He received a First Class FCC Radiotelephone license in 1976. Gene, first licensed in Scotland as GM5AQM in 1969, received his present Scottish call sign in 1984. He is an AMSAT area coordinator and has succeeded in completing two-way contacts with DP0SL (aboard the space shuttle Challenger*), and U2MIR (aboard the Soviet space station,* Mir*).*

Gene completed Penn State University's ASEE degree program in 1968. After a four-year tour as a communications technician in the US Navy, he began a civil-service career in 1973. He currently manages a technical publication facility that produces printed and automated calibration procedures for US Army electronic test equipment.

Gene and his wife, Phyllis, have two children: Mark (KA3MZH) and Nikki (KA3MZJ).

Feedback

☐ Author John Grebenkemper reports that some information was left out of his August 1989 *QST* article, "Improving and Using R-X Noise Bridges." See p 31. In the center column, the tabular information should read:

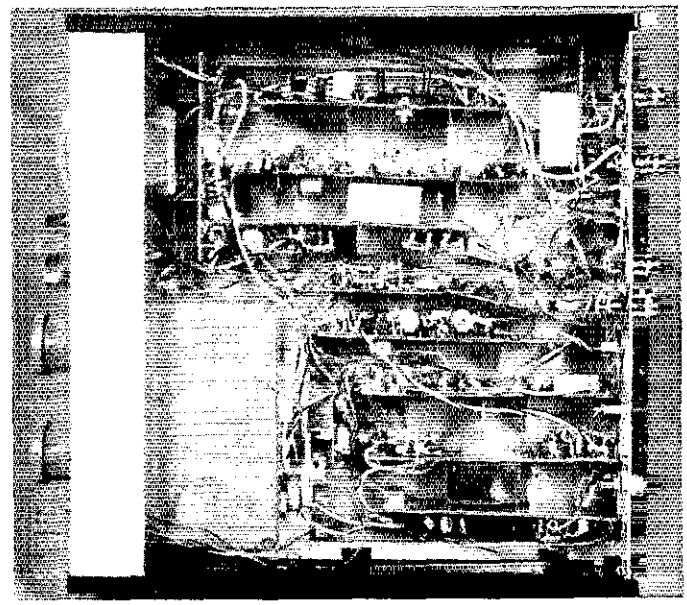
$f = 26.777$ MHz
$R(f) = 64\ \Omega$
$X(f)$ (raw) $= -22\ \Omega$
$X(f)$ (corrected) $= -8.2\ \Omega$
$f + f_\lambda/4 = 29.223$ MHz
$R(f + f_\lambda/4) = 50\ \Omega$
$X(f + f_\lambda/4)$ (raw) $= -24\ \Omega$
$X(f + f_\lambda/4)$ (corrected) $= -8.2\ \Omega$

☐ Please refer to November 1988 *QST*, pp 79-87 for the following correction the 1988 Field Day results. In the 2A category, N5RR's line score should have read 2989-2-10-9,152 not 4216-2-10-14,060. With this correction, the Salt City DX Association, W2FR, is the winner of the 2A category with a line score of 3504-2-20-10,678.

A QRP SSB/CW Transceiver for 14 MHz

Part 2[†]: This month, W7ZOI rounds out his description of a 1- or 10-W SSB/CW rig with details on its transmitter, TR switching and optional speech processor.

By Wes Hayward, W7ZOI
7700 SW Danielle Ave
Beaverton, OR 97005



Most of the transceiver's components are contained in ugly-constructed modules, with the exception of the VFO (lower left) and panel-mounted controls and jacks.

SSB generation occurs in the circuit shown in Fig 4. A microphone amplifier (Q16-U6) supplies audio to an MC1496 balanced modulator (U7). One-microfarad capacitors (C6-C8) are used at the output of the audio amplifier and at several positions in the balanced modulator. (Originally, 10- or 22-μF units were used, but these caused the system to respond slowly during TR transitions.)

The modulator output is applied to Q11, a 2N3904 IF amplifier. This stage terminates the transmitter crystal filter and provides a convenient place for CW carrier injection. Another IF amplifier (Q12-Q13) follows the crystal filter. The TX GAIN control, R5, is set for an output of -10 dBm from Q13. This level is applied to the transmit mixer, or to the speech processor described later.

Fig 5 shows more of the transmitter. SSB energy at -10 dBm drives the transmit mixer, U8, another diode ring mixer. The 5-MHz VFO signal is amplified to $+10$ dBm for the mixer by Q17 and Q18. A 3-dB pad terminates the mixer, with the signal continuing to a three-pole, LC, band-pass filter. The first stage in the output-amplifier chain is Q21, a 2N5179 feedback amplifier with an output of $+2$ dBm. This signal is looped through a coaxial-cable jumper on the transceiver rear panel for use with VHF transverters.

The driver, Q22, a 2N5859, is capable of about $+20$ dBm output. Transceiver output is obtained from Q23, an IRF511 HEXFET® PA operating at the 1-watt-output level. This power level is a little low for use on the air with dipoles, but is too high for many transverter applications.

Louder-Signal Options

Two additional circuits, shown in Fig 6, round out the SSB system. The first, at Fig 6A, is an IF speech processor. The cable between T8 and transmit mixer U8 is broken and applied to the processor. The processor is driven with a -10 dBm signal. This signal is clipped with parallel, reverse-connected, hot-carrier diodes (D11 and D12). The intermodulation products generated by the clipping are rejected by an additional crystal filter (FL3). The signal is then amplified back to the original -10 dBm level by Q27 and Q28. This circuit generates about 10 dB of clipping. Reports and measurements made on the clipped signal indicate good quality, a potential problem area with many speech processing systems.

Fig 6B shows a 10-watt-output FET power amplifier. The FET that I used (an M/A-COM DV2880T) is no longer available, but is similar to the Motorola MRF138. Alternatively, one could obtain several watts of output from another IRF511.[8] The TR switching in the transceiver is set up for an outboard PA.

Summary

This was a very enjoyable project, and one that I would recommend for other experimenters. The 20-meter phone band, however, can be a little intimidating for the QRP enthusiast.

A rig like this can probably be built and adjusted by those with only modest test equipment. A 15-MHz oscilloscope served as my test-equipment workhorse during construction of this project. A home-brew spectrum analyzer also served as a very useful tool, but is not required. Fig 7 shows the transceiver's CW output spectrum. The 270-Ω resistor and 0.56 μF capacitor associated with the base of Q20, Fig 6, provide CW rise and fall times of 1 and 1.5 ms, respectively. Careful measurement of signal levels during construction helps to keep the system spectrally clean.

Acknowledgments

The author gratefully acknowledges the photographic assistance of Dee Lynch, KA7NPN, and technical discussions with Jeff Damm, WA7MLH.

Fig 4—The transceiver SSB generator. Resistors are ¼ W, carbon film; unless otherwise indicated, capacitors are monolithic or disc ceramic.
C9—60-pF, ceramic-dielectric trimmer.
C10, C11—35-pF, ceramic-dielectric trimmer.
FL2—9-MHz transmit filter, 2.5 kHz wide at -6 dB (KVG XF-9A).
T7—Broadband transformer: Primary, 10 bifilar turns of no. 28 enam wire on FT-37-43 toroidal, ferrite core; secondary, 3 turns of no. 28 enam wire over the primary. Observe phasing.
Y2—8998.5-kHz crystal (KVG XF-901 suitable).

Fig 5—The transmit mixer, driver, final amplifier and associated circuits. Unless otherwise indicated, resistors are ¼ W, carbon film, and capacitors are monolithic or disc ceramic.
C12-C14—60-pF mica- or ceramic-dielectric trimmer.
D13—1-A, 600-PIV diode.
K1—12-V dc relay.
L7-L9—20 turns of no. 24 enam wire on a T-44-6 toroidal, powdered-iron core.
L10—15-μH choke.
L11-L13—14 turns of no. 24 enam wire on a T-50-6 toroidal, powdered-iron core.
T8—Broadband transformer: Primary, 15 turns of no. 28 enam wire on an FT-37-43 ferrite, toroidal core; secondary, 4 turns of no. 28 enam wire over the primary.
T9, T10—Broadband transformer: 10 bifilar turns of no. 28 enam wire on an FT-37-43 ferrite, toroidal core. Observe phasing.

[†]Part 1 of this article appeared in *QST*, December 1989, pp 18-21.

[8]W. Hayward and J. Damm, "Stable HEXFET® RF Power Amplifiers," Technical Correspondence, *QST*, Nov 1989, pp 38-39.

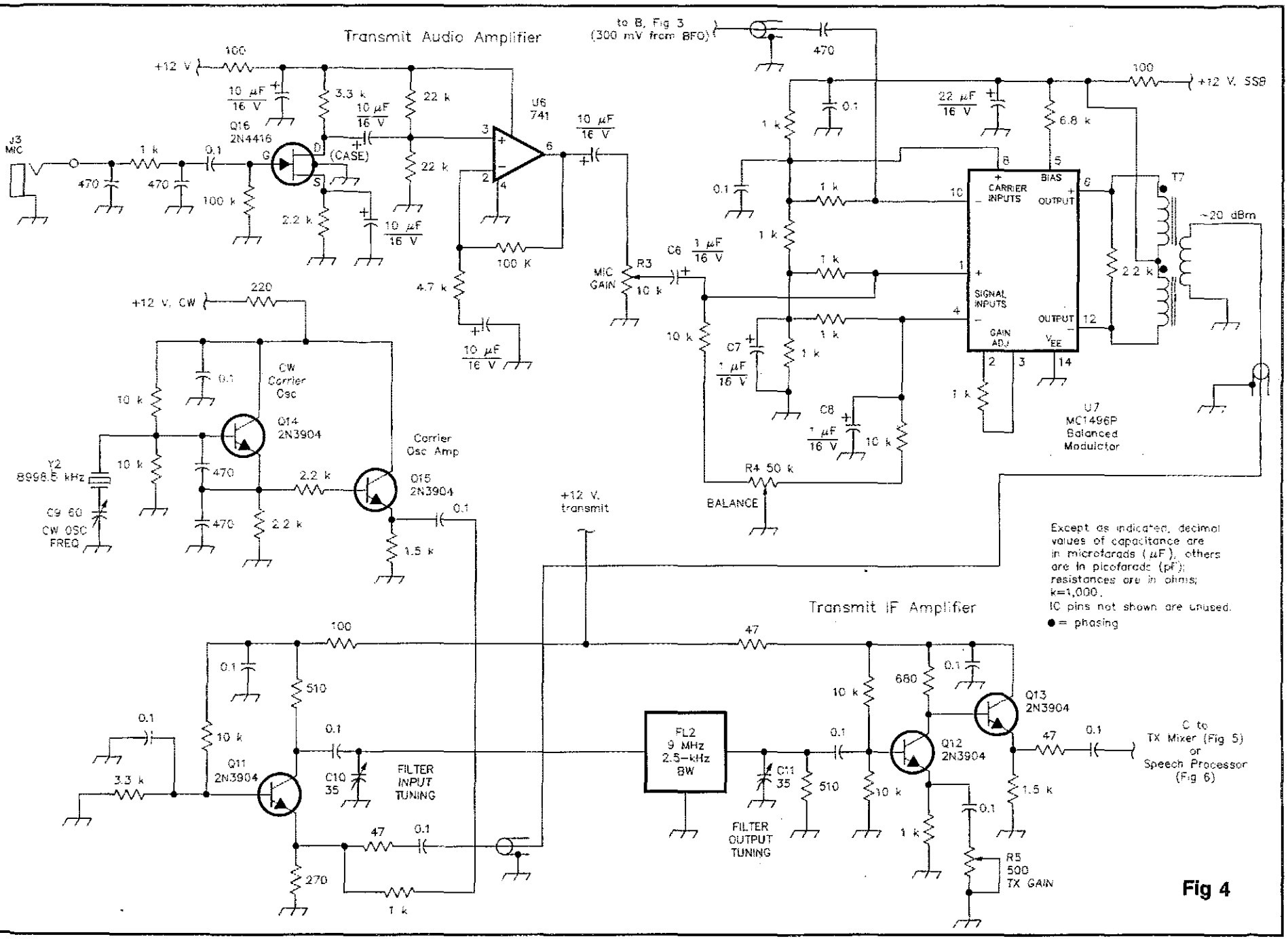

Transmit Audio Amplifier
to B, Fig 3
(300 mV from BFO)
+12 V
100
10 µF 16 V
3.3 k
22 k
Q16
2N4416
J3
MIC
1 k
0.1
470
100 k
2.2 k
(CASE)
U6
741
100 K
4.7 k
MIC GAIN
R3
10 k
C6 1 µF 16 V
+12 V, CW
220
CW Carrier Osc
Q14
2N3904
Carrier Osc Amp
Q15
2N3904
Y2
8998.5 kHz
C9 60
CW OSC FREQ
1.5 k
+12 V, transmit
R4 50 k
BALANCE
C7 1 µF 16 V
C8 1 µF 16 V
U7
MC1496P
Balanced Modulator
CARRIER INPUTS
SIGNAL INPUTS
BIAS
OUTPUT
GAIN ADJ
VEE
+12 V, SSB
6.8 k
T7
~20 dBm
Except as indicated, decimal values of capacitance are in microfarads (µF), others are in picofarads (pF); resistances are in ohms; k=1,000.
IC pins not shown are unused.
● = phasing
Transmit IF Amplifier
Q11
2N3904
FILTER INPUT TUNING
C10 35
FL2
9 MHz
2.5-kHz BW
FILTER OUTPUT TUNING
C11 35
Q12
2N3904
Q13
2N3904
R5 500 TX GAIN
C to TX Mixer (Fig 5) or Speech Processor (Fig 6)

Fig 4

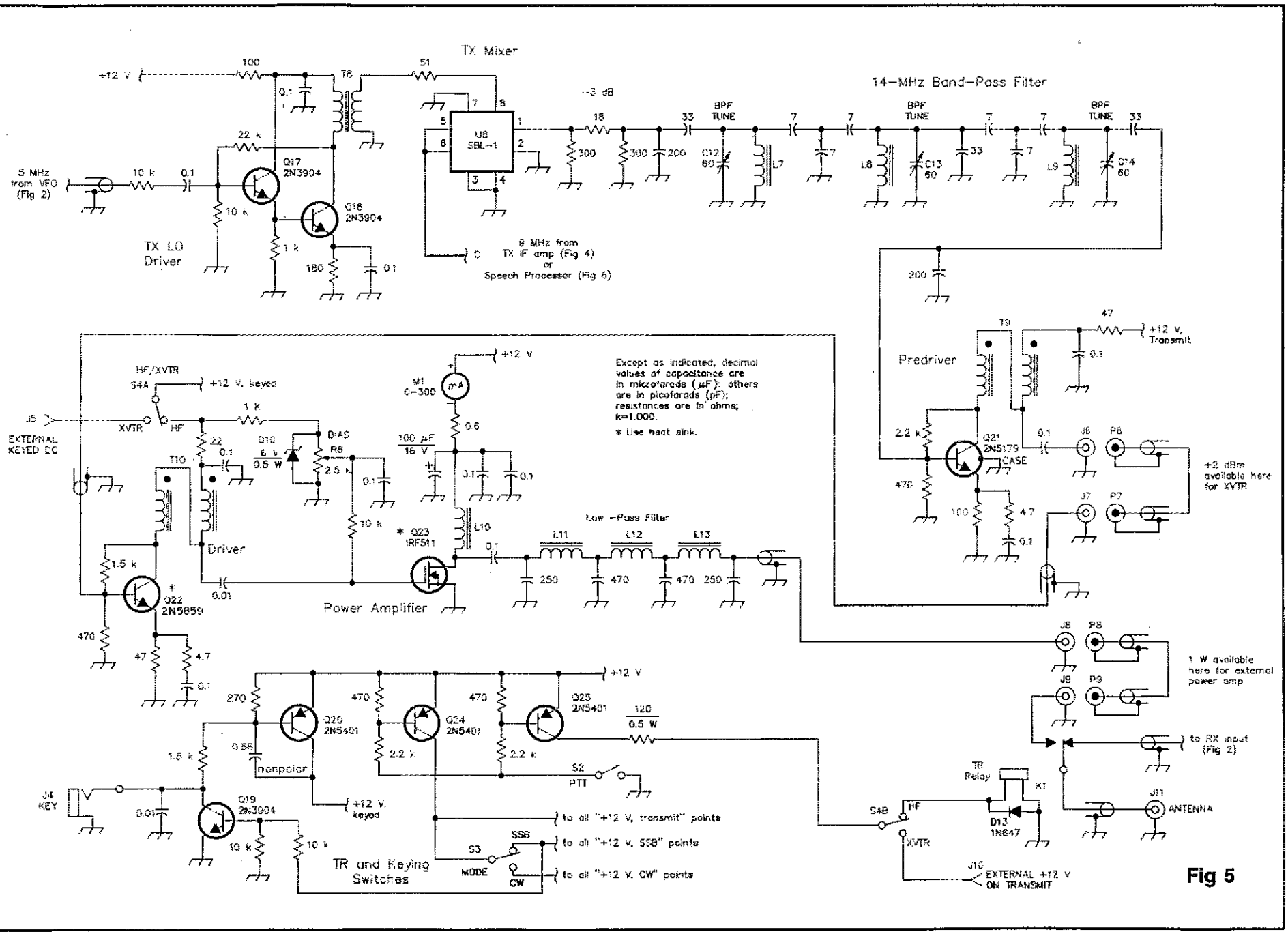

TX Mixer
14-MHz Band-Pass Filter
TX LO Driver
5 MHz from VFO (Fig 2)
Q17 2N3904
Q18 2N3904
U8 SBL-1
-3 dB
9 MHz from TX IF amp (Fig 4) or Speech Processor (Fig 6)
BPF TUNE
Predriver
Q21 2N5179 CASE 7
+12 V, Transmit
+2 dBm available here for XVTR
Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k=1,000.
* Use heat sink.
HF/XVTR
S4A
+12 V, keyed
EXTERNAL KEYED DC
M1 0-300 mA
Driver
Q22 2N5859
Q23 IRF511
Power Amplifier
Low-Pass Filter
1 W available here for external power amp
to RX input (Fig 2)
TR Relay
K1
D13 1N647
ANTENNA
EXTERNAL +12 V ON TRANSMIT
Q20 2N5401
Q24 2N5401
Q25 2N5401
Q19 2N3904
TR and Keying Switches
S2 PTT
S3 MODE
SSB
CW
to all "+12 V, transmit" points
to all "+12 V, SSB" points
to all "+12 V, CW" points

Fig 5

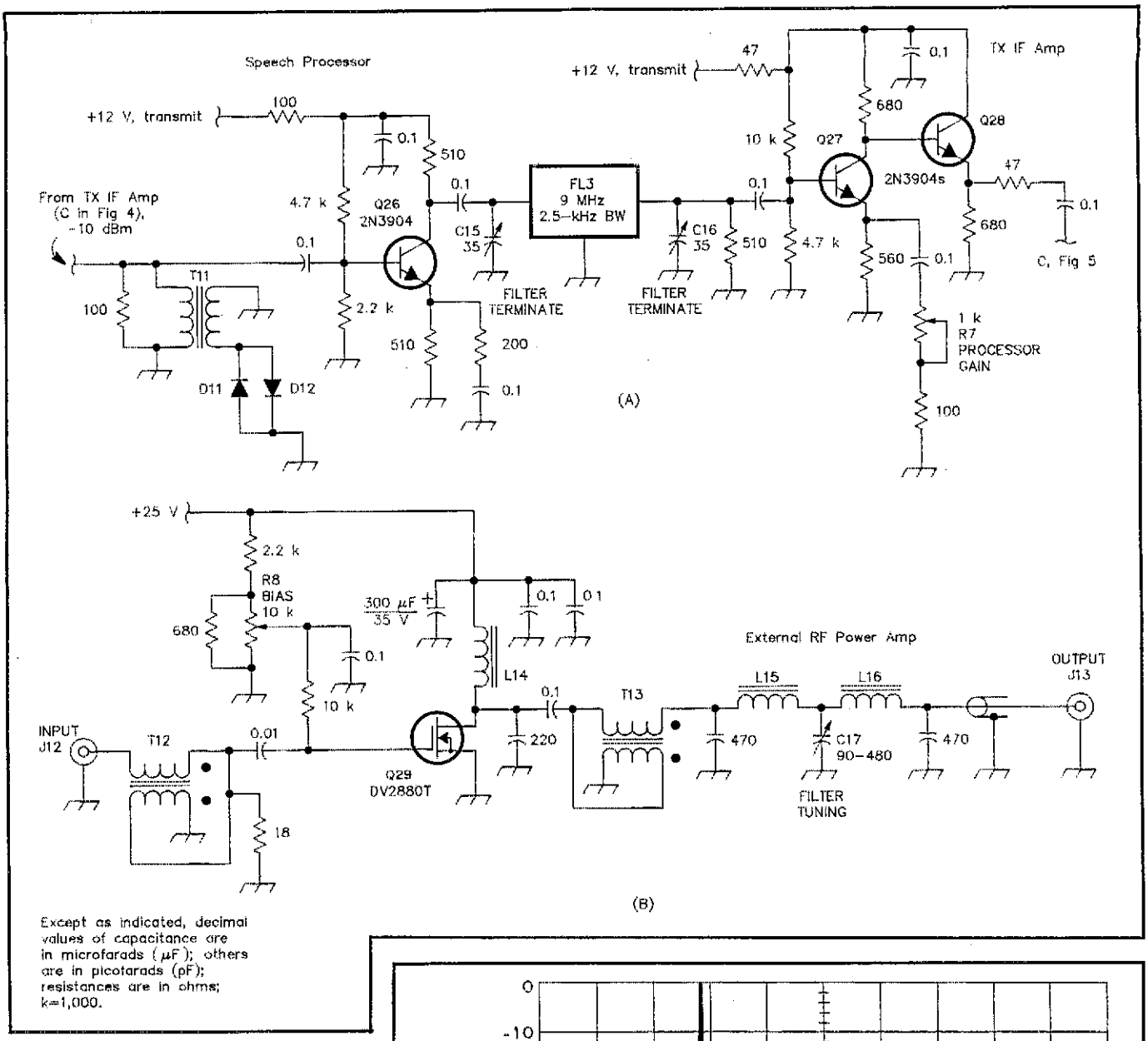


Fig 6—The optional speech processor (A) and outboard power amplifier (B) circuits. Unless otherwise indicated, resistors are ¼ W, carbon film, and capacitors are monolithic or disc ceramic.

C15, C16—35-pF, ceramic-dielectric trimmer.
C17—90- to 480-pF, mica-dielectric trimmer.
D11, D12—Hot-carrier diode, HP-5082-2672 suitable.
FL3—9-MHz transmit filter, 2.5 kHz wide at −6 dB (KVG XF-9A).
L14—50 turns of no. 26 enam wire on a T-68-2 toroidal, powdered-iron core.
L15, L16—19 turns of no. 20 enam wire on a T-50-6 toroidal, powdered-iron core.
T11—Broadband transformer: Primary, 3 turns of no. 28 enam wire over secondary; secondary, 16 turns of no. 28 enam wire on an FT-37-43 toroidal, ferrite core.
T12—Broadband transformer: 7 bifilar turns of no. 22 enam wire on an FT-50-43 toroidal, ferrite core. Observe phasing.
T13—Broadband transformer: 11 bifilar turns of no. 18 enam wire on an FT-82-61, toroidal, ferrite core. Observe phasing.

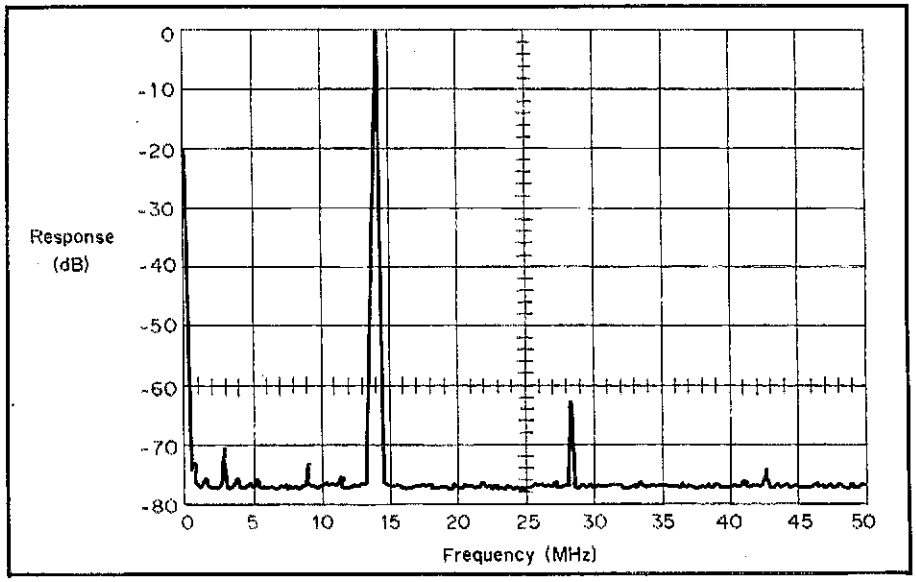
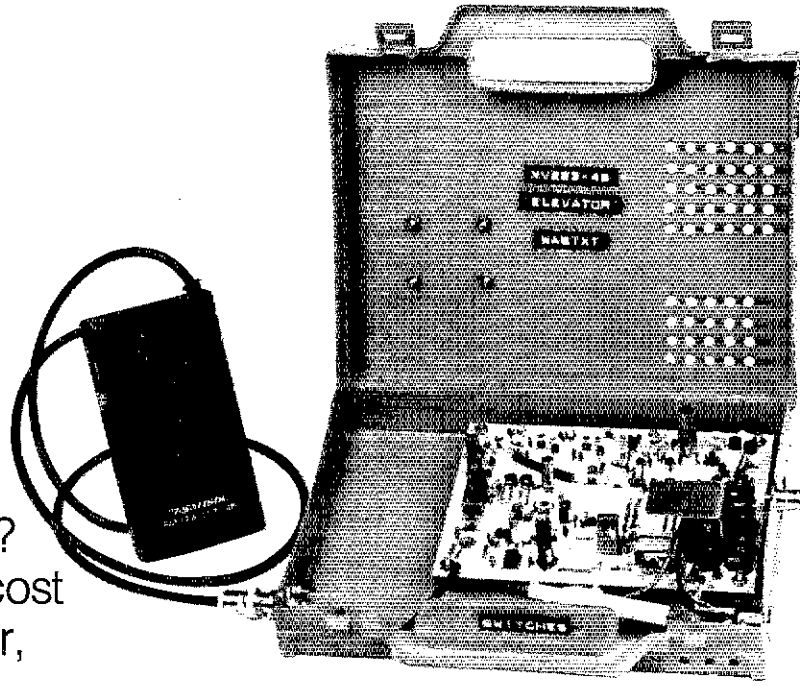


Fig 7—The transceiver's output spectrum contains a second-harmonic component 63 dB below its 1-W CW output. The major nonharmonic spurious response is a 2:1 spur near 1.5 MHz ([2 × VFO] − IF); this component is −70 dBc. The spike at far left is the spectrum analyzer's "zero-spur." An external 20-dB pad in the coaxial line provided extra protection for the analyzer, a Tektronix 2756P. The spectrum-analyzer measurements were provided by Stan Griffiths, W7NI. The transceiver complies with *current FCC specifi*cations for spectral purity.

The Elevator: A Simple 220-MHz FM Transverter



Going up . . . to 220-MHz FM? Try the Elevator! Add a low-cost 49-MHz hand-held transceiver, antenna, and you're there!

By Mike Agsten, WA8TXT
405 W Bogart Rd
Sandusky, OH 44870

I've always been thrilled by the opportunity to try out a new band or mode of operation! Some time ago, I became interested in getting on 220-MHz FM. Novices have voice privileges on that band—and I'm a Novice at heart. The cost of commercially made gear for 220 MHz initially dampened my enthusiasm, but not for long. An avid experimenter, I considered the home-brew alternative.

I wanted a 223-MHz FM transceiver that would allow me to make solid local contacts. The radio had to be reliable, easy to reproduce and tune up. It also had to comply with current FCC specifications for spectral purity and cost less than $100. The Elevator, an intermediate-level construction project, meets these design goals. Several Elevators have been in operation locally for over a year providing dependable communications.

Overview

Hand-held transceivers—such as the 49-MHz TRC-501 available from Radio Shack®—have become very popular for short-range, unlicensed communication. These inexpensive, crystal-controlled FM radios are stable; they also have a superhet receiver and use a modulation level that is compatible with existing amateur VHF FM standards. But how do you get the '501 to work on 223 MHz? Easy—you build a transverter!

A transverter is a combined transmit and receive converter. Transverters allow you to use a transceiver (or separate transmitter/receiver combination) on a band other than that—with some additional circuitry (in this case, the Elevator)—the 49-MHz TRC-501 can be used on 223 MHz. Connected to the Elevator, the '501 acts like a 223-MHz transceiver with a speaker/mike.

One version of the Elevator—connected to the '501—is shown in the title photo. An oblique view of another Elevator is shown in Fig 1 and an inside view in Fig 2. Inexpensive plastic pencil boxes are used as enclosures for both units. Ventilation holes are drilled in the top and bottom covers on the right-hand side. A small **U**-shaped metal bracket is attached to the back of the top cover at the left (Fig 1). The TRC-501 can be clipped to this bracket when carrying the unit.

The Elevator in Fig 1 is designed for dual-channel operation and has a small slide switch mounted on the bottom lip of the

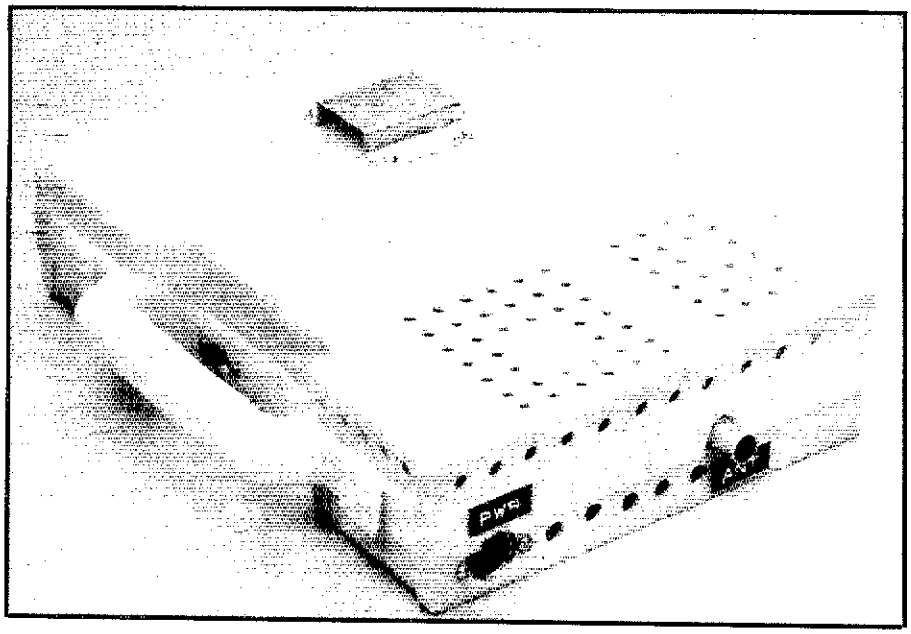


Fig 1—An oblique view of a two-channel version of the Elevator. At the top rear of the case is a **U**-shaped clip to which the TRC-501 transceiver can be attached. Beneath the handle at the left is a frequency-selection switch for two-channel operation. Ventilation holes are drilled in the top and side of the case. The DIN **PWR** and BNC **ANT** jack are mounted on the bottom lip of the box; a notch in the upper lip allows it to fit around the **ANT** jack.

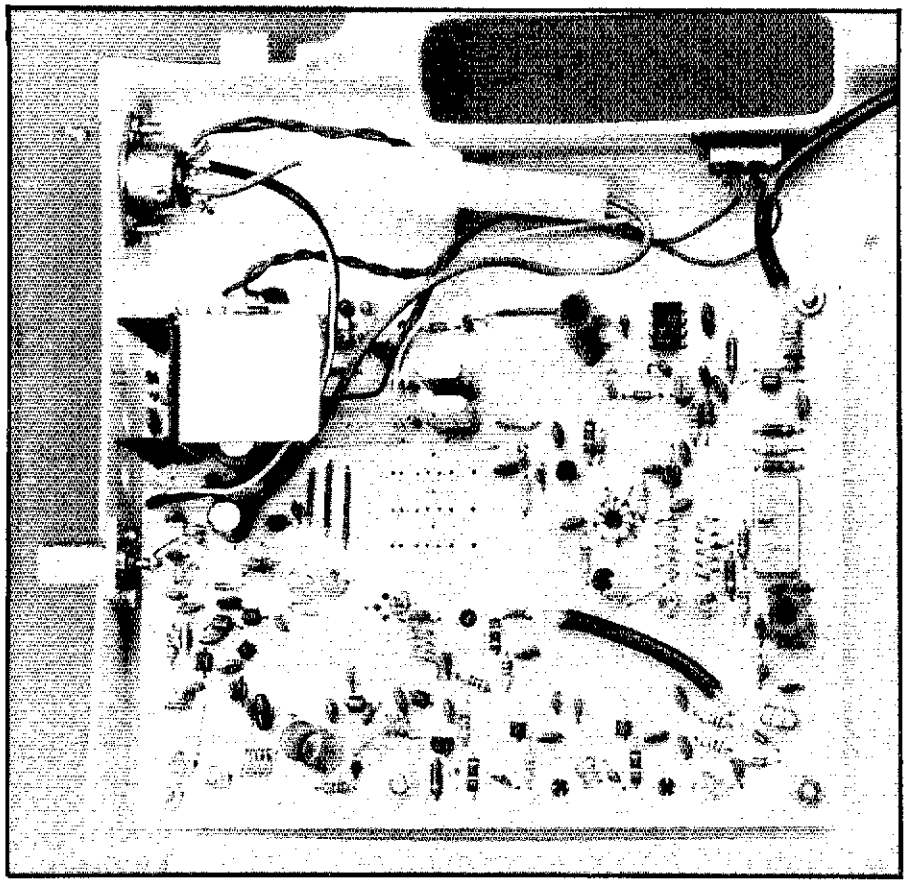


Fig 2—An inside view of an Elevator built for two-channel use (note the two crystals at the top middle of the board). The crystal-selection switch is mounted in the handle section of the plastic case. (This unit contains an experimental GaAsFET receiver preamplifier on the foil side of the board. Therefore, some components are not visible in the area of Q8. Refer to the parts overlay [Fig 7] for component placement.) At the upper left, the DIN **PWR** connector can be seen; an in-line fuse holder (for F1) is immediately to the right of the connector. The cable at the top right of the board (near the crystal-selection switch) leads to the **XCVR** jack (J1) on the other side of the case. Voltage regulator U3 and its finned heat sink are below the DIN connector. An aluminum extension is attached to U3's heat sink; beneath this extension are C17 and C18. Cylindrical heat sinks made from aluminum tubing fit tightly over Q2 (above the coaxial-cable jumper) and Q7 (left, foreground). L9 is the vertically mounted coil near Q7. The **ANT** connector (J2) is at the left just below U3.

Opportunities for Experimentation

There are several opportunities to advance the work presented here. All are subject to the possibility of elation (or disappointment) that comes from trying something new.

During development, three TRC-501 transceivers were used; all provided similar results. Similar units on the market may also work with the Elevator, but none have been tried.

This transverter was initially developed on the 2-meter band. The proximity of the transceiver's second harmonic to the 2-meter transverter's 96-MHz LO produced close-in spurs of significant amplitude. Therefore, a high-Q band-pass filter in the feed line is required for satisfactory performance. Other bands show good promise—in particular, the 1270-MHz Novice allocation. With recent strides in "no-tune" MMIC technology, it seems likely that a low-power (100 mW) microwave version of the Elevator could be produced for less than $100.

Inspection of the TRC-501 schematic indicates ample opportunity for packet-modem interfacing. Is there a need for a low-cost, limited-channel packet transceiver? Would a cheap, stand-alone microwave system help expand our beachhead on 1270 MHz? Think about it.—*Mike Agsten, WA8TXT*

plastic housing beneath the carrying handle. Because the unit in the title photo is designed for single-channel use, no switch is used, but a convenient location for this optional switch is identified by the label **SWITCHES**.

With the exception of the power transformer, power connectors and optional channel-selection switch, the Elevator is contained on a single PC board. For operation from the home station, power for the Elevator can be supplied from a 9-V ac wall transformer. For portable, mobile or home-station operation, a 12- to 14-V dc supply can also be used. The transverter delivers between 1 and 1.5 W of RF output, has adequate receive sensitivity, built-in RF-sensed TR switching and room for five crystals.[1]

Circuit Description

To give you an idea of how the transverter works, a brief circuit description is in order. Refer to the schematics in Figs 3 and 4.

Power Supply

Power for the Elevator is supplied through the DIN connector, J3. Fig 4 shows how to power the Elevator from an ac or dc power source. F1 and F2 are in-line fuse holders; F1 is installed within the Elevator's case.

For operation from the ac mains, the 9-V ac input from the wall transformer is fed to a voltage doubler/rectifier (D6 and D7). The dc output is filtered by C17 and C18 and fed to regulator U3. D8-D10 are used to raise the regulated output of U3 to approximately 13.6 V. A jumper is connected between points **A** and **D** when an ac wall transformer is used.

For operation from a dc supply, the positive output of the power supply is connected to point **D** and the jumper between **A** and **D** is not used. D20 provides reverse polarity and transient-voltage protection. Dc operating voltage is applied continuously to TR switch detector U2, local oscillator (LO) Q1 and Q2, the power-amplifier (Q6 and Q7) collector circuits and the IF transceiver (the TRC-501) at J1.

Local Oscillator

The LO operates in the 86-MHz region. For 223.5-MHz operation with a 49.830-MHz IF (standard channel A on the TRC-501), an 86.835-MHz crystal is used at Y1. The crystal frequency required is determined by subtracting the channel frequency of the TRC-501 from the desired operating frequency and dividing the result by 2:

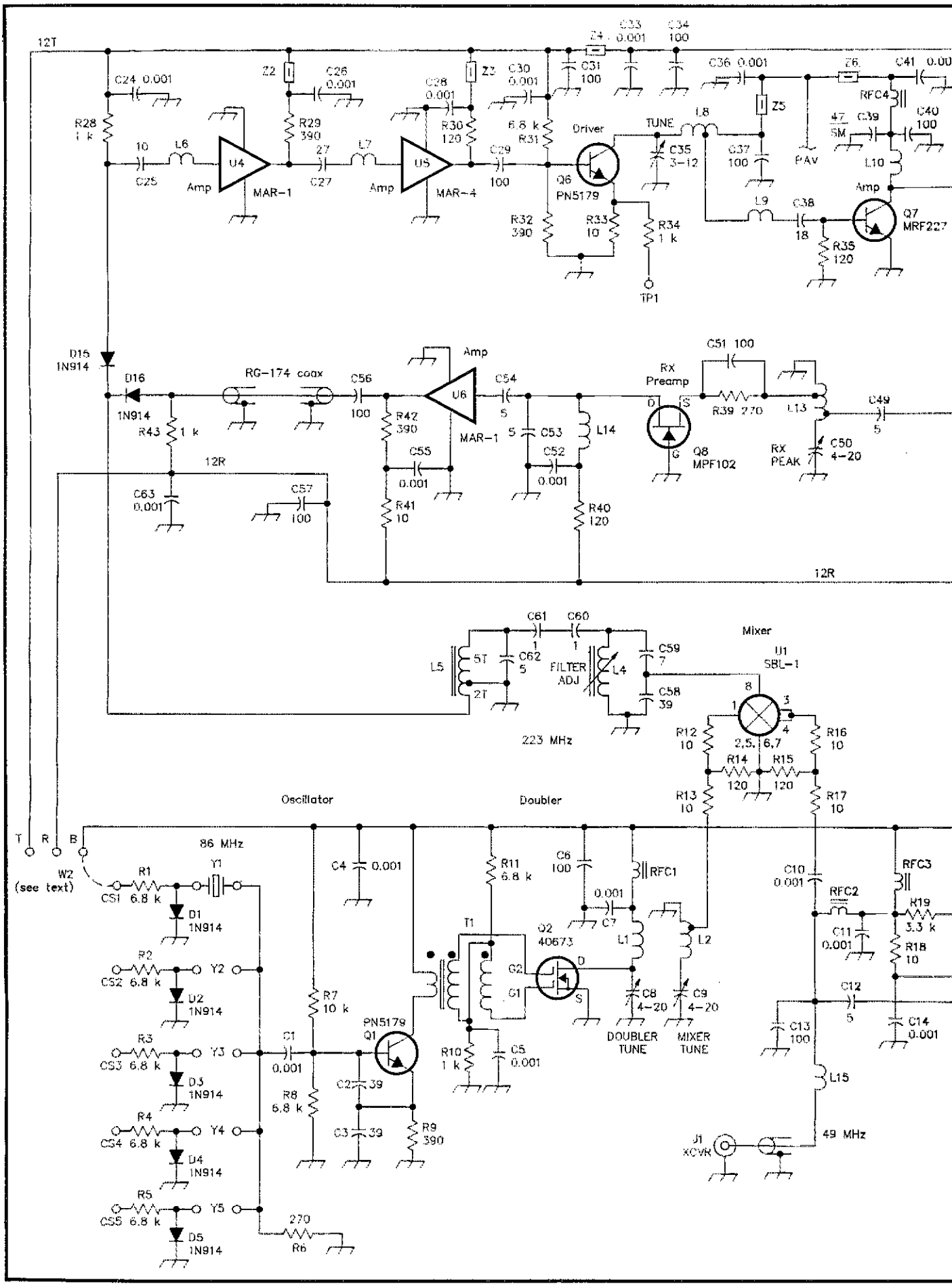
$$F_x = (F_{op} - F_{ht}) \div 2 \qquad \text{(Eq 1)}$$

Push-push doubler Q2 multiplies the oscillator output to 173.670 MHz, providing very clean LO energy to mixer U1.

Crystal Switching

Dc voltage is also available at terminal **B** for selecting diode-switched crystals with an on-board jumper (W2) or an off-board switch for simplex operation. For half-duplex operation, terminals **T** and **R** are used. Jumper **R** to the crystal-select point (CS1-CS5) corresponding to the crystal to be used for the receive frequency. Likewise, point **T** goes to the desired crystal-select point for transmit. Any switching scheme can be used, provided that only one crystal-select input is high (+12 V) at a given time.

[1]Notes appear on page 38.


12T
C24 0.001
R28 1 k
10
L6
C25
U4
Amp
MAR-1
Z2
C26 0.001
R29 390
27
L7
C27
U5
Amp
MAR-4
C28 0.001
R30 120
Z3
C30 0.001
6.8 k
R31
C29 100
Z4
C33 0.001
C34 100
C31 100
Driver
Q6 PN5179
R32 390
R33 10
R34 1 k
TP1
TUNE
C35 3-12
L8
C36 0.001
Z5
C37 100
PAV
Z6
C41 0.00
RFC4
47 SM
C39
C40 100
L10
Amp
Q7 MRF227
L9
C38 18
R35 120
D15 1N914
D16 1N914
RG-174 coax
C56 100
R43 1 k
12R
C63 0.001
C57 100
Amp
U6
MAR-1
R42 390
C55 0.001
R41 10
C54 5
5
C53
C52 0.001
L14
R40 120
RX Preamp
Q8 MPF102
C51 100
R39 270
L13
RX PEAK
C50 4-20
C49 5
12R
C61 1
C60 1
L5
5T
2T
C62 5
FILTER ADJ
L4
C59 7
C58 39
223 MHz
Mixer
U1 SBL-1
R12 10
R13 10
R14 120
R15 120
R16 10
R17 10
Oscillator
Doubler
T
R
B
W2 (see text)
86 MHz
Y1
R1 6.8 k
CS1
D1 1N914
R2 6.8 k
CS2
Y2
D2 1N914
R3 6.8 k
CS3
Y3
D3 1N914
R4 6.8 k
CS4
Y4
D4 1N914
R5 6.8 k
CS5
Y5
D5 1N914
270
R6
C4 0.001
R7 10 k
C1 0.001
R8 6.8 k
PN5179 Q1
C2 39
C3 39
R9 390
R11 6.8 k
T1
Q2 40673
G2
G1
R10 1 k
C5 0.001
C6 100
RFC1
0.001
C7
L1
L2
C8 4-20
C9 4-20
DOUBLER TUNE
MIXER TUNE
C10 0.001
RFC2
C11 0.001
RFC3
R19 3.3 k
R18 10
C12 5
C13 100
C14 0.001
L15
J1 XCVR
49 MHz

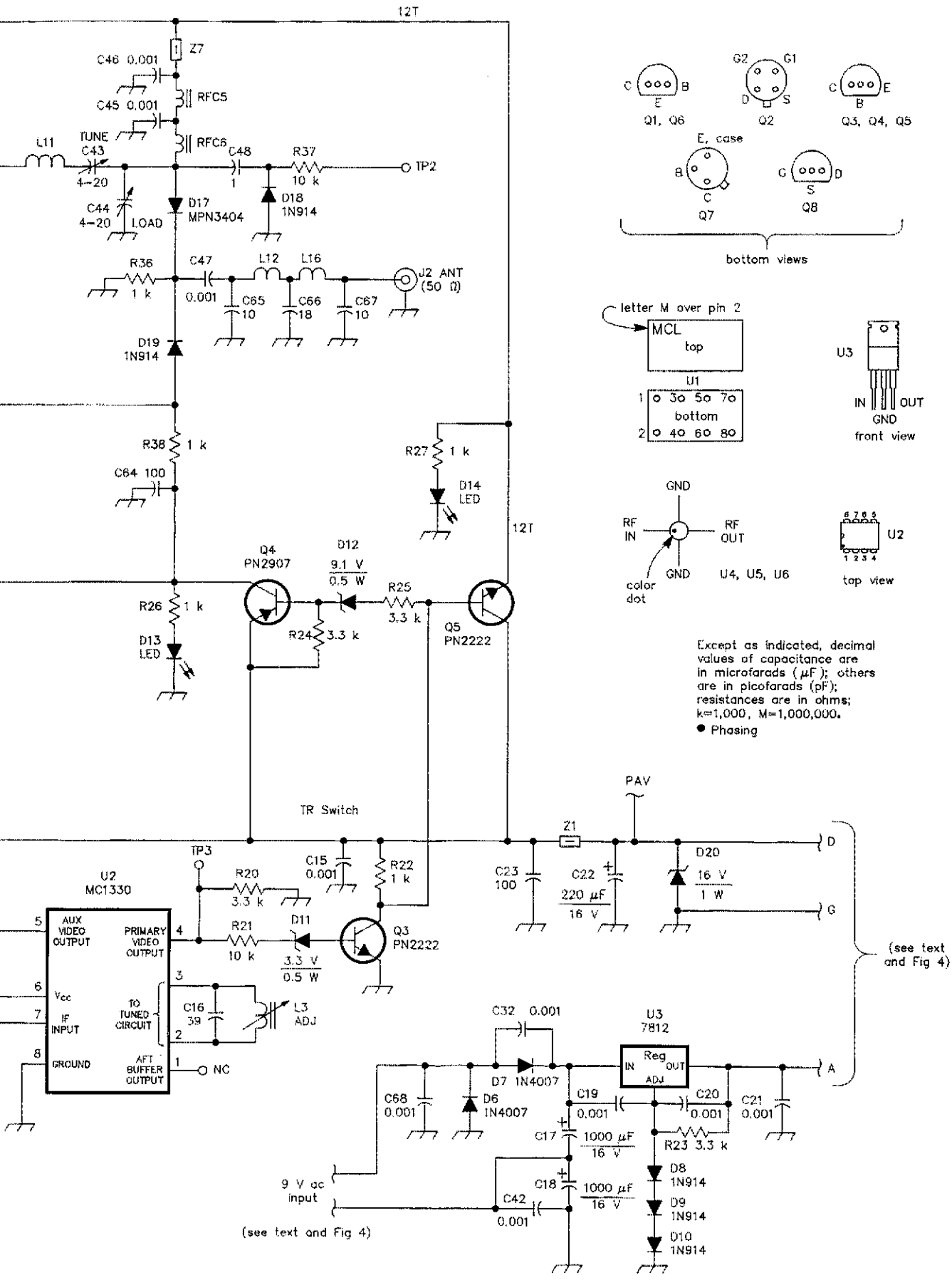

12T
C46 0.001
Z7
RFC5
C45 0.001
RFC6
L11
TUNE
C43
4–20
C48
1
R37
10 k
TP2
C44
4–20
LOAD
D17
MPN3404
D18
1N914
R36
1 k
C47
0.001
L12
L16
J2 ANT
(50 Ω)
C65
10
C66
18
C67
10
D19
1N914
R38 1 k
C64 100
R27 1 k
D14
LED
12T
Q4
PN2907
D12
9.1 V
0.5 W
R25
3.3 k
R26 1 k
D13
LED
R24 3.3 k
Q5
PN2222
TR Switch
PAV
Z1
D
G
TP3
U2
MC1330
R20
3.3 k
C15
0.001
R22
1 k
C23
100
C22
220 µF
16 V
D20
16 V
1 W
AUX VIDEO OUTPUT
PRIMARY VIDEO OUTPUT
R21
10 k
D11
3.3 V
0.5 W
Q3
PN2222
Vcc
IF INPUT
TO TUNED CIRCUIT
C16
39
L3
ADJ
GROUND
AFT BUFFER OUTPUT
NC
(see text and Fig 4)
C32 0.001
U3
7812
Reg
IN
OUT
ADJ
D7 1N4007
C68
0.001
D6
1N4007
C19
0.001
C20
0.001
C21
0.001
C17
1000 µF
16 V
R23 3.3 k
D8
1N914
D9
1N914
D10
1N914
C18
1000 µF
16 V
C42
0.001
9 V ac input
(see text and Fig 4)
A
Q1, Q6
Q2
Q3, Q4, Q5
E, case
Q7
Q8
bottom views
letter M over pin 2
MCL
top
U1
bottom
U3
IN
OUT
GND
front view
RF IN
RF OUT
GND
color dot
U4, U5, U6
U2
top view
Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k=1,000, M=1,000,000.
● Phasing

Fig 3—Schematic of the Elevator. The **T**, **R** and **B** terminals are connected to the crystal select (**CS**) terminals as described in the text. Here, W2 is shown connected between terminal **B** and **CS1** for simplex operation. A finned heat sink is attached to U3. Q2 and Q7 have cylindrical heat sinks made of aluminum tubing. Parts suppliers are listed in Table 1.

C8, C9, C43, C44, C50—4-20 pF trimmer (Mouser 24AA022).
C35—3-12 pF trimmer (Mouser 24AA021).
D11—1N5226B, 3.3-V, 0.5-W Zener diode.
D12—1N5239B, 9.1-V, 0.5-W Zener diode.
D17—MPN3404 PIN diode (Circuit Specialists).
D20—1N4745, 16-V, 1-W Zener diode.
L1—5 turns, 5/32-in ID, ½ in long. (Note: All air-wound coils use no. 22 bare wire; the shank of a drill bit can be used as a winding jig.)
L2—5 turns, 5/32-in ID, ½ in long, tapped 2 turns from ground end.
L3—0.22-0.28 μH adjustable (Jameco CL-1).
L4—0.06-0.07 μH adjustable (Jameco CL-2).
L5—7 turns no. 24 enameled wire on a T-30-12 core; tapped two turns from D15/D16 end.
L6, L7—3½ turns, 1/8 in ID, ¼ in long.
L8—3½ turns, 5/32 in ID, 3/16 in long; tap ¼ turn from C37 end.
L9—2 turns, 5/32 in ID, 3/16 in long, mounted vertically.
L10—2½ turns, 3/16 ID, 3/32 in long.
L11—4½ turns, 3/16 in ID, 3/16 in long.
L12, L13, L16—2½ turns, 5/32 in ID, 5/32 in long. L13 is tapped 1 turn from ground end.
L14—3½ turns, 5/32 in ID, ¼ in long.
L15—4½ turns, 5/32 in ID, 3/16 in long.
Q1, Q6—PN5179 (Mouser ME333-PN5179). Note: A 2N5179 has a different pin-out than that of a PN5179.
Q7—MRF227 (RF Parts).
RFC1-RFC6—4 turns no. 28 enameled wire on an FB43-101 ferrite bead.
T1—Secondary: 8 bifilar turns no. 28 enameled wire on a T-30-12 core; primary, 3 turns no. 28 enameled wire wound over the middle of the secondary.
U1—Mini-Circuits SBL-1 mixer.
U2—MC1330 low-level video detector.
U4, U6—Mini-Circuits MAR-1 amplifier.
U5—Mini-Circuits MAR-4 amplifier.
Y1-Y5—86-MHz, 5th-overtone, series resonance, HC-25/U holder. Crystek Crystals RHF-4 or equiv. The required crystal frequency is determined by subtracting the channel frequency used in the TRC-501 from the desired operating frequency and dividing the result by 2. ($F_x = [F_{op} - F_{tr}] \div 2$.) See text.
Z1-Z7—FB43-101 ferrite bead.

Table 1
Parts Suppliers

Circuit Specialists, Inc, Box 3047, Scottsdale, AZ 85271, tel 800-528-1417.

Crystek Crystals, 2351/2371 Crystal Dr, Ft Myers, FL 33907 and PO Box 06135, Ft Myers, FL 33906-6135, tel 1-800-237-3061.

Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002, tel 415-592-8097.

Mini-Circuits, PO Box 166, Brooklyn, NY 11235, tel 212-934-4500.

Mouser Electronics, 11433 Woodside Ave, Santee, CA 92071; tel 619-449-2222.

RF Parts, 1320 Grand Ave, San Marcos, CA 92069; parts orders only, tel 800-854-1927 or 619-744-0728 for information and technical help.

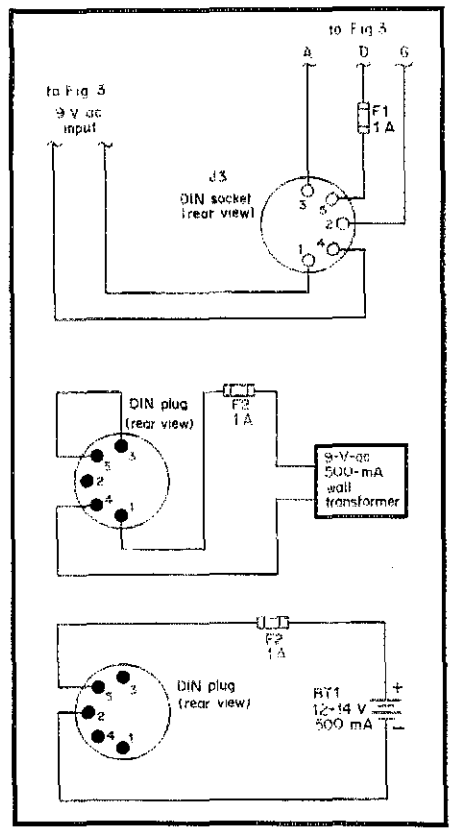


Fig 4—The Elevator can be powered from a 12- to 14-V, 500-mA source, or by an ac-operated supply delivering 9 V ac at 500 mA. All that's needed to accommodate these power sources is proper wiring of the DIN **PWR** jack (J3) as shown here. F2 is external to the Elevator; an in-line fuse works well here.

A three-pole, four-position switch will handle all the crystal-switching possibilities (except for five simplex channels—an unlikely need).

Receive Circuits

During receive, the voltage present at U2, pin 4, is about 5. This positive voltage turns Q3 and Q4 on, and turns Q5 off. Q4 applies 12 V to the receive bus (12R). Incoming signals pass through D19 to Q8, a grounded-gate JFET preamplifier. Broadband amplifier U6 provides additional gain. Received-signal flow proceeds through D16 and the 223-MHz bandpass filter L4/L5, arriving at mixer U1 where the desired signal is converted to the 49-MHz region for delivery to the IF transceiver attached to J1.

TR Detector

The RF output of the '501 transceiver is very low, so an ultra-sensitive detector (U2) is required for TR sensing. During transmit, RF applied through C12 forces pin 4 of U2 to 0 V. This turns off Q3 and Q4, disabling the receive section. Q5 turns on, applying power to the transmit bus (12T).

Transmit

When the transverter goes into transmit mode, the 49-MHz output signal from the transceiver is converted to 223 MHz in U1. Bandpass filter L4/L5 selects the desired mixer product. The 223-MHz signal is routed through D15 to broadband amplifiers U4 and U5. Interstage networks C25/L6 and C27/L7 narrow the 223-MHz response while maintaining the no-tune advantage. Additional signal amplification is provided by driver Q6 and final power amplifier Q7. PIN diode D17 passes the transmit signal to **ANT**enna connector J2 via a low-pass filter. The voltage developed across R36 by the current through D17 keeps D19 cut off, preventing transmitter RF entry into the receiver preamplifier, Q8.

Modification and Construction Information

Detailed Elevator construction and transceiver modification information is available from the author or from ARRL HQ.[2] I'll describe the more important points here.

Transceiver Modifications

To interconnect the transceiver and the Elevator, the transceiver's telescoping whip antenna is removed and replaced by a short (approximately four-foot) length of RG-58 coaxial cable. Place a grommet in the transceiver-case hole vacated by the antenna, and feed the cable through it.

Ordinarily, the TRC-501 transceiver is powered by its own internal 9-V battery. But as shown in Figs 3 and 5, J1 of the Elevator can carry both RF and dc to the transceiver. The supply used to power the Elevator can also power the transceiver through the interconnecting coax. The voltage fed to the transceiver is regulated at about 9 V by the circuit shown in Fig 5. This regulator can be built on a piece of perf board about the size of a 9-V battery. Make sure that you connect the wires to the battery clip correctly to ensure proper supply polarity for the transceiver.

The center conductor of the interconnecting coaxial cable ties to the transceiver antenna lead that originally connected to the base of the whip antenna. The 0.001-μF disk capacitor connected to the coaxial cable center conductor prevents dc voltage from being applied to the transceiver's antenna-input circuit. The coax shield is tied to the transceiver's PC board ground foil.

Elevator Construction

Unless you're an experienced VHF-circuit builder, I recommend using the PC-board layout shown in Fig 6; it's been "road tested." Parts-placement information is provided in Fig 7.

Coil winding is easier done than said. The length of each air-wound coil is set by its PC-board mounting holes; winding lengths are provided in the parts list. The turns count starts when the wire enters the

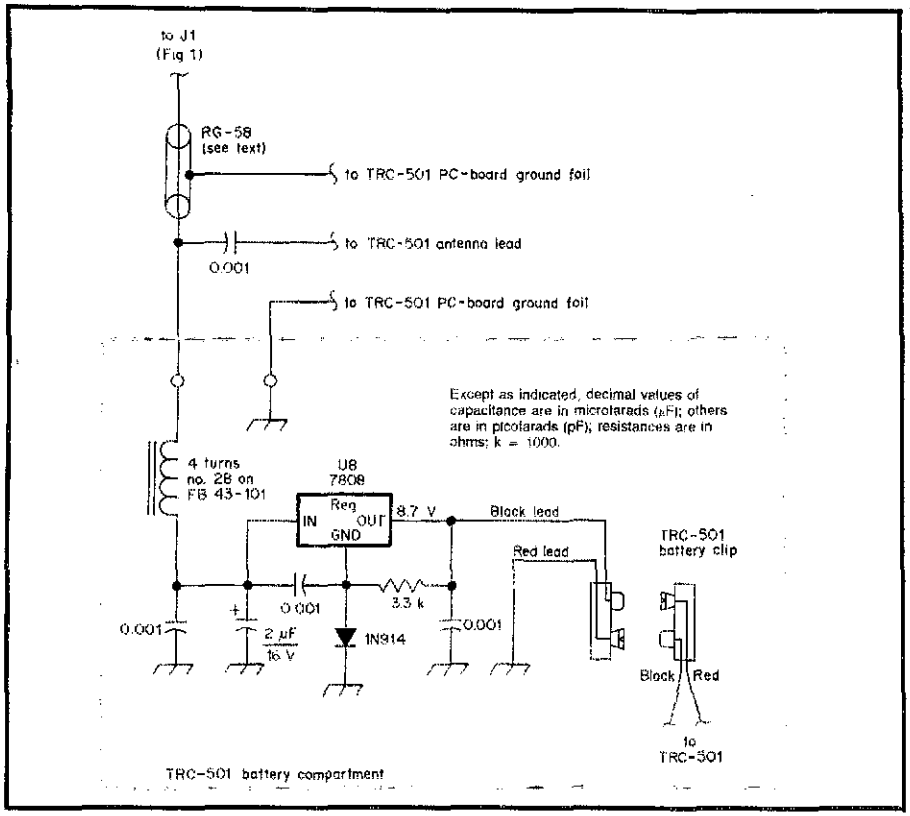


Fig 5—The supply used to power the Elevator can also power the transceiver by use of the simple regulator circuit shown here. This circuit can be built on a small piece of perf board and installed in the transceiver's battery compartment. The 0.001-μF capacitor connected to the coaxial-cable center conductor keeps dc voltage present at J1 from reaching the transceiver's antenna input circuit (see text).

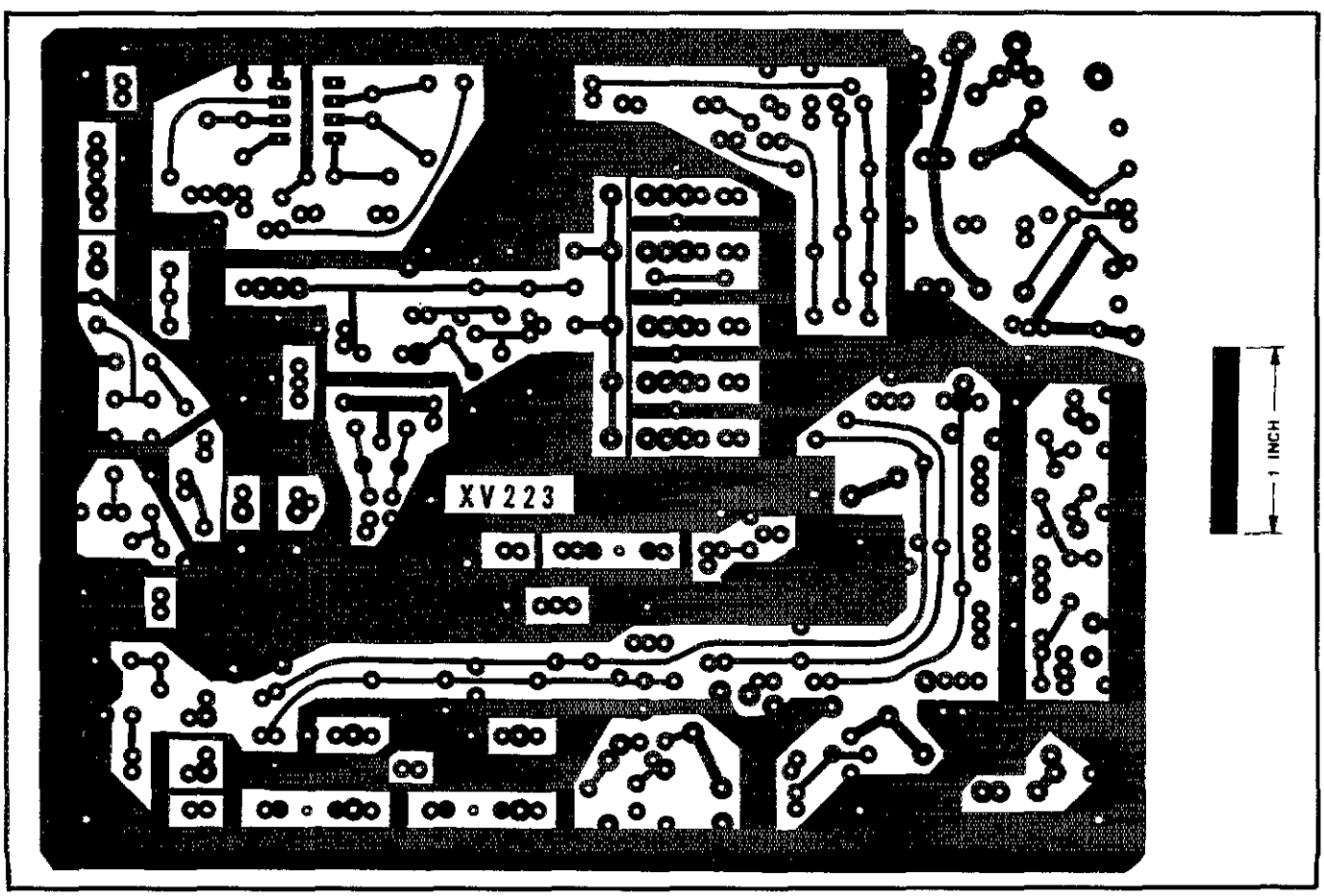
cylindrical domain of the coil and ends when it departs. For toroids and ferrite beads, one turn is counted each time the wire goes through the core hole. For L5, distribute the turns over 60 to 70% of the core. To form the bifilar secondary winding of T1, first twist together two pieces of no. 28 enameled wire (about 8 twists per inch). Wind this twisted pair to occupy 75% of the core with 8 turns of the twisted wire. Make the center tap by connecting the end of one wire to the beginning of the other, keeping the lead lengths short.

One lead of C49 connects directly to L13, as does one lead of network C51/R39. The top lead of L9 (mounted vertically) connects directly to L8 at only ¼ turn from the C37 end.

Be sure to correctly orient each transistor; make note of the position of the flat side or tab. Q7 (in a special emitter-to-case package) mounts flush with the PC board. Q2 and Q7 require heat sinks; I made mine from short lengths of aluminum tubing. Q2's heat sink is about ¾ inch long and Q7's heat sink is 1 inch long. U3 requires a finned heat sink and an additional 1-square inch radiator made from scrap aluminum sheet (see photos).

Monolithic amplifiers U4, U5 and U6 are installed on the *foil* side of the PC board;

Fig 6—Circuit-board etching pattern for the Elevator. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil.



the color dot on each device denotes its input lead. The leads of each of these devices must be trimmed somewhat. Before installing U4-U6, it's helpful to pre-tin four target solder areas for each device's leads.

A coaxial-cable jumper is required between D16 and C56. Use RG-174 or RG-58 for this purpose.

The **ANT** jack (J2) mounts directly on the PC board. Solder lugs on the flange of J2 permit easy soldering to the perimeter ground foil. The center pin of J2 connects to the PC board at the junction of L16 and C67. J1 **(XCVR)** is mounted on the case wall opposite J2 (see photos).

How you house the transverter PC board is up to you. I chose to use a nifty plastic pencil case available at a local drug store.[3] The case costs less than the shipping charge for a metal cabinet, and it works great.

Tune-Up

Connect the TRC-501 to J1 and attach a VHF wattmeter and dummy load to J2. (A dummy load can be fabricated by paralleling three 150-Ω, ½-W carbon resistors.) Relative RF output can be read by monitoring the dc voltage at TP2.

Preset the slug in L3 to a depth of about 7/16 inch from the top of the form; set L4's slug at 5/16 inch from the top of the coil form. Set all the variable capacitors at midrange. Attach a voltmeter set to read 5 V dc between TP3 (U2, pin 4) and ground.

Turn on the power supply; D13, the green LED, should light. Turn on the TRC-501 and press the PTT switch. The red LED (D14) should illuminate. Adjust L3 to obtain 0 V at TP3. Release the PTT switch.

Verify the transverter's crystal oscillator operation by probing with a frequency counter near T1, or by using an FM broadcast-band receiver to tune in the oscillator's signal below the FM broadcast band. If necessary, experiment with the turns spacing on T1 and/or the value of C3 to achieve oscillation.

Use a wavemeter near L2, a public-service-band radio equipped with an S meter, or a spectrum analyzer to monitor the doubler signal (near 173 MHz). Adjust C8 and C9 for a maximum signal indication at twice the crystal-oscillator frequency. With a voltmeter connected between TP1 and ground, key the transceiver and adjust L4, then C8 and C9 for a maximum indication; typically 0.15 V dc.

With the exception of the adjustment of L3, the foregoing preliminary tune-up steps can be made using a received signal. Adjust C8, C9, L4 and C50 for maximum quieting of the received signal. If this is done, be sure to reconnect the dummy load to the Elevator for the next step: power-amplifier tune-up.

Connect a voltmeter between TP2 and ground, key the transceiver and adjust C35, C43 and C44 for a maximum voltage indication at TP2 (typically, 3 to 4 V dc). The adjustments of C43 and C44 interact, so you should make the adjustments a few times to ensure you've achieved a maximum indication. Allow some time between tune-up periods to allow Q7 and the dummy load to cool off. Experiment by compressing and expanding the turns of L9 to achieve maximum RF output. Lacking a receive signal to peak on, C50 can be adjusted during transmit for a very small dip in the output indicated at TP2. If you have access to a spectrum analyzer, you can check for spectral purity.[4]

Operation

Connect the antenna feed line in place of the dummy load used during testing. If you're using a wattmeter, leave it in the line. (Alternatively, you can monitor the dc-voltage amplitude at TP2 for a relative-output indication.) Turn on the power supply, press the transceiver PTT switch and touch up C43 and C44 for maximum output. If a weak-signal source is available, peak C50 for best reception. That done, you're on the air! I recommend close-talking the mike for full modulation. RV1 in the TRC-501 transceiver provides some control of the deviation.

Activity on 220-MHz FM is mainly on repeaters, and simplex activity varies greatly around the country. Here in north-central Ohio, 223.5 MHz (the national simplex channel) is very quiet. I've mainly been working Elevator-equipped locals, such as N8AHK and WB8TCZ, for reliability testing. Late one evening, dozing in the shack, I was startled as the speaker came to life: "N8EDV listening." After a short QSO with Dave, I checked the map. Wow! 82 miles...and I wasn't even wearing Elevator shoes!

Mike Agsten was first licensed in 1966 and got his Extra Class ticket in 1969. He served six years in the US Navy as a Radar/Electronic Navigation Aids Technician and eight years in the US Merchant Marine as a ship's Radio Officer. Mike is currently self-employed in the marine-electronics field. Two of Mike's four brothers are hams: Dave, KK4QY, and Jim, NZ8B. Jim was an operator at KX6DC of 160-m fame.

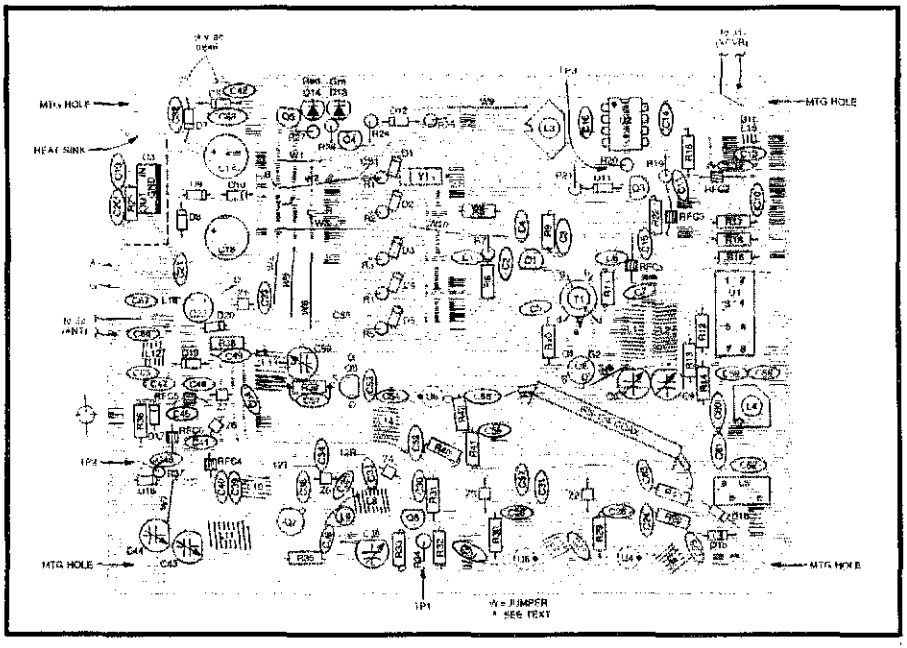


Fig 7—Parts-placement guide for the Elevator. Except for U4, U5 and U6, parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. U4, U5 and U6 are soldered to the foil side of the board. The dots near U4, U5 and U6 identify the input lead of each device. Although only one crystal is shown installed on this board, five crystals can be accommodated (see text). (For the purpose of being consistent with existing author-supplied materials, a departure from *QST* style is made in the identification of D13 and D14; normally, LEDs are identified with DS designators. Also, ferrite beads—here identified as Z1-Z7—usually have FB designators.)

Notes

[1]The Elevator is available in kit form from LECTROKIT, 401 W Bogart Rd, Sandusky, OH 44870 (a telephone number is not available). PC board only and detailed manual, $15; XV223-49 Elevator transverter kit, $89. All prices are postpaid in the US; Ohio residents add 6%. The kit includes a drilled PC board, parts, case, connectors, TRC-501 modification kit, detailed assembly manual and 9-V wall transformer (unused surplus or new). TRC-501 transceiver, crystal(s) and antenna are not supplied. A 223.5-MHz crystal for the TRC-501 channel A (49.830 MHz) XTAL-A is $9. To determine the crystal frequency required for other channels, refer to the text and the parts list of Fig 3. Send a business-size SASE for latest information. The ARRL and *QST* in no way warrant this offer.

[2]To order from the ARRL, please send your request to the Technical Department Secretary, 225 Main St, Newington, 06111 and ask for the Elevator Template Package. Include $5 to cover photocopying and postage costs.

[3]The Deluxe School Cases are sold by W. T. Rogers Co, 2514 Fish Hatchery Rd, PO Box 4327, Madison, WI 53711; tel 608-257-2227. Case part numbers are 54907 (blue); 54908 (red) and 54912 (yellow). (These cases can be purchased in single-lot quantities from the manufacturer.—*Ed.*)

[4]Two Elevators checked in the ARRL Lab met FCC requirements for spectral purity. After the initial measurements were made, one unit was detuned to the starting points specified in the tune-up instructions and retuned according to the supplied procedure. Upon completion of the tune-up, all data were nominally the same as measured initially.

Conducted By James W. Healy, NJ2L
Assistant Technical Editor

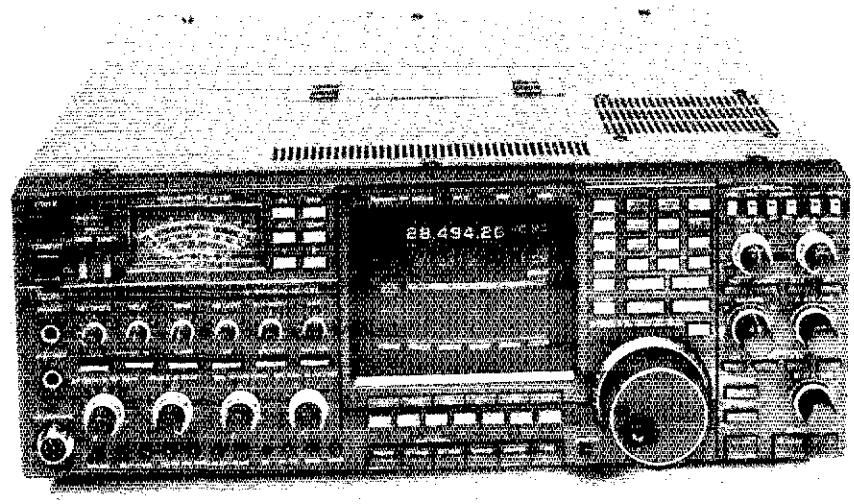
ICOM IC-781 160- to 10-Meter Transceiver

Reviewed by Mark J. Wilson, AA2Z

One thing's sure about the IC-781: It made me a popular guy. There aren't that many $6000 transceivers out there, and the '781 is a real attention-getter. Whenever I mention that I'm checking out a '781, people ask, "What's it like?" or, "Is it really worth $6000?" or similar questions. When I took the radio to KY1H's house for a DX contest, everyone wanted to see it and give it a try. Even some jaded HQ staffers wanted to take the radio home to play with.

As with most high-end gear, the IC-781 has a long list of standard features. For starters, you can't miss the 5-inch amber CRT in the center of the front panel. Other not-so-obvious features are a new synthesizer using DDS (direct digital synthesis) techniques, a fast internal antenna tuner, memories and scanning galore, a sensitive general-coverage receiver, a built-in power supply and iambic keyer, and 500- and 250-Hz CW filters.

The IC-781 is big and heavy. Approximately the same size as the IC-761, the '781 is definitely a desktop radio. Weighing in at 51 pounds, it's not the right thing to buy for mobile or portable operation. The transceiver uses ac mains power only; there is no provision for 13.8-V dc operation (its final-RF-amplifier transistors operate at 28 V). If you like, you can attach the rack handles included in the accessories box for that high-tech look.



Front-Panel CRT

The first question most people ask is, "What does the CRT do?" The short answer is, "A lot." You can see sample CRT screens in the title photo and Fig 1.

Frequency and Mode Display

The top half of the screen, displaying frequency and mode information, is pretty straightforward. The following information is displayed for VFO A and VFO B: frequency (to 10 Hz); mode (**LSB, USB, CW, RTTY, AM, FM, DATA**); filter selection (**WIDE** or **NAR**row); and transmit and/or receive offset (to 10 Hz). **XMIT** is displayed next to the VFO you're transmitting on; this is usually VFO A—unless you're operating split, in which case the **XMIT** indicator moves next to the VFO B information. The **XMIT** indicator is highlighted when the '781 is transmitting. Also displayed is memory information, showing the selected memory number and the frequency, mode and filter selections stored in that memory. Information for the VFO (or memory) in use is displayed in a larger, bolder size than that for the second VFO, reducing confusion. I really like having all the information for both VFOs available at a glance.

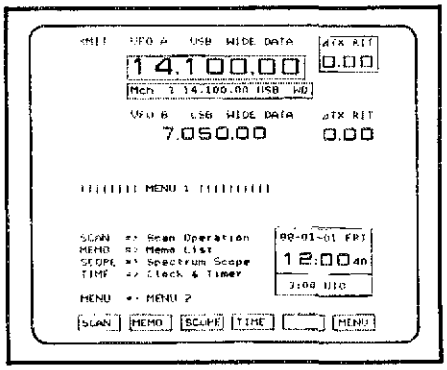


Fig 1—This view of the Menu 1 screen on the IC-781's multifunction CRT gives a hint of the variety of information it can display on its 17 different menus.

The Rest of the Display

The bottom half of the display is more complicated, because there are 17 different menus. Understanding the display is easier if you're familiar with basic computer operation and terminology. Fortunately, the manual devotes 13 well-illustrated pages to the menu displays.

Immediately below the CRT is a row of six function keys, **F-1** to **F-6**. Their functions change depending on the menu in use; highlighted labels on the CRT immediately above the keys tell what their current functions are.

F-6 always brings you back to the previous menu. There are two main menus. From Menu 1, **F-1** gets you into the scan controls. **F-2** brings you to the memory list, so you can see the frequency, mode and filter information stored in each of the 99 memories. I'll cover these screens in detail in "Memories and Scanning."

F-3 changes the lower half of the display to a spectrum scope—think "panoramic adapter"—that allows you to see signals ±25, 50 or 100 kHz from the frequency you're listening to. The scope also displays your transmitted signal, but there isn't enough detail to be able to tell if you're splattering. At first, I thought that the spectrum scope was a gimmick. After using it a while, though, I did find it useful. Although you can't really see lots of individual signals except on a quiet band, I found that I could quickly check to see whether a band was open, find a relatively clear area for CQing during contests or find pileups on DX stations.

F-4 gets you into the IC-781's elaborate clock and timer system. When either of the main menus or the clock/timer menu is selected, a box at the right of the screen shows the settings for the main clock and the secondary clock. The main clock display shows the current time (to the second), the day and date. The display for the secondary clock shows the time (hours, minutes only), and a user-programmable note. I set the main clock to UTC and the secondary clock to local time (with EST or EDT for the note). When other CRT functions are using the entire lower half of the screen, a small highlighted box immediately below the VFO B line shows the current main-clock time.

The '781's timer functions are reminiscent of those found on home electronics equipment. In the **SLEEP** submenu, you can program the radio to shut off after a defined period from 0 to 90 minutes, or you can program it to shut off at a specific time. In the **TIMER** submenu, you can program the IC-781 to turn on and off at up to five preset times, and to tune to a specific memory channel for those five periods. For

example, if you want to hear a WWV propagation forecast, you can program the IC-781 to turn on Monday at 1818Z, tune to memory channel 1 (which you've previously set to 10.0 MHz, AM, wide filter) and turn off at 1819Z. (It's like programming a VCR to tape your favorite programs while you're away.) In addition, the IC-781 has a control output for operation of a tape recorder.

When Menu 2 is selected, **F-1** brings up the **TERMINAL MONITOR** mode. In this mode, the bottom half of the CRT displays ASCII data sent to the **DATA-IN** jack on the rear panel. For example, you can display Baudot RTTY from a communications processor that has an RS-232-C output. I did not try this feature.

From Menu 2, **F-2** is used to set the parameters for ICOM's CI-V communication interface system. With the optional CT-17 level converter, you can control a number of the IC-781's functions from a personal computer. For example, programs such as Ken (K1EA) Wolff's *ConTest*, allow you to set the '781's operating frequency from the computer keyboard.

Menu 2, **F-3** allows you to choose the default filter selection (wide or narrow) for each mode. I set the defaults for narrow on all modes. It isn't possible to use the "AM wide" (6-kHz) filter in the IC-781's heterodyne-detected modes (CW, SSB, RTTY).

F-4 allows you to turn the band-stacking registers on and off. With this function enabled, the '781 goes to the last-used frequency when you return to a band. For example, if you are on 28.035, switch to 40 meters and tune to 7.233, and then switch back to 10 meters, you'll end up back on 28.035. With the band-stacking registers off, you'd end up on 28.233 MHz. Filter and mode selections are also stored in the band-stacking registers.

External Video Monitor

If you have a hard time reading the CRT on the '781's front panel, you can connect an external monitor. Video output (1 V P-P, 75 Ω) is available at the **DATA IN** jack on the rear panel. It works with any NTSC-type TV set with a video-input jack. The IC-781 drove an ARRL HQ Apple® //e monochrome monitor flawlessly.

Frequency Control

The IC-781's frequency display resolves frequencies to the nearest 10 Hz (0.01 kHz). An optional voice synthesizer provides audible confirmation of operating frequency. The frequency display indicates the carrier frequency in AM, FM, SSB and CW modes (CW signals must be tuned to the proper pitch for display accuracy); the mark frequency is indicated in the RTTY mode. The rig stays tuned to the same carrier frequency when changing modes.

The IC-781 has two VFOs and is capable of split-frequency operation. You can change frequency by turning the main tuning knob, or by entering a frequency directly on the keypad to the right of the CRT.

The radio tunes in 10-Hz steps at its slowest speed. Tuning speed is a comfortable 5 kHz per revolution, and it can be changed to 2.5 kHz per revolution by means of an internal switch. When you turn the tuning knob rapidly, the tuning rate steps up to 25 kHz per revolution. For large frequency excursions, 500 kHz per revolution (1-kHz steps) is available when **TS** (tuning speed) has been pressed.

A **LOCK** switch inhibits the main tuning dial (but not the keypad) to prevent an accidental QSY. (An internal switch causes the **LOCK** switch to inhibit the keypad as well.) The large main tuning knob is weighted and has a silky smooth feel. The manual shows how to adjust the tension on the tuning knob shaft to suit individual preferences.

If you need to go to a specific frequency, the fastest way to get there, generally, is by using the numeric keypad. For example, if you want to QSY to 14.195 MHz, press **1 4 . 1 9 5 ENT**er (You could also press **1 4 1 9 5 0 0** and avoid hitting the decimal key.) You don't have to enter trailing zeroes; entering **1 4 . 1 ENT**er brings you to 14.100 MHz. Similarly, if you want to move around in the same MHz range, start your entry with the decimal point. If you're on 28.025 MHz and want to QSY to 28.885, entering **. 8 8 5 ENT**er will get you there.

The keypad also serves as the band switch. Pressing the **CE** (clear entry) button toggles the keypad between band-switch and frequency-entry modes. Each of the digit keys (**0-9**) has two labels. When the keypad-entry mode is selected, yellow and red lighted labels show up in the center of each key. When the band-switch mode is selected, the lighted labels disappear, and you go by the white labels screened onto the upper left corner of each key. For example, the **1** key also selects 1.8 MHz, the **2** key, 3.5 MHz, and so on. It's a lot easier to read the lighted labels than the screened labels.

The VFO controls are arranged in a vertical row just to the right of the CRT. If you press the **A** button, you select the upper displayed frequency on the CRT. If you press the **B** button, you select the lower displayed frequency. When you have selected a VFO (A or B), you can change its frequency, mode and filter choice. So far, so good—now for the part that takes some getting used to.

Say you're listening to a rare DX station, working by call districts, on 10 meters. While waiting for him to get to your call area, you're listening to a local 75-meter net. You've got VFO A set to 3.925 MHz LSB and VFO B set to 28.345 MHz USB. This kind of operation is one reason we buy radios with two VFOs, right? On most radios, you'd press **A** to listen to the 80-meter net and **B** to listen to the 10-meter DX station. Not on the IC-781: *The IC-781 always transmits and receives on VFO A* (the upper displayed frequency) *unless you have selected split-frequency operation.* You must press the **CHANGE** key to swap the contents of VFO A and VFO B. This system takes some getting used to, but it works fine. One thing to watch out for, though: The **A=B** key makes the frequency, mode and filter settings of the other VFO identical to the *selected* VFO. This can be a problem if you want to make VFO B the same as VFO A—the VFO you're listening to—but have selected VFO B.

Split-frequency operation is accomplished by pressing the **SPLIT** switch. The controls are set up so that you always listen on VFO A and transmit on VFO B during split-frequency operation. You can press the **XFC** button to listen to your transmit frequency during split operation.

There are two sets of offset-tuning controls, one for each VFO. Offset range is ±9.99 kHz. In addition to the usual RIT, **ΔTX** (transmitter offset) and offset **CLEAR** controls, there's a momentary contact push-button switch called **+Δf**. This switch adds the offset (+ or −) to the VFO frequency, then resets the offset to zero.

Memories and Scanning

The IC-781's 99 memories store operating mode, filter selection and frequency. All 99 memories are tunable, so it's sort of like having 99 other "VFOs" in addition to VFO A and VFO B.

Memories can be selected by using the **MEMORY-CH UP/DOWN** buttons on the front panel, from the keypad, or from the **MEMO LIST** menu on the CRT. The front-panel controls are similar to those found on other radios: **M-WRITE** enters the contents of the selected VFO into the selected memory; **M-CLEAR** clears the selected memory; **VFO/MEMO** toggles between VFO and memory modes; and **M-VFO** reads the contents of the selected memory into the selected VFO.

The **MEMO LIST** menu is a useful feature. It allows you to scroll through the memories to see what's programmed into all 99 channels. You can select or clear a memory once you've found what you're looking for, and you can store a 10-character note with each memory channel.

Scanning

The IC-781's scanning features are amazing. All scanning functions are programmed from within the **SCAN OPERATION** menu on the CRT.

- In *programmed scan*, you set two frequency limits, and the IC-781 scans between them. Scanning stops when a signal breaks the squelch. Scanning speed is set by the **SCAN SPEED** control on the front panel. If you want the '781 to automatically continue scanning after stopping, press the **RESUME** button and adjust the **DELAY** control. In *fine programmed scan*, scanning slows down—but does not stop—when a signal opens the squelch.
- In *ΔF scan*, the '781 scans a selected area around the operating frequency. Choices are ±2.5, 5, 10, 20 and 50 kHz. In *fine ΔF scan*, scanning speed slows

down, but does not stop, when a signal breaks the squelch.

• In *memory scan*, the '781 scans all but the empty memory channels.

• *Selected memory scan* allows you to scan the memory channels in selected groups (you can program up to 9 different groups). For example, to check propagation, you could program all of WWV's frequencies into memory, assign them to group 1, and scan them. Note that you can assign memory channels to scan groups in any order you want (group 1 could be memory channels 2, 16, 37 and 85, for example) and change them at any time from the **MEMO LIST** menu.

Receiver

The IC-781 employs a quadruple-conversion scheme for SSB, CW, RTTY and AM, and triple conversion on FM. Intermediate frequencies of 46.51 MHz, 9.0115 MHz, and 455 kHz are used on FM, and a fourth IF of 10.695 MHz is employed in all other modes.

Signals can enter the receiver chain either from the SO-239 **ANT**enna connector or through the **RECEIVE ANT IN** phono jack, allowing use of separate receiving and transmitting antennas. Signals then pass through a filter (switched bandpass filters above 1.6 MHz, low-pass filters below 1.6 MHz). After filtering, signals travel directly to the first mixer (actually one of two mixers—see "Dual Watch"), to a switchable attenuator, or to a preamplifier.

Attenuator choices are 10, 20 or 30 dB —more than adequate for any conditions I encountered. The 10-dB-gain preamplifier is especially helpful on 10 and 15 meters. As shown in Table 1, sensitivity improves without sacrificing much strong-signal-handling capability. On many occasions I used the preamp to copy weak signals during crowded contest conditions. Although strong nearby signals sometimes caused the preamp to fold, more often than not, copy improved on the weak signals I was trying to hear.

Dual Watch

Naturally, a $6000 transceiver must offer some receiver feature that other rigs don't. In the '781, that feature is "Dual Watch." Dual Watch allows you to listen to two frequencies—one in VFO A, the other in VFO B—simultaneously. During Dual Watch operation, signals pass through the front-end filters and attenuator/preamp, and into two separate, identical first mixers. One mixer uses PLL A (VFO A) for its local oscillator; the other mixer uses PLL B (VFO B). Both signals then enter the post-mixer filter and travel through the rest of the receiver together.

The front-panel **BALANCE** control allows you to adjust the signal gain for the right balance between the two Dual Watch signals. (**BALANCE** actually controls the attenuation of two PIN-diode π attenuators in the first-mixer circuitry.) Turning the **BALANCE** control counterclockwise increases the attenuation on the VFO B mixer (making the VFO A signal louder), and vice-versa.

Dual Watch has limitations: (1) Both VFOs should be set to the same band, because the bandpass filter selected for the frequency in VFO A is in line for both signals; (2) The operating mode and filter choices are the same for both signals. (The only separate circuitry for the two signals is in the first mixer.) Dual Watch is *not* the same as having two rigs in the same box. For example, you can't transmit on both VFOs at the same time, listen on different bands and modes simultaneously, nor can you listen to one frequency while transmitting on another. Dual Watch *is* helpful, though: For example, during contests I could run stations on the main VFO while hunting for multipliers elsewhere on the band with the second VFO.

Flexible Filters

The '781 offers a number of different filter combinations. The radio comes from the factory with the following bandwidths: 6.0 or 2.6 kHz for AM; 2.4 kHz for SSB; and 2.4 kHz, 500 Hz and 250 Hz for CW and RTTY operation. FM operation uses a 15-kHz bandwidth. You have the choice of wide and narrow filters on AM, CW and RTTY (a wide SSB filter is optional). When you change modes, filter settings default to the choice you made from the **IF FILTER PRESET** menu on the CRT. You can change the filter settings at any time with the front-panel **WIDE** and **NAR** buttons. On CW and RTTY, you can also switch in 250-Hz filters in the 9-MHz and 455-kHz IFs (these filters may be used separately or together).

Other Receiver Features

The '781 offers three features, in addition to the IF filters, that really help on today's crowded bands. These features are passband tuning (PBT—actually variable-bandwidth tuning), a notch filter in the 10.695-MHz IF, and an audio peak filter (APF). The **PBT** and **NOTCH** controls function in all modes but FM, and the **APF** control works only on CW.

The IC-781 has "twin" PBT. One front-panel **PBT** control is for the 9-MHz IF; the other is for the 455-kHz IF. **PBT** narrows the passband from either the high side or the low side, and is very helpful for reducing QRM.

When the audio peak filter is switched in, you can use it to adjust the peak response of the audio filter between 500 and 1000 Hz. Although this filter sometimes helps reduce QRM and noise, I didn't use it much.

Four controls are used for the noise blanker. The **NB** switch activates a noise blanker that is fairly effective against ignition and power-line noises. This blanker works most of the time, but it has a hard time with the line noise I get on cold, dry, winter days. The '781's blanker is more effective than most, though. **NB LEVEL** varies the threshold of the blanker. **NB WIDE** is used for noise with long-duration pulses, such as the Soviet "woodpecker" over-the-horizon radar. Again, this blanker is effective much, but not all, of the time. The **BLK-WIDTH** is used to help remove echo noise from the woodpecker. Receiver dynamic range is degraded when the noise blankers are in operation—an effect common to most receivers.

The AGC in the '781 is excellent, a trait common to newer ICOM radios. What sets the '781 apart, though, is that the release time is continuously variable from the front-panel **AGC** control. Most other radios offer you a choice of two fixed release times, one fast and one slow. For casual SSB work with strong signals, I used a slower release. AGC action is smooth, and signals are easy to listen to. For CW and for SSB contesting and DXing, though, I set the AGC control for the fastest release time. The AGC doesn't thump, even at the fastest settings. Also, like the IC-761, the IC-781's AGC has depth. Strong signals sound louder than weaker ones, making it easier to dig out weak signals sharing the passband with stronger ones.

Transmitter

The '781's transmitter section deserves special mention because it produces more than 160 watts of *clean* power on all bands, thanks to 28-V finals and superior filtering. Typical numbers are shown in Table 1, and spectral photos are shown in Figs 2 and 3. Operating at its rated 150 W output, the '781's third-order IMD products are down 37 dB worst case (14 MHz). Harmonics and spurious radiation are down more than 60 dB on all amateur bands.

QRP fans will be happy to know that the IC-781's minimum power for CW, RTTY and SSB (with the compressor on) is in the milliwatt range. The **DRIVE** and **RF PWR** controls work together to allow smooth setting of output power anywhere from less than 1 W to more than 160 W.

The transmitter is SWR-protected. Power starts to fold back slightly when the antenna SWR reaches 1.3:1 or so. At 1.5:1, power folds back to 100 W, and it's 50 W at 2:1.

Antenna Tuner

The '781's built-in antenna tuner is very much like the tuner in the IC-761. It works on 160 through 10 meters. ICOM claims a matching range of 16.7 to 150 ohms, and a maximum tuning time of three seconds. It's fast!

Like the IC-761, the IC-781 allows you to preset tuner adjustments for your antennas for each band. When initializing these presets, you transmit at low power and let the IC-781 find the right match on its own. Once a match is found, you open a cover on the top panel of the transceiver, flip the **PRESET/AUTO** switch to **PRESET** and adjust a pair of potentiometers (one pair per band) until four illuminated LEDs go out. Repeat the process for each band. From then on, when you change bands, the tuning capacitors move to the preset positions and fine tune from there. The result is an automatic antenna tuner that works quickly and is

Table 1

ICOM IC-781 160-10 Meter Transceiver, Serial no. 1001

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receiver, 100 kHz to 30.0 MHz; transmitter, 1.8 to 2.0, 3.4 to 4.1, 6.9 to 7.5, 9.9 to 10.5, 13.9 to 14.5, 17.9 to 18.5, 20.9 to 21.5, 24.4 to 25.1, 27.9 to 30.0 MHz.	As specified.
Modes of operation: SSB, CW, FM, AM, RTTY.	As specified.
Power requirement: 100 to 120 V ac, 760 VA max on transmit, 150 VA max on receive.	Not measured.
Transmitter	*Transmitter Dynamic Testing*
Transmitter output power: Max 150 W PEP on SSB; 150 W on RTTY and FM; 75 W on AM.	Typically 181 W PEP on SSB; 170 W on CW, RTTY and FM; and 86 W on AM. Power output varies slightly from band to band.
Spurious-signal and harmonic suppression: >60 dB below peak power output.	See Fig 2.
Third-order intermodulation distortion products: Not specified.	See Fig 3
CW-keying waveform: Not specified.	See Fig 4.
Transmit-receive turnaround time (PTT release to 90% audio output with an S9 signal): Not specified.	25 ms, typ.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity (preamp on)	
SSB, CW and RTTY: (bandwidth not specified) <0.5 μV for 10-dB S/N from 0.1-0.5; <1 μV for 10-dB S/N from 0.5-1.8 MHz; <0.16 μV for 10-dB S/N from 1.8-30 MHz.	Minimum discernible signal (noise floor) with 500-Hz filter: *Preamp off:* 1.0 MHz, −129 dBm; 3.5 MHz, −137 dBm; 14 MHz, −134 dBm. *Preamp on:* 1.0 MHz, −129 dBm; 3.5 MHz, −141 dBm; 14 MHz, −140 dBm.
AM: (6.0-kHz bandwidth) <3.2 μV for 10 dB S/N from 0.1-0.5 MHz; <6.3 μV for 10 dB S/N from 0.5-1.8 MHz; μV for 10 dB S/N from 1.8-30 MHz.	6.0-kHz bandwidth test signal 30% modulated with a 1-kHz tone, preamp on: 1.0 MHz, −114 dBm (0.44 μV); 3.8 MHz, −125.5 dBm (0.12 μV); 14 MHz, −126 dBm (0.115 μV).
FM: (bandwidth not specified) <0.23 μV for 12 dB SINAD from 28-30 MHz.	0.21 μV for 12 dB SINAD at 29 MHz.
Receiver dynamic range: 100 dB (preamp on), 105 dB (preamp off).	Blocking dynamic range†: *Preamp off:* 3.5 MHz, 134.5 dB; 14 MHz, 134 dB. *Preamp on:* 3.5 MHz, 132.5 dB; 14 MHz, 132.5 dB. Two-tone, third-order intermodulation distortion dynamic range†: *Preamp off:* 3.5 MHz, 101 dB; 14 MHz, 102 dB. *Preamp on:* 3.5 MHz, 97 dB; 14 MHz, 99.5 dB. Third-order input intercept: *Preamp off:* 3.5 MHz, 14.5 dBm; 14 MHz, 19 dBm. *Preamp on:* 3.5 MHz, 4.5 dBm; 14 MHz, 9 dBm.
S-meter sensitivity (for S9 reading): Not specified.	42 μV at 500 kHz; 24 μV at 3.5 MHz; 30 μV at 14 MHz.
FM squelch sensitivity (28-30 MHz): <0.23 μV.	Preamp off: min, 0.1 μV; max, >0.3 V. Preamp on: min, 0.06 μV; max, >0.3 V.
Notch filter attenuation: >45 dB.	>30 dB.
Receiver audio output: >2.6 W at 10% distortion with 8-Ω load.	3.25 W at 10% total harmonic distortion (THD) with an 8-Ω load.
Receiver IF/audio response: Not specified	200-2875 Hz at −6 dB.
Size (height, width, depth): 5.9 × 16.7 × 16.2 inches; weight, 51 lb. Color: Black.	

†Blocking dynamic range and third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.

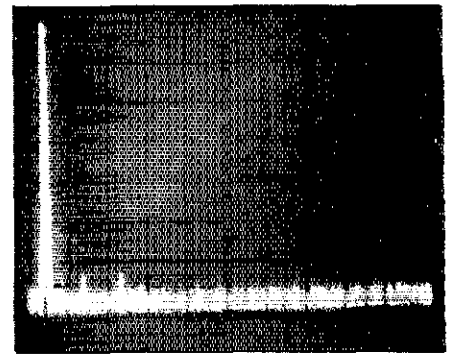


Fig 2—Worst-case spectral display of the ICOM IC-781. Horizontal divisions are each 2 MHz; vertical divisions are each 10 dB. Output power is approximately 156 W at 1.9 MHz. All harmonics and spurious emissions are at least 63 dB below peak fundamental output. The IC-781 complies with current FCC specifications for spectral purity.

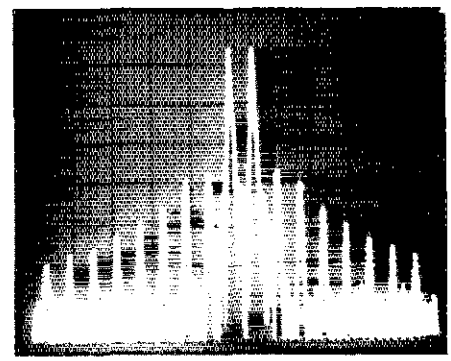


Fig 3—Spectral display of the IC-781 during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 37 dB below PEP output, and fifth-order products are approximately 39 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver was being operated at 150 W PEP output on 14.2 MHz.

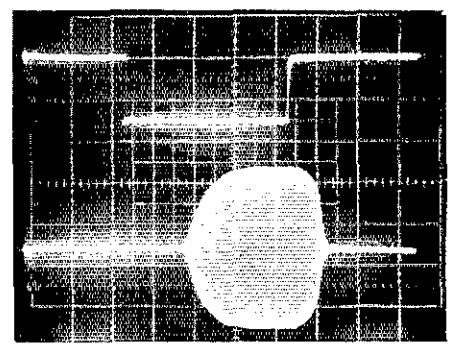


Fig 4—CW-keying waveforms for the ICOM IC-781 in the full-break-in mode. The lower trace is the RF envelope; the upper trace is the actual key closure. Each horizontal division is 5 ms. The IC-781's CW keying is extremely good.

almost transparent to the operator.

CW Operation

With the '781, ICOM introduced a feature that Kenwood owners have enjoyed since the TS-930 was introduced in the early 1980s: a front-panel **CW PITCH** control. This control allows you to vary the CW offset between 400 and 1000 Hz. Sidetone pitch automatically tracks the offset.

Both full-break-in (QSK) and semi-break-in operation are available. QSK operation is smooth, and receiver blanking is excellent. One complaint registered about the IC-761, a choppy transmitted signal in high-speed QSK operation, is much improved in the '781. I used a second receiver to listen to machine-sent CW from the '781 at speeds of up to 50 WPM, and I heard only a slight difference in character length between full- and semi-break-in. You can adjust your keyer weighting slightly to compensate for the shortened characters, but the '781's CW is easily copyable without doing so.

The transmitted CW waveform, shown in Fig 4, is well-shaped. There is no shortening of the first dit during full-break-in operation. On-air listening tests in a second receiver show that the '781's transmitted CW signal sounds great.

The IC-781 offers a built-in iambic keyer. To use it, plug your paddle into the front-panel **ELEC-KEY** jack, adjust the **KEY SPEED** control (range: 5 to 45 WPM) and send away. Keyer weighting is adjustable with an internal control. If you prefer to use your own keyer or straight key, plug it into the rear-panel **KEY** jack just as you would on any other rig.

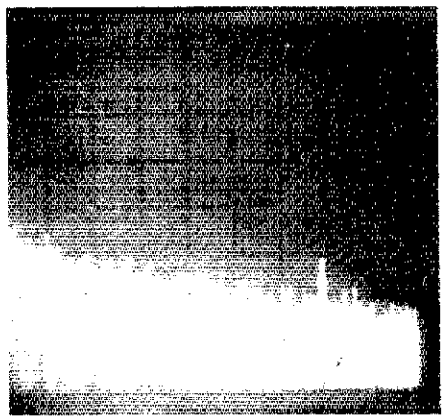
Phone

In addition to the usual **MIC GAIN** and speech-compressor controls, the '781 also offers a **MIC TONE** adjustment. You can use this control to tailor the transmitted audio to your voice and your microphone. It's worth experimenting with the **MIC TONE** control while listening in the monitor to find the best setting. I used a Heil HM-5 microphone and received good audio reports.

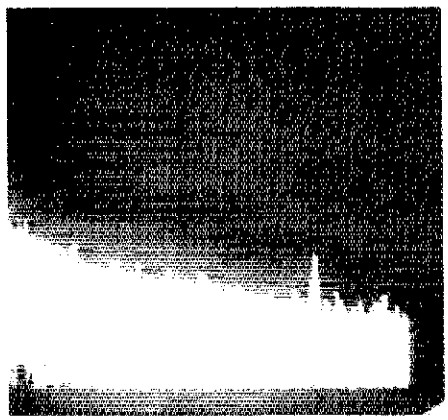
I really enjoyed making a few contacts on 10-meter FM. It's easy to access repeaters: Program the repeater's output frequency into VFO A, its input frequency into VFO B, punch the **SPLIT** button, and you're ready to go. You can monitor the repeater's input frequency by using the **XFC** button. The **TONE** switch enables a subaudible tone, factory set to 88.5 Hz. You can change the tone frequency to any of 38 standard tones by removing the covers and soldering some jumpers on a PC board.

Digital Modes

The '781 features FSK and AFSK operation, and all of the connections you need for your communications processor are available from the **ACC(1)** jack on the rear panel. I had no trouble connecting the '781 to my Tono EXL-5000. For FSK operation, switches inside the rig select 170, 425 or 850-Hz shift, high or low tones, and mark/space polarity.



(A)



(B)

Fig 5—Spectral display of the IC-781 transmitter output during composite-noise testing. Power output is 170 W at 3.5 MHz (A) and 170 W at 14 MHz (B). Each vertical division is 10 dB; each horizontal division is 2 kHz. The scale on the spectrum analyzer on which these photos were taken is calibrated so that the log reference level (the top horizontal line on the scale in the photos) represents −60 dBc/Hz and the baseline is −140 dBc/Hz. Composite-noise levels between −60 and −140 dBc/Hz may be read directly from the photographs. The carrier, which is off the left edge of the photographs, is not shown. These photographs show composite transmitted noise at frequencies 2 to 20 kHz offset from the carrier.

For AFSK operation, all connections can be made through the microphone jack on the front panel as well. Pressing the front-panel **DATA** switch disables the mike input, so you can leave your mike connected when using your AFSK equipment with the rear-panel jack.

Synthesizer

As shown in Fig 5, the '781 has one of the quietest synthesizers we've measured in the ARRL Lab. There are no annoying pops, clicks or birdies. I didn't notice any phase-noise problems, even when the bands were filled with strong signals. Lockup time is fast, too: You can operate QSK at any frequency split, and the transmitted signal quality remains excellent. (Earlier ICOM radios had problems with transmitted-signal chirp and instability during QSK operation with frequency splits of more than a kilohertz or two. These problems occurred because the radios switched into transmit before the synthesizer locked.)

Operation

The first thing I noticed when opening the IC-781's box of accessories is that ICOM includes matching plugs for most of the radio's jacks. That sure made connections to the rest of my station a lot easier.

Although the front panel is packed with controls and indicators, important controls have large knobs and are easy to find and grasp. The front-panel layout is easy to get used to—remarkable, considering the number of different things this radio does. I highly recommend that you read the instruction manual, though, to familiarize yourself with the proper operation of the controls.

The amplifier key line terminates in a rear-panel phono jack. The keying relay is rated to handle up to 30 V dc at 1 A or up to 100 V ac at 0.5 A. Be sure to check your amplifier's manual or measure its keying voltage before connecting it to the IC-781. The ALC input is adjustable. It's set to work with amplifiers providing 0 to −4 V dc, so the '781 is compatible with most modern linear amplifiers. Use of the ALC connection is important with amplifiers employing high-mu triodes, such as an 8877 or a pair of 3CX800A7s. Such amplifiers require only 50 to 75 watts of drive for legal-limit output, and the '781 has more than twice that power on tap.

Connection to a VHF or UHF transverter is possible through the rear-panel **X-VERTER** jack. The output to this jack is activated by applying 2 to 13.8-V dc to a pin on the **ACC(2)** jack. If you're creative, it's possible to leave your transverter connected to the '781 and use the **ACC(2)** jack to switch between HF and VHF/UHF operation.

I used the IC-781 extensively on phone and CW during the 1989 contest season. The IC-781's receiver is among the best we've ever tested in the ARRL Lab, and this superior performance is evident in on-the-air use. The receiver is sensitive, especially with the preamp on, and it has impressively high dynamic-range figures. Most noticeable is the fact that the receiver is clean. When the band's full of strong signals, it's still possible to find a clear spot—without having to listen to a lot of low-level mixing products and phase noise found in some other radios.

The extensive memory system, receive-audio **BASS** and **TREBLE** controls, tape-recorder output and on/off control jack,

(continued on page 73)

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

TOWER ANTI-CLIMBING SHIELDS

☐ Fig 1 shows a practical safety solution to discourage unwanted climbers on a tower: an anti-climbing shield. In this case, the shield is installed on a Rohn HDBX48 tower, but should be readily adaptable to other towers as well.

The shield consists of three 2 × 8-foot sheets of corrugated fiberglass roofing, metal plumbing straps and three bolts with wing nuts. The nuts and bolts hold the straps in place; the wing nuts face outward to allow removal when necessary.

This safety solution is inexpensive, uses readily available materials, and is pleasing to the eye. Most importantly, it removes the temptation for unwanted (usually young) visitors to climb the tower.—*Betty Oakberg, N4LZL, 105 Ulena Ln, Oak Ridge, TN 37830*

☐ Radio antennas fall under the category *attractive nuisance* because they form irresistible temptations to neighborhood adventurers. Virtually every tower, in town or not, needs some means of foiling unauthorized climbers. A simple and fairly inexpensive guard can be made from 1 × 10 or 1 × 12 rough-sawn spruce, as shown in Fig 2. This material is smooth-finished on one side and rough-finished on the other. Mount the lumber with its smooth side facing the inside of the tower; the rough sides of the boards should face outward to afford splintery discouragement to would-be steeplejacks. Attach each board to the tower with a pair of U bolts, one bolt on each end of each board.



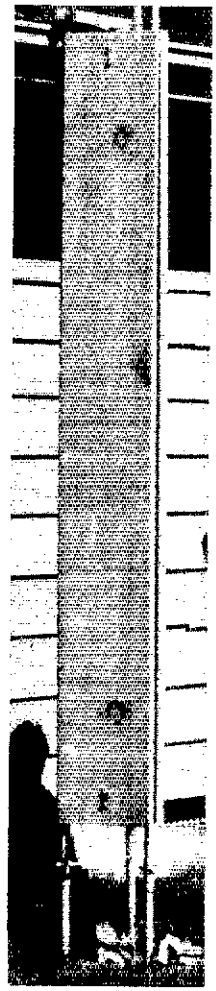


Fig 1—(left) Betty Oakberg uses this fiberglass-roofing guard to keep unwanted climbers off her tower. Betty's son Frank installed this guard in just a few minutes.

Fig 2—(right) Robert Brown's anti-climbing tower guard consists of 1 × 10 spruce lumber, paint, nuts and U bolts. See text.

The guard shown in Fig 2 cost me around $25 to build. Such a guard can be constructed in one afternoon, and, if painted to match its background, is unobtrusive to neighbors (most of whom probably tend to regard antennas less as things of beauty than radio amateurs generally do). Incidentally, spruce must be painted for weather resistance; protected in this way, it can last for decades.—*Robert E. Brown, WA9MRU, 309 S Minnesota Ave, Morton, IL 61550*

IMPROVISING A CALIBRATED AUDIO GENERATOR

☐ Have you ever wished you had an audio signal generator? You may already have one that's accurate and stable, and whose output is smoothly controllable, in *your MF/HF transceiver*! If your transceiver contains a marker generator and a digital frequency display, you can probably use it to generate audio signals at known pitches. Here's how.

Tune the transceiver to exact frequency of one of its marker signals—such as 28,300.00 kHz (28.30000 MHz).[1] Turn on its marker generator and set its **MODE** switch to lower sideband (**LSB**). If the transceiver allows adjustment of its IF bandwidth during LSB reception, set its IF bandwidth to maximum. Tune upward in frequency—slowly. When the frequency display reads **28.300.05** or so, you may start to hear a low-pitched audio tone; at 28.300.05, this is an audio pitch of 50 Hz.[2] You can use the radio's RIT control for fine tuning, if desired.

By reading the digital readout and mentally subtracting the starting frequency (28.300.00 in this case) from it, you can determine the frequency of the marker-signal pitch. If your starting frequency was 28.300.00 MHz and your display now indicates **28.301.20**, the pitch you're hearing—assuming that the frequency display is accurate, and that the marker signal is actually at 28.30000 MHz—is 1.2 kHz. If your transceiver includes IF-shift and/or IF-slope-tuning controls that operate in LSB, adjust these controls to maximize the marker-signal level (as indicated on the transceiver S meter) as you tune.

The maximum audio frequency you may be able to develop may be 2.7 to 3.0 kHz, depending on your transceiver's IF bandwidth, the frequency differential between the transceiver's BFO and IF center, and the range of its IF-shift and IF-slope-tuning controls. Because the audio frequencies used for routine Amateur Radio voice and digital communications are quite a bit lower than those necessary for hi-fi, this frequency-generation limit is not a disadvantage because it allows us to generate the highest audio frequencies we can use in our rigs on SSB.—*Martin L. Cardwell, NB3T, 4600 White Ave, Baltimore, MD 21206*

[1]Most current transceivers display medium frequencies (300 kHz to 3 MHz) and high frequencies (3 to 30 MHz) with two decimal points—one between the 1-MHz and 100-kHz places, and another between the 1-kHz and 0.1-kHz places. For the frequency given, such a display reads **28.300.00** for 28.30000 MHz (28,300.00 kHz). —*AK7M*

[2]Adjusting the radio's **IF SHIFT** control to produce lower-pitched background noise may help somewhat; on the other hand, 50 Hz may be a bit too low for some transceiver audio systems to reproduce anyway. If so, keep tuning; you'll probably hear the signal between 28.300.10 and 28.300.20.—*AK7M*

STABILIZING THE MOBILE WHIP

☐ One of the problems faced by Amateur Radio operators who operate MF/HF mobile is keeping a car-mounted whip antenna vertical and stable while driving. In this contest with the wind, a vertical antenna may be more horizontal than vertical much of the time!

Some hams just surrender and work only VHF/UHF mobile. More-persistent MF/HF mobileers remain on the low bands, guying their antennas with monofilament fishing line or small-diameter cord. (I tried this with my rear-fender-mounted Hustler mobile antenna. It worked, but my wife disapproved of the practice, and often the string sang as I drove at highway speeds. When the front guy broke on Interstate 70, I thought very strongly of going to 2 meters!)

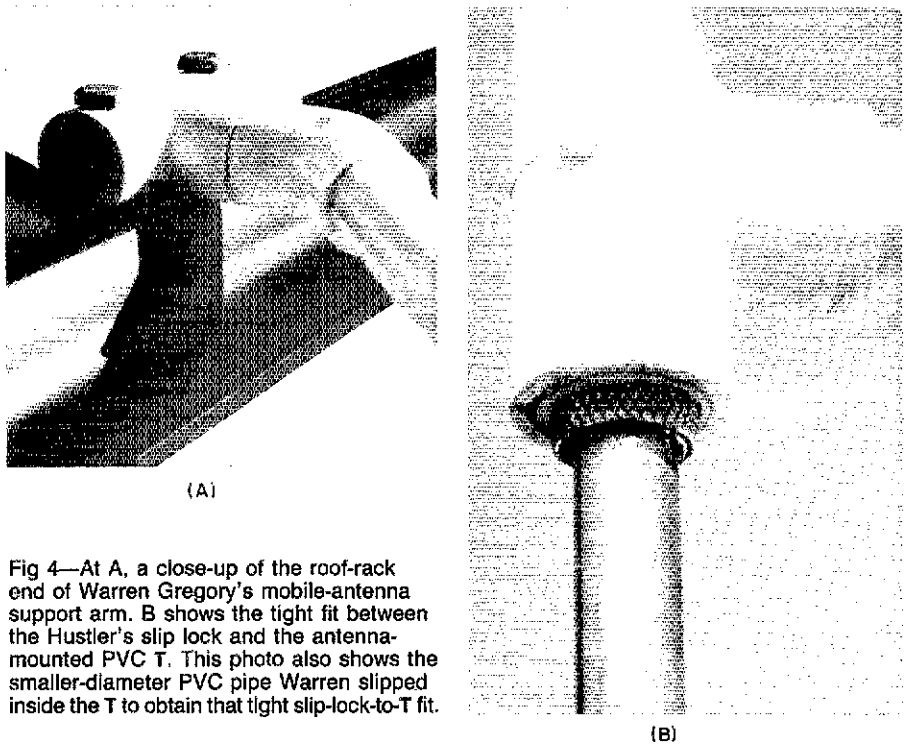
With the help of Werner Dolder, AA4IX, I devised a solution to this problem. See Fig 3. A PVC-pipe arm, attached to my station wagon's roof rack, supports the Hustler at its fold-over point, holding the antenna vertical and immovable.

I began constructing the support by carefully measuring the distance between the Hustler's fold-over point and the roof rack—at a 45° angle relative to the car body and to the antenna. After figuring where the arm would attach to the roof rack, I prepared a PVC **T** to fit the roof rack by filing a flat on one side of the **T** for a closer fit with the rack. To make this **T** more resistant to the pressure of its mounting bolts, I force-fit a piece of smaller-diameter PVC pipe through the **T**'s cross bar and glued it into the **T**. After the glue hardened, I drilled two mounting holes through the **T**'s cross bar—one near each of the cross-bar ends. I didn't have to drill holes in the car or the roof rack to mount this **T** to the car: I just dropped two square nuts into the roof-rack track and turned two stainless-steel bolts through the PVC **T** into the nuts. So far, so good!

Next, I glued a 45° PVC joint to the leg of the **T**, with the angled joint pointing back toward the antenna (Fig 4A).



Fig 3—The ham antenna on Warren Gregory's station wagon looks like just another mobile vertical until a closer look reveals a PVC-pipe support at rooftop level. This arrangement keeps the antenna vertical regardless of driving speed, but still allows the antenna to be folded for garage and car-port parking. That 45° fitting at the roof rack angles the support arm backward to meet the Hustler just below its folding point. T fittings connect the arm to the roof rack and antenna. See the text and Fig 4.



(A) (B)

Fig 4—At A, a close-up of the roof-rack end of Warren Gregory's mobile-antenna support arm. B shows the tight fit between the Hustler's slip lock and the antenna-mounted PVC T. This photo also shows the smaller-diameter PVC pipe Warren slipped inside the T to obtain that tight slip-lock-to-T fit.

I reinforced a second PVC T by forcing a piece of smaller-diameter PVC pipe through the cross bar, gluing it in and drilling it to fit the Hustler's slip lock. Then I slid this T up the antenna mast to the antenna's fold-over point, pushing the slip lock inside the cross bar (Fig 4B). (The slip lock must fit very tightly in the T.) I glued the slip lock in place.

I completed the support arm by cutting a piece of PVC pipe to connect the roof-rack- and antenna-mounted Ts and gluing this pipe into place at both ends.

I have used this PVC-pipe-supported Hustler on my car for six months—many times with all five resonators installed at once—with fine results. The support holds the antenna vertical and allows very little movement; yet, the antenna can still be folded at its fold-over point by tapping on the PVC cross bar to slide the slip lock down. Total cost of the project: under ten bucks.—*Warren Gregory, W4ZYZ, 1006 W Recess Rd, Hanahan, SC 29406*

THE HARDWARE-STORE SPECIAL CODE-PRACTICE SET

☐ Because code-practice oscillators seem to be helpful to some of my Novice students in mastering the Morse code at home, I sought a simple, inexpensive, home-brew code-practice set that the students could build themselves.

First, I tried the 555-timer-based circuit shown on p 36-6 of *The 1990 ARRL Handbook*. The oscillator itself worked well, with a few simplifying modifications (a single resistor instead of R3 and R4—47 kΩ for a 1.5-kHz pitch, 100 kΩ for a 700-Hz pitch, and 220 kΩ for a 400-Hz pitch—and the use of three D cells for a 4.5-V power supply instead of 9 V). Radio Shack®'s standard 555 IC (no. 276-1723) worked fine, but its more-expensive CMOS equivalent (the TLC555, no. 276-1718) did not deliver enough audio in a classroom situation. We used sockets for the timer ICs; even so, assembling each circuit required considerable soldering skill. Keys were a problem, too: A few old junk-box keys were available to students visiting my shack, but we needed to come up with a home-buildable key for students who wished to use their code-practice sets at home.

What finally evolved is a code-practice set consisting of a key (Fig 5) and code-practice oscillators (Figs 6, 7 and 8) capable of putting out a maximum of audio with a minimum of parts and battery voltage. The key is built on a 4 × 6 × 3/16-inch wooden base of scrap paneling. Its springs consists of two halves of a 10½-inch-long hacksaw blade. (The hacksaw blade can be

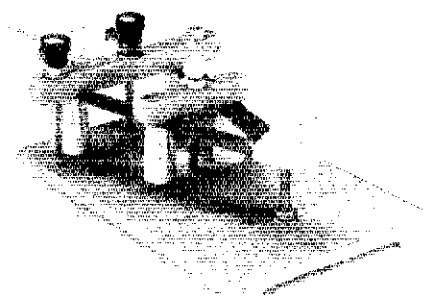


Fig 5—The Hardware-Store Special key. Yes, those hacksaw-blade springs are supported by wire nuts, and, yes, that *is* a drawer pull masquerading as a key knob! No holes need be drilled in the hacksaw blades; wooden cross bars clamp the blades against the wire-nut standoffs. Decreasing the distance between the knob and the first cross bar stiffens the key's feel. Brass no. 6-32 bolts are used for the key contacts; steel no. 6-32 bolts are used elsewhere. You can use standard hex or wing nuts instead of the acorn and knurled-plastic nuts shown at the key terminals and cross bars. To ensure adequate electrical continuity through the key, be sure to sand the tips of the key-contact bolts, and the hacksaw blade pieces where they meet their terminal and key-contact bolts.

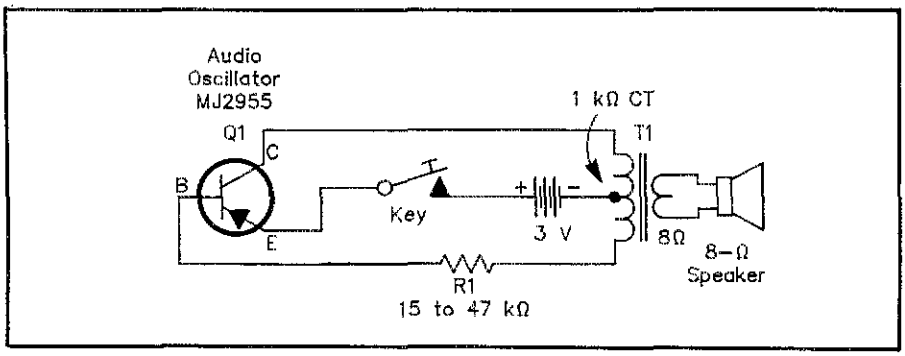


Fig 6—The Hardware-Store Special code-practice oscillator circuit is based on that shown in Fig 58D on page 4-26 of *The 1990 ARRL Handbook*. Q1 is available as Radio Shack no. 276-2043 and T1 is RS no. 273-2043. R1's resistance depends on the pitch you want and the battery voltage: With a 3-V supply, the circuit provides room-filling sound, oscillating at about 450 Hz with an R1 of 15 kΩ, and at about 1 kHz with a 47-kΩ resistor at R1.

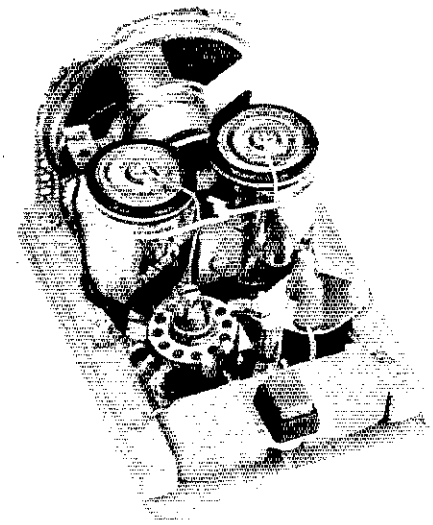


Fig 8—This Hardware-Store Special code-practice oscillator requires some soldering. In this version, R1 consists of a 5-kΩ resistor in series with a 50-kΩ potentiometer, used as a variable resistor, for pitch control. The push-button "key" makes this Hardware-Store Special self-contained, and convenient for paired groups in a classroom.

easily snapped at its midpoint by nicking it with a bench grinder, wrapping it in a piece of cloth [to contain the shrapnel that can fly when the blade breaks] and bending it at its center. Wear eye protection when you do this.) Study Fig 5 closely for more details on constructing the Hardware-Store Special key; don't be afraid to experiment and improvise with the materials you have on hand.

The next problem solved was our requirement for a simple, loud code-practice oscillator. I found a gem on page 4-26 of *The 1990 ARRL Handbook:* a *one-transistor* circuit capable of providing room-filling sound with a low-voltage dc supply. Fig 6 shows the circuit, which is simplified a bit over the *Handbook* version, and Figs 7 and 8 show two implementations of the circuit. The oscillator shown in Fig 7 is *solderless*; its connections are made with crimp-on lugs and wire nuts.

Now my Novice students are building their own keys and code-practice sets themselves—at minimum cost, and with commonly available parts and tools.—*Art Zavarella, W1KK, 1702 Main St, Agawam, MA 01001*

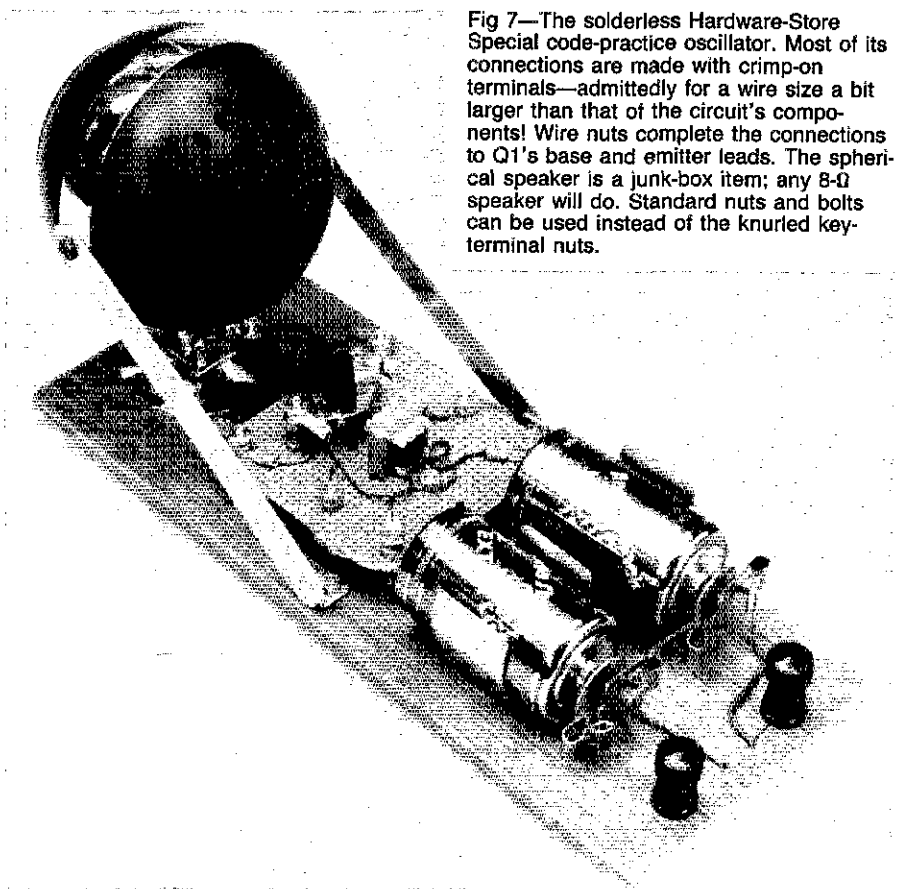


Fig 7—The solderless Hardware-Store Special code-practice oscillator. Most of its connections are made with crimp-on terminals—admittedly for a wire size a bit larger than that of the circuit's components! Wire nuts complete the connections to Q1's base and emitter leads. The spherical speaker is a junk-box item; any 8-Ω speaker will do. Standard nuts and bolts can be used instead of the knurled key-terminal nuts.

Strays



WRITE ABOUT SLOW-SCAN TV FOR *QST* AND *QEX*

☐ It's not enough that slow-scan television is alive and well on the ham bands—we'd like to publish more about the latest SSTV hardware, software and operating techniques in *QST* and *QEX*. If you can tear yourself away from the monitor and the camera long enough to write about what you're up to in SSTV, we want to hear from you. Send your SSTV manuscript to Chuck Hutchinson, K8CH, Technical Editor, 225 Main St, Newington, CT 06111, or call 203-666-1541 between 8 AM and 4 PM, Eastern Time.

If you want to write about SSTV but don't know where to start, write ARRL HQ for your free copy of *The ARRL Author's Guide*. The *Guide* explains how to tailor your work for appearance in *QST*, *QEX* and other ARRL publications. Get your copy of the *Guide* from the Technical Secretary, ARRL, 225 Main St, Newington, CT 06111. Be seeing you!—*AK7M*

QST congratulates...

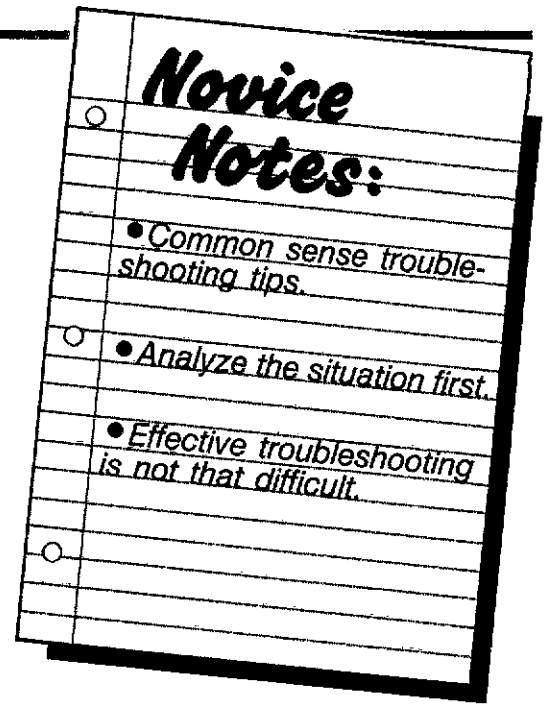
☐ the following radio amateurs on 60 years as ARRL members:

- Bruce L. Kelly, W2ICE, of Holcomb, New York
- Joseph A. Mullen, W1ASI, of Hyde Park, Massachusetts
- Harry W. Robinson, W2AZ, of Vineland, New Jersey
- Alfredo Sambolin, KP4CI, of Ponce, Puerto Rico
- W. O. Anderson, W5UBU, of Deming, New Mexico

Murphy's Law and Self Defense

Trouble strikes all of us sooner or later; here's some good advice for your next troubleshooting expedition.

By Rick Booth, KM1G
232 Washington St
Norwood, MA 02062



Now that the do-everything "glitter-box" transceiver is standard equipment in most ham shacks, many of us don't fix our own rigs. Even technically competent hams are reluctant to dive into one of these new boxes full of surface-mount devices and monolithic modules. Some people think that it's *especially* the wise technician who stays out of the rig until all else fails. You see, a wise technician knows just how much damage he or she can do.

Even if you leave the rig alone, the simplest amateur station harbors abundant frailty elsewhere. Ergo, repair is part of being a ham. It always was. This does *not* mean that you should grab the toolbox at the first sign of trouble. The only tool you need for many repairs is the tool you keep between your ears. Nobody's yet found a better tool than the common sense, especially when it comes to beating ol' Murphy.

Murphy? Ah, Murphy, as in Murphy's Law ("anything that *can* go wrong *will*"). You'll meet the mythical hoodlum soon enough, if you haven't already. Maintaining a station means meeting Murphy. Often as not his most able accomplice is. . . you! I offer myself as Exhibit A.

During a family vacation a few years ago, I bought my first new transceiver, a Kenwood TS-430S. On the way home, we stopped for a few days to visit some friends in Indianapolis. I'd planned to buy the rig, so of course I brought the essential accessories for testing it on the air—antenna, feed line, tuner, keyer, the works.

I also had an uninvited guest: Mr. Murphy. It was a nightmare. I set up on a screened porch and checked and double checked everything. I was, as they say, "getting out." Reports told me so. But the receiver kept cutting out; signals ceased abruptly, leaving only rude silence in my ears. Only the strongest stations were making it through at all. Try as I might, I couldn't win. After two frustrating days, I gave up, boxed up the rig and waited for home and help. It fell on my then-neighbor Keith, KE2DI, to find the trouble.

"Say Rick," he said, perusing the '430's front panel even before we'd installed it in the station. "Did you try turning down the squelch?"

I burned with shame. I hadn't thought of the squelch, of course. My earlier rig hadn't had one. Once I turned off the squelch, the '430 worked fine. That wasn't the first time I'd seen Murphy in the mirror, and it wasn't the last. Murphy is never banished, but he can often be outfoxed. Nowadays when my station doesn't fire up the way it should, I do things a little differently. The first thing I do is think. It doesn't always work, but you'd be surprised how easy trouble is to shoot when you use the right gun. I ask myself questions like, is the radio plugged in?

The best thing you can do, as an inexperienced troubleshooter, is learn how to analyze problems.

Laugh if you will, but a pro technician friend of mine fields calls from computer users, and that's his first question. Next, he asks "Is the computer turned on?" Things escalate after that, but you'd be surprised how many simple glitches are easily overlooked. Drop a casual question among any group of hams, and they'll be delighted to entertain you with tales of self-inflicted visits from ol' Murphy. Amateurs are uncommonly blessed with chances to make foolish mistakes, but there aren't many *new* mistakes around. Somebody's made almost every mistake before. Pay attention, and you might hear some wisdom in the mirth.

This also points out one of the best ways to solve a frustrating problem—ask for help! Very often one of your ham friends has already met Murphy in just the same disguise that's got you foiled, and your friend can probably help you make Murphy pack his bags. Don't be embarrassed to ask for help; two brains are almost always better than one.

Effective troubleshooting is really not that difficult. It may seem like a mystery to you, especially if you know someone who can put his finger on a problem after hearing only a brief description. Like most skills, however, that amazing ability can be learned. The best thing you can do, as an inexperienced troubleshooter, is learn how to *analyze* problems.

How many times have you opened the hood of your car when you have a problem, as if you expected to find a big arrow pointing to the exact trouble spot? Sometimes it works; there's water spraying out of the radiator, or you quickly spot a loose spark plug wire. More often, you stand there holding the hood, feeling just a little bit silly and wondering what to do next.

When you have a problem with a rig, don't be in a big hurry to open the box and peer inside. You won't see any big arrows in there, either. You *might* spot a burned resistor or a loose wire, but you're just as likely to break a wire getting the lid off. Sit back and *analyze* the problem before you get out the screwdriver. What are the possible causes of your problem?

Your thought process should go from general toward specific, from macro to micro, not the other way around. For example, if your rig is completely dead, don't open the box and start testing transistors in the speech-processing circuit! Think about these things:

- Did the rig fail while you were using it, or was it dead when you tried to turn it on? If it's dead today (and it wasn't yesterday) what's different? Is there a chance someone could have tweaked a control? Was there an electrical storm last night? Heavy rain? Extreme cold? *Analyze!*
- If the failure occurred right in front of you, were there any obvious symptoms? Did you hear any crackling noises, or see any sparks? Any strange smells? What *exactly*

were you doing when the failure occurred?

• If it's not a complete failure, can you localize the problem? Again, move from general to specific. Is the problem confined to one band? If it is, is there something different about that band? Do you use a different antenna there, or a preamp?

• Never discount external possibilities. In these days of high solar activity, strange things can happen to propagation. A sudden ionospheric disturbance (SID) can make the bands go completely dead. Even normal solar activity can do strange things to the 10-meter band. You'll be convinced that there's something wrong with your receiver. If this is the problem, all your receivers will be dead. If you have only one rig, check with a friend.

There's no real substitute for experience, but I can try to give you some help, based on my experiences with Murphy. Here are a few questions to ask yourself, the next time something in the station seems amiss:

• If the rig is completely dead, check the power supply. Is the plug firmly seated in the wall socket? Is there 120 V ac at the wall socket? It seems obvious, but many problems can be solved with this simple step.

• If the rig is receiving power but it's still dead, is the main fuse blown? If the fuse is blown, *don't* replace it with a larger one just to "get things going until I find the problem." The blown fuse *is* the problem. Why did it blow? Find out before you replace the fuse, and when you do replace the fuse, use one with the same rating.

• Have you read the equipment manuals yet, those golden tomes that came with your rig, tuner, SWR bridge, keyer, with practically anything? I wish I'd read the one that came with my Kenwood!

• Is the rig on the right band? Or did you try to tune up on 15 meters with the band switch set on 40? Are you on the right antenna? The wrong one might *hear* almost as well—it just won't *load*. Some transceivers have provisions for sending on one antenna and receiving on another. Is there a switch like that on yours? Is it set correctly?

• Is your coax sound? No chance of water in it, is there? Are the connectors on right? When the chief of detectives says "round up the usual suspects," there's always a connector in the bunch!

• If your rig has tube finals, is the filament switch on? Or did you just flick on the high voltage and forget the filaments? You'll never get out that way!

• If you have two VFOs, are you switched to the right one? Or are you unintentionally working "split," receiving on one frequency and trying to transmit on the other? Newer rigs have both VFOs built in, but many older ones provide for an "outboard" VFO, often with jacks on the back of the rig. Without the second VFO, these rigs need a jumper plug in the jack, or they won't light up. That's why we read the fine print!

• If you're using a VHF or UHF rig, is the repeater offset switch set correctly? You can't use a repeater with the switch set to simplex or with the wrong offset. You may hear fine, but no one will hear you!

• Check the front panel: Squelch down?



Receiver gain up? Audio gain up? Does your rig require tuning of a preselector with a panel knob? If the jacks are the same, are the headphones plugged into the mike jack, or vice versa?

• How about the keyer? Some need different settings for tube and solid-state rigs. Is yours set correctly? Read the manual!

• Trouble with an antenna tuner? Can't get that pesky SWR down? Are you sure you're switching to reflected power? If you're using balanced feed line, most tuners need a jumper between the "long wire" lug and one of the balanced feeder lugs. Do you have one? Is is connected? Read the manual!

These are but a few of Murphy's hijinks, enough to get you started in the right direction. There are also a few precautions you can take *before* you have problems. You might think of them as "Murphy repellent:"

• When the rig is functioning properly, take a few minutes to make a chart of the front panel, recording the settings of all the controls. When you have problems later, you can quickly compare this chart with the front panel and find any problems caused by incorrectly set controls. This is especially useful if you have any "harmonics" (children) around the house who like to play with your radios when you're not around.

• Try to avoid the "temporary fix" (especially when "temporary" has a tendency to stay "permanent!"). Some hams love to put things together with clip leads and masking tape, but this is an open invitation for a visit from Mr. Murphy. Take the time to fix things right, and Murphy will stay away.

• Don't skimp on labels. If you bring more than one feed line into your shack from outside, *label them*. If you build your own equipment, *label the controls*. You may remember what everything does today, but will you remember forever? Even if it's only an antenna switch box, *label it*! You know that "A" is the dipole and "B" is the ground plane, you know that RG-58 feeds the discone and RG-8 feeds the tri-bander, but Murphy *loves* unlabeled boxes and feed lines. If he sees labels on everything, he'll look for someone else to torment.

• Use as many different kinds of connectors as you can to make sure nothing gets plugged in where it doesn't belong. Don't use RCA jacks for the 12-V connections if you also use RCA jacks for the audio! This seems obvious, but it's not.

• On the subject of connectors, try to use standard connectors for power, audio and RF connections. Don't use PL-259s for power, or phone jacks for RF. Even if *you* only use RCA jacks for 12 V dc and phone jacks for audio, sooner or later you'll lend something to someone else and Murphy will be right there.

All of these ideas may seem like common sense, but most of us had to learn them the hard way. Believe me, when it comes to Murphy, a little prevention is worth a *lot* of troubleshooting. I offer in closing another bone from my closet, home to skeletons galore:

Long after I'd conquered my station's interference problems and purged my signal from nearby TVs, my family was beset on another front: I was getting into the telephone. Not just getting in, but hammering through with perfect fidelity. I spent two hours testing, probing, trying this and that. Finally, in a fit of inspiration, I checked the switch on my phone patch. It was on. One click, and Murphy vanished.

Until the next time!

QST **Profile:**

A Ham of Note

Gospel artist WD4LZC stays in tune.

By James D. Cain, K1TN
ARRL Contributing Editor
PO Box 42
Andover, CT 06232



The Harris family home at the rig: Lonnie, Larnelle, Teresa, and Mitzy.

For five-time Grammy award winner Larnelle Harris, CW is music to his ears. Harris, WD4LZC, is "Larnelle" to the world of gospel music, "Stu" on the amateur bands, and modestly prefers talking Amateur Radio to discussing the music industry awards he's garnered.

Those awards fill a page.

Technically, the term is "contemporary gospel," and Larnelle, 42, is at the top of his profession—a profession which helped introduce him to Amateur Radio.

In 1975, a banner year, Larnelle released his first LP, *Tell it to Jesus*, and made the switch from Citizen's Band to Amateur Radio. On a concert stop at an Ohio church, the pastor showed Larnelle his ham station. Before long, WD4LZC was on the Novice bands.

Later that year, while performing at a crusade, Larnelle met pianist Bruce Martin, WB4IRZ. Martin's enthusiasm for Bible study groups on the ham bands was the impetus to upgrade, and soon Larnelle had his General class ticket. He became active in early morning Bible discussions on 75 meters.

His 11-meter days had ended.

Born to a Calling

Aside from the usual high school and college jobs, Larnelle has been exclusively a professional musician. Part of a close-knit Danville, Kentucky family, Larnelle began as a boy soprano, and stints as band percussion leader and student choir conductor in high school helped land him a scholarship to Western Kentucky University in Bowling Green.

Larnelle planned to teach, to share with others his love of music, and even had a job lined up. But fate intervened in the form of an offer to join the Spurrlows, a traveling Christian group. Larnelle accepted, and after five years and many miles with the Spurrlows, he took the plunge into solo work.

This was about the time he was using CB as a diversion on long road trips, and when he discovered Amateur Radio. "My first action was to buy ARRL's *Tune in the World*," Larnelle remembers. And to learn the code.

As a drummer, CW came naturally. "CW spoke rhythm to me," says Larnelle, and rhythm is a percussionist's stock-in-trade. "The letter 'H' wasn't four dits, it was a pattern in 16th-notes."

Has anybody talked to Ringo lately?

While listening to W1AW and upgrading to General class, Larnelle found his career in high gear. His initial solo album in 1975 was followed by another in 1977 and a third (*Free*) in 1978, all on the Word Record label. *Free* brought Larnelle his first Grammy nomination from the National Academy of Recording Arts and Sciences.

Following several "Dove" awards from the Gospel Music Association, including Contemporary Black Gospel Album of the Year and Male Vocalist of the year—and another Grammy nomination in 1983—Larnelle joined his current music company, Benson Records, and began recording on its Impact label.

The coveted Grammy award came in 1984, when Larnelle joined another Benson artist, Sandi Patti. *More Than Wonderful* earned them Best Gospel Performance by a Duo or Group.

Fame had come to a quiet family man who chose music in order to "give back" what had been given to him.

A Family Hobby

Meanwhile, Larnelle had been joined in Amateur Radio by his wife Cynthia, KA4TEW. "Mitzy wondered what it was all about at first," Larnelle remembers, but now she's an active Technician licensee.

Son Lonnie and daughter Teresa haven't caught the Amateur Radio bug, yet. They are typically busy youngsters; Lonnie plays alto saxophone in his high school's marching and concert bands, while Teresa takes guitar lessons and plays in her elementary school orchestra. CW should be a snap for them!

When the Harris family moved to Louisville, Larnelle discovered another value of Amateur Radio. Being either on the road or working at home much of the time, he found it difficult to make new friends in



Clifton Davis, center, star of the television sitcom "Amen," and Larnelle Harris each perform "You're My Child" for World Vision specials. The two are joined in Los Angeles for the taping by John Barker of Benson Music and song co-writers Dave Clark and Don Koch.

his new community, as many self-employed people do. Amateur Radio helped solve that dilemma, once Larnelle began getting invitations to local repeater breakfasts and club meetings. Ham friends took the place of "office buddies."

Today, Larnelle Harris has five Grammy awards to his credit, the latest being for *Larnelle. . . Christmas*, released in September, 1988. That came on the heels of a Grammy for *The Father Hath Provided* the previous year.

He has begun writing music as well as performing. Teaming up with two other musicians to write the theme song for World Vision, an international aid group for children, resulted in "You're My Child." The song debuted last winter on 1500 World Vision broadcasts daily.

A couple of years ago the Gospel Music Association recognized Harris as Songwriter of the Year, when two of his songs made the nominations list.

Larnelle still is "on the road," by jet, two or three days a week, "many weeks a year." While doing concerts in churches and auditoriums, and taping shows for television airing, he still finds time to be actively involved in the Maple Grove Baptist Church of Louisville.

"I like to stay in touch with people through live concerts," Larnelle confesses. While many musicians find peace in the recording studio, Larnelle Harris continues to thrive on the arduous work of performing live.

That work leaves little time for ham radio on the fly. But WD4LZC is a mainstay on the mobile network between Louisville and the recording studios of Nashville. He also is a member of Louisville RACES.

Larnelle finds packet especially useful for a ham-on-the-go. "It's a good way to stay in touch with friends without spending a lot of time at the rig," he says.

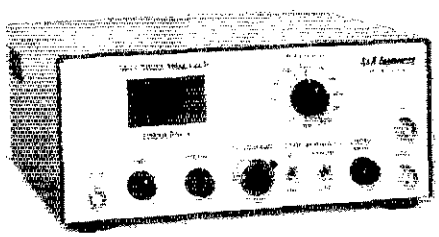
New Products

A & A ENGINEERING 450-MHz SPECTRUM ANALYZER

☐ A & A Engineering of Anaheim, California, has introduced a low-cost spectrum analyzer based on a *QST* article. Features include a logarithmic amplitude display, digital center-frequency display, selectable bandwidth and scan width, video filtering, an IF attenuator, and a variable scan rate.

Manufacturer-claimed specifications: Frequency range, approximately 2-450 MHz; sensitivity, −70 dBm or greater; selectivity, 15 or 300 kHz (selectable); scan width, 1, 5, 10, 50 and 500 kHz, and 1, 5, 10, 20 and 50 MHz per division; input impedance, 75 Ω; input dynamic range, 50 dB (minimum); RF input level, approx +3 dBm (maximum).

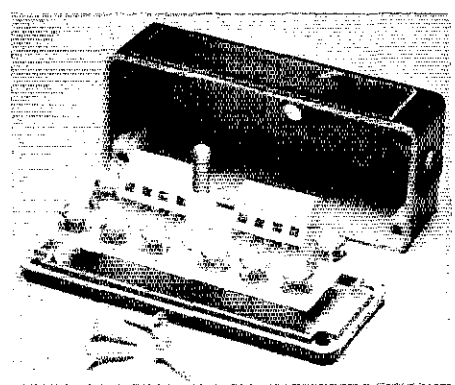
The spectrum analyzer is available in kit form, or assembled and tested. Prices: Kit, $459.95; assembled and tested, $799.95. Include $4.50 for shipping and handling. California residents must include 6% sales tax. Manufacturer: A & A Engineering, 2521 W La Palma, Unit K, Anaheim, CA 92801, tel 714-952-2114.—*Rus Healy, NJ2L*



ALPHA DELTA ROTATOR-CONTROL-LINE SURGE PROTECTOR

☐ Concerned about protecting your rotator and its control box from line transients? Alpha Delta's model CLP is made just for that purpose. It is easily installed (no soldering is required), individually protects up to eight no. 16 wires, requires no control-box or rotator modifications, and uses field-replaceable gas-tube cartridges. The CLP can also be used to protect modem and telephone lines; its low-capacitance gas-tube cartridges are suitable for use at high data rates. Price: $49.95, plus $3 shipping and handling. Ohio residents must include 6.5% sales tax.

Alpha Delta also manufactures its Transi-Trap line of coaxial-cable surge protectors. Alpha Delta products are available from many Amateur Radio dealers, and can be ordered directly from Alpha Delta Communications, Inc, PO Box 571, Centerville, OH 45459, tel 513-435-4772.—*Rus Healy, NJ2L*



And the Winners Are...

1988's award-winning ham educators are carrying forth in the best tradition of Amateur Radio—be sure to nominate your favorite instructor for 1989.

By Rosalie White, WA1STO
Educational Activities Coordinator
ARRL HQ

Do you remember *your* favorite teachers and what was special about *them—how they motivated you*, or how they always had a solution to your "insurmountable" problems? And, while you may have forgotten your fourth grade teacher, *you'll probably always remember your ham radio Elmer!*

As you read about the winners and nominees for 1988's Instructor of the Year awards, *you'll recall why you brought apples to the* teachers you liked best.

Phyllisan West, KA4FZI

The assistant principal of the Caloosa Middle School, Cape Coral, Florida, describes the 1988 ARRL Professional Teacher of the Year, Phyllisan West, KA4FZI:

"Her interest and love for Amateur Radio and the children she instructs prompted her to design and implement an Amateur Radio reading class. Phyllisan West is most deserving of this award because of the inspiration she gives to her students."

Fredrick Cady, KE7X

Fredrick Cady, KE7X, 1988 ARRL Herb S. Brier Instructor of the Year, gives us his teaching philosophy:

"The trick is to show [the students] that, while there is a lot to be learned, it is easy to get started, and that the knowledge comes in the long term rather than the short term."

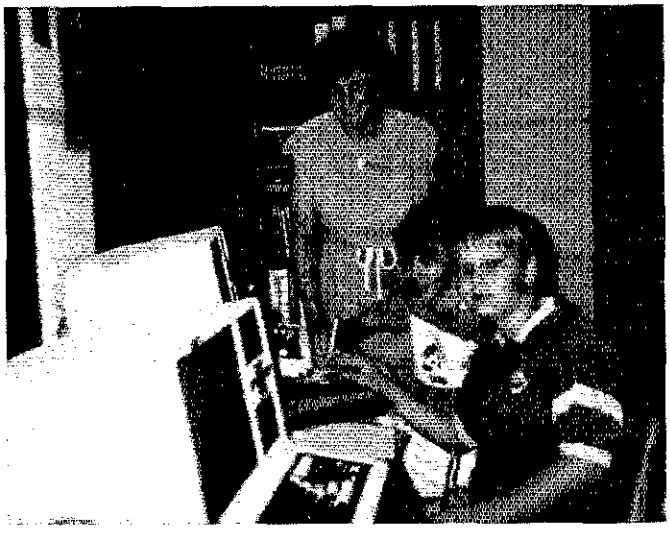
Now for the Winners' Stories!

Fred Cady, KE7X, modestly writes that all *of his classes have been a team effort with* much credit going to Les Belyea, N7AIK, and other Gallatin Ham Radio Club (Bozeman, Montana) members. Fred thoroughly enjoys *teaching at all levels, Novice class to Extra.* He feels that it is vital for instructors to recognize the different level of abilities of all students and not go beyond their present needs. "Otherwise," he says, "it is all too easy to discourage new people." Club members sit in on classes and interact with students—each student is teamed up with a club member to talk to outside of class and gets invited to attend each GHRC meeting. Each graduate *receives a club graduation certificate, an* ARRL log book, and a six-month club membership and newsletter subscription. Club members assist graduates with antenna installation *and first QSOs, and during Fred's* recent Technician/General class they helped students build keyer kits. Besides teaching classes, Fred is advisor to the Montana State *University Radio Club, trustee for club* station and repeater, W7YB, Gallatin County Assistant Emergency Coordinator, Director and Technical Committee member for Eagle*head Repeater Association, and an avid DXer* and contester.

The Fall 1989 Amateur Radio reading class of Phyllisan West, KA4FZI, was "sold out," with more students than slots to fill. Her school's guidance counselor says that students who didn't normally work up to their potential did amazingly well in her class. A parent wrote this note: "You have been a truly wonderful educator for Andy. You lit a special fire for him—in believing in his ability, and have shown him he is a capable and special person. As his parents, we will be forever grateful, and as a student, Andy will never

Your Nominations for the 1989 Awards

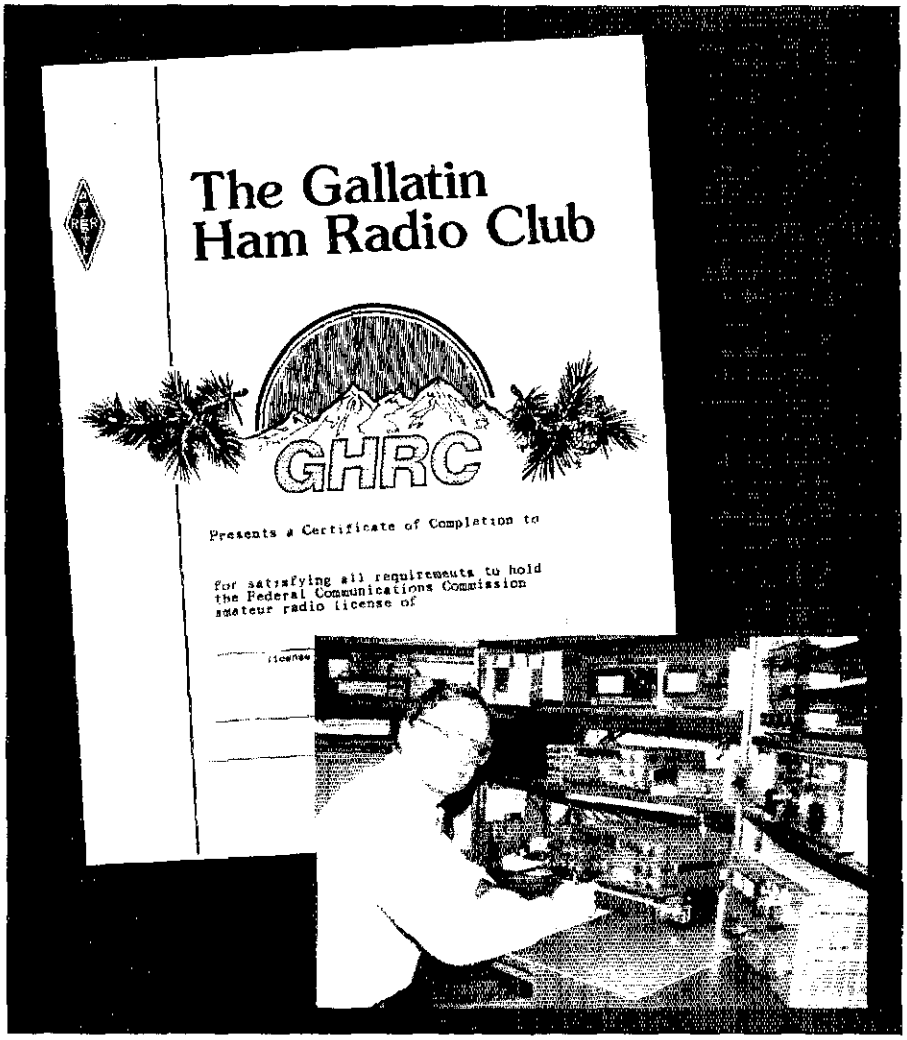
Did you have or do you know a terrific volunteer Amateur Radio instructor or a teacher who integrates Amateur Radio into the classroom? Here is your chance to thank them for all that they accomplish and to recognize them nationwide. Send *your nomination to your Section* Manager (page 8, *QST*) before January 31, 1990. Join us in giving them a tip of the white hat and an apple, along with each ham nominated for these awards in the past 11 years, for working diligently for the future of Amateur Radio.



Phyllisan West, KA4FZI, 1988 ARRL Professional Teacher of the Year, works with new Novices Melyssa Vutsinas, KC4LHI, and Jason Farnum, KC4KHW.



Instructor of the Year nominee Loraine McCarthy, N6CIO, coached Los Angeles City Fire Department members, shown here, in earning Novice licenses and in piecing together an antenna.



1988 ARRL Herb S. Brier Instructor of the Year Fred Cady, KE7X, at his station. The Gallatin Ham Radio Club, Bozeman, Montana, awards attractive certificates to Fred's graduates.

forget what you gave him." (Andy, along with eight others, passed his Novice test on June 6.) Phyllisan's reading class features technical vocabulary, communication skills and reading skills; she uses *Tune in the World* as the text. Students also learn to solder and make code-practice oscillators. She gives much credit to the Southwest Florida Traffic Net, who helped handle students' Christmas and Valentine messages, and K4KKP and KC4EGO, who came to class one or two days each week to demonstrate equipment. Phyllisan lists those who helped make an investment in the future of her young people and Amateur Radio: W3IJR, WD9AEP, WV4F, N4PSU, W4MPV, KA8OCE, WD4CHP, K9ALX, KA4GDU, W4PRL and WA4EIC.

In a recent competition with 60 other educators, Phyllisan won her school's Educator of the Year award. Besides teaching, Phyllisan manages the All Florida CW Traffic Net, reports their news to *Florida Skip*, and regularly co-hosts the traffic handlers' forum at the Ft Myers Hamfest.

What Are the Instructor of the Year Awards?

In 1978, Lake County (Indiana) Amateur Radio Club decided to honor long-time member Herb S. Brier, W9AD, who cared deeply about Amateur Radio instruction. What better way, members agreed, than to recognize other instructors who cared about their work as Herb did? ARRL concurred, and cosponsored the award. In 1987, ARRL decided to present the award to volunteer instructors, and created another award, ARRL Professional Teacher of the Year, for professionally compensated teachers who integrate Amateur Radio into their school classrooms.

This Year's Nominees

ARRL received a record number of nominations for the 1988 Instructor of the Year awards. For 1988 ARRL Professional Teacher of the Year, appreciative hams nominated: Warren Churchward, WB7FHC; Jodee D'Avignon, KG5G; Joshua Henry Felton, WA4HXZ; Bart Lawson, NZ5T; Larry Luchi, W7KZE; Chris Luvisi, KC4IDX; Loraine McCarthy, N6CIO; and Robert Wallar, WB6QNR.

For 1988 ARRL Herb S. Brier Instructor of the Year, hams approvingly nominated: David Greer, WE4K; Frank Johnson, W6KIJ; Leo Peil, WZ5H; William Welsh, W6DDB; and William "Phil" Wolfenbarger, N5HIP.

Compliments Went to All Nominees

Many comments arrived in our mailbox praising this year's nominees. Jim Brooks, N4SRT, wrote about Chris Luvisi, KC4IDX, and David Greer, WE4K: "These nominees helped increase the local ham population by over 242%; they have initiated a very unique no-fail program." Joe Brown, W6UBQ, said: "Over 40% of radio amateurs in the local area owe their licenses to this tireless and dedicated gentleman: Frank Johnson, W6KIJ." Ronda Jenkins, N4TKV, describes Henry Felton, WA4HXZ: "Being a ham since he was a boy, Henry is full of stories. He would be talking about a radio and before you knew it, would be on to a story, with everyone's ears fixed on him. Each story would end with a moral." A high school student in a class of Bart Lawson's (NZ5T) told us: "An ideal way to teach geography would be to take a class trip around the world. Since this isn't practical, Mr Lawson is doing the next best thing by bringing the world to us via ham radio!" Carle Graffunder, N7KZF, wrote about Larry Luchi, W7KZE: "Larry uses his technical knowledge and ability to encourage students with various degrees of interest and knowledge, and helps them want to learn." Larry Wald, N7LVY, Associate Professor of Education at Central Washington University says of Budd Churchward, WB7FHC: "His course, his classroom and his life are heavily involved in Amateur Radio. His efforts led to the formation of WARM, Washington Amateur Radio Mentors, a statewide network of hams who are school teachers." "In the late '50s," wrote Ken Henke, KE6AR, "Bill Welsh, W6DDB, taught a total of seven radio courses per week. Since 1961, he has taught at least four class sessions per year." John Palmer's (N6OSN) wife told us about Loraine McCarthy, N6CIO: "She was instrumental in guiding my husband, who is disabled from a stroke, through the Novice, Technician and General courses. She is to be commended for the inspiration she gave my husband in earning his licenses."

Strays

220-MHz SSB ACTIVITY DIRECTORY

☐ Stations that are active on 220-MHz SSB and would like to be listed in the 3rd edition of the *Directory* are requested to send call, grid square, name, address and telephone number to Peter E. Beedlow, NN9K, 741 Greenway Ave, Colona, IL 61241. The *Directory* is scheduled to be published in conjunction with the July 1990 Central States VHF Society meeting.

I would like to get in touch with...

☐ anyone who has a schematic, parts list, or other information about the Datong audio filters model FL3 or ANF. Harry Stumpf, 309 Penn St, Verona, PA 15147.

Sister Alverna O'Laughlin, WAØSGJ, 1988 ARRL International Humanitarian

By Richard K. Palm, K1CE
Field Services Manager

From an austere room in the heart of Middle America, a Franciscan nun acts as "a window on the world" to those who cannot see it themselves and as a lifeline to those who do.

These words, appearing in a Minnesota newspaper article, describe the mission of Sister Alverna O'Laughlin, WAØSGJ. The ARRL Board recognizes Sister Alverna's mission of helping others and has selected her as the 1988 ARRL International Humanitarian.

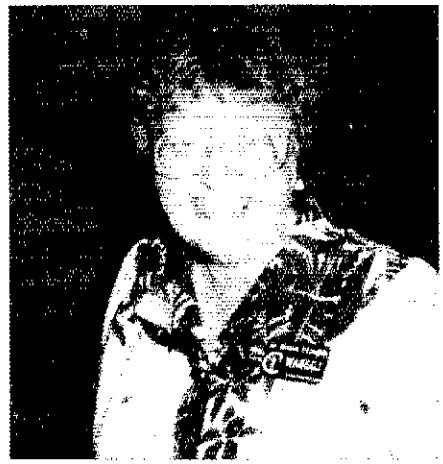
Sister Alverna was instrumental in the creation of the Courage HANDI-HAM System, having been one of the very first nuns to work with System founder Ned Carman, WØZSW, in Rochester, Minnesota. It was largely Sister Alverna's constant enthusiasm, coupled with Ned's skill at involving volunteers, that led to her being such an important part of helping the handicapped through Amateur Radio.

Courage HANDI-HAM System's Bruce Humphrys, KØHR, said, "We in the Courage HANDI-HAM System, and we in the international radio amateur community, are blessed by Sister Alverna O'Laughlin's quiet but firm manner. As the HANDI-HAM System's Educational Services Coordinator, she has consistently improved the lives of handicapped radio amateurs and students of ham radio throughout the world. She has unmatched integrity and the respect of all who know her."

Her first exposure to Amateur Radio came from Sister Judith Simon, WAØQVN. "Fascinated by the key and oscillator she stored in the closet in my department, I decided to surprise her by learning the Morse code," she said. It wasn't long before she was ready to send her first CW message to Sister Judith. At this point, Sister Alverna learned that sending the code was one thing; receiving it was quite another.

She started studying for her Novice license, although she wasn't sure exactly why, until she met Ned Carman, WØZSW, an instructor at the Rochester (MN) Amateur Radio Club. Ned spoke of his dream to help the handicapped become radio amateurs. Productive activities for the physically disabled had long interested Sister Alverna, and for her, this idea suddenly added a new dimension to Amateur Radio.

For Sister Alverna, Amateur Radio and the HANDI-HAM System are virtually one and the same. In the early years, she spent long hours working with others on the affairs of the young organization. It was trial and error, but it grew and flourished.



Sister Alverna O'Laughlin, WAØSGJ

In her present position of Educational Services Coordinator, Sister Alverna works with the system's student coordinators to assess each student's educational needs, then designs, packages and mails out the appropriate learning materials. She also is responsible for staying in touch with each of the organization's students and members. Her typical day includes everything from mailing out instructional tapes to blind students to writing articles for the newsletter, *HANDI-HAM World*.

Her International Mission Radio Association activities have included serving as net control. She checked into other international nets regularly and has often made phone patches for sisters located in South America. She kept weekly phone-patch schedules for a young Honduran hospitalized in Minnesota for almost a year.

She views her involvement in the IMRA and the Courage HANDI-HAM System as a way of filling her vows. "That's the thrust of the religious life—to help those who have needs. Through Amateur Radio we open the window of the world to people who may never get to leave their homes because of their disabilities," said Sister Alverna.

There is no single event in Sister Alverna's life which points directly to her high qualifications as the ARRL Board of Directors' choice for the 1988 International Humanitarian Award. Rather, it is her entire life which lays eloquent testimony to her compassion, enthusiasm for the joys of Amateur Radio and her dedication to sharing those joys with everyone she contacts.

The ARRL International Humanitarian Award

The Humanitarian Award is dedicated to recognizing amateurs who, through Amateur Radio, assist people in need throughout the world, promoting the welfare of mankind. This annual prize is awarded to truly outstanding amateurs for work in international humanitarianism and furtherance of peace.

Any licensed amateur worldwide, or group of amateurs who, by use of his or her Amateur Radio skills, have provided extraordinary service for the benefit of others in times of crisis or disaster, is also eligible to receive the award.

Nominations for the 1989 award will be accepted by HQ from a licensed radio amateur, governmental or any other organization which has received the benefits of the radio amateur's extraordinary service. For more information on nomination requirements, contact ARRL HQ. The deadline for receipt of nominations is June 1, 1990.

Expand Your World

People with physical handicaps or sensory impairments the world over have discovered how Amateur Radio opens doors to exciting, challenging and rewarding experiences. A world that might be bound by four bedroom walls can be expanded to the farthest reaches of the earth.

HANDI-HAM members are individuals with physical handicaps or sensory impairments who are studying for their licenses, and those who have already obtained them; membership also includes disabled and nondisabled hams who volunteer their time, effort and services to help the students.

Others help by donating money and equipment. Courage HANDI-HAM System is a nonprofit organization and all donations are tax-deductible. Contact the HANDI-HAMs at Courage Center, 3915 Golden Valley Rd, Golden Valley, MN 55422.

1988 ARRL International Humanitarian Sister Alverna O'Laughlin, WAØSGJ, adds, "I receive much more than I give. If you too wish to receive by giving, *join* the HANDI-HAM System." QST

Congress: No Fees for Amateurs!

HQ, field officials, members team up to get amateur fee schedule out of budget.

By Perry Williams, W1UED
ARRL Washington Area Coordinator

No federal fees for amateur licenses! That is the surprising and pleasing bottom line for five months of work and worry. Somewhere during the night of November 21, the Committee of Conference version of the 1989 Omnibus Budget Reconciliation Bill (HR 3299) was adopted by the Senate and House—only hours before Congress adjourned (after 4 AM on the 22nd) until January 23, 1990.

To amateurs, the key words in the Conference Report were these:

"Amateur Fees—

Both the House bill and the Senate bill include fees on licensees in the amateur radio service. The Conference Report strikes all of the fees for amateur radio licensees. The Conferees recognize that amateur licensees do not operate for profit and can play an important public safety role in times of disaster or emergency."

How did we get into this predicament, in the first place? How did we get out of it?



The Hon Carl Levin



The Hon John Dingell

The Budget Process

The fees for amateurs were proposed on Capitol Hill last summer as one very small part of the process called for by the Gramm-Rudman-Hollings Act. If, in any forthcoming fiscal year, the proposed budget exceeds the target deficit set in the Act for that year, Congress has until October 15 to "reconcile" it with Gramm-Rudman-Hollings. If the Congress cannot agree on steps to meet the goal by that date, "sequestration" takes effect: the Director of the Office of Management and Budget is required to "sequester" (hold back) the shortfall amount, with the cuts divided equally between Defense and all other activities (except certain "entitlements" such as Social Security payments)—it is the "meat-ax approach" to deficit reduction.

In July, the Budget Committees of the Senate and House had to face the fact that the proposed 1990 budget exceeded the Gramm-Rudman-Hollings target for fiscal 1990 by 17 billion dollars, around five percent of the total budget. To find that sum, they assigned a dollar quota to each standing committee; committees were to come up with budget cuts or revenue increases of that amount from their areas of jurisdiction.

The Commerce Committees, who have oversight for communications matters, set a target of around $43 million in new and increased fees that would be levied on FCC licensees. Fees had been established about four years earlier for most commercial users of radio, with not-for-profit entities exempt.

The House decided to levy new fees on those not "taxed" last time; to raise existing fees by 12.5%; and to set $30 as the minimum fee. The Senate chose $35 as its base; proposed to raise the current fees; and to put fees on some of those not already hit. However, they exempted Special Emergency Radio Services, Public Safety Radio Services and Public Broadcasting Services right from the start—but there was no such exemption for radio amateurs!

The draft legislation was reported to the ARRL Board before its 1989 Second Meeting; at Minute 83, the Board voted:

"...to oppose Amateur Radio station or operator license fees that are: 1) either in excess of the actual cost of administration, or in excess of those charged licensees of any stations in other services operated for a not-for-profit purpose; 2) for license modifications; 3) for upgrading, other than those to reimburse Volunteer Examiners; 4) for reciprocal operating permits; and 5) for RACES, military-recreation, or school club stations. The president is directed to pursue efforts toward these ends, employing staff, counsel, and other personnel as required."

The Washington team immediately set out to try to modify the proposals. A white paper was prepared following the Board outline, and we started by visiting the staffs of the Commerce Committees and of committee members. At that stage we saw no signs anyone was sympathetic; the prevailing attitude was that the budget deficit had to be cut and all Americans would take their lumps.

Indeed, when House bill HR 3299 was finally introduced on September 20, two more categories of fees for amateurs had been added but nothing changed or reduced. And, after debate focusing only on a few big issues (for example, the Fairness Doctrine and capital gains tax relief), the bill was adopted by the House on October 5.

The Senate Budget Committee's bill, S 1750, was adopted by the Senate on October 13. Both bills originally were massive. They contained hundreds of items not related to the budget. However, the Senate trimmed its bill drastically before adopting it as its text for HR 3299. Now that there were two vastly different bills bearing the same number, a Committee of Conference was necessary.

Fate interfered with the prompt completion of the work in the form of the California earthquake on October 17. House Budget Committee Chairman Leon Panetta and member Barbara Boxer's districts were struck. The Conference finally got underway on October 25, but didn't complete its work until November 21, when it presented the final, greatly streamlined text of the Omnibus Budget Reconciliation Bill.

Special thanks to these congressional staff members: Linda Gustitus and Melinda Loftin, Senate Government Management Subcommittee; Lee Godown and Audrey Bashkin, House Government Information Subcommittee; Sonia Daugherty and Caroline Costle, Mr Wise's staff; Ed Senn, Mr Tauke's staff; and John Frith, Mr Gallegly's staff.

Getting Amateurs Exempted

So much for how we got into the dilemma. How did we get out of it? The surprising happy outcome of this bill—no fees for amateurs—came about through the coordinated efforts of the League's staff, consultants Chwat-Weigend Associates, counsel Chris Imlay, N3AKD, field officials and ARRL member-volunteers. As each stage progressed, the Washington team identified the Members of Congress and Senators who were likely to play key roles in the Budget Reconciliation Process. The "home team" at Headquarters located volunteers in the right places. Phone calls then were made, and the volunteers took it from there, getting in touch with the Senator or Representative, and enlisting other amateurs to

(continued on page 57)

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS—1990*

(Check *QST* monthly for updates)

JANUARY

1	Straight Key Night
3	West Coast Qualifying Run
6-7	RTTY Roundup
10	W1AW Qualifying Run (35-10 WPM)
14	*ARRL Hamfest (Richmond, VA)*
20	*ARRL Hamfest (Monterey, CA)*
20	*ARRL Hamfest (Cape Coral, FL)*
20	*ARRL Hamfest (Greenwood, SC)*
20	*ARRL Hamfest (Crystal River, FL)*
20	*ARRL Hamfest (Hammond, LA)*
20-22	January VHF Sweepstakes
21	*ARRL Hamfest (Yonkers, NY)*
25	W1AW Qualifying Run
27	*ARRL Hamfest (St Louis, MO)*
27-Feb 4	Novice Roundup
28	*ARRL Hamfest (Wheaton, IL)*

FEBRUARY

3-4	*ARRL Hamfest (Miami, FL)*
6	West Coast Qualifying Run (10-40 WPM)
8	W1AW Qualifying Run (10-40 WPM)
10	*ARRL Hamfest (Pensacola, FL)*
11	*ARRL Hamfest (Mansfield, OH)*
11	*ARRL Hamfest (Melville, LI NY)*
17-18	International DX Contest, CW
17-18	*Southern Florida Section Convention, Sarasota, FL*
18	*ARRL Hamfest (Kansas City, MO)*
18	*ARRL Hamfest (Elkin, NC)*
23	W1AW Qualifying Run
24	*ARRL Hamfest (Charleston, SC)*
24	*ARRL Hamfest (Brooksville, FL)*
24-25	*Great Lakes Division Convention (Cincinnati, OH)*
25	*ARRL Hamfest (Davenport, IA)*
25	*ARRL Hamfest (Dearborn, MI)*
25	*ARRL Hamfest (Cuyahoga Falls, OH)*
28	West Coast Qualifying Run

MARCH

3	*ARRL Hamfest (Cave City, KY)*
3-4	International DX Contest, phone
3-4	*Texas State Convention (Brownsville, TX)*
4	*ARRL Hamfest (Belle Vernon, PA)*
9	W1AW Qualifying Run
10-11	*ARRL Hamfest (Lafayette, LA)*
11	*ARRL Hamfest (Sterling, IL)*
11	*ARRL Hamfest (Circleville, OH)*
11	*ARRL Hamfest (Stirling, NJ)*
11	*ARRL Hamfest (Indianapolis, IN)*
17-18	*ARRL Hamfest (Charlotte, NC)*
17-18	*ARRL Hamfest (Ft Walton Beach, FL)*
18	*ARRL Hamfest (Maumee, OH)*
20	W1AW Qualifying Run
23-25	*N Florida Section Convention (Orlando, FL)*
23-25	*Nebraska State Convention (Kearney, NE)*
25	*ARRL Hamfest (Trenton, NJ)*
25	*ARRL Hamfest (Madison, OH)*
31	*ARRL Hamfest (Charleston, WV)*
31	*ARRL Hamfest (Scottsdale, AZ)*
31	*ARRL Hamfest (Flemington, NJ)*

APRIL

1	*ARRL Hamfest (Grosse Point Woods, MI)*
3	West Coast Qualifying Run
6-8	*41st International DX Convention (Mar Vista, CA)*
7	W1AW Qualifying Run
7	*ARRL Hamfest (Lebanon, PA)*
8	*North Carolina State Convention (Raleigh, NC)*
8	*ARRL Hamfest (Madison, WI)*
9 (Mon)	144-MHz Spring Sprint
14	*ARRL Hamfest (Bowling Green, KY)*
17 (Tue)	220-MHz Spring Sprint
25 (Wed)	432-MHz Spring Sprint
27-29	*Dayton HamVention® (Dayton, OH)*†
29	W1AW Qualifying Run

MAY

2	West Coast Qualifying Run
4 (Fri)	902-MHz Spring Sprint
4-6	*ARRL Hamfest (Buellton, CA)*
10 (Thu)	1296-MHz Spring Sprint
11-12	*Iowa State Convention (South Sioux City, NE)*
12	*ARRL Hamfest (Columbia, MO)*
13	W1AW Qualifying Run
13	*ARRL Hamfest (Medina, OH)*
17 (Thu)	2304-MHz Spring Sprint
18-20	*Atlantic Div/New York State Convention (Rochester, NY)*
20	*ARRL Hamfest (Tamaqua, PA)*
20	*ARRL Hamfest (Peotone, IL)*
20	*ARRL Hamfest (Wrightstown, PA)*
20	*ARRL Hamfest (Wheeling, WV)*
20	*ARRL Hamfest (Wabash, IN)*
25	W1AW Qualifying Run
26-27 (Sat-Sun)	50-MHz Spring Sprint

JUNE

1-3	*Northwest Division Convention (Seaside, OR)*
2	*ARRL Hamfest (Knoxville, TN)*
3	*ARRL Hamfest (Chelsea, MI)*
3	*ARRL Hamfest (Princeton, IL)*
5	West Coast Qualifying Run (10-40 WPM)
8-10	***ARRL National Convention (Kansas City, MO)***
8-10	*ARRL Hamfest (DFW Metroplex, Dallas, TX)*
9-11	June VHF QSO Party
10	*ARRL Hamfest (Willow Springs, IL)*
11	W1AW Qualifying Run (10-40 WPM)
23-24	Field Day
27	W1AW Qualifying Run

*Hamfest/Conventions of record as of November 24, 1989

†Not an ARRL event

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS—1990*

(Check *QST* monthly for updates)

JULY

1	*ARRL Hamfest (Wilkes-Barre, PA)*
4	West Coast Qualifying Run
7	*ARRL Hamfest (West Des Moines, IA)*
7-8	*Central Division Convention (Indianapolis, IN)*
7-8	*Southeastern Division Convention (Atlanta, GA)*
8	*ARRL Hamfest (Alexander, NY)*
8	*ARRL Hamfest (Downers Grove, IL)*
10	W1AW Qualifying Run (35-10 WPM)
14-15	IARU HF World Championship
21	*ARRL Hamfest (Union, ME)*
22	*ARRL Hamfest (Van Wert, OH)*
27-29	*ARRL Hamfest (Flagstaff, AZ)*
28	W1AW Qualifying Run
28	*ARRL Hamfest (Texas City, TX)*
29	*ARRL Hamfest (Peotone, IL)*
31	West Coast Qualifying Run

AUGUST

3-5	*West Gulf Division Convention (Austin, TX)*
4-5	UHF Contest
4-5	*Florida State Convention (Jacksonville, FL)*
5	*ARRL Hamfest (Berryville, VA)*
8	W1AW Qualifying Run
11	*ARRL Hamfest (Bend, OR)*
11	*ARRL Hamfest (Springfield, MO)*
18	*ARRL Hamfest (Victoria, TX)*
18-19	10-GHz Cumulative Contest
18-19	*Alabama State Convention (Huntsville, AL)*
18-19	*ARRL Hamfest (Cedar Rapids, IA)*
23-26	*Southwestern Division Convention (San Diego, CA)*
28	W1AW Qualifying Run

SEPTEMBER

5	West Coast Qualifying Run
8-10	September VHF QSO Party
9	*ARRL Hamfest (Joliet, IL)*
9	*ARRL Hamfest (Butler, PA)*
13	W1AW Qualifying Run
15-16	10-GHz Cumulative Contest
15-16	*Roanoke Division Convention (Virginia Beach, VA)*
15-16	*Illinois State Convention (Peoria, IL)*
22	*Michigan State Convention (Gayford, MI)*
22	Joint ARRL/CRRL Computer Networking Conference (London, ON)
22-23	*ARRL Hamfest (York, PA)*
23	*ARRL Hamfest (Cleveland, OH)*
26	W1AW Qualifying Run
29-30	*ARRL Hamfest (Louisville, KY)*

OCTOBER

2	West Coast Qualifying Run (10-40 WPM)
12	W1AW Qualifying Run (10-40 WPM)
13-14	*ARRL Hamfest (Memphis, TN)*
14	*ARRL Hamfest (Maysville, NC)*
21	*ARRL Hamfest (Centralia, IL)*
28	W1AW Qualifying Run
31	West Coast Qualifying Run

NOVEMBER

3-5	November Sweepstakes, CW
10	W1AW Qualifying Run
10	*ARRL Hamfest (West Monroe, LA)*
17-19	November Sweepstakes, phone
27	W1AW Qualifying Run

DECEMBER

Nov 30-Dec 2	160-Meter Contest
4	West Coast Qualifying Run
8-9	10-Meter Contest
9	W1AW Qualifying Run
27	W1AW Qualifying Run

*Hamfest/Conventions of record as of November 15, 1989

†Not an ARRL event

No Fees for Amateurs

(continued from page 54)

Hearty thanks to the thousands of amateurs who contacted their senators and representatives from July 1989 to the present on this issue. We want to especially thank the following, more deeply involved because of their location and their ARRL Field Services status: N1CKN, WB1FVK, KA1FW, K1IIF, KA1IYR, K1PAD, W1PRT, N3DUE, KA3HSC, W3ICM, AB4CR, W4RH, WM4T, AB4W, W5APX, W5HD, W5JZZ, W5PDY, WA6BWT, WD6EKQ, WD6EKR, KB6INO, WB6W, KB6ZV, WB7OCE, W7QGP, WB8BGY, K8OLG, WA8STX, KB9PY, WB9ZQE, and WAØYCZ.

do likewise—all on short notice, as the needs became apparent.

Early in the process we were in touch with a senator and a representative who each had been helpful on the 220-MHz issue: Senator Carl Levin (D-MI), chairman of the Subcommittee on Oversight of Government Management, and Rep Bob Wise, chairman, Subcommittee on Government Information, Justice and Agriculture.

We worked with Senator Levin to prepare an amendment to the Senate bill. Senators Steve Symms (R-ID), Chris Dodd and Joe Lieberman (both D-CT) were ready to be cosponsors. Senator Levin was persuaded not to formally introduce the amendment because the leadership wanted to adopt its stripped-down bill with no further changes. Nevertheless, the amendment formed the basis for the eventual deletion of amateur fees from the legislation. The effort had the active assistance of Senators Ernest Hollings (D-SC) and John Danforth (R-MO), chair and ranking minority member, respectively, of the Commerce Committee, and Senator Jim Sasser (D-TN), chairman of the Senate Budget Committee.

When the work of the Conference Committee started, Mr Wise, who is also a member of the House Budget Committee, wrote a persuasive letter to its chairman, Rep Leon Panetta (D-CA-16). A similar letter was sent by Rep Elton Gallegly (R-CA-21) to Chairman Panetta.

Another old ally of ours (from the PL 97-259 campaign of 1982), Rep Tom Tauke (R-IA-2), sent a letter to the Commerce chairman and all his colleagues on the Energy and Commerce Subcommittee on Telecommunications and Finance, urging that the House agree to drop amateur fees.

Without the support of Rep John Dingell (D-MI-16), chairman of the full Energy and Commerce Committee, it would not have been possible to delete the amateur fees. In presenting the Conference Report, Mr Dingell said in part:

"Mr Speaker, section 3001 contains the conference agreement for FCC cost of regulation fees. There are several significant differences between this section and the comparable provisions of HR 3299 as it passed the House, and I'd like to direct the attention of my colleagues to them.

"The House-passed provisions were designed to charge fees for all applicants at the FCC. The Commerce Committee believed that this was the most equitable way to achieve the savings mandated by the budget resolution.

"The Senate version was significantly different. The Senate decided to continue to exempt public broadcasters, as well as public safety and other licensees. This was a reasonable approach, since many of those licensees are units of State and local governments. Any fees paid by these entities would ultimately be borne by taxpayers.

"But it is my view that if some licensees are exempted, then amateur radio operators should not be subjected to the fees. Amateurs do not use the spectrum for profit, and they render important services to the public during natural disasters. Since the conferees have accepted some of the exemptions proposed by the Senate, we have decided to exempt the amateur service as well."

Amen! And Hallelujah! QST

Kathleen Hill, KB6INO, was contacted in mid-October, and asked to send a telegram to her district Representative, Leon Panetta, Chairman of the House Budget Committee. She readily agreed. Then came the California earthquake of October 17. The next day, she was on duty at the Hollister (California) Emergency Operations Center when Mr Panetta came in. When she had a chance to speak to him privately, she told him she'd sent him a telegram the day before. Mr Panetta asked, "What about?" Kathleen told him about the amateur fee issue before the Conference Committee. He promised on the spot to help!

License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL HQ; SASE, please).

2) Mail to FCC, PO Box 1020, Gettysburg, PA 17326. There is no fee.

3) If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a five-year grace period under which you may still renew without retesting. However, after two years of the grace period has elapsed, you will lose your call sign, and will be assigned a new one. After this five-year grace period is over, you must be reexamined for a new license.

4) Note that 10-year-term licenses, which have been issued to all amateur licensees renewing since January 1984, have only a two-year grace period before both the license and call sign expire.

5) You may apply to have your license renewed at any time during the term of the license. FCC suggests the application be made approximately 90 days before expiration.

6) If you are simply modifying your license (change of address, for example), you must fill out a Form 610. Incidentally, your license will also be renewed automatically for 10 years at this time.

7) If you have any questions or problems, drop a note to the Regulatory Information Department, ARRL HQ.

The "Considerate Operator's Frequency Guide"

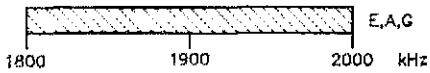
Some frequencies that are generally recognized for certain modes or certain activities (all frequencies are in MHz):

1.800- 1.830	CW, RTTY and other narrow-band modes
1.830- 1.840	CW, RTTY and other narrow-band modes; intercontinental QSOs only
1.840- 1.850	CW, SSB, SSTV and other wideband modes; intercontinental QSOs only
1.850- 2.000	CW, phone, SSTV and other wideband modes
3.590	RTTY DX
3.610- 3.630	RTTY
3.790- 3.800	"DX window"
3.845	SSTV
7.040	RTTY DX
7.080- 7.100	RTTY
7.171	SSTV
10.140-10.150	RTTY
14.070-14.0995	RTTY
14.100	NCDXF beacons
14.230	SSTV
14.313	Maritime mobile
18.100-18.110	RTTY
21.070-21.100	RTTY
21.340	SSTV
24.920-24.930	RTTY
28.070-28.150	RTTY
28.190-28.225	Beacons
28.680	SSTV
29.300-29.510	Satellite downlinks
29.520-29.580	Repeater inputs
29.600	FM simplex
29.620-29.680	Repeater outputs

ARRL band plans for bands above 29.300 MHz are shown in the ARRL *Repeater Directory* and *The FCC Rule Book.* For suggested packet frequencies, see p 54, Sep 1987 *QST* and p 51, Mar 1988 *QST.*

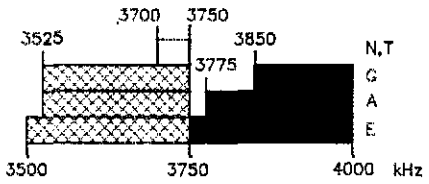
Frequency Allocation Chart

160 METERS



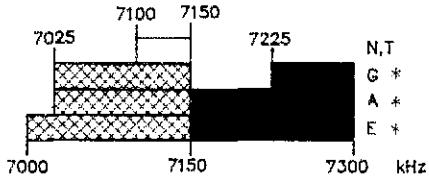
Amateur stations operating at 1900–2000 kHz must not cause harmful interference to the radiolocation service and are afforded no protection from radiolocation operations.

80 METERS



5167.5 kHz (SSB only): Alaska emergency use only.

40 METERS



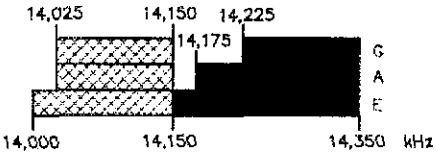
* Phone operation is allowed on 7075–7100 kHz in Puerto Rico, US Virgin Islands and areas of the Caribbean south of 20 degrees north latitude; and in Hawaii and areas near ITU Region 3, including Alaska.

30 METERS



Maximum power on 30 meters is 200 watts PEP output. Amateurs must avoid interference to the fixed service outside the US.

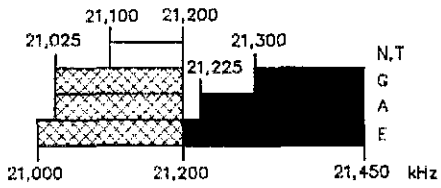
20 METERS



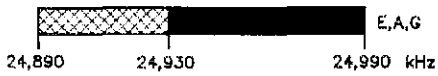
17 METERS



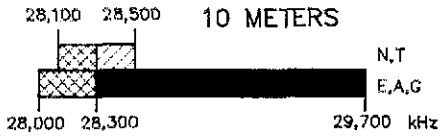
15 METERS



12 METERS

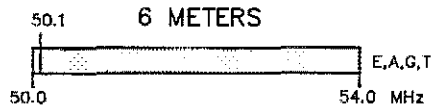


10 METERS



Novices and Technicians are limited to 200 watts PEP output on 10 meters.

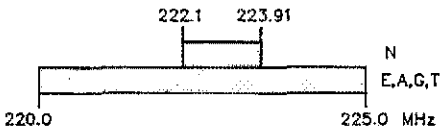
6 METERS



2 METERS



1.25 METERS

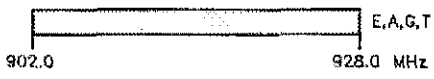


Novices are limited to 25 watts PEP output from 222.1 to 223.91 MHz.

70 CENTIMETERS



33 CENTIMETERS



23 CENTIMETERS



Novices are limited to 5 watts PEP output from 1270 to 1295 MHz.

US AMATEUR BANDS

Revised November 15, 1989

US AMATEUR POWER LIMITS

At all times, transmitter power should be kept down to that necessary to carry out the desired communications. Power is rated in watts PEP output. Unless otherwise stated, the maximum power output is 1500 W. Power for all license classes is limited to 200 W in the 10,100–10,150 kHz band and in all Novice subbands below 28,100 kHz. Novices and Technicians are restricted to 200 W in the 28,100–28,500 kHz subbands in addition, Novices are restricted to 25 W in the 222.1–223.91 MHz subband and 5 W in the 1270–1295 MHz subband.

Operators with Technician class licenses and above may operate on all bands above 50 MHz. For more detailed information see The FCC Rule Book.

KEY

- = CW, RTTY and data
- = CW, RTTY, data, MCW, phone and image
- = CW, phone and image
- = CW and SSB
- = CW, RTTY, data, phone, and image
- = CW only

E =AMATEUR EXTRA
A =ADVANCED
G =GENERAL
T =TECHNICIAN
N =NOVICE

ARRL Members Elect Representatives

Counting of the votes for ARRL Division Directors and Vice Directors took place at Headquarters on November 20, 1989. Newly elected representatives and those who were unopposed will take office on January 1, 1990, for two-year terms.

Here are the results of the voting and profiles of your elected representatives:

Atlantic Division

For Director:

Hugh Turnbull, W3ABC, 4398
Robert B. Weinstock, KN1K, 1578

Hugh has been elected to another term as Atlantic Division Director, a position he has held since 1982. This followed terms as Vice Director (1980-82) and Assistant Director (1974-80). He has been licensed since 1932 and is a Life Member of the League. Hugh has been chairman of the Board's RFI Task Group since 1980 and is a member of the Board's Executive Committee. He also is the ARRL representative to the Accredited Standards Committee C.63 Working Groups for RF immunity and the CISPR Subcommittee G on Information Technology Equipment. Hugh is a Registered Professional Engineer holding degrees from Lafayette College and West Virginia University. Hugh is a Navy WW II veteran and retired from the Naval Reserve program as a Lieutenant Commander. He retired in 1979 after a 37-year engineering/management career with the FCC, VOA and NASA. He is also the Chairman of the Foundation for Amateur Radio's Scholarship Committee and is a resident of College Park, Maryland.

For Vice Director:

Kay C. Craigie, KC3LM, 3244
James M. Mozley, W2BCH, 2724

Kay has been elected to her first term as ARRL Vice Director of the Atlantic Division. She has been Section Manager of Eastern Pennsylvania since 1986, where she plays an active and visible role in the amateur community. She lives in Paoli, Pennsylvania, and is a Life Member of the League. While EPA SM, she supported a revitalized SKYWARN program and has worked to gain recognition for amateur volunteers. Kay holds a PhD from the University of Pennsylvania and has taught at the University of Maryland and Cabrini College.

Dakota Division

For Director:

Howard Mark, WØOZC, 609
George Frederickson, KCØT, 253
Richard Clem, WØIS, 163

Howard has been reelected to a third term as Dakota Division Director, a position he has held since 1986. Howard was Vice Director from 1982-86. A resident of Burnsville, Minnesota, Howard says he has visited every club or hamfest that has invited him. He is a Life Member of ARRL and has been licensed for more than 32 years. He is active on packet radio, RTTY, AMTOR, fast- and slow-scan television and 2-meter FM. He recently retired from the Control Data Corporation and is now an independent video producer and marketer based in Minneapolis.

For Vice Director: There was no eligible nominee for Vice Director. In accordance with the Articles of Association, the vacancy will be filled by appointment by the ARRL President.

Delta Division

For Director:

Joel M. Harrison, WB5IGF, 1770
Arthur P. Kay, W5APX, 741

Joel enters his second term as Delta Division Director after serving on the Membership Services Committee and on the Ad-Hoc Elections Committee. Most recently, Joel was appointed as Secretary to the Administration and Finance Committee. Prior to his election as Director, he served three terms as Section Manager of Arkansas. Joel is a Life Member of the ARRL and is active on all modes from 1.8 through 432 MHz, including packet and OSCAR. He has received a number of ARRL operating and public-service awards. Joel, 31, is the youngest current ARRL Director. He lives in Judsonia, Arkansas, and is president of Utility Services, Inc, an inspection company serving the operators of nuclear power facilities.

For Vice Director:

Henry R. Leggette, WD4Q, 876
James A. Amundson, W5TRD, 822
John M. Wondergem, K5KR, 813

Henry has been elected to his first term as Delta Division Vice Director. A resident of Memphis, Tennessee, he holds a Master of Science degree from Memphis State University. Henry is currently employed by the Federal Aviation Administration as a Flight Data Processor Supervisor. He has earned many operating awards including 5BWAS, 80 Meter WAS, DXCC and WAC, and is a Life Member of the League.

Great Lakes Division

For Director:

Allan L. Severson, AB8P, 2804
Leonard M. Nathanson, W8RC, 2132

Moving up from Vice Director, Allan has been elected to his first term as Director of the Great Lakes Division. Al is presently employed as a field underwriter for State Farm Fire and Casualty Company and lives in Lakewood, Ohio. He has served on the Board's Membership Services Committee, Administration and Finance Committee and the Volunteer Resources Committee. He belongs to five clubs, has served as EC, DEC and as Assistant Director. Al has been Ohio SCM and SM for two terms and is a Life Member of ARRL. His Amateur Radio activities continue to be primarily in public service. He is active on all bands, 1.8 through 432 MHz, including VHF packet radio.

For Vice Director:

George Race, WB8BGY, (unopposed)

George steps into the position of Vice Director of the Great Lakes Division for the first time. A graduate of Western Michigan University, he is currently a Technical Services Supervisor and Telecommunications Manager at Albion College. George has been an ARRL Life Member since 1978, participates in traffic nets and operates on all bands and modes. He has served as Michigan EC, DEC, SEC, TC, ASM, State Deputy RACES Officer and Michigan SM.

Midwest Division

For Director:

Paul Grauer, WØFIR, 1639
Robert S. McCaffrey, KØCY, 742

Paul returns as Director of the Midwest Division after 16 years at the post, giving him the distinction of being Senior Board member. Paul is President of the ARRL Foundation and is a member of the ARRL Executive Committee. First licensed in 1928, he holds an Extra Class license and is a Life Member of ARRL. As a MARS operator, Paul made more than 19,000 phone patches for servicemen, particularly those in Southeast Asia. He has a Golden Anniversary Award from QCWA and belongs to four chapters. Paul is currently President and CEO of Wilson Telephone Company and is a resident of Wilson, Kansas.

For Vice Director:

Lyndell C. "Chuck" Miller, WAØKUH, 1187
Laurence S. Staples, WØAIB, 1180

Chuck has been elected to his second term as Vice Director of the Midwest Division after having served as an Assistant Director for 10 years. He is chairman of the PHD VEC and the 1990 ARRL National Convention. Chuck is active in numerous

clubs and is a Life Member of the League. Chuck is retired from the US Marine Corps and lives in Kansas City, Missouri.

Pacific Division

For Director:

Rodney J. Stafford, KB6ZV, (unopposed)

Rod steps into a third term as Director of the Pacific Division. He has previously served as Section Manager of Santa Clara Valley. Rod and his XYL, N6KLI, live in San Jose, California. He has been a lawyer for 17 years and is a Life Member of ARRL. Rod writes, "It's the Director's duty to be available to League members to discuss their concerns, to provide useful information to clubs and members, to represent the Division and to provide leadership in conducting League affairs."

For Vice Director:

Charles P. McConnell, W6DPD, (unopposed)

Chuck enters his second term as Vice Director. He's been a ham since 1960 and is a Life Member. An active DXer and contester, Chuck holds a number of operating awards. Prior to his election as Vice Director, he worked as San Joaquin Valley Section Manager to increase the level of emergency preparedness. He is a resident of Fresno, California, and is listed in the 18th edition of *Who's Who in the West.*

Southeastern Division:

For Director:

Frank M. Butler, Jr, W4RH, (unopposed)

Frank returns as Director for the Southeastern Division, a position he has held since 1980. He has served as North Florida SCM (1957-1980) and Vice Director (1979-1980). As a Board member, Frank served on all standing committees, has been Chairman of the Publications and Membership Affairs Committees and is presently a member of the Membership Services Committee, Board liaison to the Amateur Radio Digital Communications Committee and US Representative on the IARU Region 2 Executive Committee. Frank was first licensed in 1950 and resides in Fort Walton Beach, Florida. Frank also holds First Class Radiotelephone and Second Class Radiotelegraph Operator license. He graduated from the University of Alabama with a BSEE and has done graduate work at Ohio State and Florida State Universities. Frank is a retired civilian electronic engineer for the US Air Force at Eglin Air Force Base. He is a member of numerous Amateur Radio and professional organizations and is a Life Member of the League. Frank is active on HF and VHF and has received public-service awards for work in numerous emergencies.

For Vice Director:

Evelyn Gauzens, W4WYR, 2809
Alan Page, KE4WO, 1174

Evelyn returns for a sixth term as Vice Director of the Southeastern Division. She was first licensed in 1952 and holds an Advanced class license. She has been chairman of the Tropical Hamboree and ARRL Conventions for 25 years and has served as an Assistant Director for 16 years. She has been TVI chairman of Dade County for 21 years and QSL manager for AI4ARU. Presently, Evelyn is serving as ARRL Public Information Officer for South Florida and is ham radio's public relations contact for VE teams and the local media. She is an ARRL Life Member and resides in Miami, Florida.

ARRL RECEIVES FEMA DEVELOPMENT GRANT

The ARRL received a $10,000 grant from the Federal Emergency Management Agency (FEMA) for high-frequency packet radio modem and protocol development over the next two years. The ARRL will use the grant to fund out-of-pocket costs (excluding labor or overhead) for volunteer participants in the development program.

FEMA has a special interest in effective communications between FEMA representatives and Amateur Radio operators at the onset of natural disasters. Existing packet radio hardware and software operates effectively on VHF, but at HF, reception of packet transmissions is often marginal because of fading and interference. The FEMA grant is aimed at encouraging development of techniques to improve the reliability of HF packet communications.

Several research topics will be explored: modems, protocols, diversity reception and network management techniques.

Designers or design teams wishing to participate in this program are invited to contact Lori Weinberg, ARRL, 225 Main Street, Newington, CT 06111. Send a resume for each team member stating qualifications in the above areas and a brief description of the design approach (not to exceed three pages, double spaced). Formal proposals are not sought at this time but will be requested in the near future.

RADIO AMATEUR CALLBOOK SOLD TO BPI COMMUNICATIONS, INC

Herb Nelson, W9IGL, President and Publisher of *Radio Amateur Callbook*, has announced the completion of the sale of all outstanding shares of Radio Amateur Callbook, Inc to BPI Communications, Inc.

BPI publishes *World Radio TV Handbook*, a well-known publication for shortwave listeners. *Radio Amateur Callbook*, a listing of radio amateurs in the US and abroad, has been published since 1920. Radio Amateur Callbook, Inc, is the oldest commercial firm serving the Amateur Radio community. Herb Nelson told ARRL that "while we have a different owner, nothing else has changed. We are still the *Radio Amateur Callbook*, and we are still located in Lake Bluff, Illinois."

CAPTAIN KURT CARLSEN, W2ZXM, SK

Capt Henrick Kurt Carlsen, W2ZXM, famed captain of *Flying Enterprise*, has died at the age of 75. In 1952, Captain "Stay Put" gained international attention for staying aboard his slowly sinking US freighter for a week after the ship's hull was ripped open by a storm. After ordering his crew and passengers to abandon ship, he remained aboard so *Flying Enterprise* would not be claimed as salvage.

Capt Carlsen later returned to the sea aboard *Flying Enterprise II*. For many years he was frequently heard and contacted by hams worldwide as W2ZXM/MM.

EXTRA CLASS NAME CHANGE PETITION DENIED

In late 1988, a petition was filed with the FCC by an individual requesting the name of the Amateur Extra class license be changed to "Master of Radio Communications." The FCC denied the petition, numbered RM-6648, on October 20, 1989.

The FCC said that the change would be insignificant to the amateur community, yet it would create a burden on the Commission. The Commission went on to say that only 15 people commented out of almost half a million radio amateurs.

HARRY DANNALS, W2HD, NAMED QCWA PRESIDENT

ARRL President Emeritus Harry Dannals, W2HD, has been named as the new president of the Quarter Century Wireless Association. Dannals currently resides in Charlottesville, Virginia. A retired senior engineer for the Sperry Corporation, he has been involved in ARRL leadership for more than 40 years. Dannals is a former QCWA director.

He replaces outgoing President Leland Smith, W5KL, who has been named QCWA President Emeritus for his outstanding contributions during his four years as QCWA president.

SIMPLIFIED RECIPROCAL LICENSING IN NEW ZEALAND

Are you planning a visit to New Zealand? Be sure to take your ham rig along. The New Zealand Association of Radio Transmitters has announced the establishment of a liberal visitors' operating permit. Effective immediately, all amateurs, regardless of license class, may operate a hand-held transceiver on the VHF/UHF bands without prior licensing approval. There is no application to complete and no fee, however, the following conditions apply.

- Licensed visitors may use VHF/UHF hand-helds on 144 MHz and above, available to amateur stations in ITU Region 3. For

example, operation on the 220-MHz band is not permitted in New Zealand. If you plan to operate HF, you must apply for a reciprocal operating permit.

- Operation is for a period of not more than four weeks.
- Visiting amateurs must hold a current license issued by their respective governments.
- A copy of the current license must be carried while operating and be available for inspection.
- Use of the apparatus must conform with the requirements of the New Zealand Radio Regulations as of 1987, and the general terms and conditions shown on the license schedule.
- Visiting amateur must use their home call sign suffixed by ZL 1, 2, 3 or 4 as appropriate.

HOLMES APPOINTED AS STATE DEPARTMENT COORDINATOR FOR INTERNATIONAL COMMUNICATIONS AND POLICY

The White House has announced that President Bush intends to appoint Bradley Holmes as Coordinator for International Communications and Policy at the Department of State. Holmes would have the rank of ambassador and would replace Sonia Landau. Holmes was Chief of the Policy and Rules Division of the FCC Mass Media Bureau.

In other FCC staff changes, Lex Felker, N4LF, has left the Commission to join a Washington law firm. He was Chief of the FCC Mass Media Bureau.

REPEAT NOMINATING SOLICITATION

Because no petitions were received for the Alaska and Delaware Sections by the petition deadline of September 8, 1989, as a result of Notices in July and August *QST*, nominating petitions are hereby resolicited. See the above notice for details on how to nominate.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Illinois, Indiana, Maine, Northern Florida, Oregon, Santa Clara Valley, Vermont and Wisconsin Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page eight of this issue.

A petition, to be valid, 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 *on that petition*. It is advisable to have a few more than five signatures on each petition.

Petition form (FSD-129) is available on request from ARRL Headquarters but is not required. The following is suggested:

(Place and date)

Field Services Manager,
ARRL 225 Main Street,
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...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 on or before 4 PM Eastern Standard Time, March 9, 1990. Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before April 1, 1990. Returns will be counted May 22, 1990. SMs elected as a result of the above procedure will take office July 1, 1990.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1990.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July 1990 *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately—*Richard K. Palm, K1CE, Field Services Manager*

SECTION MANAGER ELECTION RESULTS

Ballot have been counted in Section Manager elections for Alabama, Michigan, New Mexico and Tennessee. Four other races were uncontested. Their term of office began January 1, 1990. The results are as follows:

In the Alabama Section
Mildred Cullen, AA4XF, 376
Joseph Smith, WA4RNP, 343
Ms Cullen was declared elected.

In the Michigan Section
George Race, WB8BGY, 1323
William LeVeque, WB8Q, 568
Mr Race was declared elected.

In the New Mexico Section
Joe Knight, W5PDY, 364
Robert Scupp, WB5YYX, 178
Mr Knight was declared elected.

In the Tennessee Section
Harry Simpson, W4MI, 587
Tim Berry, WB4GBI, 502
Mr Simpson was declared elected.

Four other SM races were not contested. The following were declared elected:

In the East Bay Section
Bob Vallio, W6RGG

In the Santa Barbara Section
Thomas Geiger, W2KVA

In the Kansas Section
Robert Summers, KØBXF

In the Western Massachusetts Section
Jean Hurtle, KA1IFC

FCC-ISSUED CALL SIGNS UPDATE

The following is a list of FCC call signs issued as of November 1.

District	*Group "A" Extra*	*Group "B" Advanced*	*Group "C" Tech/Gen*	*Group "D" Novice*
Ø	WXØY	KFØGC	NØLFA	KBØFJN
1	NZ1P	KC1QW	N1HBP	KA1UQD
2	WU2H	KE2QE	N2KAM	KB2ISS
3	NX3G	KD3PV	N3HPO	KA3VHS
4	AB4RM	KM4ZZ	N4XHB	KC4MZT
5	AA5OQ	KG5ZR	N5PNP	KB5KXU
6	AA6SA	KK6BZ	N6WUU	KC6GQO
7	AA7CF	KF7XY	N7NTQ	KB7IWN
8	WX8A	KF8CE	N8LMP	KB8IIT
9	WM9F	KE9ST	N9JAI	KB9DNF
Guam	KH2K	AH2CF	KH2EG	WH2AMH
Hawaii	**	AH6KB	NH6VC	WH6CFU
Alaska	**	AL7LP	NL7SV	WL7BVU
Virgin Islands	NP2F	KP2BR	NP2DK	WP2AGZ
Puerto Rico	**	KP4QJ	WP4WZ	WP4IPE

**indicates all 2 × 1 calls have been issued in these areas.
The N-prefixed Group C (1 × 3) call signs blocks for the fourth and sixth call districts have nearly all been assigned. After N4ZZZ and N6ZZZ have been issued, FCC will begin assigning calls from the Group D (2 × 3) call sign block.

Correspondence

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Editor

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

DOWN THE RIVER

☐ In the November issue of your great magazine, there was a story [entitled "White Water Portable"] about local hams running the Verde River with rigs. I guess it was 30 or 35 years ago when I did the same thing. I used a rig with a collapsible mast antenna and a motor generator. The whole thing went through the Grand Canyon on the Colorado River. I think that I made about 40 contacts, none of them were with DX though, but what a thrill it was working from the bottom of a canyon one mile deep. I don't think my compatriots enjoyed the sound of the engine every night and morning, but it was a ball.

Just wanted you to know about it. Keep up the good work.—*Barry Goldwater, K7UGA, Scottsdale, Arizona*

HURRICANE HUGO

☐ I was recently on one of the first chartered aircraft allowed into the US Virgin Islands following Hurricane Hugo. My first job there was to set up a station and assist with emergency traffic coming out of the island. The first day I worked 20 meters, then moved to the vicinity of 28.47 MHz, where I remained for seven more days.

First, I owe a lot of thanks to all of the amateurs who helped through countless calls and pieces of traffic, who stood by through all the problems, and also to the many operators who offered moral support at the times we really needed it. I must also thank a number of relatively inexperienced hams who handled traffic faultlessly, tirelessly, professionally, with understanding and with a perseverance that was incredible.

I also owe a few apologies to all Novices and Technicians who I doubted deserved 10-meter voice privileges. You handled the bulk of my traffic. I am also sorry that Field Day hadn't prepared me for the realities of the situation in which I found myself, and consequently my techniques were often lacking.

Amateur Radio works. It was 10 days after Hugo before the first satellite telephone connection was established to the island, and that adds up to a lot of traffic.—*Randy Young, KG5OH, San Antonio, Texas*

THE MAGIC OF RADIO

☐ I am twelve years old and my interests in electronics and social studies were sparked when I read your October issue of *QST*. I never knew such a vast world of communications lay out there just waiting to be grabbed. When I was 10, my father gave me a shortwave radio in exchange for keeping my room clean, and I only wished I could operate a station of my own. My knowledge of ham radio started as the new school year came, and I checked out all of the books in the school library about radio and electronics. My class' teaching aide saw my interest and since her husband is a ham, she told me all about it and gave me the October issue of your magazine. Now, I'm wondering if you know of any groups that operate in or around Marin County. Also, please send me any free information you have on how to get a license, for it seems that a new world has opened before me.—*David W. Pifke, Sausalito, California*

YOUR LOCAL LIBRARY

☐ When I ventured out into the world of Amateur Radio, what frustrated me the most was the lack of available information in our public libraries. In the shelf space where amateur books should have been, were 10-15 year old tomes devoted to Citizens Band. I did manage to find a copy of the *1972 Handbook*. It was tattered and torn with pages missing.

I urge my fellow radio enthusiasts to go to their local libraries and request that appropriate books be purchased. Better yet, donate! Most public libraries will accept donated books, provided they are not dated and are in good condition. What about code practice tapes?

Remember, it may encourage others to get licensed, and that will certainly benefit the entire Amateur Radio community.—*Michael Zadoroznyj, KB2HMK, Garfield, New Jersey*

HAM RADIO AND THE METRIC SYSTEM

☐ The metric system is used nearly worldwide with the exception of the United States.

Instead of telling another station that your 3-element Yagi is 75 feet high, tell him it is about 23 meters high. Do not give your QTH as 50 miles south of Chicago, give it as 80 kilometers south of Chicago. Along these lines most other countries measure temperature only in degrees Celsius. We should also consider using Celsius ourselves, so that a DX station will have a better idea of what we are talking about when we discuss the weather. —*Robert Strack, K6CNB, Covina, California*

RECRUITMENT: YOU CAN MAKE THE DIFFERENCE

☐ Much has been written, said, and tried to get more hams into the hobby—mostly in ham radio magazines and newsletters where very few of the general public will view it. Anyone wanting to know how to become a ham has to know one!

If the ham community wants growth, it cannot put the burden on the ARRL; it must be done on an individual basis. That is, if each ham brought one new person into Amateur Radio each year, we would have over a million and a half active hams soon!

Again, it's up to us to grow in number so our frequencies won't be sold to commercial interests. I've read somewhere that ham frequencies are worth billions of dollars in the commercial market, and in America today, money talks louder than tears and apathy.

Come on, only one new ham a year—you can do it!—*Rick Meuse, NC1V, Melrose, Massachusetts*

THANKS

☐ I have been assigned my Novice call letters, KB2IAN. My instructors are dedicated radio amateurs and devote their time and energy to teaching prospective Amateur Radio enthusiasts. My way of expressing my thanks is to apply for membership in the ARRL. As an organization, the ARRL is indeed fortunate to have these men on their membership roster: George Wright, NK2P, Gerald G. Silverman, WB2GYS, and Robert S. Bissett, ND2L. Thanks for your help! —*Ralph E. Walsh, KB2IAN, Oceanport, New Jersey*

AMBASSADOR HAM

☐ Amateur Radio is a unique hobby. Our license allows us to cross national and international boundaries at will. Our voices zip over the airwaves to every corner of the world. We hams, communicate personally with people of every nationality, political philosophy and social circumstance. We do easily that which governments do with great difficulty. Many hams, by the very nature of our hobby, are goodwill ambassadors for our country. Unfortunately, as in many aspects of life, there are a few "bad apples." People who take advantage of easy anonymity to spew out insults that, said face to face, would not go unpunished. I recently monitored a QSO between a foreign station and one in the United States. A third station was interfering with this friendly contact. The cursing and obscenities made my skin crawl. My first response was to interrupt and tell this creep off. But the two hams in the QSO were more more experienced than I. After realizing the nature of the interference, they chose to ignore it and go on with their contact. After awhile, the growling, miserable voice of the intruder simply went away. I suppose he assumed he wasn't being heard. I'm sure the US ham was embarrassed—I certainly was.

So here is the point: Amateur Radio is a hobby. It's done for fun. One of the most important aspect of our hobby, by its nature, is the furtherance of goodwill throughout the world.

So to the bad apples out there, help us out. Let the airwaves remain a place where people of all nations can meet and share something we all desperately need: a friendly voice and a friendly word.—*Bill Kushner, KB2FDJ, Port Washington, New York*

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

W1FH—Role Model

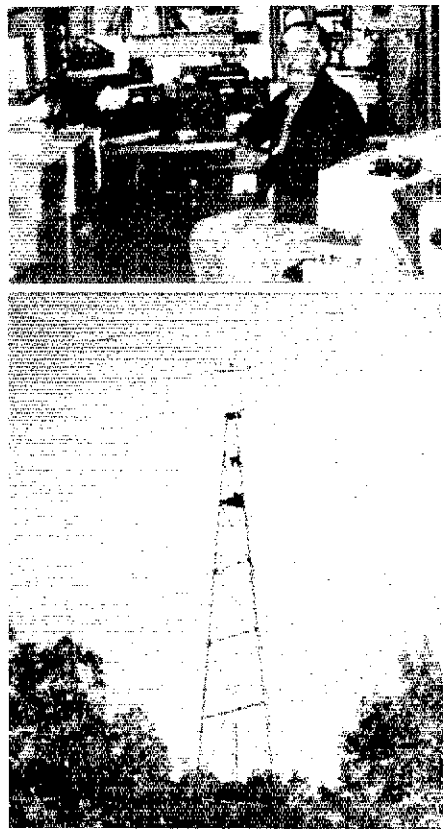
We all strive to pattern our DX (and other) behavior after a role model, someone who evinces the kind of behavior we personally would like to emulate. After all, within our field of Amateur Radio we are exposed to what seems to be the representation of the entire gamut of life: the good, the bad, the indifferent (and, alas, even the ugly). Under the heading of good is a ham this editor (and many hams worldwide) views with the highest regard—a decent man, the quintessential listener on the bands, the effective operator, a truly nice guy who always plays within the rules. He is Charlie Mellen, W1FH. His personal modesty and disregard for acclaim have made it quite a challenge to get him to furnish even the modest amount of information to follow.

It's impressive to find someone pursuing an avocation that started almost 60 years ago. W1FH was first licensed in Boston on February 9, 1930, and issued the call he holds today. As with hams of that unique vintage, Charlie became interested in the field of what was then called shortwave through a *Popular Mechanix* article on building shortwave receivers. His first was a galena crystal radio with which he heard KDKA and WLW, his first taste of distance. Charlie listened to the old 80-meter band and heard hams operating AM on 3500-3550 kHz. From there it wasn't a very long jump to learning the code by listening to shipboard operators. His earlier hobby of building model planes while in junior high school gave way to the thrill of chasing long distance contacts, first on 80 and then on 20 meters.

In those early days, the first W1FH station used a Hartley 201A, a surplus RCA power transformer and mason jar rectifiers. His current station is modest by some big-time standards but is classic W1FH: modest, long-lasting receivers/amplifiers, and redundancy to be prepared for breakdowns when that rare (truly rare!) station he hasn't worked shows up! A look at the accompanying photo certainly reveals the workhorses of the past few decades: 75A4 receivers, a 310B exciter to 4-400A amplifiers; KWM-2s, a 30L-1 and a 30S-1; plus the old reliable TO keyer. If you visited Charlie 20 years ago, you would have seen the same self-supporting 75-foot tower with a 3-element Yagi and Mims rotator.

W1FH has seen not only the world change, but DXing as a sport evolve from one deriving self-satisfaction doing something the hard way (whether getting the gear engineered or working the DX yourself) to one perhaps with too much emphasis on list operation. The latter, plus poor manners are his pet dislikes. Balancing that equation is the pleasure of renewing old friendships (for example his decades-long acquaintance with pioneer Ivan Pastre, F3AT).

With a modest location and antennas, it has taken a high degree of persistence to become a high DXCC achiever. Both pre- and post-WW II, the W1FH call has shown prominently. Along with tough times there have been exciting highlights. Before WW II,



The W1FH shack and antenna—he holds DXCC Number 1 Mixed, Number 1 Phone.

Charlie wanted mightily to work AC4YN. In 1946, he was called *by* AC4YN, relaying some exciting traffic for that time—Lowell Thomas, in Lhasa, Tibet, had broken his leg and wanted CBS to know! This remains his most exciting QSO. As is so typical in DXing, once you've broken the ice, the next rare one seems easy. So it was, when in fairly short order W1FH worked AC4NC, AC3SS and AC4RF. W1FH's modest Boston QTH still finds the SE Asia path the toughest to crack.

In six sunspot cycles, Charlie finds no two cycles the same. The highlight of the current cycle is the excitement of nighttime JAs on 10 meters. The variations from cycle to cycle emphasize his personal view of hamming: Go in there day after day, and you'll never know what you'll find. DXpedition views? W1FH finds them a great thing, but as many have noted, evolving somewhat into commercialized operations.

Knowing Charlie Mellen is a privilege. Make his caliber of operation your New Year's resolution.

Next month a look at WA4DPU who made the Honor Roll in June 1989 at the age of 28!

CIRCUIT

☐ **3Y0B:** OH2BH has been added to the list of operators for this February Bouvet special.

☐ **Most Wanted:** VP2ML's 1989 survey, based on over 2000 responses, indicates the top ten still desired as: ZA XZ 3Y 7O YA 4W S2 XW A5 1S. (Thanks *The DX Magazine*)

☐ **5Z4FN/G4ABI** is now active (mostly 15-meter CW) from Nairobi, Kenya, after years of operation from Zambia and Ghana as 9J2GE/9G1GE, and most recently /ST2 from the Sudan. QSL to Donald S. Radley, 5Z4FN, Box 44765, Nairobi, Kenya.

☐ **LU6ELF/D2:** Jorge will be active until March. Try him Saturdays on 21.340 MHz at 2100Z. QSL direct only.

☐ **JA2EZD:** Hiroo will be visiting the Caribbean Islands this winter. Cards to his manager JA2MNB, Box 6, Nishiharu, Aichi, 481 Japan (or via JARL).

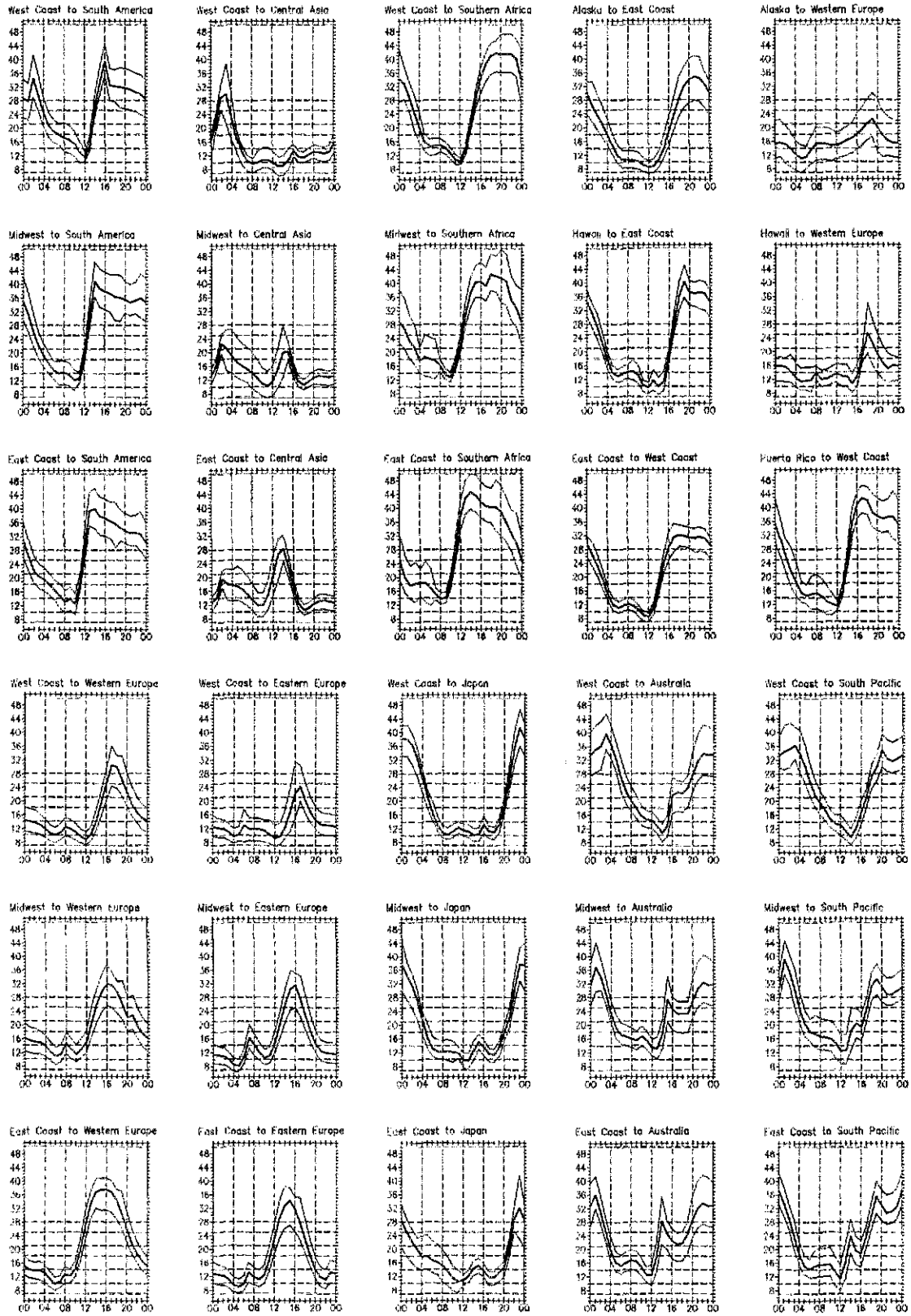
☐ **V85GA** offers an apology, noting that a lot of his mail went astray from November 1988 until June 1989. Someone had been opening his post box and stealing the contents. If you still need a card, please try again to WA8DRZ/6 or to Gerald A. Ashcroft, V85GA, Box 1200, B.S.B. 1912, Brunei, Borneo.

☐ **Routings:** HL9TG, Gary Kohtala, suggests cards to his military address, Box 146, 751st Mi. Bn., APO San Francisco, CA 96271. (Gary reminds: comply with the wishes of the DX station; don't call on top of a contact in progress; don't tune up on the frequency; and listen before transmitting! If not, you might make the contact, but you won't make the log.) JY4MB now goes direct, Mohammad Balbisi, Box 3236, Amman, Jordan. VQ9LF, Larry Fields, says his mail continues to go around in circles. He suggests you QSL via his wife/manager, Felipina Fields, 10B 25th St, WBB, Olongapo City, Philippines 2200 ($0.45 US postage). VS6/DU/VE1BLG, Norm Morgan, is attached to the Foreign liaison section of the Canadian External Affairs, headed for a three-year Philippines posting. Cards via VE3JDO (who also handles cards for YN1QG, YN1FI, VE2LJ). 7J6CAS and HC8 stations WS7I WA7EGA WV7Y via Betsy Townsend, WV7Y (ex-KE7PL), Box 644, Spokane, WA 99210. HD8EX goes to Box DX, Cuenca, Ecuador.

☐ **New:** W6HJK has a 90-minute audio cassette that lets you hear what ham radio Russian really sounds like. Check with Len Traubman, 1448 Cedarwood Drive, San Mateo, CA 94403. KC3NE produces a really high quality T-shirt with DX Hog (and graphic) on the front and "CU in the pileups" on the back. Check for details with Mike Klein, Box 306, Cheltenham, PA 19012. DX awards rules free for those requiring 1989 contacts, for an SASE or IRC from Ted Melinosky, K1BV, K1BV Awards Directory, 525 Foster St, South Windsor, CT 06074-2936.

☐ **Call Sign Directory:** This 196-page compilation by DK5JI, published by the DARC, is nothing less than outstanding. Everything you could possibly want to know about calls and their relation to major awards is included. More info from the DARC Verlag, Postfach 11 55, D-3507 Baunatal, Germany.

☐ **Help:** N7IRR is on the track of KZ5MQ and KZ5BC 1962, ZM1AAT/K 1970, FB8XX 1962, A35FX 1972.



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Sunspot data is derived from *Solar Indices Bulletin,* National Geophysical Data Center (E/GC2), Boulder, Colorado. Curves are generated using IONCAP. These predictions, for January 16 to February 15, 1990, assume a smoothed sunspot number of 192, which corresponds to a smoothed 2800-MHz solar flux of 236.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official DXCC Countries List. You may endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The Satellite, 160 Meter, 80 Meter, and 40 Meter DXCC awards are endorsable in 10-country increments through 200, and 5-country increments above 200. Presently, there are a total of 321 current countries on the official ARRL DXCC Countries list. The totals shown below are exact credits given to DXCC members from August 4, to August 31, 1989. An SASE will bring you the rules and applications forms for participation in the DXCC program. Send $1.00 to request the ARRL DXCC Countries List.

NEW MEMBERS

Mixed

AH6GN/127
CT1DRA/288
DL2SAV/130
F1JGA/262
HA6VV/108
HA6ZG/133
HB9CXY/107
HB9ZJ/109
IK3ASM/122
JA1LTR/114
JG1BBP/108
JH1DSF/152
JM1BPP/297
JA2EAB/107
JA3BKP/150
JA3PIS/219
JE4MZA/127
JH6WMJ/122
JR6XIW/158
JH7WNV/110
JH8JBX/222
OE7HPI/105
SMØPRB/137
VE6BBP/178
VK3BLZ/108
VK4OH/147
XE1GPC/127
XE1HHH/272
XE1RM/305
XE1SV/148
XE1UF/306
XE1ZZA/271
YT2IJ/120
YV3AJ/120
ZP45Ø/108
ZXØF/103
KC1OC/101
KV1J/104
N1CTD/256
N1FNN/100
KB2BMP/101
KU2V/101
N2BAP/132
N2HOS/194
N2RQ/110
NB2D/103
NX2T/209
WA3MKB/199
N4OXZ/103
N4SZ/254
WA4TYN/100
WB4FNH/309
N5IMW/134
N5OP/111
NJ5N/277
W5FKX/101
W5NDK/150
WA5Y/176
WA5ZEK/104
AA6LF/109
KE6CX/122
KJ6FD/126
KJ6HO/112
N6DN/161
N6QLQ/5N/164
N6VB/102
K7HPH/102
N7IZD/164
N7LPS/115
NX7U/148
W7EYE/206
AJ8B/106
W8RHY/100
W8XM/314
WA8N/109
K9HFN/121
K9UXC/120
KA9MBH/103
NØCWR/304
WØBZD/112

Phone

CT1DRA/278
DL6VU/116
F1JGA/196
GMØDBW/110
HA6QJ/102
IK1MJL/151
IK3ASM/112
IK7MCJ/206
IT9JKY/201
JG1BBP/102
JS1DLC/W2/109
JJ2LPV/110
JG3BFE/107
JE4MZA/127
JH8JBX/191
LA2WR/114
VE3LST/101
XE1GPC/127
XE1HHH/272
XE1RM/303
XE1SV/148
XE1UF/306
XE1ZZA/271
YC9VGB/110
YCØJVT/117
YT2IJ/102
YV3BKC/203
YV3CFE/133
YV3DGA/127
ZXØF/102
KV1J/104
N1CTD/256
N1CYA/100
N1FNN/102
KB2BMP/101
N2GST/106
N2RQ/110
NX2T/180
W2EJG/147
WA3MKB/198
N4OT/114
WB4TGB/103
KF5OO/103
WA5Y/106
WA5ZEK/104
AA6LF/109
K6DKQ/110
KB6DKK/100
KJ6HO/112
N6QLQ/5N/164
K7HPH/100
WTEYE/205
K9HFN/110
AFØR/113
NØCWR/302
WØBZD/112

CW

DL2SAV/128
G4WVX/119
IK8DOI/103
JA3PIS/212
SMØPRB/118
YBØBLO/102
K1SRR/101
N1HN/205
W1ZK/105
N2GPT/108
W2DX/129
K3EI/103
KB4QWG/100
KC4ATD/116
KK4BE/102
N4OXZ/102
KA5GMN/150
N5OP/110
NJ5N/225
WA5Y/136
WV5M/136
K6ETM/105
N6DN/106
WN6R/120
K7PXV/111
N7LPS/102
KA8VWE/103
KE8KE/121
W8BE/273
W8XM/285
K9FOQ/105
W9AYH/109
KØJZM/101
NØHRK/132

RTTY

DF3FJ/104
I2YWR/101
JA2LA/108
VE1BLX/100
NA2K/115
W2IZC/108
AA5AU/130
K6DKQ/110
N6CGB/108

Satellite

KB2E/100
WA2RDE/103

160 Meters

HB9CXZ/102
I4EAT/102
ZL1HY/101

80 Meters

HA8UB/107
I4EAT/239
JM1BPP/148
NL7J/104
SM6AOU/114
SM6CTQ/108
N1CTD/128
W1ZK/115
K4CXY/115
N4KG/284
K8EFS/107

40 Meters

HA8UB/142
I2EOW/156
IT9JKY/107
JA3EMU/265
JA4VUQ/190
JA5PUL/184
SM6AOU/131
SM6CTQ/145
VE1BN/171
XE1VIC/151
K1YR/196
N1CTD/103
ND1T/110
AA6GM/102
K8EFS/107

10 Meters

HA8UB/152
JA4XH/163
OZ4LS/174
SM6CTQ/181
KA1RRL/106
N1CTD/111
WA1EOT/113
KB2HQ/105
KD2UF/106
KB4BBC/105
WA4CMS/170
KE8CX/122
KJ6NZ/107
N7GXS/100
W7FP/125
WR7C/105
K8CGW/114
K8EFS/218
KE8RV/107
KD9OT/106
W9GXR/108
W9IAL/105
KUØS/102
WDØ CNU/125

5BDXCC

AG1C
WG6P
5N9GM
W8ZSD
F6EZV
WA2HZO
K8EFS
AA4DO
HA4XX
WB8K
WS6X
SM7BIP

NEW HONOR ROLL MEMBERS

Mixed

314

W5VSZ/319
AB8Y/319

313

HAØDU/318
JH2CJW/318
K1EFI/327
K2IJ/317
K4XR/320
N4VG/317

312

W2FGY/322
WA3DVO/325
WB3CQN/316
KC4DY/313
KU4J/317
WD8PKF/316
WD9IIC/316
KØLD/322
WØFF/325
WØKZV/325

Phone

314

GW3CDP/319

313

N4VG/317

312

FE6AXP/321
IN3DYG/315
K1EFI/316
K2HWE/317
W2FGY/322
WB9SYF/314
KØSE/315

CW

309

SM6CVX/314
KE4I/314
W7LR/315

308

OH2BN/310
W6TFO/310

ENDORSEMENTS

Mixed

CX4CR/329
DF5WA/155
DJ1ND/302
DJ4XA/331
DJ6NI/327
DJ6OV/270
DK2UA/314
DK5EL/250
DK5PR/331
DL1FBO/281
DL1TH/196
DL2ZAE/257
DL4FBZ/270
F6DZU/317
FY5AN/323
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G3XTT/312
HB9DDZ/244
I1RBJ/339
I5SMX/185
I5UNA/258
IK8BQE/301
IØTIC/263
JA1KXY/318
JG1JWP/172
JP1BJR/283
JR1XIS/275
JA2HNP/334
JG2UUS/153
JA3DM/249
JE3MYG/280
JR3EGA/278
JA4AQA/230
JA4JDG/139
JA4VAD/320
JH4UVU/303
JA5ALE/309
JA5AUC/322
JE5IVW/327
JH5FQO/292
JR6CF/204
JA7QFU/288
JA8CAO/267
LA9GV/320
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OH5OZ/291
OZ2E/302
OZ4LS/189
OZ7BG/328
PAØLRK/306
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PY2FR/338
PY2YP/299
PY5ATL/333
PY7ZZ/330
SM4DHF/329
SM6AHS/311
SM6CMR/270
SM6MSG/216
SM7CMY/313
SMØBFJ/335
TA1AZ/176
VE2DWH/265
VE2RO/153
VE3CPU/315
VE3CWE/315
VE3FIU/209
VE3GMT/338
VE3ST/350
VE3UDX/308
VE4AGT/181
VE7DX/321
VE7RG/313
XE1JTR/265
XE1MDX/311
XE2AQ/274
ZS5NK/254
AK1N/299
K1EM/319
K1HDO/312
K1VJH/318
K1WJB/308
K1XA/290
K1ZLA/249
K1ZZ/324
KA1EJ/260
KA1ILA/278
KM1A/131
KM1R/284
NC1E/216
ND1T/126
NF1B/258
NK1I/159
W1ELR/350
W1ENE/335
W1GVZ/303
W1HSB/318
W1JA/176
W1LQQ/338
W1QUS/325
W1ZK/277
WA1SPT/177
WA1WMS/304
K2MUB/344
K2OVS/263
K2PF/213
K2WT/302
KA2GOW/186
KA2YPT/269
KB2E/309
KD2UF/232
KD2WO/246
N2AP/331
N2DT/321
N2FFB/125
NA2J/300
NA2K/305
W2BOK/362
W2DX/206
W2HZ/342
W2JAJ/225
W2JU/201
W2MT/328
W2NUS/250
W2NY/318
W2OTS/125
W2PPG/339
W2UE/361
WA2DSC/303
WA2HZO/209
WA2UXC/316
WB2EKK/209
WB2GFI/194
WB2KCI/285
WB2PMP/313
WB2QMU/325
WB2WVG/151
WI2J/281
WM2B/143
K3OTY/324
K3ZO/307
K3ZR/335
KA3DDT/300
KC3EK/292
KE3Q/291
KE3R/260
KX3Q/272
N3GB/310
NI3P/280
W3AZ/220
W3CWG/362
W3EYF/349
W3HCW/301
W3HXI/199
W3SO/331
WA3WIP/318
AA4AR/320
AA4KA/318
AA4M/321
AA4NJ/275
AA4QE/201
AA4TV/284
AA4V/327
K4ADK/296
K4BVQ/352
K4BYK/311
K4CEF/335
K4ELK/315
K4GJD/328
K4GXQ/238
K4IKR/344
K4JBY/253
K4JYS/315
K4KFH/317
K4LTA/338
K4QMU/273
K4RSB/316
K4XH/330
K4XP/324
K4ZKZ/341
KA4ODV/179
KB4HU/314
KB4PEF/163
KC4MJ/272
KC4QT/284
KE4I/335
KF4QD/226
KM4AZ/158
KM4IH/178
KR4F/314
KZ4V/303
N4GE/317
N4KTY/271
N4NO/335
N4OT/272
N4QF/318
N4SZE/179
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W4JKC/284
W4OMQ/341
W4PKA/253
W4PZV/337
W4RJC/331
W4ROM/250
W4VQ/350
WA4CTA/319
WA4DPU/319
WA4OEJ/316
WA4QYK/153
WA4SSI/290
WB4CSK/310
WB4FLB/297
WB4LMI/246
WB4PUD/314
WB4RFZ/318
WB4TDH/324
WB4VKW/305
WC4B/302
AD5N/345
AF5M/322
K5AOB/173
K5BZU/329
K5VNJ/323
KD5R/141
KR5D/300
W5EQ/307
W5JG/319
W5SG/315
WS5O/286
AA6EQ/126
K6EXO/342
K6GAK/332
K6LRN/270
K6RF/354
K6RN/354
K6ZO/370
KB6RXF/200
KE6OT/278
KI6X/135
KT6T/297
N6IXX/190
W6KPC/343
W6MJP/332
W6MND/325
W6MVW/175
W6OMR/334
W6QNM/355
W6RKP/360
W6TC/332
W6TEX/306
W6XP/333
WA6OCV/164
WA6WZO/323
WB6YNI/276
WK6E/327
K7NW/265
K7OXB/330
K7UT/326
KX7J/293
NV7J/230
W7LR/323
W7ND/301
W7NP/306
W7ZR/322
WA7BPI/307
WW7D/200
AD8O/308
K8BXD/205
K8CHN/159
K8KJN/311
K8RWL/332
K8TDJ/150
K8TVO/KL7/208
KA8CMR/251
KB8DB/317
KC8QT/305
KE8KE/154
N8EIH/156
NJ8X/125
W8CD/285
W8JBI/364
W8XD/285
WA8RXI/126
AI9Y/225
K9AB/359
K9KK/304
K9LJN/299
K9MM/339
K9NB/323
KA9CFD/290
KG9E/277
KG9Z/305
N9AEJ/251
N9BUS/304
NC9I/201
NG9E/259
NM9H/252
W9AA/277
W9DY/358
W9FR/330
W9GMS/320
W9HAH/292
W9JEK/230
W9KQD/343
W9MCR/324
W9TA/306
W9TC/317
W9TX/318
WA9LOZ/201
WA9VGY/328
WA9WJE/332
WD9DGA/246
KØCS/320
KØHT/302
KØJGH/316
KØKES/310
KØRW/228
KBØG/305
KG9C/310
NØAT/322
NJØM/301
WØEU/280
WØTRF/325
WØUO/315
WAØEWU/175
WAØOZP/155
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DF7QD/281
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DL5OAH/227
DL6RA/204
DL9DY/334
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HK6AUG/201
HK6BDX/299
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I2IAU/300
I2WZX/304
IK2ECN/254
I8IYW/260
IK8BQE/299
IØTIC/252
J73PD/274
JA1KXY/318
JA2HNP/305
JH2CJW/305
JA4AQA/230
JA4VAD/307
JE4DSA/157
JH4UVU/206
JE5IVW/321
JH5FQO/292
JF7DZA/283
LA5YE/268
LA9GV/320
ON6MY/319
ON6NY/311
PY2FR/337
PY2OB/311
PY6ACP/254
PY7ZZ/325
SM4DHF/318
SM5CCH/263
SM6AHS/309
SM6MSG/171
SMØJOO/252
TI2MEN/196
VE3CWE/284
VE3FIU/201
VE3GMT/338
VE3ST/324
VE3UDX/304
VE4AGT/181
VE7DX/318
VK4ZM/259
XE1JTR/265
XE1MDX/311
XE1SN/226
XE2AQ/245
YV5IVI/264
ZP5ZR/267
ZS5NK/252
AK1N/294
K1EM/275
K1HDO/302
K1ZLA/249
KA1HBV/261
KM1R/272
N1EOA/152
W1DO/333
W1ENE/320
W1LQQ/331
W1WAI/251
W1ZK/241
WA1WMS/286
K2IUK/302
K2PF/153
KA2YPT/264
KB2HQ/192
KC2ZA/152
KD2UF/232
KD2WQ/240
N2HOS/187
NA2K/297
NC2O/129
NX2H/175
W2DX/157
W2HZ/341
W2NZG/296
WA2B/125
WA2UXC/316
WB2KCI/279
WB2QMU/320
K3OTY/324
KC3EK/286
KE3A/315
KX3Q/265
N3EHD/277
N3FBN/250
N3GB/289
W3CWG/360
W3EYF/309
W3HCW/301
WA3DMF/164
WB3ABS/300
AA4AR/320
AA4KA/307
AA4M/310
AA4NJ/239
AA4TV/280
AA4V/326
K4BVQ/339
K4BYK/309
K4CEF/329
K4GJD/328
KA1KR/343
K4ONF/308
K4RSB/315
K4XH/328
KA4ODV/178
KB4CWO/290
KB4HU/314
KC4DY/312
KC4MJ/272
KD4MM/202
KD4OS/240
KE4I/333
KJ4JM/178
KJ4VG/150
KJ4WU/200
KK4GT/278
KM4IH/178
KZ4V/296
N4JOS/261
N4NO/313
N4ONI/294
N4PYD/226
N4QF/313
W4MOI/126
W4PKA/245
W4PZV/335
W4UW/315
W4VQ/330
WA4ACL/247
WA4CTA/316
WA4DPU/315
WA4OEJ/315
WA4QYK/153
WA4WTG/325
WB4CSK/263
WB4FNH/308
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K5VNJ/320
KD5BM/279
KG5FX/205
KR5D/274
N5IQL/129
NT5C/280
W5SG/308
W5VHN/209
W5VSZ/307
K6CID/294
K6EXO/336
K6ICS/208
K6RF/337
K6RN/315
KE6OT/257
KI6UT/200
KI6X/126
KI6ZH/153
KT6T/294
W6KON/333
W6KPC/342
W6OMR/320
W6RKP/354
W6XP/333
WA6WZO/324
WE6H/282
WK6E/251
K7NW/261
K7OXB/325
K7TUH/250
K7UT/325
KB7UH/303
KF7RU/152
KX7J/271
N7EYG/202
NQ7Q/157
NV7J/228
W7KSK/259
W7ZR/309
WA7CYP/206
AB8Y/308
AD8O/306
K8CHN/154
K8DFC/291
KB8DB/317
KC8QT/299
KQ8O/280
N8EIH/152
NA8C/132
W8JBI/353
WB8RFN/218
WD8PKF/314
WD8SDL/261
WJ8C/273
K9AB/341
K9BSL/175
K9KJS/255
K9KK/299
K9LJN/288
K9MM/337
KA9PJZ/284
KA9VRA/200
KD9OY/228
KE9JR/134
KU9I/322
N9BUS/295
W9KQD/328
W9QQ/326
W9TA/300
W9TC/316
W9TX/312
WA9LOZ/161
WA9OQT/125
WA9VGY/324
WD9DGA/243
WD9IIC/286
WE9R/201
KØEPE/341
KØUCJ/323
KØJZM/289
KØLD/318
KØOC/288
KØØG/294
NØAT/321
WØFF/308
WØYDB/335
WØYMH/328
WBØYWO/127

CW

DF5WA/155
DJ3XD/252
DJ4XA/301
DK2UA/260
DK5PR/305
DK6NC/260
F6CZL/263
G3XTT/285
GØEHO/134
HAØDU/253
HB9DDZ/227
I5SMX/197
I5UNA/233
JG1JWP/167
JI1XTZ/235
JP1BJR/283
JR1XIS/247
JA2TK/293
JH2CJW/304
JE3MYG/210
JM3DDG/130
JA4JDG/127
JA4VAD/183
JH4UVU/278
JA5AUC/257
JA8CAQ/296
OZ2E/286
OZ4OC/252
PAØLOU/301
PY7ZZ/315
SM4DHF/275
SM6AHS/286
SM6CMR/245
SM6MSG/177
VE3CPU/276
VE3CWE/275
VE3ST/264
VE7DX/277
YB2BNJ/229
K1EFI/300
K1EM/228
K1HDO/231
K1XA/261
NC1E/183
W1LQQ/295
WA1WTP/226
K2IJ/307
K2JLA/253
K2PF/198
NA2K/198
W2EJG/177
WB2GFI/138
W3EYF/293
AA4KA/288
AA4M/301
AA4NJ/196
AA4V/291
K4CEF/301
K4XP/134
KR4F/294
KU4J/293
KZ4V/294
N4NO/308
W4OMQ/125
W4VQ/316
WA4CTA/303
WA4DPU/304
WB4CSK/302
WB4FNH/142
WB4VKW/293
WC4B/275
KD5R/134
KR5D/289
NF5Z/261
NG5F/177
WB5TKO/125
WC5N/239
KE6OT/185
KN6J/207
N6LHN/220
W6JTI/250
W6TC/318
W6TEX/268
WK6E/276
K7NW/182
KX7J/249
W7KSK/200
WA7BPI/293
AB8Y/290
K8NN/254
KB8DB/268
W8CD/275
W8JBI/303
WD8PKF/279
K9AB/315
K9LJN/280
K9MM/322
KA9TSW/193
KB9OD/269
W9FF/229
W9KQD/311
W9TX/289
WA9VGY/150
WD9IIC/306
KØKES/298
KBØG/288
WØHBH/275

RTTY

LA9GV/127
KA9PJZ/172
NJØM/214

160 Meters

G3XTT/158
VE3DO/130
ZS5LB/134
W7AWA/137
WØZV/214

80 Meters

VE7FPT/130
K1EFI/203
W1JR/240
W3GG/217
AA4V/178
KZ4V/165
W4VQ/233
KBØG/147

40 Meters

SM6CVX/266
W1WAI/252
KZ3H/192
AA4V/233
KBØG/235

10 Meters

DJ4XA/273
HB9RG/262
JA4JVX/230
SM6MSG/157
K1EFI/279
N1CIX/202
KA2ANF/131
KZ3H/200
AA4TV/229
AA4V/255
KZ4V/231
W4BKP/200
W4VQ/286
KB9DB/251
KBØG/201
WØHBH/214

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

Sierra Intermountain Emergency Radio Association Relays for Pony Express Rerun

By Dorothy Uebele, N7MXA

Unlike the original Pony Express (1860-61), the riders of the 1989 Pony Express Rerun were assisted by members of the Sierra Intermountain Emergency Radio Association (SIERA), as they crossed the state of Nevada.

In 1988, SIERA provided communications on a rather impromptu basis for about 70 miles of the run from Echo Summit, California, to Fallon, Nevada. The Pony Express riders were so pleased, SIERA was asked to cover the entire 463-mile Nevada segment in 1989. SIERA was prepared, as the group had previously established guidelines for sponsoring radio communications at community events.

Goals for the Rerun

The primary goal was to follow the riders and provide information about their progress. This proved to be a real endurance test, as the gallop across Nevada took the participants 60 hours of riding day and night.

Other goals included determining SIERA's equipment and personnel capabilities in the event of an emergency and to contribute to the positive reputation of the Amateur Radio Service.

SIERA's Challenge

Radio communications across the wilds of Nevada presented a significant challenge to the club members. A strong recruiting campaign netted a total of 43 amateurs who were directly involved in the communications support effort. Nevada has a series of 13 mountain ranges and valleys that run north and south, while the path of the event was from east to west. Paved roads on the Pony Express route were the exception rather than the rule.

Mobile VHF team members in visual contact with the riders used 2 meters to communicate with the portable HF stations in the more remote areas. The HF stations then relayed messages to and from the net control station in Carson Valley. This setup gave everyone involved access to information about the event.

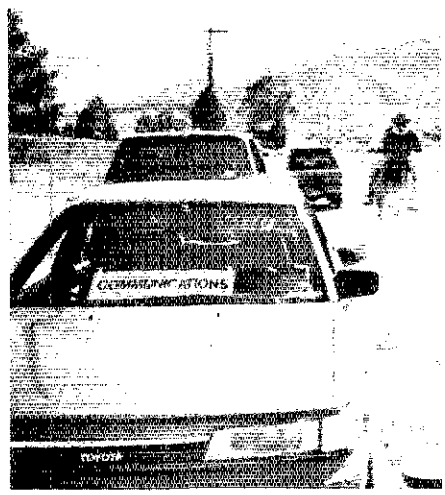
Propagation patterns changed drastically and posed a challenge to the operators. The Rerun, like the original Pony Express, operated around the clock, providing the communicators with exciting full-time tasks.

As the ride approached western Nevada, VHF communications via repeaters became more practical as a primary communications technique. Repeater trustees were extremely cooperative in allowing use of the machines. An experiment with packet radio was also part of this communications drill. Six-meter packet was employed for a remote link and gave the advantages of message accuracy and unattended operation.

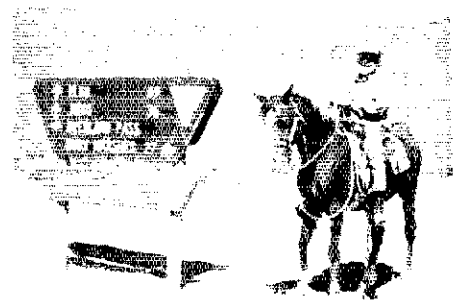
The End of the Trail

While the original Pony Express riders had to contend with Indians and bandits, today's riders dealt with cattle crossings, barbed-wire fences, automobile traffic and balky horses that don't particularly care for being loaded into trailers. At dusk, one operator reported that he had sighted a pony arriving—a comment that was quickly retracted, as the supposed pony was in fact a large deer. One wag suggested that he put a saddle on the deer, so it could carry the mail.

The exercise met its objectives. Thanks to generous and innovative amateurs, information about the progress of the Rerun was readily available to ride captains and riders. Additionally, some outstanding practice in field and community-service communications was achieved. The event also had the rewarding feature of allowing participants to contribute to the reenactment of a fascinating part of America's history.



A Pony Express Rerun rider takes off at a gallop from a radio checkpoint. SIERA members provided communications for the entire 463-mile Nevada segment of the Rerun. *(N7MMY photo)*



Ride Captain Jim Swindle takes a breather next to a trail marker. The ride across Nevada took 60 hours of riding day and night. *(N7CPP photo)*



Will Johnson, N7KLO, sitting in the back of his truck, passes along information, as the Pony Express Rerun riders await the arrival of the mail. *(W6SXX photo)*

Field Organization Reports October 1989

ARRL Section Emergency Coordinator Reports

Twenty-seven SEC reports were received, denoting a total ARES membership of 20,206. Those sections reporting were: GA, ENY, KS, KY, IA, LAX, MI, ME, MN, MO, NFL, NLI, NM, NV, OH, OK, OR, ORG, PAC, RI, SD, SDG, VA, WMA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	108	86.00	349	735
TCC Central	87	94.00	516	1063
TCC Pacific	112	90.32	535	1040
Summary	307	90.10	1400	2838
Cycle Three				
TCC Eastern	62	100.00	37	74
Cycle Four				
TCC Eastern	111	89.52	602	1183
TCC Central	84	88.40	370	655
TCC Pacific	115	92.74	561	1091
Summary	310	90.22	1533	2929

TCC Roster

Eastern Area, Cycle 2: KW1U Director. K1EIC W1FYR KA1MDM KT1Q W1QYY KW1U WB2EAG WA2FJJ W2FR NN2H WB2MNA W2MTA N2XJ N3AZW N3EMD NC3V WA3YLO AA4AT W4FRR N4GHI WB4PNY N4SS W4SQQ KA8CPS WT8L W8PMJ NJ8S K8TPF WB8YDZ W8YP VE3ORN.

Central Area, Cycle 2: NØFBW Director. WB5YDD KD5KQ WØWNJ W5YQZ NS5M K5UPN W5CTZ WØFE AE5I KFØFI KA9FEZ VE5KZ KE5ZV WA4JDH.

Central Area, Cycle 4: K5GM Director. WB5J W5JDF KM5L K5MXQ N5TC K5TL W5TFB W5TNT KB5W W9CBE NR9K W9LKN KFØFI WØCRW AIØO NRØS NBØZ.

Pacific Area, Cycle 2: ND5T Director. W5JOV KB5UL K6UYK WF6O VE7EIL KF7R K7OVK NØIA W7TGU W7IGC NØIA WAØYNP.

Eastern Area, Cycle 3: KN1K Director. N3EMD W3JKX W3OKN AA4AT WT8L K8TPF KA8WNO.

Eastern Area, Cycle 4: KN1K Director. KB1AF W1CE N1FNN W1NJM W1QYY KA1MDM KY1T KW1U W1UD W2FR W2GKZ NQ2H W2LWB W2RQ WA2SPL W2YGW W3GL WB3GZU W3PQ KQ3T NC3V N4GHI W4SQQ N4SS W4UQ K4WJR K4ZK W8BO WT8L W8PMJ N8XX VE3FAS VE3GSQ.

Pacific Area, Cycle 4: KØDJ Director. N2IC KA5NNG ND5T W6EOT K6LL WF6O W6VZT W7EB W7LG W7GHT W7VSE KA7CPT KN7B NN7H NR7E KØDJ KØSN KØTER KCØD KJØG.

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep to Area	% Rep
Cycle Two						
Area Nets						
EAN	31	522	16.80	.611	96.2	
CAN	31	666	21.48	.553	100.0	
PAN*	60	435	7.50	.549	94.4	
Region Nets						
1RN	60	248	4.13	.409	78.0	100.0
2RN	61	139	2.27	.224	91.5	100.0
3RN	31	79	2.55	.310	88.1	100.0
4RN						96.8
RN5	62	577	9.31	.451	90.0	100.0
RN6	62	106	1.71	.234		93.3
RN7	62	370	6.00	.400	84.1	96.6
8RN	62	284	4.58	.309	96.7	96.8
9RN	62	192	3.10	.267	86.3	100.0
TEN	62	555	8.95	.419	84.5	100.0
TWN	62	289	4.66	.496	81.0	93.9
ECN						83.9
Cycle Three						
Area Net						
EAN	30	124	4.13	.403	86.24	
Region Nets						
1RN						86.6
2RN	30	84	2.80	.222	98.0	83.3
3RN						100.0
4RN						76.6
8RN						90.0
ECN						83.3
Cycle Four						
Area Nets						
EAN	31	949	30.61	1.247		98.1
CAN	31	1015	32.74	1.127		100.0
PAN	31	798	25.74	1.027		87.9
Region Nets						
1RN	62	380	6.13	.516	100.0	100.0
2RN	47	125	2.66	.336	70.3	96.7
3RN						100.0
4RN	62	1332	8.94	.415	98.0	96.7
RN5	62	621	10.01	.690	84.8	100.0
RN6	62	318	5.12	.530	95.9	98.3
RN7	62	302	4.90	.598	87.9	100.0
8RN	59	259	4.39	.385	88.0	100.0
9RN	62	254	4.09	.480	91.0	100.0
TEN	62	288	4.65	.430	65.5	100.0
TWN	56	246	4.39	.402	91.7	91.9
ECN						96.7
ARN	31	77	2.48	.071		96.7

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, EPA, EMA, EWA, GA, IA, IL, IN, LA, MDC, ME, MI, MN, NC, NFL, NNJ, NH, NTX, OH, OK, OR, ORG, PAC, SC, SD, SB, SF, SNJ, STX, SV, TN, VA, VT, WI, WMA, WNY, WTX, WPA, WWA.

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 18-month period, upon sending notification to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ.

803
KK1A
551
KC9CJ
210
KF5VF
159
WG9J
151
W6VOM
150
WTØG
144
KF8AU
W7TVA
142
WA9W
WA2SPL
136
N5NZH
WA9VND
132
W4ANK
129
KDØCL
126
W2MTA
125
WB7WOW
123
WB2OWO
121
W2QNL
120
WF6O
116
N9BDL
114
KF5BL
WB6DOB
112
K5UPN
111
WØOYH
109
KI6ZH
108
WD8KQC
W4PIM
NØFOO
KI4YV
107
W9YCV
K9CNP
N5MEA
106
WA4PFK
K4ZK
WB2VUK
105
WB2ZJF
WAJDH
K4NLK
103
N3EMD
KA1GEP
WA1TBY
WT7A
W7LNE
W7VSE
102
KJ4VT
WB4WII
KA2QOO
101
WB8SYA
KD8HD
W4DWN
AG9G
NM1K
100
N5PGZ
W3FA
N7MAL
99
KW1U
W9CBE
98
N2XJ
N4KFU
KC4WN
WE2G
97
WA4EIC
W1PEX
K4IWW
W7GHT
96
W2RRX
W4CKS
NR9K
KA1GWE
N4MEJ
WB4FDT
94
NY8W
K8TVG
KC4ESG/T
KA7AID
93
K3JL
AC5Z
WB4KSG
92
N8FPN
KØBXF
KB9LT
WA2VJL
W9DM
W4JLS
KC4GCK
91
KØERM
KA9FVX
90
KAØKPY
N4EXQ
89
K8CQF
N5NAV
88
WR2E
KB5BNU
KT1Q
WD4LOO
87
KB1AF
WB4ZTR
ND2S
WA9VLC
86
KT9I
AA4ZV
85
W5CTZ
KC3Y
W1ALE
84
KC5NG
WB4DVZ
K4MTX
N2EIA
83
WT8J
KD8KU
82
WB7EMO
N3DRM
81
KA1S
KC4BHX
80
WB8R
N4FAQ
N4KSO
N7BGW
79
KM4LS
KI4QH
KD3JK
78
N4JTG
K2YAI
77
K2VX
NS9Q
WD5GKH
WAØTFC
W9HBI
76
KAØARP
WDØGUF
WA4TXT
K3RXK
WB4HRR
WA2FJJ
75
WA3UNX
KA2INE
W2MTO
AA4AT
KJ3E
NN2H
74
WT0E
N3AZW
73
NO3M
N8HSC
KA2KJF
WB5J
KB7LX
NJ3V
72
WI8J
WA2PAC/T
KAØUEQ
WA1JVV
WS7U
KB2EPU
71
N8EFB
KE2JX
WB8BGY
KA4HHE
70
KA7WFW
69
WB8YPG
N8HSC
NR3Q
NM3K
KA2ZNZ
WB1BTJ
68
N8CEI
WB4VMX
NW3K
67
N5KCL
KB5JNM
KA4FZI
W6SX
KB4CAU
66
N8FWA
K4BGZ
K3GHH
KA7WZM
KC2HJ
65
KA8CPS
WA4RUE
N4ORZ
K2ZVI
64
WA8DHB
K8JDI
KDØYL
WB2QIX
KA9QXI
63
WB5YDD
KA7EEE
KG2D
62
N6CRV
WBØZNY
KB5ADE
KJ9J
W9UMH
N4RHV
WB2OEV
61
W7LBK
N2DXP
K7LBK
NB1A
K5WOD
W2FR
60
WB8KWC
WB2FTX
KDØNH
56
N2IKR/T
52
KA6TND/T
N6FWG/T
51
N8INP/T
49
KA1RSY/T
N2DIY/T
48
KA1UCU/T
47
KA1HPO/T
45
N2EVG/T
N2JBA/T
44
KA6HJK/T
43
N6FWG/T
42
N8JYV/T
KA2UTI/T

The following stations qualified for PSHR during the month of September, but were not listed in last month's column: KA1S, N8EFB, WB8FSV, N8FWA, KD8HB, KD8KU, WD8KBW, WB8KWC, K8TVG, N9BDL, W9CBE, KC9CJ, KA9FVX, AG9G WG9J, NS9Q, W9YCV, WA9W, WT0G, NØKIA/T.

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the call sign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	802	891	1494	91	3278
WØTX	0	1502	1004	5	3012
W9ZRX	0	1166	1166	0	2332
KK1A	171	957	325	803	2256
W1PEX	13	547	1433	13	2006
WB9YPY	0	1134	118	697	1949
NØBQP	33	1088	49	730	1900
KØHOA	3	818	820	1	1642
NØFBW	0	755	755	3	1513
W3IWI	0	683	689	0	1372
KB4N	0	681	647	0	1328
WØLJF	0	640	635	0	1275
WC9CJ	14	752	46	462	1274
W3VR	319	377	521	41	1258
WA2SPL	21	609	584	36	1250
K5UPN	2	541	533	6	1082
WBØTAX	0	455	455	0	910
K4DOR	332	97	412	17	858
KF8AU	115	285	330	28	758
N4GHI	2	413	328	14	757
N8JAT	199	169	249	118	735
WF6O	12	321	361	24	718
WA4JDH	1	321	368	4	694
WA9W	10	378	298	5	682
N4HOG	0	317	317	0	634
KØYFK	31	287	318	0	631
WB6MIF	0	303	303	0	606
KF5BL	217	92	386	8	603
W5TNT	25	317	252	8	602
N3AZW	25	253	264	20	562
NR9K	17	280	240	10	547
N6DOJ	0	270	226	45	541
WA6ZUD	4	268	270	2	544
WA5EQW	0	251	42	250	543
NB3P	1	270	269	0	540
N1GMU	2	253	265	0	530
WG9J	17	182	232	9	530
K6UYK	29	234	236	5	504
WA9VND	2	212	249	40	503

BPL for 100 or more originations plus deliveries:

WB4OBC 226, K1TOY 145, WA2VJL 135, WØFIR 125, KØORB 123, W1FYR 113.

The following stations qualified for BPL during the month of September, but were not listed in last month's column: WB9YPY 2195, NØBQP 1803, WBØTAX 1454, KC9CJ 1209, KØHOA 1076, N4GHI 1069, KA1IFC 916, WG9J 809, WØLVI 789, KØYFK 656, WØLFJ 610, K4DOR 574, WA9W 564, W3ATQ 514, N4HOG 514.

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	25	249	372
Clearing House Net	31	171	243
Early Bird Net	31	201	613
Golden Bear Amateur Radio Net	31	324	1632
Great Lakes Emergency & Traffic Net	31	52	1195
Gulf Coast Hurricane Net	31	156	3523
IMRA	26	825	1588
Mission Trail Net	31	176	955
NYSPTEN	31	49	398
Southwest Traffic Net	31	244	1777
West Coast Slow Speed Net	31	90	377
20 Meter ISSBN	26	944	271
7290 Traffic Net	49	321	3390
75 Meter ISSB Net	31	579	1243

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to HCR 5 PO Box 574-334, Tierra Linda Ranch, Kerrville, TX 78028 or call 512-257-1296 to record late-breaking information.

More Ideas for Enhancing Chances for Working DX on 50 MHz

The 50.100 to 50.125 DX window seems to be working quite well, but many, including WA6JRA, already have some interesting ideas for augmenting or enhancing it. With some justification, Sam is concerned that West Coast stations will still have difficulty working Europe with East Coast and Midwest stations probably being much stronger on the other side of the pond. He notes that the same goes for Easterners trying to work into the Pacific. Thus, WA6JRA wants two additional frequencies, both in the CW subband, in an attempt to alleviate the situation. Sam proposes to designate 50.090 MHz as the CW DX calling and working frequency and 50.010 MHz for what he terms "super" DX, or "DXX." He urges that no one use 50.010 MHz for US-to-US contacts, even if they are transcontinental. Further, he asks that Europeans look for West Coast stations on 50.010 MHz. This conductor generally supports this idea but cautions that regulations in some European countries may not permit full use of this plan.

K6QXY and several other California 6-meter operators offer another suggestion. They propose that, during strong JA openings, the Japanese be worked above 50.125 MHz. It is contended that this will make it easier for everyone to hear some of the other Asian countries such as VS6, HL and BY.

In an effort to reduce some of the QRM on the 28.885-MHz liaison frequency, SMIRK suggests that crossband activity take place at 28.895 MHz and above, and that QSOs and extensive discussions be carried out at 28.875 MHz or below. This plan leaves 28.885 MHz clear for quick 6-meter propagation reports.

ON THE BANDS

For those of us in North America, October brought the first widespread 6-meter F2 openings of the fall season. While September produced scattered openings, all parts of the country benefited in October—even if only for one or two days. Probably the most notable series of openings took place between the 13th and 15th, no doubt facilitated by A and K readings of zero.

The term "notable" is an understatement, because these openings were truly historic. There have been long-path openings from southeastern US to Japan in past cycles, but they have involved only extreme south Florida. This time, much of the Southeast was in on the fun—with WE4N, Lynchburg, VA, the most northerly station that I have heard of. Ed managed a contact with JA4MBM. The western extremity was, apparently, K5CM/N5KW, in eastern Oklahoma. Connie and Pam made some dozen JA con-

2-Meter Standings

For WAS holders, listings are WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. (The U.N. does not count as a call area.) Grids are those Maidenhead designators worked since the VUCC award was instituted January 1, 1983. In order to make the standings a true reflection of current 2-meter activity, those not reporting within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of a statement indicating continued activity. It is not necessary to show additional states, call areas or grids worked in order to be relisted. Compiled November 9, 1989. Updates for next listing must be received by May 5, 1990.

* = EME used on some contacts; † = WAC.

WAS Holders

1	K0MQS*	IA	—	—	
2	K5CM*	OK	—	—	
3	N0JA*	MO	—	—	
4	K9HMB*	IL	—	—	
5	K1WHS*	ME	—	—	
6	WA4MVI*†		1	—	
7	K5JL*	OK	—	—	
8	WA9DOT*†	WI	—	—	
9	WB0ZXU*	IA	—	—	
10	K9CA*	IN	—	—	
11	W0SD*	SD	—	—	
12	K5BMG*	LA	—	—	
13	K5GW*	TX	—	—	
14	WB5LUA*	TX	23	—	
15	K4GL*	SC	23	—	
16	W0VB*	MN	14	—	
17	WB5LBT*†	LA	50	—	
18	K4PKV*	NC	—	—	
19	W0RWH*	MO	23	—	
20	W8IDU*†	MI	23	—	
21	K1MNS*†	NH	48	—	
22	WB9VEN*	IL	—	—	
23	K5FF*†	NM	18	—	
24	W5FF*†	NM	22	149	
25	W7FN*	WA	—	—	
26	W1JR*†	MA	34	162	
27	WB0QMN*	CO	—	—	
28	WB4EXW*	NC	18	—	
29	K9KFR*	IN	—	—	
30	K3VGX*	PA	—	—	
31	SM7BAE*	21	—		
32	WA7BJU*	OR	—	—	
33	VE7BQH*†	57	—		
34	W6PO*	CA	—	—	
35	WA3VSJ*	PA	27	—	
36	AL7FS*	AK	20	—	
37	WB0YSG*	NE	—	—	
38	N7NW*	WA	—	—	
39	W5LUU*	TX	—	—	
40	W4HJQ*	KY	—	—	
41	K5UGM*	TX	—	—	
42	W5UN*	TX	—	—	
43	WA4LYS*†	FL	49	—	
44	WA1JXN/7*†	MT	58	—	
45	W5JTL*	MS	14	—	
46	W0ANH*	MN	—	—	
47	WA4NJP*	GA	—	—	
48	W5HM*	NM	—	—	
49	W7CI*	AZ	26	—	
50	N5KW*	OK	13	—	
51	WB0TEM*	IA	23	—	
52	WD8FOY*	IA	23	—	
53	W0RWG*	MO	16	—	
54	WB5ERD*	TX	—	—	
55	W4WD/7*	UT	—	—	
56	KE5C*†	TX	—	—	
57	WA4COG*	AL	—	—	
58	WB9CAS*	IL	—	—	
59	W2CNS*	NY	33	—	
60	K0ALL*	ND	26	—	
61	K9XY*	WI	29	—	
62	K1FO*	CT	18	98	
63	W4DFK*	VA	—	—	
64	WD5CRK*	OK	—	—	
65	WB8PAT*	OH	39	97	
66	KX0O*†	CO	30	148	
67	W7HAH*†	MT	60	231	
68	K1BKK	VT	—	—	
69	K7KQT*	WA	—	—	
70	KB8RQ*	OH	—	—	
71	WA7BBM*	AZ	—	—	
72	SM2GGF*	—	—		
73	KD8SI*	OH	—	—	
74	K2QS*†	NY	17	—	
75	K1GVM*	MA	34	—	
76	WA9OZN*	IL	—	—	
77	WA6MGZ*†	CA	59	232	
78	WD5AGO*†	OK	38	150	
79	WD4DGF*	TN	36	174	
80	VE1UT*	NS	42	—	
81	W0RRY/5*	OK	30	—	
82	WB0VYV*	IA	—	—	
83	W5ROI*	MS	19	206	
84	WA2GSX*†	NY	27	—	
85	WA0TKJ*†	KS	51	327	
86	KB7Q*	MT	—	—	
87	AB3D*	DE	25	32	
88	KF0M*	KS	28	173	
89	WC2K*	NJ	38	233	
90	N5BLZ*	TX	—	—	
91	K0AOD*	MO	—	—	
92	WB4KNF*	TN	—	—	
93	WB0SWD*	IA	—	—	
94	W7IUV*	AZ	47	129	
95	W8RT*	KS	27	150	
96	W2PGC*	NY	23	90	
97	DL8DAT*	—	—		
98	WD9ACA*†	IL	50	—	
99	W5SUS*†	AR	—	—	
100	AF1T*	NH	24	—	
101	WB0YSG*	KS	—	—	
102	WA9KRT*	IN	—	—	
103	K9UIF*	IL	—	—	
104	W5UWB*	TX	39	—	
105	W5UWB*	TX	39	—	
106	W0VB*	MN	—	—	
107	KB3PD*	DE	21	140	
108	F6BSJ*	—	—		
109	KI3W*†	PA	58	266	
110	WA5WJB*	TX	—	—	
111	K9SR*	IL	—	—	
112	K5WE*	OK	26	176	
113	K5YY*	AR	16	264	
114	W4ZD*†	FL	66	338	

N1BUG*	ME	45	48 216
WA1OUB*	NH	41	24 155
W1AIM*	VT	39	15 103
K1KA*	NH	34	12 93
N1AIS	MA	34	12 —
W1EJ	NH	31	13 —
W1RIL	MA	30	13 74
K1SF	MA	29	11 —
K5MA/1	MA	27	11 106
WA1AYS	MA	27	10 —
K1LPS	VT	25	11 62
W1PLX	ME	24	10 76
WA1TRE	ME	24	10 58
W2RS	NJ	38	13 129
N2WK	NY	38	11 151
KE2N	NY	37	13 138
W2UAD	NY	37	13 108
WB2CUT	NJ	37	13 —
N2BJ	NY	36	13 114
K2OVS	NY	36	12 92
WA2FGK	NJ	36	11 —
K2GK	NY	35	11 124
K2LME	NJ	32	— 102
WB2ZSY	NY	31	12 107
WA2ZPX	NY	31	8 —
W2WGL	NY	28	11 82
KU2A	NY	22	9 80
WA3USC*	MD	47	25 —
WB3LJK	MD	39	14 132
W3CWG	PA	38	12 185
W3RUF	PA	38	12 112
W3ZZ	MD	37	12 135
AE3T	PA	37	12 —
WA3FYJ	PA	37	11 149
W3QTC	MD	35	11 72
K3ZO	MD	34	11 120
K3KEL	PA	32	11 76
KC4EQ*	KY	45	13 —
WS4F	GA	40	13 189
W4CPZ	SC	40	11 145
W4HHK	TN	40	9 —
K4CKS	GA	38	13 171
K4KAE	SC	38	13 110
WA4OWC	FL	38	13 —
NY4T	TN	38	12 175
W4LNG	GA	38	12 43

K4QIF	VA	38	11 —
N4MW	TN	37	12 128
KI4CI	FL	37	11 151
W8QXO/4	GA	37	11 125
W4ISS	GA	37	8 —
WD4AHZ	FL	36	14 178
KX4R	GA	36	11 143
WB4SLM	TN	35	12 127
K3ICH/4	VA	34	13 —
WA4MJD	TN	34	9 114
WD4AFY	GA	34	9 107
NA4I	GA	33	14 78
NI4Z	FL	32	9 28
K1FJM/4	FL	30	14 114
N4MM	VA	30	13 109
WA4OFS	FL	29	9 82
KK4NO	SC	28	7 57
WD4FAB	FL	26	8 103
WB4RUA	GA	24	8 86
WB7ECS/4	AL	24	7 64
KA5AIH*	TX	49	38 247
K5UR	AR	48	17 363
K5SW	OK	47	15 240
W5UGO	OK	44	12 35
W5HN	TX	43	12 —
W5NZS	OK	41	13 162
W5SXD	TX	40	11 97
W5FYZ	LA	38	11 156
WA5HNK	TX	37	10 —
NU5F	LA	35	11 135
N5BBO	TX	35	10 93
WA5IYX	TX	30	9 —
W5DFU	OK	29	9 114
KE5EP	TX	28	— 74
N5KWB	LA	22	6 114
WA7EPU/5	NM	12	5 12
N6AMG*	CA	32	37 —
K6PVS*	CA	29	22 245
K6QXY*	CA	20	14 —
WA6LHD	CA	20	9 81
WA6LHD	CA	20	7 67
W6RXQ	CA	11	5 41
W6PFE	CA	5	4 21
W7JF*	MT	47	16 —
W7RV*	AZ	44	24 169
AA7A*	AZ	29	17 168
K7ICW*	NV	25	9 120
K7ND	WA	14	6 —
K8RZB	OH	41	— —
WB8BKC	MI	40	12 170
K8AXU	OH	40	12 119
W8QXO/4	GA	38	11 138
W8NJR	OH	36	12 146
WA8NPX	OH	35	9 130
WA8EOJ	OH	32	10 144
W8RQQ	OH	31	10 116
KB9SG	MI	30	8 —
W8WVM*	WV	23	24 —
W9UD	IL	46	14 164
WB9MSV*	IL	45	14 210
NN9K	IL	45	11 201
KB9NM	WI	43	14 —
N9AQ	IL	42	13 201
WB9OJR	IL	41	9 170
K9VGE	WI	39	11 147
KD9JQ	IL	38	— 153
W9YCV	WI	34	11 131
W0UC/9	WI	31	11 131
N0AKC/9	WI	17	7 48
K0DAS*	IA	48	13 123
W0EMS	NE	48	11 —
N0LI	KS	46	15 233
WB0SIL	MO	46	13 —
KM0A	MO	45	14 278
KC0QR	NE	45	11 173
K0TLM	MO	44	11 190
KA0NNO	CO	44	— —
WB0YZN*	NE	43	18 107
K0GJX*	MN	43	12 130
W0FY	MO	43	10 124
WB0DGF	NE	43	10 85
W0IZ	IA	42	12 168
N0EOQ	CO	42	— —
KB0HH*	KS	41	14 183
W0RAP	IA	41	10 101
K0US	NE	39	11 125
WB0PW	CO	38	9 —
W0JRP	MO	35	11 142
KA0KUY	KS	31	9 121
N0AJU	NE	31	9 113
N0BTN	NE	28	10 104
WB0RJR	MO	27	8 —
W0SII/7	WY	27	— 74
K0RZ	CO	21	7 50
VE3DSS*		38	13 —
VE3FKX*		36	10 —
VE3LNX		29	11 105
VE4AQ		16	8 28
VE5LY*		31	13 92
SM0PYP*		41	— —
KG6DX*		22	— 67
SP5CJT*		11	— —

tacts during openings around 1400Z on both the 14th and 15th. Many stations farther to the south and east had many JA contacts. It is understood that VP5D, running just 10 W, worked well over 100 Japanese stations. Nor was the long path propagation limited to the southeast US. For the first time, Hawaiian 6-meter operators got a shot at Europe. KH6HI reports that, beginning at 0800Z October 14th, he worked Mediterranean stations, including 5B4AZ, ZC4MK, SV1DH, SV1AB, SV1OE and eight 9H1 stations. Bert says that the 5B4CY beacon was still in when he closed down at 1100Z. A number of other KH6s also got in on the opening, which resulted in WAC for many. No KH6 had previously been able to qualify for this award.

October 23 brought southern Africa to several areas of the country, including the West Coast. On a CQ, WA6BYA raised Z23JO in Zimbabwe, and following that, he, as well as N6AMG and K6QXY, worked ZS3AT and ZS3E. These stations were also worked by several Ohio stations an hour or so earlier. Two days later, Z23JO was again worked in Ohio and a number of southern states, including Texas.

The final days of October and the first week of November heralded widespread 50-MHz propagation throughout the world, with many additional stations claiming WAC. The openings included hook-ups between Australia and Europe, with VK6RO working about a dozen Europeans, including UK, SM and PA stations between 1030 and 1145Z November 1st. VK8ZLX is reported to have worked 13 countries in 11 days. The first week of November brought continuation of the morning European openings to much of the US, including the West Coast. To demonstrate the strength of some of these openings, K7ICW recounts that, on November 7, he heard Z23JO on his IC-502 and quarter-wave whip. Japanese stations have been heard into the central part of the country, including Texas, for several late afternoons beginning November 6. On the 9th, K6STI, San Diego, contacted G4GLT, while N5JHV and KN5S, both in southern New Mexico, could be heard working a number of Europeans.

Between October 25 and 31, W6JKV and K6MYC paid a visit to the island of Ponape in the Republic of Micronesia, taking with them a 4-Yagi array and an 800-W amplifier for 2-meter EME, in addition to their always-capable 6-meter setup. On 2-meter EME they worked W5UN, N5BLZ, KB8RQ and VE7BQH. Mike says that a poorer-than-expected site, high sky noise and the moon's close proximity to the sun prevented additional contacts.

On 6 meters, they QSOed four KL7s, six KH6s, six 9H1s, 14 VKs, one ZL, five VS6s, the western portions of the US and Canada, KG6DX and some 300 Japanese. The US contacts included 11 W7s, five WØs and four W5s. A total of five VE6s and 7s also went into the log. The most easterly station(s) worked were K5CM/N5KW. Calls used were V63JT and V63AU.

These solar-induced ionospheric conditions have not been limited to 6 meters. They have also been felt on 2 meters in some parts of the world. ZS3E has been piling up Italian contacts beginning mid-October, with most of the openings getting under way about 1830 to 1900Z. In this hemisphere, HI8W reports a 144-MHz contact with LU7FA at 0045Z October 14th.

An event of some significance in the World Above 50 MHz, which escaped my attention when reported to me last February, involves the first 23-cm WACs. This was made possible by the appearance on 23-cm moonbounce of YV5ZZ. According to the *K2UYH 432 and Above EME News*, Ed runs 150 W to a 6-meter dish. Al reports that the first station to work YV5ZZ was OE9XXI/OE9PJM, followed by OE5JFL, HB9BM, LX1DB, K2UYH, WBØQMN, WB5LUA, WBØDRL and VE4MA. This band continues to be an up-and-coming EME band.

Those who need Alaska should have an easier time of it from now on. N4LTA writes that he has shipped a beacon to AL7C in Anchorage. It runs 22 W on 50.066 MHz. The antenna is a halo at 35 feet. Not to be outdone, Hawaii has a new beacon as well. It operates on 50.074 MHz under the call KH6HI. The KH6HME beacon has also been heard on 50.062 MHz.

WB5TCO reports that he is now living in Green Bay, Wisconsin, and is back on 23 cm, after a five-year absence. Bill is running 150 W to a quad array of W1JR 45-element loop Yagis and is looking for skeds. He can be reached at 414-497-9481. So far he has worked five stations, the farthest K9UIF at 208 miles.

Flash! Several stations have apparently worked more than 100 countries on 6 meters as of last November: VE1YX, K8WKZ, K5FF, W5FF and W4CKD. More on this next month.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Radio Daze

I go to the Dayton HamVention® every year and stay in a different hotel each time—because it's harder to hit a moving target. My friends say that instead of switching hotels, I should remove my blinking call-sign badge. Little do they know that it's bullet-proof!

Dayton Wish List

Weeks before Dayton, I make a list of things I need. I also save my major equipment purchases for Dayton because I can usually get a good deal there. The years I drive, I come back with two packages of wire-wraps and a spool of electrical tape, and the years I fly, I come back with tons of stuff.

In '89, my major purchase was a 220-MHz radio. My old circa-1975 model still worked, but lacked a Touch Tone pad, a PL synthesizer, memory, scanner, and was too big to fit under my car's dashboard (see January 1988 FM/RPT for my tale of woe trying to install that radio in my car). Its receiver was dying and its transmitter was weak. So, with cash burning a hole in my pocket (cash is recommended for the best deals at the Dayton), I literally hopped-scotched my way to Ohio.

As soon as I arrived, I began comparison shopping. The best deal I found was a cash-only dealer who had three units of the model I wanted at $75 less than the next best deal. I soon handed over the cash and took away the radio.

It was a beauty! With 25-W output, it covered 215-230 MHz as well as the whole 220-MHz ham band (now I will know when UPS is in my neighborhood). To top it off, it also covered 2-meters with 45 W out on that band. I could receive on both bands simultaneously, or transmit on one band while receiving on the other. The front panel had 22 controls, and five were dual function. Its microphone had PTT, a Touch Tone pad, and two buttons that controlled the operating frequency. Thirty memories waited to be programmed. This radio had more bells and whistles than the Banana Man!

The Moment of Truth

Now, for the moment you've been waiting for: installation in my road warrior. The new radio was smaller than my old one and I thought that I'd have no problem installing it in my car. Wrong! There's not much room under that dashboard and the only place it would fit was under the extreme left end of the dash, next to the door, right above the driver's left foot. The initial two-hour installation was almost a washout because there wasn't enough clearance for my foot to reach the clutch pedal. However, drilling a new set of mounting holes achieved the correct amount of clearance.

All was well until I hit the road. I had to take my eyes off the road to see the front panel, yet, the panel was so full of controls and their designations so small, that I kept pushing the wrong buttons.

The best location for the new rig is on top of the dash in front of the steering wheel, where it would be clearly visible to the driver. But I don't have to tell you the problem with that installation: someone would quickly break in and take the radio for a long walk.

I like my radio and I've considered ripping out the in-dash AM-FM radio and trying to squeeze the ham radio in there. Rock 'n' roll hasn't been the same since Buddy Holly died, so I wouldn't be missing much music-wise, although I would miss the Sox games. On second thought, maybe I'll rip out the in-dash tape player and stick the ham radio in its vacant spot.

I'll think of something!

• *At the Foundation*

Rocketing Into the Nineties

By Mary E. Schetgen, N7IAL
Secretary
The ARRL Foundation

The Officers and Directors of the ARRL Foundation extend their sincerest thanks to all Foundation supporters. Through your outstanding interest and contributions, we've seen growth in programs to serve ARRL members and the greater Amateur Radio community. The new decade will offer more opportunities for the advancement, enhancement and preservation of Amateur Radio thanks to YOU! We appreciate your continued support. Best wishes for an exciting New Year and beyond!

The start of a new decade, especially one that will close out the most progressive century in man's history, brings out our feelings of hopeful anticipation and wonder. As hams, we look forward to innovation in our beloved hobby. We scan the pretty advertisements and study the product reviews to learn what current and coming technology will grace our ham shacks, autos or briefcase. A trip to the nearest ham radio store reaffirms our conviction that we are active participants, as we have been for decades, in the constantly evolving world of radio communications. We are justifiably proud of our voluntary contributions to this evolution—for the basement tinkerers and ham club whiz kids—are among the true unsung heros in this, the century of communications development.

The upcoming Shuttle Amateur Radio Experiment (SAREX) scheduled for April will provide another opportunity for hams to get involved in space-age communications and perhaps, even more importantly, we'll be putting out the signal to schools all over the US in a way that will bring the general public's attention around to where we are today and where we're going. It's no small feat. You'll be reading in this and other publications about your role in making SAREX the best Amateur Radio public awareness vehicle ever. It's a participatory experiment in Amateur Radio communications for hams and literally millions of non-hams.

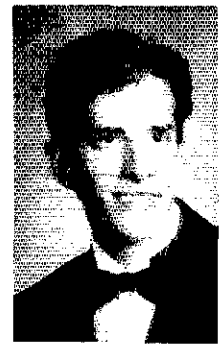
Stay tuned to *QST* for full details on how to join in. Also, support the ARRL Foundation with a contribution to the SAREX Fund. Every dollar contributed will help strengthen our SAREX support for this and future missions.

DEEP IN THE HEART OF...KANSAS

There's more growing in Kansas than wheat. America's heartland is yielding an ever-increasing crop of benefactors—folks committed to seeing that their regional youth get as many educational opportunities as possible. So, it should come as no surprise that a new scholarship for 1990, sponsored by Irving W. Cook, WAØCGS, will be available for Kansas students this coming autumn.

If you or your group feel the tug to help students in your region, why not follow the leads underway in Kansas and New England and contact the Foundation about establishing a regional scholarship. We're available to answer your questions by calling 203-666-1541 ext 230 or writing: The ARRL Foundation, 225 Main St, Newington, CT 06111.

Meet two more of our 1989-90 academic scholarship recipients: Jonathan J. Vidal, N3GIU—The You've Got A Friend In Pennsylvania Scholarship—$1000 and David A. Stein, KD2ZE—The Dr James L. Lawson Memorial Scholarship —$500.





Contributor's Corner

We wish to thank the following for their generous contributions to:

The Victor C. Clark Youth Incentive Program Fund
Arthur P. Samuelson, W6VV
in memory of Charles Buckter, W6BOW
Elsie A. Watts
in memory of Charles Buckter, W6BOW

The Irving W. Cook Scholarship Fund
Irving W. Cook, WAØCGS

The Paul and Helen L. Grauer Scholarship Fund
Central Kansas ARC (KS)

The Bill Bennett, W7PHO Memorial Scholarship Fund
Patricia Forman-Meeks, KS7L

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W. Raymond Burrows, WA2FLT
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David Robinson, W1NEB
Edward F. Tindall, KC5ZW
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Leonard M. Wilhelm, WA8FZW
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Robert C. Paulsen, W2KPZ
William L. Scarborough, WA6ASI
Mary W. Glen, KB7BRU
W. Raymond Burrows, WA2FLT
Neil Sandberg, N5NBW

As received and acknowledged during the month of **October.**

THE ARRL FOUNDATION, INC.
"for the advancement of amateur radio"

Amateur Satellite Communications

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

The 90s Begin

So—now we begin the 90s with all the expectations that turning this large symbolic page connotes. Over the next few installments of this column, I'll try to provoke your imagination regarding where the Amateur Radio satellite field may be heading. For now, there are a few issues from the previous decade that need to be cleaned up before we can freely look ahead.

First, as you may have noted, this column has become aperiodic. Because of constraints on total page count, *QST* must carefully modulate the volume of its contents. This column will serve as an elastic buffer to work with other components of each issue to ensure that page count objectives are met.

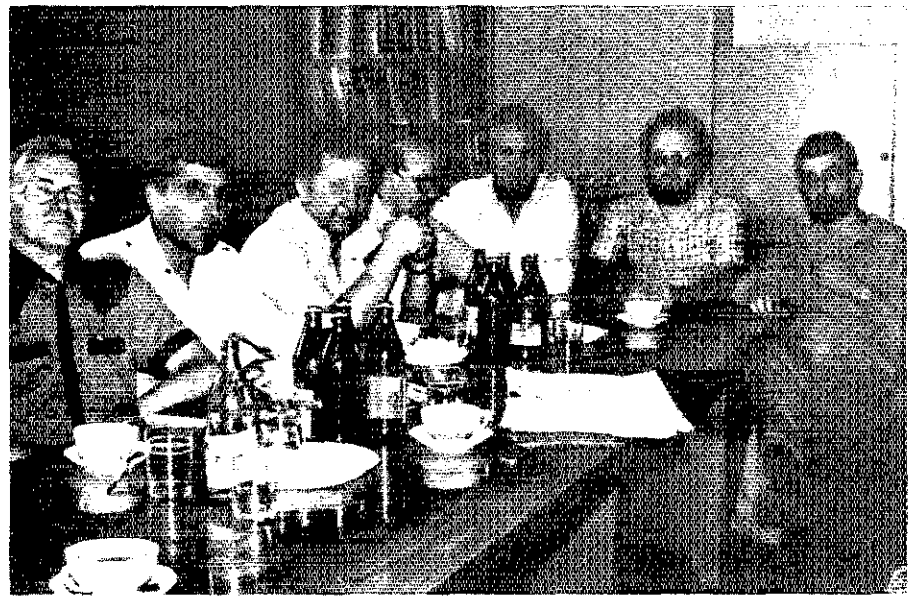
Second, as expected, UoSAT OSCAR 9 has expired. After a remarkable 8 years and 1 week of service—after 44,761 orbits—UO-9 fell from orbit on October 13, 1989, at approximately 07:51:30 UTC. UO-9 probably impacted in the South Pacific half way between New Zealand and South America. The estimated impact points were 49.2° S, 220.9° E and 46.4° S, 220.0° E according to Max White at the Royal Greenwich Observatory in England. There were two impact points noted, suggesting the spacecraft broke into two major pieces as it disintegrated.

The winner of the Chicken Little 3 contest is Doc Emerson, W4ITJ, who figured the impact to be October 13, 1989, at 10:14 UTC, an error of about +2.3 hours. The next best guess was proffered by Jeff Yanko, WB3JFS, who estimated October 13, 1989, at 19:01:22 UTC, an error of about +11.15 hours. Congratulations to the winners of CL-3!

Finally, last year the pages of *QST* carried a series of articles on Amateur Radio in the Soviet Union, written by Jim Cain, K1TN.[1] The series did much to illustrate the new openness (Glasnost) now evident in the USSR. I was fortunate to make several business trips to the USSR in 1989. On one occasion, I had the honor of being a guest at the RS3A satellite command station in Moscow. Later the same evening, I took part in a meeting of the Moscow Radio Club. Knowing that a picture is worth a thousand words, and with the realization of the number of square inches of paper allocated to this column, here is a choice vignette from Moscow and the very pleasant hours I was privileged to spend with our Soviet colleagues last year.

[1] J. Cain, "Tune in to Glasnost," Part 1, *QST*, Sep 1989, pp 41-46; Part 2, *QST*, Oct 1989, pp 44-48; Part 3, *QST*, Nov 1989, pp 48-50; Part 4, *QST*, Dec 1989, pp 44-46.

For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT at 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include a business-size SASE.



A meeting at the main RS satellite control station in Moscow brought together RS3A leadership and guests including (left to right): Leonid Labutin, UA3CR; Valery Salenko, DOSAAF (the Voluntary Society for Assistance to the Army, Air Force and Navy); Boris Stepanov, UW3AX (Deputy Editor-in-Chief of *Radio Magazine*); Vladimir Eraksin, DOSAAF; Vladimir Lyuban, DOSAAF; Leonid Maxakov, RA3AT, and Michael German (no call).

Strays

UNITED NATIONS ASSIGNS CALL TO WORLD BANK

☐ The United Nations has granted the call sign 4U1WB to the World Bank Amateur Radio Club. The station is located at the bank's headquarters address at 1818 H Street NW, Washington, DC. The station features a tribander, dipoles and operation on 80 through 10 meters with 1-kW capability. Club members will operate the station with the emphasis on weekends and weekday lunch hours. Contacts with 4U1WB count as the United States for DXCC purposes. Direct QSL cards with SASE to the address above or via the bureau to manager KK4HD.—*Paul Vander Eijk, KK4HD, President, WBARC*

QST congratulates...

☐ Peter Kemp, KZ1Z, on being chosen Technology Educator of the Year by the New England Association of Technology Teachers. The award followed on the heels of Pete being named Connecticut Industrial Technology Education Association Teacher of the Year. Peter is an ARRL registered instructor and Educational Advisor, was 1983 ARRL Instructor of the Year and Central Connecticut State University Alumni Association's Outstanding Teacher of the Year. He supervises 6-8th grade curriculum development for industrial arts at Bethel Middle School, heavily incorporating Amateur Radio into the program. He licenses approximately 50 young Novices each year.

I would like to get in touch with...

☐ anyone who has a schematic for converting a Gonset Super 6 shortwave converter to solid state. Richard Cosma, KA1NRW, 14 Temple St -E308, Framingham, MA 01701.

On Line

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Winter Wonderland of Software

My mailman does not disappoint me. Every week he brings me more software to try out and write about. For this installment of On Line, he has delivered an interesting variety of software for the Apple® Macintosh®, Commodore 64™, MS-DOS® and Tandy® Color computers.

Apple Macintosh

FDLog!

A new version of FDLog! (mentioned in October 1989 On Line) allows users to abort CW transmissions after a keyer memory has been sent. The new version is available for $29.95 from System One Control, 3900 85th Ave N, Suite 200, Brooklyn Park, MN 55443.

Commodore 64

Super Log

Super Log is a logging program that uses sequential files of log data. Each log file can contain a maximum of 200 entries and can be printed in order of entry or alphabetically based on call sign suffixes. The program also provides color preferences, an on-screen 24-hour clock, full documentation and disk directory listings. It has been compiled in machine language and runs "very fast." Super Log is available for $9 from Scott Cundiff, N5ASD, 108 Northside Dr, Vivian, LA 71082.

Super Net/Quick Search Documentation

Early shipments of Super Net and Quick Search, mentioned in July 1989 On Line, did not include documentation. Documentation is now available and may be obtained by sending an SASE to Scott Cundiff, N5ASD, at the address above. By the way, Version 2 of Super Net has been compiled and is also available from N5ASD.

MS-DOS Computers

Amateur Radio Log Database

Amateur Radio Log Database is a multifunction logging program that provides a "regular" logging function with real-time duping, editing and printing; a "contest" logging function that includes all of the regular logging functions plus automatic generation of QSO numbers and the creation of dBase® III+-compatible files; and a "master" logging function that creates a "master" log from the regular and contest logs, and prints QSL labels, logs, award applications, and so on. The program is available for $25 from Don Greenbaum, WB2DND, 250 Standish St, Duxbury, MA 02332.

HandyCODE AR

HandyCODE AR is truly unique. Instead of using a keyboard to input data to your computer, you can connect a CW keyer to a parallel port of your computer and input data as Morse code. While writing a report with WordStar® or entering numbers into Lotus® 1-2-3, you can be improving your CW skills as well!

Morse did not create his code with a computer keyboard in mind. This software, however, makes up for the code's shortcomings by supporting the keyboard's extra keys as well as any user-defined commands. Macros are supported as well.

It was a lot of fun using Morse code as input to a computer. It improved my CW sending skills, especially in regard to accuracy. The program operates from 1 to 99 WPM. In order to be accurate, I quickly switched to the low end of that range before increasing my speed.

HandyCODE AR provides on-line help, the capability of outputting data to a speech synthesizer and includes a code practice utility to improve your CW skills in preparation for going on the firing line with 1-2-3, dBase, and so on. The program runs on IBM® PC, PCJr,® XT, AT, PS/2® or compatible computers and is available for $149 from Microsystems Software, Inc, 600 Worcester Rd, Suite B2, Framingham, MA 01701.

MN Antenna Analysis and YO Yagi Optimizer Software, Version 2.0

Version 2 of MN and YO, whose previous versions were described in On Line in May 1988 and June 1989 respectively, are now available. MN analyzes antennas made of wire or tubing. New features include faster analysis of symmetrical free-space antennas using 254 analysis pulses, which doubles the model capacity and allows modeling of complex antenna systems having up to 150 wires; faster analysis of antennas over ground; new plotting features with zoom capability; enhanced color and improved plot printouts.

YO optimizes Yagi-Uda antenna designs for maximum forward gain, best pattern and minimum SWR. Its new features include a gain—F/B—SWR trade-off mechanism, antenna optimization across a frequency band, minimization of rear or side lobe patterns using peak or average side lobe power, full EGA color and enhanced printing and plotting functions. MN is available for $75 postpaid (previous owners may upgrade for $50) and YO is available for $90 postpaid (upgrades are $60) from Brian Beezley, K6STI, 507½ Taylor St, Vista, CA 92084.

Ten-Ten Number/Bar Reporting and Paper Chasing

Ten meters is wide open these days and Ten-Ten number chasing is more popular than ever. To keep track of your Ten-Ten numbers, two programs are available. Ten-Ten Number and Bar Reporting can maintain 2500 Ten-Ten records on one diskette without duplicating records. Records may be searched by number or call sign, and may be edited or deleted. The companion program, Ten-Ten Paper Chasing, is intended to perform the record-keeping chores for local Ten-Ten chapters. The programs are available from Al Longo, NN1J, 20 Primrose Rd, Bristol, RI 02809 for $28 postpaid (for both programs).

Total Ham

Total Ham is a logging and duping program that also provides beam headings, countries and states needed/worked check lists, QSL manager list and QSL status information. Contest, net and normal logging is supported. It is recommended that the program be used on either a hard disk or a floppy disk with greater than 360-kbyte capacity. Total Ham is shareware; registration costs $25. The software is available from Dick Miller, WD4AZG, PO Box 1566, Manassas, VA 22110.

WJ2O Master Log

WJ2O Master Log is a "log database" that provides user-adjustable colors and monochrome compatibility, the transfer of data from other sources such as Lotus 1-2-3, QSL card tracking and printing, WAS, DXCC, and WPX reporting, a net operations section, search and scan capability, easy step-by-step menus, instant data retrieval, help utilities, selectable printouts, global data adjust and a fine manual. WJ2O Master Log is available for $29.95 from Dave Farnsworth, WJ2O, PO Box 16, 2945 Main St, McConnellsville, NY 13401.

Tandy Color Computer

CoCoPACT/CoPACT3

CoCoPACT/CoPACT3 are two full-featured terminal programs designed for amateur digital communications using the Tandy TRS-80® Color Computer 1, 2 or 3 and a TNC or multimode controller. The software features split-screen operation with received data displayed in the upper screen and local keyboard data displayed in the lower screen. Special handling of TNC control codes, stream/channel switches and other TNC functions are provided to simplify control of the TNC. The programs include a 40-kbyte QSO buffer and ten user-definable macro keys. A built-in editor can be used to create and edit incoming and outgoing data off-line.

CoPACT3 is intended for the Color Computer Model 3 only, and features an 80-column display, an additional 24-kbyte transmit buffer and a selectable 2400-baud serial-port data rate. The programs are available on disk or tape from Monty W. Haley, WJ5W, Rte 1, Box 210-B, Evening Shade, AR 72532 for $21.95 postpaid (for both programs).

IARU News

Conducted By Richard L. Baldwin, W1RU
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The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

CCIR Celebrates 60th Anniversary

The CCIR (International Radio Consultative Committee) celebrated its 60th anniversary at ceremonies held in the International Conference Center of Geneva on October 5, 1989. Each of 65 distinguished participants in the work of the CCIR received a *Diplome d'Honneur* for his or her long-term contributions to the work of the CCIR. There was an address by CCIR Director Richard Kirby, WØLCT. And, as is customary at events like this, there was a anniversary lecture, "Radio Propagation in Bad Weather," by Dr J. R. Norbury of the United Kingdom, which related to the effects of rain and other precipitation on microwave links. After the speeches and presentations, there was a lavish reception for all of those who had received invitations, of which, IARU was one.

Of the 65 persons who were honored at the ceremonies, six were radio amateurs.

Rudolf Binz, DL3SO, of the Federal Republic of Germany, was honored for his contributions to Joint CCITT-CCIR Study Group on Vocabulary 1961-1970.

Herbert Blaker, K4KDY, of the United States, was honored for his technical contributions to, and leadership of, CCIR studies on the mobile, radiodetermination and amateur services, and on the fixed service below 30 MHz.

Eberhard George, DL7IH, of the Federal Republic of Germany, was honored for his sustained contributions to, and leadership of, CCIR studies in CCIR Study Groups 1, 3, 7 and 8 since 1972; Vice-Chairman and Chairman CCIR Study Group on mobile and amateur services, 1978-1986 and since 1986 respectively.

Olof Lundberg, SMØCKV, of Sweden, was honored for his sustained technical contributions to and leadership of CCIR studies of radio systems in the maritime mobile service and the maritime mobile-satellite service.

Dr Harold Dougherty, WB2MII, was honored posthumously for his technical contribution to, and his leadership of, CCIR studies on propagation in nonionized media.

James Potts, W5CWE, was honored for technical contributions to CCIR studies on the fixed-satellite service, particularly on the efficient use of the geostationary orbit.

The CCIR is the arm of the International Telecommunication Union that studies various technical questions in preparation for World Administrative Radio Conferences, among other functions. It develops the technical foundation on which many decisions at World Administrative Radio Conferences are made.

The CCIR is, for reasons of practicality, divided into a dozen or so study groups, each of which addresses some particular area of the science. Some study groups deal with television; others with sound broadcasting, mobile services, radio relay systems and so on. The study groups that deal with propagation and, inter alia, Amateur Radio are of particular interest to the amateur and amateur-satellite services.

Product Review

(continued from page 43)

and wide/narrow AM filters make for a versatile general-coverage receiver as well.

I do have two complaints about the IC-781: (1) Its fan, which comes on any time the radio is switched into transmit (and usually after 5 or 10 minutes of receive-only use), is noisy. It's not too much of a problem when you're wearing headphones, but it's annoying in a quiet room. (2) Some of the labels on front-panel push buttons are screened on—not engraved. Consequently, the labels on the often-used **CHANGE** and **XFC** buttons on the review radio have worn off during the review period, leaving shiny, unlabeled keys. ICOM should be able to do better here.

If you've read this far, you've probably guessed that I really like the IC-781. Although it's got a lot of bells and whistles—many of which I don't use a whole lot—the basic radio performance is outstanding. That's what really matters to me. Most hams (including me) won't be spending $6000 for an IC-781, so I'll be especially interested to see if some of its solid basic performance trickles down to less-expensive models like the IC-765.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns.—*Ed.*]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices.

Henry Tempo 3002A 144-MHz linear amplifier, s/n 60-162 (see Product Review, November 1989 *QST*). Minimum bid: $1645.

Sealed bids must be submitted by mail, and must be postmarked on or before January 27, 1990. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, please clearly identify the item you wish to bid on, using the manufacturer's name, model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send bids to Kathy McGrath, Product Bids, ARRL, 225 Main St, Newington, CT 06111.

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. 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 of any kind and games of chance such as bingo.

†**California (Monterey)—January 20.** *Sponsor:* Naval Postgraduate School ARC. *Time:* 9 AM-3 PM. *Place:* Hwy 1 (from north take Casa Verdeway exit, from south take Fremonte St, and turn right on Casa Verdeway). *Features:* demonstrations of ham radio modes, flea market ($10 per space), ham QLF and nonham CW contests. *Talk-in:* 146.37/97 K6LY repeater. *Admission:* free. *Contact:* D. L. McKinney, 408-663-6117.

†**Florida (Cape Coral)—January 20.** *Sponsor:* Fort Myers ARC. *Time:* 9 AM-4 PM. *Place:* Moose Lodge Hall #2199, 4.8 miles west from SR 41 on Pine Island Rd, on right side. *Features:* forums, computer displays. *Talk-in:* 146.28/88. *Admission:* $4. *Contact:* c/o M. M. Cornwell, N4PSU, PO Box 4814, N Fort Myers, FL 33918-4814, 813-275-5410.

†**Florida (Crystal River)—January 20.** *Sponsor:* Sky High ARC. *Time:* 9 AM-4 PM. *Place:* National Guard Armory just off US 19 in Crystal River, turn east at traffic light south of Crystal River Airport on Seven Rivers Dr to building. *Features:* VE exams 1 PM, forums, refreshments, tailgating area, free parking. *Talk-in:* 146.355/955. *Admission:* $5. *Contact:* Wendell Quinney, N4LNR, 9231 E Moccasin SL, Inverness, FL 32650, 904-344-5631.

†**Florida (Miami)—February 3-4.** *Sponsor:* Dade Radio Club. *Time:* Saturday 9 AM-5 PM, Sunday 9 AM-4 PM. *Place:* Youth Fair Expo Ctr, FL Turnpike exit to SW 8 St, exit east to 107 Ave, South to SW 24 St, west to entrance. *Features:* exhibits, forums, on-site campground with hookups. *Admission:* advance $5, door $6. *Contact:* Evelyn Gauzens, W4WYR, 2780 NW 3 St, Miami, FL 33125, 305-642-4139.

Illinois (Villa Park)—January 28. *Sponsor:* Wheaton Community Radio Amateurs. *Time:* 8 AM-3 PM. *Place:* Odeum Exposition Ctr. *Talk-in:* 144.79/145.39. *Admission:* advance $4, door $5. *Tables:* all tables reserved. *Contact:* 312-629-8006.

†**Louisiana (Hammond)—January 20.** *Sponsor:* Southeastern Louisiana University ARC. *Time:* 9 AM-4 PM. *Place:* Southeastern Louisiana University. *Features:* refreshments, dealers, technical forums, VE exams. *Talk-in:* 146.40/147.00. *Admission:* free. *Tables:* first table free, extra tables $5. *Contact:* preregister $4.35 to SELARC, Don McEwan, W1IDK, PO Box 1324, Hammond, LA 70404.

Massachusetts (Lexington)—January 13. *Sponsor:* Minuteman Repeater Assn. *Time:* vendors 8 AM, public 9:30 AM-2 PM. *Place:* Westboro Senior High School. *Talk-in:* 146.01/61, 444.925/449.925. *Admission:* $2, $1 after 1 PM. *Tables:* 4-ft, $8 advance, $12 door, 4-ft floor space $4 advance, $8 door. *Contact:* Andrew Morrison, N1BHI, Minuteman Repeater Assn, PO Box 2282, Lexington, MA 02173.

Michigan (Southfield)—January 21. *Sponsor:* Southfield High School ARC. *Time:* exhibitors 6 AM, public 8 AM-3 PM. *Place:* Southfield High School, 24675 Lahser. *Features:* parking, refreshments. *Admission:* $4, children 12 and under free. *Tables:* $12 for one 8-ft table (reserved and paid in advance). *Contact:* Robert Younker, Southfield Senior High School, 24675 Lahser Rd, Southfield, MI 48034 (answering machine for further info, 313-746-8675).

†**New York (Yonkers)—January 21.** *Sponsor:* Metro 70 cm Network ARC. *Time:* setup 8 AM, public 9 AM-3 PM. *Place:* Lincoln High School, Kneeland Ave, off Yonkers Ave, at St John Ave, right turn onto Theresa Ave, left onto Kneeland Ave. *Features:* refreshments, ham gear, VE exams, free parking, frequency checks. *Admission:* $3. *Tables:* $12 each. *Talk-in:* 440.425/445.425, PL 67.0, 146.31/91 *Contact:* Otto Supliski, WB2SLQ, 53 Hayward St, Yonkers, NY 10704, 914-969-1053.

†**Ohio (Mansfield)—February 11.** *Sponsor:* Inter-City ARC and Mansfield Amateur Service Emergency Repeater Inc. *Time:* 7 AM. *Place:* Richland County Fairgrounds. *Talk-in:* W8WE 146.34/94. *Admission:* advance $4, door $5. *Tables:* advance $7, door $10 if available. *Contact:* send SASE to Dean Wrasse, KB8MG, 1094 Beal Rd, Mansfield, OH 44905, 419-589-2415 after 4 PM (advance ticket/table orders must be received and paid by February 1, 1990).

Ohio (Middletown)—January 20. SWOH Digital Symposium. *Sponsors:* Engineering Technology Department, Miami University, Middletown DIAL RC, Ohio Packet Council, Cincinnati Buckeye Netters. *Time:* 9 AM-4 PM. *Place:* Thesken Hall, Miami University-Middletown Campus, exit 32 off I-75 to SR 122, west to Breiel Blvd, at fifth traffic light turn right (north) on Breiel and follow to the seventh traffic light, then turn left. *Features:* refreshments, networking plans and progress, BBS software and SYSOPs sessions (AMTOR, RTTY and CW), manufacturers' exhibits, demonstrations. *Talk-in:* 146.01/61. *Admission:* free. *Contact:* Hank Greeb, N8XX @ KC8TW.OH.USA, Compuserve 72277.706, 513-385-8363 (after 6 PM), 6580 Dry Ridge Rd, Cincinnati, OH 45252.

Ontario (St Catharines)—February 3. *Sponsor:* Niagara Peninsula ARC. *Place:* CAW Hall, 124 Bunting Rd. *Features:* dinner, dance. *Talk-in:* 147.24/84. *Admission:* $3. *Tables:* $12 commercial, $5 noncommercial. *Contact:* NPARC Inc, PO Box 692, St Catharines, Ontario L2R 6Y3, 416-682-4844.

†**South Carolina (Greenwood)—January 20.** *Sponsor:* Greenwood ARS. *Time:* 8 AM-5 PM. *Place:* Civic Ctr, Hwy 72 east. *Features:* flea market, refreshments, VE exams. *Talk-in:* 147.765/165. *Admission:* advance $3, door $4. *Contact:* for reservations Eldora Keck, 152 Cherokee Dr, Greenwood, SC 27646, for info Earle Gillian, 405 Draper St, Greenwood, SC 29646, (D) 803-229-3176, (N) 803-223-4436.

†**Virginia (Richmond)—January 14.** *Sponsor:* Richmond Amateur Telecommunications Society, Inc. *Time:* 8:30 AM-3:30 PM. *Place:* Virginia State Fairgrounds (Exhibition Hall), convenient from I-95, I-295, I-64. *Features:* VE exams (10:30 AM). *Talk-in:* 146.28/88, 144.83/145.43. *Admission:* $5. *Tables:* 8-ft table included $10, commercial spaces 8-ft table $20 first space, $15 each additional. *Contact:* for tickets and reservations Mark Huff, WA4DHY, 804-747-0227 (7 PM-10 PM), other info Bill Mason, AB3P, 804-745-5822.

Wisconsin (Waukesha)—January 13. *Sponsor:* West Allis RAC. *Time:* 8 AM-3 PM. *Place:* Waukesha Co Expo Center Forum, I-94 to Co J, south to FT, west to Expo. *Features:* packet radio meeting, VE exams 9 AM, at the Red Carpet Lanes across the street from Expo Ctr, refreshments. *Admission:* advance $2, door $3. *Tables:* 4-ft $3 in advance, $4 at door, additional 4-ft $4 in advance, $5 at door, electrical outlet $5 as available (advance reservation deadline January 5, 1990). *Contact:* send SASE to WARAC SWAPFEST, PO Box 1072, Milwaukee, WI 53201.

†ARRL Hamfest

Coming Conventions

February 17-18
Southern Florida Section, Sarasota

February 24-25
Great Lakes Division, Cincinnati, Ohio

ARRL NATIONAL CONVENTIONS

June 8-10, 1990—Kansas City, Missouri

August 23-25, 1991—Saginaw, Michigan

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.

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 are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not 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, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext. 283.

Strays

I would like to get in touch with...

☐ anyone who has info on speed keys made by E. O. Jones. Lynn A. Burlingame, N7CFO, 15621 SE 26th St, Bellevue, WA 98008.

☐ hams who are interested in the Raman Catholic Tridentine Mass, under the 1962 Missal. Al Arbogast, WA4AZY, 2908 Middlesex Ct, Lexington, KY 40503.

☐ anyone having info about the Sherlock Holmes Wireless Society. John R. Knott, W1HLE, 701 Oaknoll Dr, Iowa City, IA 52246.

SUNCOAST SENIORS BROCHURES AND POSTER EXPERIENCES

☐ Have you working with the recruitment of senior into Amateur Radio and are using ARRL's Project Suncoast Seniors "tools ?" The tools included brochures and posters aimed at senior citizens and a new-ham recruitment guidebook. Please drop a note about your experiences and activities to ARRL Educational Activities Branch.

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

N1AWO, Richard Fuller, Jr. Pawtucket, RI
WB1EOU, James W. Plamondon, Worcester, MA
W1OKI, Lawrence F. Smith, Sudbury, MA
KA1RJT, William W. Martin, Sr, Durham, CT
A11S, Bruce Terrell, Pittsfield, MA
WA1STR, Robert W. Menzies, Danvers, MA
K1WO, Aurel J. Doucette, Somerset, MA
WA1YCJ, Jackson A. Shedd, Wells, ME
W1YXJ, Waldo W. Guy, West Dennis, MA
WA1ZOF, Herbert H. Stone, Stoughton, MA
W2BSR, Arthur M. Braaten, Riverhead, NY
WA2FTR, Luther G. Schimpf, Holmdel, NJ
WB2HCT, Clarence R. McCormack, Lawtons, NY
W2ILQ, Earl J. Smith, Locke, NY
W2KFY, John E. Capazzi, Millville, NJ
K2LCU, Robert M. Akin, Jr, Ossining, NY
W2RTW, John M. Mulligan, Elmira, NY
K2TVR, Ernest Lamb, Charlotte, NC
K2VKP, Edmund A. Polik, Buffalo, NY
WA2YNT, Robert P. Means, Vincentown, NJ
WA2ZQP, Vincent Faulkner, Arkport, NY
W2ZXM, Henrik Kurt Carlsen, Woodbridge, NJ
W3BDF, Paul D. McReynolds, Feasterville, PA
WA3CIG, Lewis P. Scarborough, Mercersburg, PA
K3LXN, Stephen J. Johnson, Elkton, MD
W3OJM, Ramond A. Hartman, Emsworth, PA
W3OLU, Clarence L. Kerr, Belle Vernon, PA
W3QVY, Fredrick E. Broad, New Milford, PA
W3UHL, Harold J. Nearhoof, State College, PA
K3WN, Kenwood F. Stark, Oakland, MD
*WA4AGN, Rodney V. Adams, Oriental, NC
W4CBT, Robert T. Keys, Coumbia, SC
K4EDE, Richard W. Thwing, Sr, Columbus, NC
W4GAA, Thomas J. Blalock, Tallahassee, FL
WA4GEC, Roy T. Hardin, Kingsport, TN
N4IIC, Albert S. Evans, Hampton, VA
K4IKI, Julius E. Tangel, Vero Beach, FL
WA4IOP, J. Carl Williams, Savannah, GA
K4MIG, Ronald C. Marze, Cayce, SC
KA4NFW, Keith V. Landes, Englewood, FL
W4NM, Francis V. Kohl, McLean, VA
N4OEN, Jane O. Hill, Monteagle, TN
W4OHZ, William B. Sanderson, Elizabeth City, NC
K4PIK, Benjamin A. Morgan, Jr, Jekyll Island, GA
N4QHL, Cliff Grubbs, Newnan, GA
KB4QLN, Fogle C. Clark, Long Beach, NC
KE4RX, Paul J. Skidmore, Kingston, TN
KB4RZD, Dalton L. Copeland, Memphis, TN
W4SOO, Robert W. Van Buskirk, West Palm Beach, FL
K4YID, H. Aubrey Lewis, Ellenwood, GA
W5CC, H. V. Shepard, Denton, TX
W5DE, Arch M. White, Artesia, MS
W5FZ, Walter E. Clayton, Socorro, NM
W5LDV, Ervin L. Chicoine, Houston, TX
W5QDX, C. M. Bartholomew, Austin, TX
W5RUY, Eugene M. Hopkins, Albuquerque, NM
KE5WU, Richard A. Bellah, Childress, TX
W6BOW, Charles L. Buckter, San Francisco, CA
W6BYH, Leon W. Brammer, Delano, CA
WA6DPU, Harold Sammuli, San Diego, CA
W6FMW, Carlton T. Nickell, Woodland, CA
W6FN, Kenneth L. Klippel, Carlsbad, CA
KE6GK, David R. Huxford, Antioch, CA
KD6GV, Wallace H. Honeywell, Citrus Heights, CA
K6JYA, Eric N. Wyland, San Diego, CA
N6KFD, Robert, M. Lefever, Ventura, CA
KA6KNJ, Henry P. Dowsi, Pacific Palisades, CA
W6NB, James E. Wilson, Sun City, AZ
W6PFT, Lester P. Frost, Placerville, CA
N6TQG, Frances C. Ritterband, Sherman Oaks, CA
W7BIS, John H. Bielenberg, Polson, MT
W7CD, George W. Merideth, Seattle, WA
N7CHV, Joseph I. Gates, Billings, MT
W7GIJ, Mervin R. Critchlow, Bothell, WA
WA7HEH, Glen O. Thomas, Tucson, AZ
N7JEM, Francis H. Roberts, Plano, TX
K7NMQ, James H. Taylor, Phoenix, AZ
WB7SMB, Robert H. Walker, Ellensburg, WA
W8CFX, Gene Heikkinen, Painesville, OH
N8EXX, Charles G. Johnson, Roscommon, MI
W8HZA, John A. Davies, South Charleston, WV
KZ8O, Walter E. Cummings, Cape Coral, FL
WD8ORI, Richard C. Bonar, Bellaire, OH
KA8QKV, William F. Stoermer, Centerville, OH
WD8REC, Rex T. Mayne, Vestaburg, MI
W8SUC, Charles R. Case, Grove City, OH
K8TCH, Vedder B. Puryear, Hastings, MI
K8TMF, Willard L. Garver, NEY, OH
KA8YBN, Charles F. Ritchie, Wheeling, WV
N9DJW, Victor O. Rutsch, Bloomer, WI
K9FXI, Henry E. Schultz, Watertown, WI
N9FZE, Albert Reinholz, Onalaska, WI
W9JBV, Ronald M. Adams, Bluffton, IN
KA9QIX, Rodney C. Payne, Rhinelander, WI
W9SSR, Anthony S. DeRose, Albuquerque, NM
K9UBM, Marvin L. Dice, South Bend, IN
NU9W, Frederick K. Stamm, Chicago, IL
WAØCDS, Leonard F. Peterson, Arriba, CO
WØDWO, Louis W. Cox, Hemet, CA
WØNHT, Leo C. Smith, Fairbury, NE
KØOIR, Leonard A. Olsen, Frederic, WI
KØPFM, Earl R. Stroud, Newton, KS
WØQOR, Charles W. Scott, St Ann, MO
KØZWX, Ralph R. Noonan, Spearfish, SD
G2DU, Philip G. Tandy, Oxford, Great Britain

*Life Member, ARRL

Notes: All Silent Key reports sent to HQ must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for 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.

50 Years Ago

January, 1940

☐ Reviewing 1939, the Editor says one highlight was the imposition of new stability rules on 5 meters, which reduced occupancy for a while (the transceivers went to 2½ meters) but has produced a more orderly and communications-effective band.

☐ Major Armstrong's wide-band f.m. system for broadcasting has many advantages for amateur use, say G. Grammer and B. Goodman of the Hq. staff, and they outline the basic theory plus describing a fundamental station setup. For u.h.f., of course, because of bandwidth requirements.

☐ While it won't compete with 3-element beams, W6QCC's antenna setup of three 33-foot verticals in a triangle with quarter-wave matching sections permits twelve compass points of directivity by simply switching the phasing.

☐ A U.H.F. Marathon for 1940 is announced by Communications Manager Handy, aimed at further promotion of our use of that portion of the spectrum (anything above 50 Mc). An award will also be given for the most states worked during the year.

☐ W8GDC has improved on the pi-section antenna coupling network by adding inductance sections to the output sides, resulting in a system that is truly universal—plus allowing minimal coupling and thus reduced harmonic troubles.

☐ An Underwriters' Labs report on electrical shock shows that as little as 50 ma. can be lethal, and since typical hand-to-hand body resistance is 3500 ohms, a 300-volt power supply must be treated with enormous respect. Switch to Safety!

☐ How good are the coils you've been using in the rig? W9KWP shows us simple methods of measuring "Q" and thus how we can improve efficiency.

☐ Tube manufacturers are rolling out new models in volume; three pages in this issue report specs on tubes from the transmitting HK257 to the receiving 1R5.

☐ A sad note is that of 32 countries with societies members of the I.A.R.U., only eight permit amateur radio operation at present.

☐ The math may look a little frightening, but Glenn Browning's paper on regeneration in the preselector offers possibilities of improved image rejection and gain.

25 Years Ago

January, 1965

☐ Reviewing 1964, the Editor picks as highlights reciprocal operating privileges, a commemorative stamp, the formation of Region II IARU, and the League's 50th anniversary.

☐ Amateur teletype has been around for some years, but the availability of discarded (but still useful) equipment from Bell Telephone has produced considerable new interest. K8DKC outlines the features and practical performance of the various units.

☐ Following on his "Antennas and Feeders" series in late 1963, Technical Director George Grammer, W1DF, now takes up "The Whys of Transmission Lines" to help us understand this most important link in delivering useful power to an antenna.

☐ Hurricane Hilda ripped through the four southeastern states in September, but well-organized amateur communications nets kept officials in touch, as well as providing messages on personal safety.

☐ Instead of an audio oscillator to measure frequency between the usual 10-kc. markers, K6YRQ built a simple binary counter with flip-flops, attaining an accuracy of nearly one cycle.

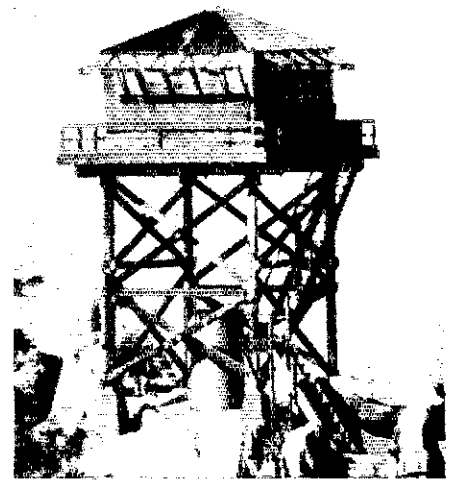
☐ Responsive to the November issue article claiming buying is better than building, dozens of amateurs angrily claim that we should, we can and we do build lots of our own equipment; the Correspondence section is filled with sample letters.

☐ A tie vote for director in the Hudson Division, the second such tie in League history, requires a second balloting between candidates W2AGW and W2TUK.

☐ Some 30,000 orders for official ARRL first day covers with the amateur radio commemorative stamp will be fulfilled by mailing from Anchorage, Alaska, chosen in recognition of emergency communications work carried on after the 1964 earthquake.—*W1RW*

Results, 1989 September VHF QSO Party

By Billy Lunt, KR1R — Contest Manager
and
Mark R Burke, KA1MIS — Contest Assistant



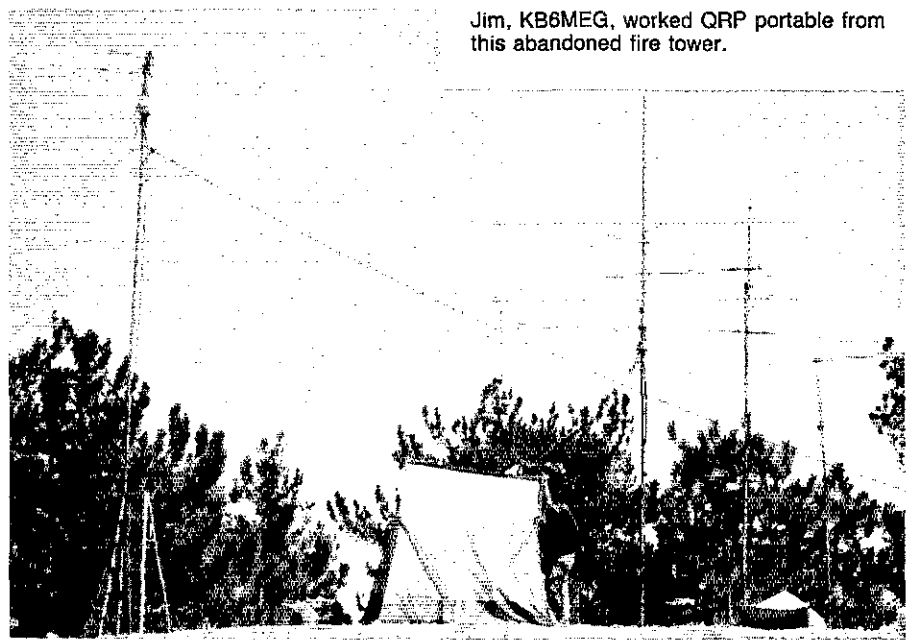
Jim, KB6MEG, worked QRP portable from this abandoned fire tower.

After the proverbial "How'd ja do?" inquiry after a VHF contest, the next question to follow usually is about the conditions. In the September VHF QSO Party of the 9th through the 11th, the answer was "flatter than a pancake."

"The UHF bands were hot all week up and down the coast. W4FSO was good copy late Friday night. Would the conditions hang in there for one more day? No way."—WA1HYN. K4AEK watched the grass grow between contacts. Dennis, WBØWAO/8 pretty much summed it up: "With no sporadic E, no aurora and no tropo, this contest will be decided by operator skill and tenacity. The conditions were average for the entire contest with very little if any enhancement on any band. I sure missed the aurora that we had last year." Not to be discouraged, however, Dennis expects to have 1296 for the next VHF contest.

In spite of the generally poor conditions, operator skill and tenacity were very much in evidence. Witness the record-breaking single operator score for a September contest by K2LNS operating from the familiar WA2FGK venue: 235k points. Seven single-op entries topped the 100k mark usually reserved for the overall winner: WA2TEO, K2SMN, K1RZ, N2BJ, N2CEI and W3IP. Outstanding!

The QRP portable category attracts the stout of heart, for example WA6PZL: "I carried a backpack one mile to the mountaintop. It had to be the longest mile of my life. All QRP portable entries should have to hike up mountains. I had a lot of fun and will do it again." Top-scoring QRPer KT2B made his 4 watts count from Slide Mountain in FN22. Pete advocates backpacking to choice mountaintop locations, with this his tenth such venture. Besides working the pileups, Pete notes that "pure mountain



The Ventura County ARC operated K6MEP from this tent city at 8830 feet above sea level.

Single Operator Top Ten

Call	Score	Call	Score
WA2FGK (K2LNS,op)	235,773	N2CEI	116,620
WA2TEO	173,310	W3IP	101,952
K2SMN	123,714	VE3ASO	94,900
K1RZ	122,760	W1RIL	91,035
N2BJ	118,172	K2UOP/4	88,949

Multioperator Top Ten

Call	Score	Call	Score
W2SZ/1	827,122	N2WK	167,162
W1XX/3	733,211	N6AMG	146,125
WB3CZG	308,716	K1TR	132,540
W3KWH	198,129	K1WHS	119,544
N2WM	176,301	N4EQT	115,173

QRP-Portable Top Ten

Call	Score	Call	Score
KT2B	7,068	VE3GBA	1,050
K6LMN	3,441	KC3ZG/8	1,032
KB6MEG	3,375	NOØY	989
N1EWB (FN42)	1,656	N1ABY	900
N6QYQ	1,110	WA6PZL	533

Division Leaders

Single Operator			Multioperator	
Call	Score	Division	Call	Score
*WA2FGK (K2LNS,op)	235,773	Atlantic	*W1XX/3	733,211
NC9F	18,827	Central	WØUC/9	62,524
WA6BWE	18,031	Dakota	*WBØGGM	24,728
WA5NFC	16,340	Delta	KC4YO	25,351
WA8TJL	39,536	Great Lakes	N4EQT	115,173
*N2BJ	118,172	Hudson	*N2WM	176,301
NØLL	24,411	Midwest	KXØO	100,893
WA2TEO	173,310	New England	*W2SZ/1	827,122
W7JXU	4,983	Northwestern	WB7PEK	3,840
K6LMN	3,441	Pacific	*N6AMG	146,125
K2UOP/4	88,949	Roanoke	N8ZM	95,323
W1XE	3,132	Rocky Mountain	W5IXR	1,175
W3ZR	1,525	Southeastern	W4CMA	7,296
W6CPL	17,264	Southwestern	K6MEP	51,418
WD5BKV	31,065	West Gulf	*N5KW	76,610
VE3ASO	94,900	Canada	VE3BQN	13,056

* denotes new Division Record

Single Operator QSO Leaders By Band

50 MHz

WB1BXS	258
WA2CWA	179
WA2TEO	161
WA2FGK (K2LNS,op)	158
W8RQQ	140
W4DR	127
WB1GQR (WB2JSJ,op)	126
W2HRW	126
NY1E	124
N2BJ	116
K1RZ	113
N2CEI	111
AK2F	105
NN9K/Ø	96
K2UOP/4	94
NW5E/3	86

144 MHz

WA2FGK (K2LNS,op)	335
W1QK	324
WA2TEO	306
WA3HMK	303
WB2QOQ	287
W9OEH	271
N2BJ	251
K1RZ	244
NW5E/3	244
K2SMN	234
WB1GQR (WB2JSJ,op)	227
W3ZZ	217
VE3ASO	215
AK2F	212
VE3PCW	207
W3EP/1	203
W1RIL	202
NA1S	200
NJ2L	197

220 MHz

N2CEI	75
WA2TEO	73
N2BJ	71
WB1GQR (WB2JSJ,op)	66
WA2FGK (K2LNS,op)	62
W6CPL	59
K1RZ	58
K2SMN	52
NW5E/3	51
W1RIL	48
WB2YEH	48
KD5RO	45
VE3ASO	45
WA1HYN	44
K2UOP/4	43
WA2TIF	42

432 MHz

WA2TEO	123
N2BJ	123
WA2FGK (K2LNS,op)	122
K1RZ	116
WB1GQR (WB2JSJ,op)	105
W2HRW	88
WB2DNE	88
K2UOP/4	85
W3IP	84
N2GHR	83
K2JWE	83
K2SMN	82
W2CNS	82
N2CEI	80
WB8K	78
WB2YEH	76
W1RIL	75

902 MHz

WA2TEO	34
WA2FGK (K2LNS,op)	27
N3CX	27
N2CEI	26
K2SMN	25
W1RIL	25
WB2YEH	25
N2BJ	24
WA2ONK	24
KD5RO	23
AB1U	20
WA3JUF	20
K2UOP/4	19
W3IP	18
WA1MBA	17
VE3ASO	17

1296 MHz

WA4VHF	59
WA2LTM	55
K2SMN	53
W3IP	52
WA2FGK (K2LNS,op)	47
N2GHR	44
WA2TEO	43
W1RIL	42
N2BJ	42
N2CEI	40
KD5RO	40
K2JWE	37
K2GAL	37
N3CX	36
WB2YEH	35
K2UOP/4	31

2304 MHz

WA2FGK (K2LNS,op)	14
WA2LTM	12
WB2YEH	12
N2CEI	11
WA3JUF	10
W1RIL	9
KD5RO	8
WB1FKF	6
N3CX	6
WØRSJ	5
WA1MBA	4
VE3ASO	4



Contest duo N5KW and K5CM finished as West Gulf Multiop Division leaders.

Single Operator Multiplier Leaders By Band

50 MHz

NN9K/Ø	47
WA2FGK (K2LNS,op)	44
W4DR	43
WA4VCC	40
W8RQQ	39
WB1BXS	38
K1RZ	37
KC3CL	36
NY1E	33
WA2TEO	31
N2CEI	31
WA2CWA	31
K2UOP/4	30
W2HRW	29
WA3DJG	29
KB4OLM	29

144 MHz

W9OEH	63
WA2FGK (K2LNS,op)	57
WA3HMK	56
WA8TMK	52
KA9BGC	52
KD8SI	51
WA8TTE	51
K1RZ	49
WA5NFC	49
VE3PCW	48
WD5BKV	46
W9JGV	46
VE3KDH	44
K2SMN	43
WA2TEO	43
W2CNS	43
W3ZZ	43
KC3CL	43

220 MHz

WA2FGK (K2LNS,op)	29
K2SMN	26
WA2TEO	26
N2CEI	24
W3IP	24
WD5RO	23
K1RZ	23
W3ZZ	23
VE3ASO	23
VE3EMS	23
N2BJ	22
K2GK	22
K8DIO	21
NW5E/3	20
K2UOP/4	19

432 MHz

WD5BKV	37
WA2FGK (K2LNS,op)	36
K1RZ	35
KD8SI	35
W2CNS	34
WB8K	32
K2SMN	31
WA2TEO	31
WB2DNE	31
N5WS	30
K2GAL	29
W3IP	29
VE3EMS	28
N9KC	27
VE3ASO	27
K8DIO	26

902 MHz

K2SMN	16
KD5RO	16
WA2TEO	15
WA2FGK (K2LNS,op)	14
N2CEI	13
N3CX	13
AB1U	11
VE3ASO	11
W1RIL	10
WA1MBA	10
N2BJ	10
WB2YEH	10
K2UOP/4	10
WA2ONK	9
W3IP	9

1296 MHz

WA4VHF	20
KD5RO	19
K2SMN	18
W3IP	18
W2CNS	17
WA2FGK (K2LNS,op)	17
W1RIL	15
N3CX	15
N2GHR	14
WA2TEO	13
K2JWE	13
WA2LTM	13
K2UOP/4	13
N2CEI	12
K2GAL	12
WA8TJL	12

2304 MHz

WA2FGK (K2LNS,op)	10
KD5RO	8
W1RIL	6
N2CEI	6
WA2LTM	6
WB2YEH	5
WA3JUF	5
VE3ASO	4
WB1FKF	3
WØRSJ	3
WA1MBA	2
N3CX	2

spring water sure tastes good when you're hot and thirsty." The contest rule makers wonder if there should be some provision made in this category to provide for operator assistance without making it a multiop category. Suggestions?

While on the subject of rules, a competitive rover class is being given consideration. For the uninitiated, rovers are not a canine category but rather those grid hoppers who pop up from place to place such as WB5VZL whose orange Volkswagen, complete with Yagis in place, is quite a classic. He, like many a rover station, has had to contend with the overzealous curious highway patrolman. The question under study is should we have a competitive rover category that allows accumulation of scores from different grids? And what other conditions should be met?

The record-shattering score by multiop W2SZ/1 reads more like a wide-open June contest. The Greylock gang set the new course record for September with 827k. Can a mil be far behind? The top-ten box shows some uncharacteristic geographical spread for September, the most notable being the fine effort by the West Coast's N6AMG at 146k.

Participation is the name of the game in these VHF contest affairs, and some areas do especially well. K2LNS noted the increase in Canadian participation, with many a VE entry sprinkled throughout his extensive log. VE3DSS also observed that "Canadian activity levels continue to rise." Let's keep up the good work...eh?

Looking ahead is always part of the VHF contest game, for one never knows what to expect next. So mark your calendar for the popular VHF Sweepstakes, January 20-22, the weekend before the Super Bowl, football fans. This is the one that gets folks on to contribute to the club aggregate score. Tell the iceman to stay away!—*W1XX*

SOAPBOX

I was surprised not to hear very much scatter on 6 meters. The other bands had good activity and conditions (WA2TEO). I tried a new mountaintop this time. The change was worth it! The weather was hot. Next time, I will bring a fan for the tent. Activity was good at the beginning but dropped typically after the first few hours (W1QK). I enjoyed the contest. I was not really prepared to make this many contacts. I worked new grids from VE1 and VE2. I hope the January contest will have half as much activity as this contest did (NA1S). The brick blew up one hour before the start of the contest! Oh well! Wait till next time (N1ABY). Great signal from W1XX/3 in FN00, especially on 902 and 1296! I tried 2304 but no cigar! (W1RIL). Working VE3ASO on 1296 on Sunday made the whole weekend worthwhile. I even forgot about the +20-dB line noise on 2 meters (NA1W). I just have a 5-element beam in a good location. I never entered a contest before. I had lots of fun! (KA1KTT). It is a lot of fun to take your whole VHF/UHF station to a mountaintop for a contest! Almost everything worked, too! It was great to work W1XX/3, 310 miles away, on 220-MHz FM with 10 W and a mag-mount (NJ2L). This was my first time in a VHF contest. I had a lot of fun and will try even harder next time (WB2DZH). What a weekend for the XYL to want me to put new leaders and gutters on our house! (WA2YEI). It seemed as if activity was down a bit. The conditions were marginal with warm temperatures. Murphy hit when the 432 GaAsFET blew out! Six meters was dead as a doornail (AK2F). There were good groundwave conditions but the activity seemed to be low. I was pleased to hear continued activity on 220 MHz. It is always fun to see how low-power stations work out when conditions are good (WA2UDT). The contest seemed to drag due to a lack of 6-meter band openings, or was it because I ran out of beer? (WA2CWA). It was pleasant to hear so many new stations on 1296! (K2GAL). The new 432 and 1296 antenna systems worked well in spite of the below average band conditions (W2CNS). This was my first VHF contest and I really had a great time operating. I was amazed at what 30 watts can do when the band conditions are reasonably good. My only question is: Where does all the activity go after the contest ends? I am looking forward to the next VHF contest (KA3LUW). I was only able to get on for the last 1.5 hours of the contest due to the IARU Region II conference (K3ZO). I wish VE3ASO would get out of the middle of the pack so he could hear me! I don't think he needed me, as much as I needed him! Great contest and lots of fun (K3YDX). This was my first VHF contest. I was disappointed that more stations did not show up. All contacts were ground wave (W4UEA). This was a ground-wave test except for some MS on 6 meters. It was fun working from my home QTH with maximum power of 200 watts on any band (WA4VCC). Poor conditions, low activity, football, baseball, tennis and a hamfest made for a low score! (WD4AHZ). This was the worst band conditions that I have seen during any VHF contest in years! I hope for better conditions in January (KC4YO). This was my first VHF contest. It was terrific! (KM4MP). Where was everyone? The bands were in great shape—especially 432! It was almost as if everyone was halfheartedly operating. There was no activity to speak of. It was very disappointing. But, I still picked up a few new grids! (KB4OLM). I had fun! The QSOs are getting better. For the next contest, I will have a 2-meter Boomer and a brick on 6 and 2 meters (N4KWX). It was lots of fun with low power. I could have used openings on 6 meters and more local activity (KC4B). It was a very slow contest! Thank goodness it is over! (WA5UFH). Conditions were poor, even for September (W5FF). We had an excellent location, but there was freezing wind Saturday night! (W5IXR). I beat my previous record by one point! Where were all the locals? (KF5PE). Wedding and funerals should be scheduled around contest weekends (K9MK). There are no mountains on the coastal plains of Texas, so we tried operating on the roof of a 13-story building. It was very nice to have an antenna at 175 ft with a 50-ft feed line! Watch out for us in January. We will have bigger antennas and amplifiers (WB5N). At least my antennas didn't blow down this time like they did in June (W8CM). Activity was good for a September contest. This was the biggest effort ever from northern California. We work so hard for such a little score as compared to the East Coast (N6AMG). There were a few good openings into Arizona and very good openings into northern California (N6RPM). The weather was bright and sunny for the entire weekend. No thunderstorms on this trip! (K6KL). I hope to stimulate more VHF/UHF contest activity for the next contest (KH6JJK). I worked QRP portable from an abandoned fire tower. The high winds did not stop the fun (KB6MEG). We all struggle equally hard to work the masses on the coast so the scores from Eastern Washington should

Multioperator QSO Leaders By Band

50 MHz

W2SZ/1	380
W1XX/3	338
WB3CZG	256
N2WK	167
N2WM	165
W3KWH	159
K1TR	155
K1WHS	140
WA8NJR	131
W8UC/9	122
N5KW	115
W1BCG	108
N6AMG	106
N8ZM	105
N4EQT	104

144 MHz

W1XX/3	672
W2SZ/1	623
N2WM	385
WB3CZG	322
N2WK	289
K1TR	300
N2WK	289
W3KWH	286
NM8X	275
K1WHS	222
N4EQT	213
N6AMG	211
W1BCG	208
N8ZM	173
WA8NJR	169
W3HZU	149
N5KW	149

220 MHz

W2SZ/1	173
N6AMG	123
W1XX/3	101
N2WK	80
K6MEP	72
WB3CZG	70
N2WM	60
K1TR	54
K2XR	52
NM8X	51
K1WHS	50
N4EQT	50
W3KWH	48
K2BWR	45
N8ZM	40
WA8NJR	35

432 MHz

W2SZ/1	270
W1XX/3	214
N6AMG	162
WB3CZG	139
K1WHS	112
N2WK	105
W3KWH	102
K1TR	101
NM8X	88
N2WM	86
W1BCG	80
N4EQT	78
N8ZM	71
KXØO	71
WW4T	56
K2XR	60

902 MHz

W2SZ/1	76
W1XX/3	46
N2WM	27
WB3CZG	25
K1TR	24
K2XR	23
N2WK	23
N6AMG	21
K1WHS	19
W3KWH	15
W1BCG	14
KXØO	9
NM8X	6
N8ZM	4
WW4T	3

1296 MHz

W1XX/3	85
W2SZ/1	71
N6AMG	57
WB3CZG	45
N2WM	36
W1BCG	32
N2WK	32
K1WHS	28
K2XR	28
W3KWH	27
K2BWR	26
K1TR	25
KXØO	22
WN4T	21
K6MEP	18
N8ZM	13

2304 MHz

W2SZ/1	60
W1XX/3	19
WB3CZG	11
W3KWH	9
K1WHS	7
K1TR	4
N2WK	4
N6AMG	3
KXØO	3

be fairly uniform (WA7VHW). The highlight of the contest was making my first two QSOs on 1296. Conditions sure could have been better (WB8TGY). Conditions were up and down. A bad storm Saturday evening kept me off the air during good conditions to the south and east. I had fun anyway! See you in January (N8FEH). We all had a great time even though the bands were flat and participation seemed low (NM8X). Where did the tropo go? There was no need for a dupe sheet this year! (N9KC). This was the only contest that there was plenty of time to sleep, do housework, build low-band equipment and etc (WB9AYS). The conditions were poor, and a severe thunderstorm kept me off the air Saturday evening (WF9M). This was my first full-fledged VHF/UHF contest from my new QTH with the new antenna system (WB9TAE). It was kind of like a dead band contest. Things never got off the ground (WA9LZM). We did not experience an opening on any band, hence the low score. We were able to keep the station going through the night but closed down four hours early. Glad we didn't miss an opening! We will be back on from another rare Iowa grid next June (WØRPK). Good contest! (KØVUA). Ho hum conditions but great fun! (WTØW). Saturday was acceptable; Sunday was dead! (KE9QT). Where was everybody? Was this the multi-dead-band contest? I can't believe the lack of activity! (VE3BFM). It sure was a quiet contest except for some Saturday afternoon tropo. I got the 6-meter Boomer up just before the winds started to blow. At least we didn't get any snow! (VE3DSS). I really enjoyed the contest, although quite a few stations did not hear me. I ran out of pop and cigarettes at the portable site. I worked 17 new grids! (VE3GBA). There was no aurora and not the best of conditions but fun as usual (VE3DJ). Out of the last six contests that I entered, no equipment failed but Murphy struck with lousy band conditions (VE6BOJ).

Multioperator Multiplier Leaders By Band

50 MHz

W1XX/3	79
W8UC/9	63
N5KW	57
WB3CZG	56
W2SZ/1	53
W3KWH	53
WA8NJR	52
KØO	50
N8ZM	45
N4EQT	43
WW4T	43
N2WK	42
KC4YO	40
NM8X	35
N2WM	35
K1WHS	34

144 MHz

W1XX/3	87
N4EQT	63
NM8X	58
W3KWH	57
KXØO	56
WB3CZG	54
N5KW	53
WW4T	52
W2SZ/1	51
N8ZM	50
WA8NJR	49
N2WM	48
W8UC/9	47
W3HZU	44
KC4YO	43

220 MHz

W1XX/3	44
W2SZ/1	33
N4EQT	33
N8ZM	29
N2WK	28
WB3CZG	28
W3KWH	28
N2WM	27
NM8X	25
K2BWR	22
K1TR	21
WA8NJR	21
KXØO	20
WW4T	19
N6AMG	19
K2XR	17

432 MHz

W1XX/3	65
N4EQT	44
W2SZ/1	42
KXØO	40
NM8X	35
WB3CZG	33
W3KWH	33
N8ZM	33
N2WM	30
N5KW	30
WA8NJR	28
W8UC/9	28
WW4T	27
K1TR	25
N2WK	25
K1WHS	24

902 MHz

W1XX/3	24
W2SZ/1	21
N2WM	15
N2WK	14
WB3CZG	14
N6AMG	14
W3KWH	12
K1WHS	11
K1TR	11
K2XR	11
KXØO	9
W1BCG	8
NM8X	5
N8ZM	4
WW4T	3

1296 MHz

W1XX/3	36
W2SZ/1	25
KXØO	21
WB3CZG	19
N6AMG	17
N2WM	16
W3KWH	16
N2WK	15
W1BCG	13
WW4T	13
K1WHS	12
K1TR	12
K2XR	12
N8ZM	12
K2BWR	11
K6MEP	10

2304 MHz

W2SZ/1	17
W1XX/3	11
W3KWH	7
WB3CZG	6
K1WHS	4
N2WK	4
N6AMG	3
KXØO	3
K1TR	2

Scores

Scores are listed by ARRL/CRRL Sections. Within each Section, single-operator scores are listed first and then multioperator scores. From left to right, each line lists: call, score, QSOs, multipliers and bands worked (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; 9 = 902 MHz; E = 1296 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.7 GHz; I = 10 GHz; J = 24 GHz; K = 48 GHz; L = Light). An asterisk before the call sign denotes a QRP-portable station; among the single-operator stations, the single-band winners are noted with band letter(s) being in boldface print indicating the band won.

W

1

Connecticut

WA2TEO 173,310- 740-159-**ABCD9E**
AB1U 28,783- 220- 79-ABCD9E
W3EP/1 25,393- 330- 67-ABD
W1QK 11,016- 324- 34-B
WB1BXS 9,804- 258- 38-**A**
NA1S 5,400- 200- 27-B
KA1W 1,820- 90- 18-B
N2CQL 1,428- 84- 17-B
WA1GTP 1,224- 47- 24-ABC
*N1ABY 900- 60- 15-A
K1WVX 784- 49- 16-B
NX1Q (FN31) 270- 27- 10-B
W1BCG (K1s JBS,PVT,VYU,KA1s PQS,RDX,N1s CTF,ESK,NI1U,W1HAD,WA1TOU,K2LME,ops) 82,662- 458- 97-ABCD9E
K1RKT (+ KA1TFB,NF1E,NG1S) 6,335- 181- 35-AB

Eastern Massachusetts

WB1FKF 16,120- 137- 65-B**CD9EFGI**
KX1C 7,560- 140- 42-**ABCD**
*N1EWB (FN42) 1,656- 46- 24-ABCDE
KC1EL 810- 54- 15-B
WA1CRE 546- 36- 13-**A**BCD
W1PSG 532- 38- 14-B

Maine

NY1E 4,092- 124- 33-**A**
W1PLX 1,260- 60- 21-**B**
K1WHS (+ AF1T,K1MNS,WA1NIE,W3HQT) 119,544- 584-136-ABCD9EFGI

New Hampshire

AC1J 6,278- 111- 43-**ABCD**
KA1CDZ 1,387- 55- 19-ABCD
*KA1LMR 36- 7- 4-BCD

Rhode Island

WA1HYN 14,893- 158- 53-B**CDE**
AI1K 1,224- 72- 17-**B**
W1AQ (K1AGA,KM1X,N1GOP,NO1U,WA1s AHK,VPC,ops) 1,863- 109- 17-B

Vermont

WB1GQR (WB2JSJ,op) 74,868- 537-102-**ABCDE**
W1AIM 15,939- 165- 69-ABCDE**I**
K1LPS 7,956- 102- 51-ABCD9E**I**
N1BWT 6,576- 112- 48-ABD

Western Massachusetts

W1RIL 91,035- 478-119-**ABCD9EFG**
WA2TIF 19,608- 250- 57-BCD
WA1MBA 14,850- 149- 55-BD9EF
K1ISW 11,568- 170- 48-ABCDE
NA1W 8,246- 136- 38-BDE
KA1KTT 1,242- 69- 18-B
W1NY (W1KK,op) 986- 58- 17-A
K1JG 935- 51- 17-BCD
W2SZ/1 (K1DH,KA1s DZV,FZY,JFW,PRT,NC1J, WA1s UGE,ZMS,KZTR,KA2s FWN,WRG,DGA, N2s CJJ,GXH,HUC,HPA,W2ARQ,WA2sAAU, SCA,SPL,WB2KMY,WM2Y,WS2B,KD3NC, AK4L,WA8USA,ops) 837,122-1682-277-
K1TR (+ K1BA,KM3T,N1s AEQ,DJB,WA1s AYS,PBU) 132,540- 666-141-ABCD9EFGHI

2

Eastern New York

N2BJ 118,172- 627-124-**ABCD9E**
NJ2L 43,152- 345- 93-ABCDE
WA2BAH 11,186- 190- 47-ABCD
*KT2B 7,068- 114- 38-ABCD9
KD2IX 2,783- 117- 23-BD
WB2DZH 741- 57- 13-B
WA2YEI 495- 33- 15-AB
*WB4WXE 120- 12- 10-A
NX1Q (FN21) 12- 4- 3-B

NYC-Long Island

N2GHR 42,849- 358- 81-**ABDE**
WB2YZV 34,048- 291- 76-ABCDE
WA2EIO 5,950- 107- 34-BDE
WB2JKJ 5,908- 200- 28-BC
WA2SLY 3,854- 126- 29-AB
KD2LL 3,172- 122- 26-AB
K2OVS 2,100- 56- 30-ABD
WB2CUY 1,690- 65- 13-D
NB2T 1,500- 100- 15-B
WA2EUS 1,040- 34- 13-DE
WB2ZSY 656- 41- 16-B

Northern New Jersey

N2CEI 116,820- 513-140-ABCD9EF
AK2F 30,317- 372- 71-ABCD
K2JWE 10,249- 120- 37-DE
WB2QOQ 9758- 287- 34-**B**
K4BNC 8,987- 140- 49-ABD
WA2UDT 7,840- 125- 48-ABCD
WA2CWA 5,549- 179- 31-**A**
WA2LTM 4,047- 67- 19-**EF**
WB2BPY 774- 43- 18-AB
WA2IFS 75- 15- 5-A
NX1Q (FN20) 60- 10- 6-B
N2WM (+ KX2O,N2s AAZ,HMM,NV2D) 176,301- 759-171-ABCD9E
K2XR (K2OWR,W2HWG,ops) 71,281- 385-119-ABCD9E
K2BJG (+ WB2RRB) 6,660- 112- 36-BCDE

Southern New Jersey

K2SMN 123,714- 493-159-**ABCDE**
WB2YEH 65,302- 354-103-ABCD9EF
K2GAL 55,944- 328-111-ABD9E
KA2WKA 33,620- 294- 82-ABCD9E
W2HRW 16,752- 270- 44-ABD
W2EIF 16,312- 148- 66-ABCD9EF
WA2CNK 15,300- 208- 50-BD9
K2LOO 558- 43- 13-B
NX1Q (FM29) 45- 9- 5-B
K2BWR (+ K2ZRJ) 36,960- 242- 96-ABCDE

Western New York

KD5RO 79,860- 341-132-ABCD9**EFGI**
W2CNS 69,412- 354-134-**ABCDE**
K2GK 26,592- 188- 98-ABCDE
NM2J 13,532- 142- 68-ABCD
KU2A 12,330- 128- 70-ABCD9
K2MPE 6,885- 110- 51-ABD
KD2YB 6,174- 103- 49-ABC
W2WGL 1,232- 56- 22-B
N2WK (+ KA2s,AAP,GPJ,HSK,KB2SE,KD2KO, KM2P,N2JCP,NO2O,W2HPF,WA2s LAQ,MOP, TMC,ZKD,WB2s JLR,QCJ) 167,162- 700-166-ABCD9EF

3

Delaware

NX1Q (FM28) 4- 2- 2-**B**

Eastern Pennsylvania

WA2FGK (K2LNS,op) 235,773- 765-207-**ABCD9EF**
N3CX 26,065- 163- 65-CD9EF
WA3JUF 25,594- 185- 67-ABCD9EF
W8RSJ 23,141- 199- 73-ABCD9EF
WA3HMK 16,968- 303- 56-B
KC3X 13,570- 202- 59-ABD
N3EXA 2,852- 92- 31-AB
KA3LUW 918- 51- 18-B
WB3CZG (+ WA1MKE,NA2T,K3MKZ,KB3Q, WA3YON,WB3s FAA,IWJ,K9PW) 308,716- 897-228-ABCD9EFGHIJ

Maryland-DC

K1RZ 122,760- 580-155-**ABCDE**
W3IP 101,952- 444-144-ABCD9E
NW5E/3 72,772- 478-113-ABCDE
W3ZZ 69,375- 409-125-ABCDE
WB2ONE 54,495- 371-105-ABDE
K4JSI 19,899- 228- 67-ABCD
K3AKR 15,309- 189- 83-ABCD
WA4VHF 3,540- 59- 20-**E**
N3GFZ 3,332- 119- 28-B
K3ZO 2,212- 79- 28-AB
K3YDX 2,058- 98- 21-B
W3MSN 924- 40- 22-ABD

KA3CXG (FM19) 540- 36- 15-B
KA3CXG (FM18) 4- 2- 2-B

Western Pennsylvania

WA3DJG 35,424- 231-108-**ABCD9E**
KA3RWP 14,342- 188- 71-**ABCD**
AI3V (FM09) 10- 2- 2-**BH**
AI3V (EM99) 10- 2- 2-**BH**
*NI8O/3 (EN90) 4- 1- 1-**F**
*NI8O/3 (EM99) 4- 1- 1-**F**
*NI8O/3 (EM09) 4- 1- 1-**F**
*NI8O/3 (FN00) 4- 1- 1-**F**
*NI8O/3 (EN91) 4- 1- 1-**F**
*NI8O/3 (FN01) 4- 1- 1-**F**
AI3V (FN02) 4- 1- 1-**H**
AI3V (EN80) 4- 1- 1-**H**
W1XX/3 (+K1s GX,JX,KH6CP/1,AA2Z,N3FYD, NR3T,NU3T,N4MM,W9IP)
733,211-1476-347-ABCD9EFG
W3KWH (KA3KSD,N3EQP,NI8O,W3s IOH,SVJ, WA3s FYJ,TTS,WB3EML,WD8BHO,ops)
198,129- 654-211-ABCD9EFHI
W3HZU (KA3s ATH,IUO,KB3CU,N3s GKP,GLN, GPF,NO3C,W3s HMS,SST,WA3USG,ops)
31,525- 282- 97-ABD

4

Alabama

WB8RDY 117- 13- 9-**A**
WA4VUG 63- 9- 7-**B**

Georgia

K4KAZ 940- 35- 20-**ABD**
*KA9UIE (EM73) 85- 6- 5-**DEF**
*KA9UIE (EM84) 12- 2- 2-**9E**
W4CMA (K4AEK,WB4LRA,ops)
7,296- 121- 48-ABDE

Kentucky

N4EQT (+KA8SSB,N8CRB,W8ULC,WF8Z)
115,173- 455-191-ABCD9E

North Carolina

N2CJP 5,336- 96- 46-**ABCD**
KA4HKK 1,708- 61- 28-B
*KA9UIE (EM85) 270- 10- 9-BCD**9EFGHI**
WW4T (+AA4S,N4s HSM,OOT,WB4NMA,WD4s DWN,IIS,MBK,WQ4V,WS4F)
80,017- 338-161-ABCD8EFGHI

Northern Florida

W4UEA 612- 26- 17-**ABC**

South Carolina

WA4VCC 34,034- 222-119-**ABCD**
KK4NO 14,773- 133- 79-ABCD**EF**

Southern Florida

W3ZR 1,525- 56- 25-**ABD**
WD4AHZ 476- 27- 14-**BD**
WB4EHS 190- 19- 10-B
W4FNR 1- 1- 1-A

Tennessee

KF4FL 14,707- 161- 77-**ABD**
WB8IGY (EM86)
2,080- 42- 32-ABC**DE**
WB8IGY (EM85)
1,824- 42- 32-ABCDE
N4USG 425- 25- 17-B
WB8IGY (FM78) 280- 14- 14-ABCD
KC4YO (+KB4PIW,KD4XJ,N4s RJY,TCF,UOG, WA4GBE,WB4GFO,WD4EWX)
25,351- 220-101-ABD
N4RFV (+ops)
6,760- 125- 52-ABC

Virginia

K2UOP/4 88,949- 451-131-**ABCD9E**
KM4MP 20,448- 233- 71-ABCD
KB4OLM 14,325- 171- 75-ABD
WA4PGM 10,395- 165- 63-AB
WD4GXN 7,578- 143- 53-AB
K4FTO 7,200- 138- 45-ABD
W4DR 5,461- 127- 43-**A**
N4KWX 4,644- 129- 36-AB
KC4B 4,608- 128- 36-AB
N4HB 3,364- 116- 29-B
WA4SBC 3,234- 98- 33-BCD
WB8IGY (EM96)
2,775- 53- 37-ABCD9E
WA4MMP 195- 15- 13-AB
NX1Q (FM27) 16- 4- 4-B

5

Arkansas

WA5NFC 16,340- 152- 86-**ABCD**
N5DL (+KA5NTT,KG5MD,WD5CAP)
6,136- 90- 59-ABD

Louisiana

KG5VE 5,626- 97- 58-**AB**
N5KWB 1,296- 44- 27-AB**C**
WA5UFH 260- 20- 13-A

Mississippi

KD5BM 720- 36- 20-**B**

New Mexico

W5FF 1,862- 49- 38-**AB**
N5JHV 1,584- 44- 33-AB**D**
KN5S 144- 13- 8-ABD
W5IXR (+N5EPA)
1,175- 39- 25-ABD

North Texas

N5WS 24,570- 187- 90-**ABD9E**
WA5TKU 4,074- 64- 42-ABC**DE**
KF5PE 2,976- 66- 31-B9E
K9MK/5 2,550- 57- 34-BD9E
WN4KKN/5 126- 14- 9-B

Oklahoma

WD5BKV 31,065- 233-109-**ABD**
K5SW 17,661- 149- 87-ABC**DE**
W5UGO 7,772- 98- 58-**BD**
N5KW (+K5CM)
76,610- 362-163-ABCDEL
W5NZS (+N5s NDV,NFI,W5GDL)
5,782- 86- 49-ABCD

South Texas

WB5OBS 9,552- 137- 48-ABC**DE**
KG5VH 3,738- 88- 42-A**BD**
N5OEO 1,827- 63- 29-AB
W5OZI 1,530- 51- 30-**AB**
W3XO/5 1,176- 49- 24-AB
WB5N (+NT5D)
5,214- 138- 33-ABD
KC5FP (KB5GFD,WA5S,ops)
144- 14- 9-ABD

West Texas

W8CM 16,318- 162- 82-**ABD**
W5AL (DM95) 6,328- 83- 56-ABCD
W5AL (DM86) 56- 8- 7-B
W5AL (DM85) 18- 6- 3-B
WB5VYE (+K5s BYS,BZH,N5ONL,WD5DCZ)
10,614- 125- 61-ABCD9E

6

East Bay

NR6E (CM88) 252- 13- 12-**ABCD9E**
NR6E (CM87) 72- 6- 6-ABCD**9E**
NR6E (CM97) 72- 6- 6-ABCD**9E**
N6MG (K6KLY,N6s FRI,ICW,IG,ops)
146,125- 692-125-ABCD9EFI

Los Angeles

W6CPL 17,264- 208- 52-ABC**D9EI**
AA6LJ 2,328- 97- 24-**AB**
N6RPM 850- 48- 17-ABD
K9AKS 455- 35- 13-B
WA6BIL 408- 34- 12-AB
KI7F/6 217- 31- 7-B
WB9AJZ (+KB6FYG)(DM24)
1,426- 48- 23-ABD
WB9AJZ (+KB6FYG)(DM14)
36- 9- 4-AB

Orange

WB6FCS 9,735- 132- 59-ABC**D**
K6CH 5,920- 115- 40-ABD**E**
K6KL 1,863- 57- 27-BD
*N6QYQ 1,110- 74- 15-B
*WA6PZL 533- 41- 13-**A**
WB9AJZ (+KB6FYG)(DM13)
180- 20- 9-AB

Pacific

KH6JJK 80- 16- 5-**AB**

Santa Barbara

*NS6X 112- 14- 8-**AB**
K6MEP (K2LCT,WB2ODH,K6VMN,KH6N,N6s HBI,QOA,NS6X,WA6FPX,WD6DJS,ops)
51,418- 363- 94-ABCDEI

Santa Clara Valley

*K6LMN 3,441- 70- 37-ABCD9E
AJ6T 559- 24- 13-BD
WB6LRV (+WB6PFJ)
13,380- 177- 60-ABCD

San Diego

WA5BNH 6,768- 124- 38-BCDE
*KB6MEG 3,375- 86- 25-BCD
W6OYJ 900- 44- 15-BCD**I**
WB9AJZ (+KB6FYG)(DM22)
1,080- 46- 20-ABD
WB9AJZ (+KB6FYG)(DM23)
136- 17- 8-AB

San Joaquin Valley

KF6NY (DM06) 112- 7- 7-**ABCD9EI**
KF6NY (DM07) 112- 7- 7-ABCD**9EI**
KF6NY (CM96) 105- 7- 7-ABCD**9E**
KF6NY (DM05) 78- 7- 6-A**B**CD9E
KF6NY (CM95) 45- 5- 5-ABCDE
W6UE (N6DLU,WA6OTU,ops)
4,750- 92- 38-ABCDE
WA6ZRC (WA6BIL,WB6JCD,ops)
2,190- 59- 30-ABCD

Sacramento Valley

NR6E (CN80) 1,058- 28- 24-**ABCD9E**
NR6E (CN90) 630- 21- 18-ABCD**9E**
NR6E (CM98) 432- 16- 16-ABCD9E
NR6E (CN81) 432- 16- 16-ABCD**9E**
NR6E (CM89) 390- 15- 15-ABCD**9E**
NR6E (CM99) 325- 15- 3-ABCD**9E**
KF6NY (DM08) 5- 5- 5-ABCDE
W6JEX (K6AAW,N6EGN,ops)
18,724- 232- 82-ABCD
WB6RHC (+KC6BCU,N6s EJX,RZJ)
5,150- 106- 40-ABCD

7

Arizona

W7GZ 322- 18- 14-**ABD**
*KL7GLK 8- 2- 1-**L**

Eastern Washington

N7AUV 416- 27- 13-**BD**
WA7VHW 377- 29- 13-**B**
W7FHI 270- 27- 10-B
W7IDZ 40- 8- 5-AB
N7JGO 12- 4- 3-**A**

Idaho

W7VXW (+WA4GPM)
2,436- 74- 28-ABD

Oregon

W7JXU 4,983- 119- 33-ABC**DE**
KE7CX 4,553- 115- 29-AB**CD9E**
W7VOK 330- 26- 10-ABCD
WD4ECK/7 66- 11- 6-B
K7HSJ (CN85) 24- 6- 2-C

Utah

NJ7A 312- 19- 13-**ABD**

Western Washington

WB7UUP 4,800- 111- 32-ABC**D9E**
K7ND 2,592- 78- 24-ABC**DE**
K7IDX 726- 66- 11-**A**
*N7LXQ (CN97) 114- 19- 6-AB
K7HSJ (CN87) 70- 11- 5-BCE
*N7LXQ (CN87) 36- 9- 4-AB
KB7GEW 30- 10- 3-AB
K7HSJ (CN88) 12- 3- 2-C
WB7PEK (+KA7ICT)
3,840- 97- 30-ABCDE

8

Michigan

WB8WAO/8 11,926- 136- 67-ABC**D**
N8FUJ 11,480- 162- 56-**BD**
KU8P 10,740- 130- 60-ABC**DE**
WG8Q 9,800- 148- 56-ABCD
K8BI 7,656- 115- 58-A**B**D
WB8TGY 4,428- 81- 41-ABDE
N8FEH 1,953- 63- 31-B
WA8TAQ/8 1,740- 58- 30-B
NM8X (+N8s CQA,FGB,NR8S,VE3s BXI, CKU,DGR)
112,504- 515-164-ABCD9E
N8HNS (+N4SC,KA8RVK,KB8s AFS,DEY,HVT, KN8JDN,N8s IMO,IRT,IRW,WA8TON,WB8VOJ, WK8X) 20,124- 213- 78-ABCD

Ohio

WA8TJL 39,536- 249-112-ABCDE
KD8SI 38,610- 277- 99-**BCDE**
KC3CL 34,020- 284-108-ABCDE
K8DIO 31,304- 216-104-AB**CD**
WA8TTE 17,100- 153- 90-ABDE
WB8K 11,880- 138- 55-BD
K8DW 9,900- 110- 66-ABCDE
WA8TMK 7,800- 150- 52-B
WB8JAY 6,985- 106- 55-ABD
K8TL 6,222- 82- 51-ABCDE
W8HBG 5,600- 108- 40-BD
W8RQQ 5,460- 140- 39-**A**
N8CCC 4,914- 95- 42-ABCD
KE8FD 4,794- 94- 51-AB
N8IAO 2,464- 88- 28-B
WB8QGR 2,244- 66- 34-AB
N8HWK 2,132- 82- 26-B
K8CQA 2,046- 64- 31-BD
WD8DCX 1,884- 53- 26-ABD
WA8RCN 1,540- 70- 22-B
KB4RPF 1,045- 55- 19-AB
WA8RMZ 887- 47- 21-B
WB8IGY (EM88) 720- 21- 20-ABCD9E
WB8IGY (EM89) 594- 20- 18-ABCD9E
K8MR 450- 30- 15-B
WB8IGY (EM79) 252- 13- 12-BCDE
WB8IGY (EM78) 209- 13- 11-ABCDE
*KA8PQC 182- 14- 13-B
W8XT (EM79) 144- 24- 6-ABCD
*W8XT (EM89) 60- 8- 6-ABCD
WA8NJR (+KB8HLL,KD8AX,N8s FFU,IDT)
79,000- 394-158-ABCDE

West Virginia

WB8IGY (EM97)
1,107- 28- 27-ABC**DE**
*KC3ZG/8 1,032- 38- 24-**BD**
WB8IGY (EM98) 336- 17- 14-BCDE
WB8IGY (EM99) 315- 15- 15-BCDE
N8ZM (+WA8s OGS,R,SVV,WD8ISK,W8VNE)
95,323- 406-173-ABCD9E
KC8FI (+KB8A,KD8s IP,IQ,KE8RM,KZ8J)
6,413- 121- 53-AB

9

Illinois

NC9F 18,827- 191- 67-ABC**DE**
AF8Z 13,500- 169- 60-ABCD
KA9BGC 9,204- 177- 52-**B**
NG9R 7,808- 102- 61-ABD
W9JGV 6,164- 134- 46-B
N9AQ 4,536- 108- 42-B
N9KC 3,360- 54- 32-BC**D**
WB9GKA 1,980- 53- 33-ABD
N9HFL 1,292- 57- 19-BC
N9BJG 1,131- 38- 29-AB
WD9DCW 406- 29- 14-B
WB9AYS 24- 8- 4-A

Indiana

W9OEH 17,073- 271- 63-**B**
WF9M 3,549- 91- 39-B
W9CSF (K9s DZE,URA,KA9PGD,NA9N,NY9B, WA9KRT,WB9YHH,WD9s BDW,EIX,ops)
19,110- 193- 78-ABCD

Wisconsin

WA1UJU/9 2,937- 89- 33-**B**
WB9TAE 2,640- 84- 33-AB**D**
WA8LZM 1,650- 55- 30-**AB**
N9BXA 1,525- 56- 25-ABD
W9YCV 1,325- 48- 25-BD
N9GNG 1,071- 50- 21-B**C**
WB5TCO 72- 6- 4-**E**
W8UC/9 (+K8GJX,N8s AKC,BSH)
62,524- 320-154-ABCDE

0

Colorado

W1XE 3,132- 69- 36-ABC**D**
N8BSA 418- 38- 11-**B**

Iowa

KA8TLJ 6,560- 160- 41-**B**
KD8BT 1,620- 56- 27-ABD
W8RAP 60- 5- 4-**E**
W8RPK (+K8QR,KA8RQN,N8s JAS,JEG,NL,WA8s JFS,WYW,WB8OEU, WR8G) 18,952- 154- 92-ABCDE

Kansas

N8LL 24,411- 173-103-ABC**DE**
WQ8P 13,455- 161- 65-**BD**
W8RT 7,749- 101- 63-ABD
N8IGZ 2,232- 62- 36-AB
K8VUA 1,620- 46- 27-BD
WD8G 1,326- 51- 26-AB
*NO8Y 989- 25- 23-BD9E**F**
KA8KAN 450- 25- 18-B
KX8O (+N8KSC,WA8TKJ)
100,893- 342-199-ABCD9EF

Minnesota

WA8BWE 18,031- 192- 73-**ABD**
K8IR 14,342- 143- 71-ABC**DE**
NN9K/8 4,512- 96- 47-**A**
K8DAS 3,384- 54- 29-DE
WT8W 1,817- 53- 23-BCDE
KB8ZQ 898- 43- 18-ABD
W8OHU 832- 30- 16-BDE
N9CIH 648- 27- 12-**C**
N8HJZ (EN34) 330- 23- 11-ABD
WB8GGM (+WA2PHW,KA8JWC)
24,728- 205- 88-ABCDE
N8HJZ (+KB8DOJ)(EN14)
253- 18- 11-BD
N8HJZ (+KB8DOJ)(EN15)
210- 15- 10-BD
N8HJZ (+KB8DOJ)(EN24)
160- 15- 8-BD
N8HJZ (+KB8DOJ)(EN16)
128- 12- 8-BD
N8HJZ (+KB8DOJ)(EN26)
80- 13- 5-BD
N8HJZ (+KB8DOJ)(EN25)
55- 8- 5-BD

Missouri

W8FY 12,245- 120- 79-A**BCD**
W8JRP 11,520- 128- 72-ABCD
N8JRN 2,775- 75- 37-**B**
WB8CLL 2,449- 79- 31-B
*N5KVK 182- 21- 7-BD
W3HDH/8 36- 6- 6-A
KØTLM (EM29)(+N9BD,AJ8E,N8MO)
3,157- 54- 41-ABCDE
KØTLM (EN30)(+N9BD,AJ8E,N8MO)
1,056- 30- 22-ABCDE
KØTLM (EM38)(+N9BD,AJ8E,N8MO)
836- 34- 19-ABCDE
KØTLM (EN20)(+N9BD,AJ8E,N8MO)
846- 21- 19-ABCDE

North Dakota

KE9QT 360- 30- 12-**B**
NT8V 252- 21- 12-**AB**

Nebraska

KD8HE 4,089- 69- 47-**ABD**
WD8BQM 840- 30- 21-ABCD
N8BTN 459- 23- 17-B**C**

VE

Maritime-Newfoundland

K1GVM/VE1 924- 34- 22-**BD**
VE1AKT 264- 22- 12-B

Quebec

VE2DUB 11,426- 142- 58-**ABDEI**
VE2KW 352- 22- 11-BCDEI
VE2YB 135- 15- 9-AB

Ontario

VE3ASO 94,900- 437-146-ABC**D9EFI**
VE3EMS 30,225- 231- 93-BCD
VE3PCW 9,938- 207- 48-**B**
VE3KKL 8,946- 118- 63-ABCD
VE3BFM 8,850- 103- 59-ABCD9E
VE3DSS 7,920- 94- 60-ABCDE
VE3KDH 6,864- 156- 44-B
VE3RM 6,210- 115- 54-AB
VE3SMA 5,460- 104- 42-ABDE
VE3QF 5,198- 82- 46-ABDE
VE3DVF 3,264- 73- 34-BD
VE3WCB 2,744- 98- 28-B
VE3VAL 1,820- 65- 28-**A**
*VE3GBA 1,050- 50- 21-B
VE3DJ 950- 40- 19-BD
VE3FVW 180- 15- 10-BD
VE3DNR 12- 4- 3-B
VE3BQN (+VE3s PCK,SDJ)
13,056- 176- 68-ABD
VE3SAU (VE3s FHK,FHU,OJN,ops)
3,498- 78- 38-ABD

Manitoba

VE4AQ 20- 5- 4-**B**

Saskatchewan

VE5LY 35- 6- 5-**ABD**

Alberta

VE6AFO 2,774- 115- 19-ABCD
VE6BOJ 2,416- 125- 16-**ABD**
VE6EY (DO20) 280- 20- 10-ABCD
VE6EY (DO21)
209- 14- 11-ABCD
VE6EY (DO31) 144- 11- 9-ABCD
VE6EY (DO30) 120- 10- 8-ABCD
VE6EY (DN39) 24- 4- 4-ABCD
VE6EY (DN29) 6- 2- 2-BD
VE6NOV (VE6s CA,KC,KZ,ops)
3,600- 118- 24-ABCD

Marine Mobile

*N1EWB/MM 12- 5- 2-**BC**

Checklogs

K2SSB, KE2DI, W2HAX

Club Competition Rules and Contest Disqualification Criteria

The 1990 contest season is upon us. Three of the ARRL-sponsored contests during 1990 include an ARRL-affiliated club competition —January VHF Sweepstakes, February/March International DX Contest and the November Sweepstakes. There are a few ground rules to follow to ensure that your club's scores are properly credited (and to ease the log checker's burden). These are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. [The use of standard ARRL contest forms will help ensure that your score is figured properly and speed up the publication of contest results in *QST*.]

Please call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings to be counted for a club.

For a club to be listed, two conditions must be met:

1) At least *three different entries* from members of the club must be submitted.

2) All members wishing to be included in the club score *must* indicate the club name on their summary sheet *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) **Unlimited:** Any club submitting *51 or more entries*. (One station can submit two entries—one on phone and one on CW in the November Sweepstakes and the DX Contest.) All stations and all operators must reside within 175 miles of the club's center. All members must attend at least two club meetings per year to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended a meeting as a member prior to the contest. Those club members who are disabled in such a way that they are unable to travel are exempt from the two meeting per year rule but they must be regularly active in club affairs. To be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside 175 miles may not compete in the club competition. The club must be ARRL-affiliated.

2) **Medium:** Any club submitting *50 or fewer entries* except as noted in local club criteria below. The same mileage and attendance requirements apply as the unlimited class club. The club must be ARRL-affiliated.

3) **Local:** Any club submitting *10 or fewer entries*. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be ARRL-affiliated.

Single-operator and multioperator station scores may be counted. At a guest-operated single-operator station, *both* the guest operator *and* the station licensee must be members of the same club in order to count the score for that club. At multioperator stations, at least *66 percent* of the operators must be members of the same club for the score to count for that club. *A multioperator entry may (optional) utilize nonmember operators licensed one year or less without including such operators in the above 66 percent calculation. The intent here is to encourage clubs to recruit contesters from newer amateurs without adversely affecting the club aggregate score.*

In conjunction with the two-meetings-per-year rule, the club must hold *at least four* in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (eg, if a club with 100 members submits only the 10 highest scores, even if more than 10 of its members wish to compete).

It is not within the intent of these rules that a club should vote out a member or that a member resign and then be voted back into the club later so the member-attendance rule can be met.

The highest scoring affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator CW score and the highest single-operator phone score (ARRL International DX Contest and ARRL November Sweepstakes) in any club entry will be awarded a club certificate when at least three single-operator CW and/or three single-operator phone score are submitted.

Disqualification

If the claimed score of a participant is reduced by 2 percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reduction may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts and/or other scoring discrepancies.

An entry with more than 2-percent duplicate contacts left in the log or an entry in which more than 2-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected will be automatically disqualified.

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, eg, disqualification from the 1990 phone SS prohibits submission of an entry for the 1991 phone SS, but 1991 CW SS participation is okay.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by HQ, three additional contacts will be deleted as a penalty. The penalty will not be considered part of the 2-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final.

Rules, 1990 School Club Roundup

The School Club Roundup (formerly Operation Search) is sponsored by the Council for the Advancement of Amateur Radio in the New York City Schools in association with the ARRL to foster contacts with and among school radio clubs.

1) **Object:** For all stations to contact and exchange QSO information with as many stations as possible, especially school clubs, on all amateur bands excluding 30, 17 and 12 meters. Work stations once on phone and once on CW (packet and RTTY count as CW). No repeater contacts except satellite and "real-time" packet.

2) **Contest Period:** Monday through Friday, the second full week in February (Feb 12-16, 1990), 1300-0100 UTC each day. Operate no more than 24 of the 60 hours. Off periods must be at least 30 minutes in length and be clearly marked in the log.

3) **Entry categories**

(I) Individual or single operator (non-club)
(C) Club or group (nonschool)
(S) School club (grades K-12)

4) **Exchange:** Call sign, RS(T), class (I, C or S), US state or DXCC country. For example, W2CXN answers N2RQ by sending: N2RQ DE W2CXN 57(9) S NY.

5) **Scoring**

(A) *QSO points:* Count one point for each phone QSO and two points for each CW QSO (packet and RTTY count as CW).

(B) *Multipliers:* Total number of states, DXCC Countries, 2 times the total number of "C" category QSOs and 5 times the total number of "S" category QSOs.

Suggested HF/MF Frequencies (kHz)

CW	Novice CW	Phone	Novice Phone
1800-1810		1855-1865	
3530-3600	3710-3730	3850-3950	
7030-7080	7110-7130	7200-7250	
14,030-14,060		14,250-14,300	
21,050-21,080	21,110-21,130	21,300-21,400	
28,050-28,080	28,110-28,130	28,550-28,650	28,350-28,400

(C) *Final score:* Multiply the total QSO points times multipliers for the final score.

6) **Reporting:** Logs must include exchange information, bands and signature of all operators (and authorized club official or trustee). Dupe sheets are required for entries making over 100 QSOs. Sample log and entry forms are available for an SASE to N2RQ. Entries must be postmarked within 30 days after the end of the contest (Mar 18, 1990) and mailed to the School Club Roundup, Lew Malchick, N2RQ, c/o Brooklyn Technical HS, 29 Fort Greene Pl, Brooklyn, NY 11217.

7) **Awards:** Certificates will be issued to the top three entries in each category. A special certificate will be issued for any station contacting ten or more school clubs. Send a large SASE or sufficient number of IRCs for complete results and more information about CAAR/NYCS.

Rules, 1990 Novice Roundup

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to contact and exchange QSO information with as many stations as possible on the Novice bands. All authorized emissions modes may be used (see scoring information). Higher-class licensees work Novices and Technicians only.

2) **Contest Period:** The week that spans the end of January and the beginning of February, including both weekends. Begins 0000 UTC Saturday, January 27, 1990, and ends 2400 UTC Sunday, February 4. Operate no more than 30 hours during this nine-day period. Nonoperating periods must be at least 15 minutes; listening time counts as operating time. Times on and off must be indicated in your log.

3) **Entry categories**

(A) *Single Operator:* One person performs all transmitting, receiving and logging functions during the contest period.

(B) *Multioperator:* Single transmitter only. This category includes stations making use of any form of assistance, such as help with logging or relief operator, during the contest period.

4) **Exchange:** Signal report and ARRL/CRRL Section (country for DX stations). Both stations must receive and acknowledge the complete exchange for the contact to count. Novices should send /N and Technicians /T after their call sign so others will know their license class.

5) **Scoring**

(A) *QSO Points:* Count one point for each complete voice QSO and two points for each complete CW QSO. Voice modes include SSB and FM; CW includes all authorized digital modes such as RTTY and packet radio. You may work stations only once on a voice mode and once on a digital mode, regardless of frequency band.

(B) *Multiplier:* Each ARRL/CRRL Section (see page 8 of *QST*), plus VE8/VY1, plus each DXCC country.

(C) *Code Proficiency:* Additional points can be earned if you have qualified for an ARRL (not FCC) Code Proficiency certificate. CP credit equals the speed in words per minute indicated on the latest certificate or

Do not write above this line.

NOVICE ROUNDUP

License Class
- X Novice
- ☐ Technician
- ☐ Other

CALL USED KA1UFZ/N ARRL SECTION or COUNTRY CT

CALL OF OPERATOR *IF DIFFERENT* FROM CALL USED

CHECK ONE: Single Operator Station X Multioperator Station ☐

If multioperator, show calls of **all** operators, loggers

Total CW QSOs 120 x 2 = 240
Total phone QSOs 104 x 1 = 104
Total QSOs 224 QSO points 344

For QSO Points:
CW includes—CW, RTTY, Packet
Phone includes—SSB, FM

MHz	CW QSOs	PHONE QSOs
3.7	80	N/A
7.1	13	N/A
21	15	N/A
28	12	101
222		2
1270		1
Total	120	104

SCORING 344 Total QSO points (+) 10 CP credit (x) 51 Total multipliers (=) 18,054 claimed score

18,054 Claimed Score

22 Hours of Operation

"I have observed all competition rules as well as all regulations for Amateur Radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date 2/4/90 Signature Lisa Kurtosik Call KA1UFZ

Please enclose log, photos, comments, ideas, etc. with your entry and mail within 30 days after the contest to:
ARRL Contest Branch, 225 Main St, Newington, CT 06111.

MULTIPLIER CHECK-OFF LIST

1	2	3	4	5	6	7	8	9	0	VE	DX
~~CT~~	~~ENY~~	DE	~~AL~~	~~AR~~	EB	~~AZ~~	~~MI~~	~~IL~~	~~CO~~	~~MAR~~	
~~EMA~~	~~NLI~~	~~EPA~~	~~GA~~	~~LA~~	~~LAX~~	~~SWA~~	~~OH~~	~~IN~~	~~IA~~	~~PR~~	
~~ME~~	~~NNJ~~	~~MDC~~	~~KY~~	MS	~~GRG~~	ID	~~WI~~	~~WT~~	~~KS~~	~~ON~~	
~~NH~~	~~SNJ~~	~~WPA~~	~~NC~~	NM	~~SB~~	MT			MN	MB	
RI	~~WNY~~		~~NFL~~	~~NTX~~	~~SCV~~	NV			MO	SK	
~~VT~~			SC	~~OK~~	~~SDG~~	~~OR~~			NE	AB	
~~WMA~~			~~GFL~~	STX	SF	UT			ND	~~QC~~	
			TN	WTX	~~SJV~~	~~WWA~~			SD	YU/NWT	
			~~WI~~		SV	WY					
			~~PR~~		~~PAC~~	~~AK~~					
			VI								

Print or type.

NAME: LISA KURTOSIK CALL:

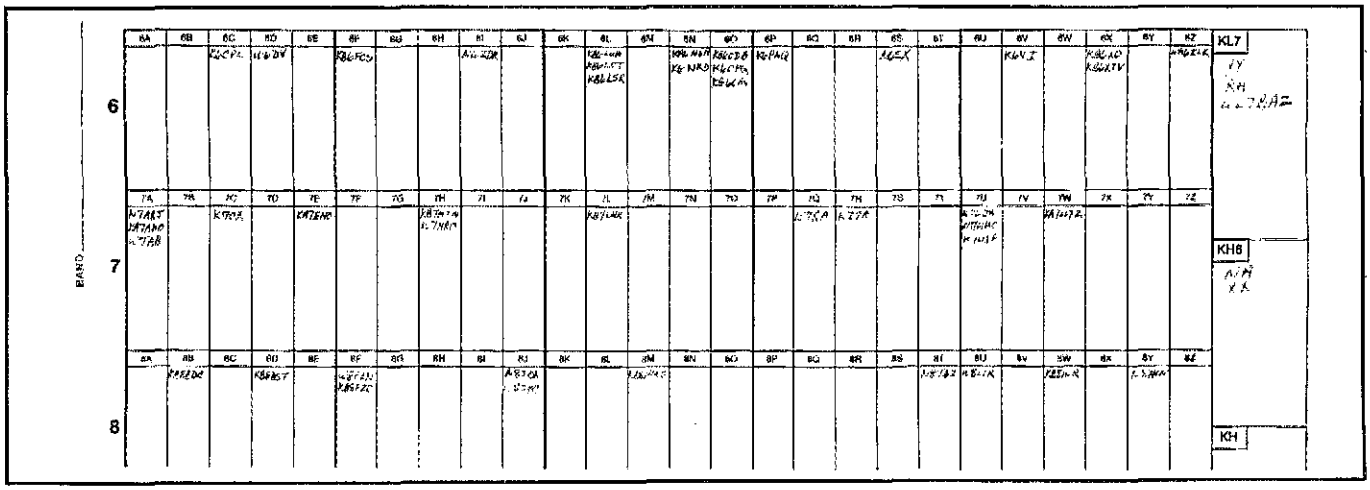
ADDRESS: 225 MAIN ST

NEWINGTON, CT 06111

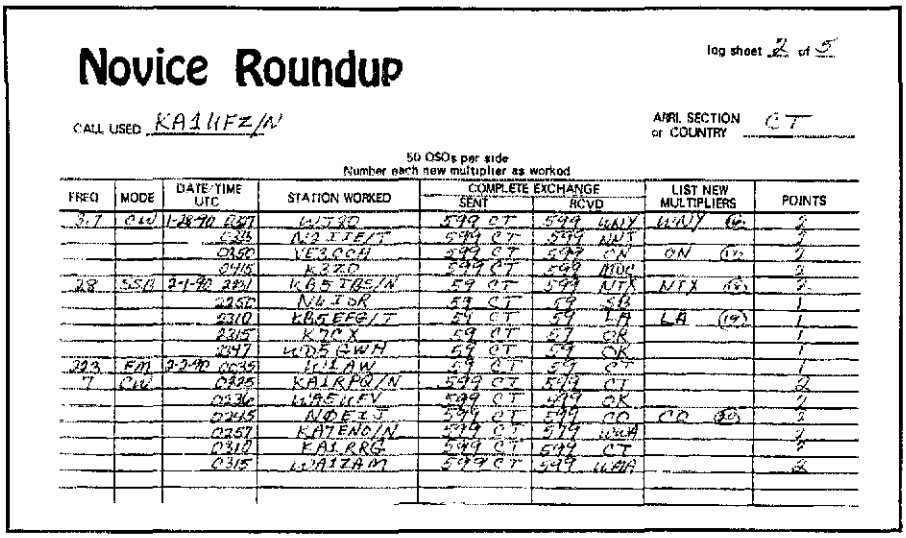
1. Check log for duplicate QSOs
2. Copy ALL QSO info carefully. A penalty is assessed for incorrectly copied QSO info.
3. Observe mailing deadline
4. Dupe/check sheet must accompany all entries of 200 or more QSOs

MCS-49 (5/89)
Printed in USA

A properly filled out summary sheet (cover sheet) log sheet dupe sheet.



Dupe sheet.



Novice Roundup

log sheet 2 of 5

CALL USED KA1UFZ/N

ARRL SECTION or COUNTRY CT

50 QSOs per side
Number each new multiplier as worked

FREQ	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE SENT	COMPLETE EXCHANGE RCVD	LIST NEW MULTIPLIERS	POINTS
3.7	CW	1-28-90 0237	W1JO	599 CT	599 WNY	WNY (16)	2
		0315	N2IIE/T	599 CT	599 NNJ		2
		0350	VE3CCH	599 CT	599 ON	ON (17)	2
		0415	K3ZO	599 CT	599 MDC		2
28	SSB	2-1-90 2231	KB5IBS/N	59 CT	599 NTX	NTX (18)	2
		2250	N6IDR	59 CT	59 SB		1
		2310	KB5EFG/T	59 CT	59 LA	LA (19)	1
		2315	K7CX	59 CT	59 OR		1
		2347	WD5GWH	59 CT	59 OK		1
223	FM	2-2-90 0035	W1AW	59 CT	59 CT		1
7	CW	0325	KA1RPQ/N	599 CT	599 CT		2
		0236	WA5UFV	599 CT	599 OK		2
		0245	NØEIJ	599 CT	599 CO	CO (20)	2
		0257	KA7ENO/N	599 CT	599 WWA		2
		0310	KA1RRG	599 CT	599 CT		2
		0315	WA1ZAM	599 CT	599 WMA		2

Log sheet.

sticker held by the entrant. For more details on the Code Proficiency program, see Contest Corral, this issue.

(D) *Final Score:* Add your Code Proficiency credit to your total number of QSO points. Multiply that total by your ARRL/CRRL Section/DXCC country total for your final score.

6) **Miscellaneous:** Crossband and cross-mode contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only. Contacts made through repeaters (or on locally used repeater output frequencies) are not permitted. Packet radio contacts made through digipeaters are not permitted.

7) **Reporting**

(A) Entries must be postmarked no later than 30 days after the end of the contest (Mar 7, 1990). No late entries can be accepted. Use ARRL Novice Roundup forms, a reasonable facsimile or submit entry on diskette. An entry with more than 200 total QSOs must include duplicate check sheets (an alphabetical listing of stations worked). Send entries to: ARRL Contest Branch, 225 Main St, Newington, CT 06111.

(1) Official entry forms (log sheet, summary sheet, dupe sheet) are available from HQ for an SASE with two units of first-class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM compatible, MS-DOS formatted, either 3.5 or 5.25 inch (40 or 80 track). The log information must be in an ASCII file and contain all log exchange information (band, mode, date, on and off times, QSO time in UTC, call of station worked, exchange sent, exchange received, multipliers [marked the first time worked] and QSO points) with spaces as delimiters. The summary sheet must be in a separate ASCII file. One entry per diskette.

8) **Awards:** Certificates to every Novice and Technician entrant who submits a valid entry. Endorsements for top Novice and Technician entrant in each ARRL Section/Division. Non-Novice/Technician entries are not eligible for awards.

9) **Conditions of Entry**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) *Disqualifications:* See page 80 of this issue.

Strays

I would like to get in touch with...

☐ anyone who has a schematic of the EICO model 460 and 400 oscilloscopes. I have full info on the EICO model 221 VTVM. George K. Hudson, W2BHZ, RD 4 Box 133, Pine City, NJ 14871.

☐ anyone with a manual or schematic for an EICO model 435 oscilloscope. Dick Harris, KW8B, 42518 Schoolcraft, Plymouth, MI 48170.

☐ anyone with a manual for a Hallicrafters S-120 receiver. Robert Bishop, KB7GJ, 2174 Darah St, Idaho Falls, ID 83402.

☐ anyone with a schematic or manual for a General Radio Co unit pulse generator type no. 1217-C. J. L. Whittaker, KUØD, Rte 1 Box 76D, North Branch, MN 55056.

☐ anyone who has a manual for a Johnson Viking Challenger. Charlie Vaughn, 1968 Huntington Hall Ct, Atlanta, GA 30338.

☐ anyone conversant with adapting commercial telephone FAX for use with VHF FM radio. Jack Geist, N3BEK, 2205 Henderson Ave, Silver Spring, MD 20902.

☐ anyone who can furnish me with a copy of the service manual and schematic for a Bearcat DX-1000 communications receiver. Lewis I. Hegyi, N2BPO, 102 Oakwood Dr, Cinnaminson, NJ 08077.

Contest Corral

Conducted By Billy Lunt KR1R
Contest Manager

DECEMBER

31-Jan 1

ARRL Straight Key Night, 24-hour period UTC (from 7 PM EST Dec 31 until 7 PM EST Jan 1). This is a friendly meeting on the air using straight keys. Suggested areas of operation of 80, 40 and 20 meters are 60 to 80 kHz from the lower-band edges and 10 kHz from the lower-Novice band edges. When participating in SKN, use SKN instead of RST preceding the three-digit report to clue in passersby. Following SKN, send a list of stations worked plus your vote for best fist heard (not necessarily one you've worked) during that period. This is not a contest; quick contest-like exchanges are discouraged. Vote also for the most interesting QSO. Mail your report by Jan 10 to ARRL HQ.

JANUARY

3

West Coast Qualifying Run, 10-35 WPM, at 0500Z Jan 4 (9 PM PST Jan 3). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of highest speed you copied, certify that your copy was made without aid and send to ARRL HQ for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

6-7

ARRL RTTY Roundup, Dec *QST*, p 78.

Hunting Lions in the Air Contest, CW, Dec *QST*, p 81.

10

W1AW Qualifying Run, 35-10 WPM, at 0300Z Jan 11 (10 PM EST Jan 10). Transmitted simultaneously on 1.818 3.5815 7.0475 14.0475 18.0975 21.0775 28.0775 50.08 147.555 MHz. See Jan 3 listing for further details.

13-14

Hunting Lions in the Air Contest, SSB, Dec *QST*, p 81.

14

QRP ARCI Fireside Sprint, Dec *QST*, p 81.

20-21

AGCW-DL QRP Winter Contest, Dec *QST*, p 81.

HA-DX Contest, Dec *QST*, p 81.

Michigan QRP Club CW Contest, Dec *QST*, p 81.

North Dakota QSO Party, sponsored by the Red River Amateurs, from 0000Z-0800Z and 1600Z-2400Z Jan 20 and 0800Z-1600Z Jan 21. Work stations once per band and mode. Exchange RS(T) and state/province/country (county for ND stations). Suggested frequencies: phone—1.865 3.905 7.280 14.295 21.380 28.500; CW-1.810 3.540 and 35 kHz up from band edges; Novices 25 kHz up from Novice band edges. Count 10 points per phone contact, 20 points per CW contact and 50 points per RTTY contact. ND stations add 1000 bonus points for working 5 Novices. ND stations multiply QSO points by the sum of states/countries/provinces worked. All others multiply QSO points by number of ND counties worked (max 53). Certificates and plaques. Mail logs by Feb 28 (include SASE for results) to Mike Beaton, KDØA, 2267 Flickertail Dr, Fargo, ND 58103.

Texas QSO Party, Dec *QST*, p 81.

20-22

ARRL January VHF Sweepstakes, Dec *QST*, p 77.

25

W1AW Qualifying Run, 10-35 WPM, at 2400Z Jan 25 (7 PM EST). See Jan 10 listing for further details.

26-28

CQ World Wide 160 Meter DX Contest, CW, Dec *QST*, p 81.

27-Feb 4

Novice Roundup, this issue, p 81.

27-28

UBA Contest, CW, Dec *QST*, p 82.

YL-ISSB QSO Party, CW, Dec *QST*, p 82.

28-29

Winter Classic and Homebrew Radio Exchange, Dec *QST*, p 82.

FEBRUARY

3-4

New Hampshire QSO Party, sponsored by the NH ARA, from 1900Z Feb 3 until 0700Z Feb 4 and 1400Z Feb 4 until 0200Z Feb 5. Work stations once per band and mode. Exchange signal report and QTH (county for NH stations; state/province/country for others). Suggested frequencies: phone—1.875 3.935 7.235 14.280 21.380 28.380 50.115 144.205; CW—1.810 and 35 kHz above band edges; Novice—35 kHz above Novice band edges. Count 1 point per phone QSO, 2 points per CW/RTTY QSO and 5 points per Novice/Tech QSO. NH stations multiply by total NH counties/states/provinces/countries worked. Others multiply by total number of NH counties worked (max 10). Count 20 bonus points each for working WB1CAG, NY1Z, N2BD, W1GUA, W1WQM, K1RD AND WB1HBB (Max 140 bonus points). Awards. Must be postmarked by Mar 10 (include SASE for results). Send logs to Mt Moriah RS, c/o Bud Valcourt, NY1Z, 19 Teague Dr, Salem, NH 03079.

Ten-Ten International Net Winter Phone QSO Party, sponsored by the Ten-Ten International Net, from 0000Z Feb 3 until 2400Z Feb 4. Open to all amateurs but only paid-up 10-10 members are eligible for awards. Single operator only. SSB, AM and FM. Work stations once on 10 meters only. Contacts must be in the phone subband. Exchange call, name, state and 10-10 number (if member). Count 2 points for each QSO with a member, count 1 point for each QSO with nonmember. Final score is total QSO points. Awards. Send logs along with cover sheet and dupe sheet before Mar 1 to Houston SHOT Chapter, c/o Jack Steets, KG5NO, 5609 Whitehaven, Bellaire, TX 77401.

Vermont QSO Party, sponsored by the Central Vermont ARC, from 0000Z Feb 3 until 2400Z Feb 4. Stations may be worked three times per band (once each on CW, phone and RTTY). All QSOs must take place in the appropriate mode subbands. Exchange signal report and QTH (county for VT stations; state/province/country for others). Suggested frequencies: phone—lower 25 kHz of the 80-15 General bands, Novice 10-meter SSB, 50.110, 144.200; CW—3.540 3.720 7.040 7.120 14.040 21.040 21.140 28.040; RTTY—3.620 and 90 kHz from lower band edges. Count 1 point per phone QSO, 2 points per CW or RTTY QSO. Multiply by number of states/provinces/countries for VT stations; others multiply by number of VT counties worked (max 14). 20-point bonus points for working W1BD. Awards. Official log sheets available for SASE to sponsor. Mail entry by Mar 1 to D. Loverin, WA1PDN, 50 Liberty St, Montpelier, VT 05602.

4

North American Sprint, CW, sponsored by the National Contest Journal, from 0000Z-0400Z Feb 4 (phone contest 0000Z-0400Z Feb 11.) Contests are separate; 80, 40, 20 meters only. Suggested frequencies: CW—around 3.540 7.040 14.040; phone—around 3.850 7.225 14.250. Work stations once per band. A valid QSO is between an NA station and another station. You must send and receive all of the following information: other station's call, your call, serial number (consecutive starting with 001), your name and state (or province/country). An operator may use only one call sign during the contest. Multiply valid QSOs by sum of states, provinces and North American countries (not W/VE). KH6 is not counted as a state or as an NA country. VE multipliers are Maritimes (VE1, VO1, VO2), VE2 through VE7 and VE8/VY1 (8 max) Non-NA countries do not count as multipliers. Special QSY rule: Stations soliciting a call by sending CQ, QRZ, etc, are permitted to work only one station in response to that solicitation. They must thereafter move at least 1 kHz before working any other station, or at least 5 kHz before again soliciting calls. Team competition: Each team has a maximum of 10 members as a single-entry unit. Clubs having more than 10 members may submit more than one team entry. To qualify, the name and call sign of each operator (and station operated if a guest op) must be registered with WN4KKN for CW (K7GM for phone). The team registration information must be either in a written or telegraphic form and received before the start of the Sprint. There are no distance or meeting requirements for a team entry. CW and phone teams are separate. Entries must be received no later than 30 days after the Sprint. Mail CW entries to Trey Garlough, WN4KKN, 7609 Hardy Dr, Austin, TX 78757. Phone entries go to Rick Niswander, K7GM, 1521 W Impala Ave, Mesa, AZ 85202.

6

West Coast Qualifying Run, 10-40 WPM, at 0500Z Feb 7 (9 PM PST, Feb 6). See Jan 3 listing for more details.

8

W1AW Qualifying Run, 10-40 WPM, at 0300Z Feb 9 (10 PM EST, Feb 8). See Jan 10 listing for further details.

10-11

PACC Contest, sponsored by VERON, from 1200Z Feb 10 to 1200Z Feb 11. CW and phone, 160-10 meters. Work PA PB PI stations. Single and multi-operator categories. Exchange signal report and serial number. Dutch stations will send signal report and province (GR FR DR OV GD UT NH ZH FL ZL NB LB). Work stations once per band, regardless of mode. Count one point per QSO and multiply by number of provinces worked per band for final score. Mail logs before 30 days after the contest to PACC Contest, F. Th. Oosthoek, PAØINA, PO Box 499, 4600 AL Bergen op Zoom, The Netherlands.

11

North American Sprint, phone, see Feb 4 listing for further details.

17-18

ARRL International DX Contest, CW, Dec *QST*, p 79.

23

W1AW Qualifying Run, 10-35 WPM, at 2100Z Feb 23 (4 PM EST). See Jan 10 listing for further details.

23-25

CQ World Wide 160 Meter DX Contest, phone, Dec *QST*, p 81.

24-25

UBA Contest, phone, Dec *QST*, p 82.

(Continued on page 84.)

Special Events

Conducted By Billy Lunt, KR1R
Contest Manager

Pitcairn Island: The amateurs of Pitcairn Island will operate VR2ØØPI/(2 letters of operator's call) throughout the **year of 1990** to celebrate their island's bicentennial. Operation will be in the Novice 10-meter SSB band and General 20-and 15-meter SSB bands. For certificate, send no. 10 SASE to Dr G. O'Toole, KB6ISL, 9605 San Gabriel Ave, South Gate, CA 90280-4725.

Duluth, Minnesota: The North Shore RA will operate KDØBB **Jan 9-13** to commemorate the John Beargrease 500 Miler. Operation will be in the lower portions of the 80-10 meter bands. For QSL, send legal size SASE to BARC, Box 500, Duluth, MN 55801.

Philadelphia, Pennsylvania: The University of Pennsylvania ARC will operate N3KZ 1600Z-2000Z **Jan 17** in celebration of Benjamin Franklin's birthday and the 250th year of the University. Operation will be on 14.250. For QSL, send no. 10 SASE to W3KRB, 1207 Waverly Rd, Gladwyne, PA 19035.

Monterey, California: The Naval Postgraduate School ARC will operate K6LY 1600Z-2300Z **Jan 20** to commemorate the first annual ham radio Winterfest. Operation will be in the lower portion of the General 40-15 bands and Novice 10-meter SSB. For QSL, send SASE to Ken Teunis, N6SJV, 3178 Crescent Ave, Marina, CA 93933.

Coloma, California: The El Dorado County ARC will operate WA6LYE from 1600Z **Jan 20** until 0200Z **Jan 21** to commemorate the discovery of gold in California on Jan 24, 1848. Suggested frequencies: CW—7.050, 14.050 and 28.050; SSB—the lower 25 kHz of the General 40-and 20-meter bands and the Novice 10-meter band. For QSL, send SASE to El Dorado County ARC, PO Box 451, Placerville, CA 95667.

Kaysville, Utah: The Davis High School ARC will operate N7MMB 1400Z-2300Z **Jan 27** to celebrate the birthday of Novice Enhancement. Operation will be on 28.375. For certificate, send SASE to Jon Utley, N7MMB, 434 Bing Cir, Farmington, UT 84025.

Houghton, Michigan: The Michigan Technological University ARA will operate W8YY from **Jan 31** until **Feb 4** to celebrate MI Tech University's Winter Carnival. Suggested frequencies: CW—1.805, 3.550, 7.050, 14.050, 21.050; phone—1.850, 3.875, 7.250, 14.250, 21.375, 28.450; Packet—145.01. For certificate, send QSL and large SASE to W8YY ARC, Wadsworth Hall, Houghton, MI 49931.

Computer Diskette Media: Items for this column can now be sent on a standard 3.5- or 5.25-inch MS-DOS formatted floppy disk to ARRL HQ. The file must be in an ASCII format and must contain all information as listed below. The file can also be sent via modem to the ARRL Bulletin Board at 203-665-0090.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **February 1** to make the **April issue.** Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- × 12-inch envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

W1AW Schedule

October 29, 1989—April 1, 1990 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000
	CW Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Teleprinter Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0245, 0545
EST	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:45 PM, 12:45 AM
CST	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:45 PM, 11:45 PM
MST	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:45 PM, 10:45 PM
PST	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:45 PM, 9:45 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.5815, 7.0475, 14.0475, 18.0975 21.0775, 28.0775, 50.08, 147.555 MHz.
Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 18.160, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from September 1989 *QST*, pages 9 and 83," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 83.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications 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.

W1AW will be closed on January 1 and February 19.

Contest Corral

(continued from page 83)

24-26

Maine QSO Party

28

West Coast Qualifying Run, 10-35 WPM, at 0500Z Mar 1 (9 PM PST, Feb 28). See Jan 3 listing for further details.

Computer Diskette Media: Items for this column can now be sent on a standard 3.5-or 5.25-inch MS-DOS formatted floppy disk to ARRL HQ. The file must be in an ASCII format and must contain all information as listed below. The file can also be sent via modem to the ARRL Bulletin Board at 203-665-0090.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **February 1** to make the **April** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Walt Dabell, KD3GS—ASM: Bill Ryan, WA3DPJ. The Salem Nuclear Power Plant drill was held in October. Amateurs from Kent and Sussex counties participated in a very successful operation. Communication was maintained on several frequencies and several pieces of traffic were passed. The Kent County ARES group maintained a net-control and relay station for H&W traffic going into the San Francisco area after the big earthquake. The recent hurricanes and earthquakes have put amateur radio emergency communications through the paces. Are we ready in Delaware for such an emergency? Hurricanes, blizzards, nuclear disasters, chemical spills all are possible hazards in Delaware. To find out how you can get involved, ask at your next club meeting, contact your local ARRL Emergency Coordinator, check into a local or section net, or give me a call (ph number is on pg.8). We won't be prepared without your help. Oct net rpt: DTN stns 299 tfc 35 in 22 sessns, DEPN stns 41 tfc 12 in 4 sessns, SEN stns 73 tfc 1 in 5 sessns. Traffic: W3QQ 53, K3JL 24, WB3DUG 21, KA3GRQ 21, WA3WIY 16, KD3GS 15, W3FEG 13, K3YBW 7, KC3FW 4. TOTAL 174

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. TC: W3FAF. PIO: W3ZXV. Happy New Year! There's no better time to say it: Constructive, specific suggestions for improvement of ARRL programs and services are needed and appreciated. Club newsletters sent to Section and Division leadership are carefully read and provide a major input from the ham community. In Eastern PA, we're listening. We hope to hear many from EPA on the mic and key during Novice Roundup. Best of luck in the January VHF contest, too. WA3TQJ has organized an ARRL Affiliated Club at the Leary Elementary School in Warminster. It has few members now but will grow. Del-Lehigh's new officers are W3PYF, W3TDF, N3EYT, and KA3MNY. This reminds me to remind you that 1990 Annual Report forms will arrive soon; please return them promptly so we have up-to-date info on your club. We were happy to get '89 reports from Hilltoppers, York, and Pack Rats after last month's QST deadline. Lebanon Valley's January program will be given by the director of education at Hawk Mountain, whose topic will be tracking birds (the feathery kind, not AMSATs) via radio telemetry. KC3LM had a visit to Susquehanna Co. ARC on the December sked. TRIAC may sponsor a charter trip to ARRL HQ in January. Contact KA3SMV at his CBA if interested. PIO W3ZXV has been chosen president of Telford ARA. In ARES news, N5IEP is now EC for Northampton Co. His father, WB1BRE, serves as SM in New Hampshire. Looking at NTS, Section Net Managers were offered the opportunity to distribute net certificates at the end of '89. We had a little delay when STM KB3UD suddenly had to go to Japan on business. Suggestions for new ORS's were also sought from the NM's. SEPATN, an NTS local net based on RF Hill's 145.31/R, reports an upsurge of check-ins thanks to an extensive repeater cross-linking system. Contact NM K3UEI for the latest info on the links. Finally, it was great to have W3KAG healthy and back on the nets late last year. All are welcome to QNI a Section Net.

EPA	3610 kHz	Daily 7 & 10 PM	AA3B, Mgr.
EPAEPTN	3917 kHz	Daily 6 PM	WA3EHD, Mgr.
PTTN	3610 kHz	Daily 6:30 PM	WB3EPU, Mgr.

Your ARES, RACES, and club nets need your participation, too. Traffic (October): N3AZW 562, N3DRM 175, W3JKX 132, KD3AO 94, N3CD 88, W3IVS 85, AA3B 66, WA3EHD 46, N3GXK 36, WB3EVL 34, N3EFW 33, KA3MVM 33, W3KOD 32, KA3SKT 29, W4UQ 23, WA3CKA 22, W3ZID 17, KU3R 16, W3NNL 15, WB8KPE 14, W3CL 12, KA3QYH 11, W3BNR 10, KA3RGF 8, W3VA 7, K3ARR 6, N3FGC 6, W3TWV 6, W3ADE 6, KC3TD 5, W3AQN 4, W3GJC 4, W3FAF 2. NETS (QNI/QTC): EPA 483/126, EPAEPTN 458/135, PTTN 241/75, D6ARES 105/13, MARCNET 75/1, MARCTN 176/52, SCESN 100/4, SEPATN 175/12. @BBS: @K3RLI 397, @WA3TSW 320, @WB3JOE 162, @N3ET 13.

MARYLAND: SM, Ken Cohen, NI3F. ASM/PKT: KJ3E. ASM/ACC: WA3YLO. OOC/BM: NB3P. PIO: N3BMB. SEC: KN3U. TC: W3VVN. STM: N3EGF. SGL: KW3X. During October, ur SM visited the halls of Congress and heard Senator Daniel Patrick Moynihan, who just came back from St. Croix, praise ham radio for our help after Hurricane Hugo. I also stopped by Senator Carl Levin's office to say "tnx" for his leadership in opposing license fees. W3YVQ gave a brilliant talk on RACES to CARA. The CARA hamfest was bigger and better than ever. Welcome aboard to KA3BUY and KB3WL, new ECs for Baltimore and Garrett County respectively. PG County RACES/ARES just launched a new newsletter...a nice one too! Every club should consider having Novice classes and a press liaison; local newspapers are always looking for good stories, and we hams have plenty of them. 73 es CU next month! With the nets: WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 31/69/365, PON/WB3BFK 26/21/289, MDD/W3FA 57/204/470 (TOP BRASS W3FA/104, W3QQ/96, K3GHH/80), MEPN/K3RXK 30/132/896, MAVEN/W3YVQ 0/0/0. Traffic: W3IWI 1372(BPL), NB3P 540(BPL), WB4OBC 456(BPL), KC3Y 215, KA3RFE 205, K3GHH 171, KJ3E 153, NR3Q 132, K1LNJ 130, K3RXK 106, W3FA 98, KA3T 82, NC3Z 68, NT3S 62, N3ETI 51, KA3ENQ 44, N3GIY 30, KD0M 28, K3USO 24, WB3BFK 24, KD3JK 22, N3EGF 22, K3ORW 21, W3YVQ 20, K1BGT 19, W3DQI 19, NF3X 18, W3ZNW 12, W3FZV 11, N3GDF 8, WA3EPT 4, WA3GYW 3, KA3DXX 2, WA3SCW 2. PSHR: W3FA 100, KC3Y 85, KD3JK 79, K3RXK 76, KJ3E 75, NR3Q 69, K3GHH 66.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA— Well, the World Series is over, finally! AND once again, thanks to all the hams who provided public service communications during the SF Bay quake. Data Mode communications (AMTOR and PACKET modes) carried the day, especially in California! Here in WNY, PSHR: KG2D N2EIA N2EVG WA2FJJ W2FR NN2H KC2HJ N1IKR W2MTA WB2OEV WB2OWO WB2QIX KA2QOO ND2S KA2UTI NJ3V K2YAI KA2ZNZ. Sept. BPL: None. Although Silent Keys are not regularly listed in this column, once again this month it seems right to observe that WB2HCT and WB1GXZ recently joined Silent Keys. Mac was a profound influence in SW New York and was a Gasser. Mary from Connecticut and New Jersey was beloved by many a CW traffic beginner for her assistance and loving guidance. By N4NGC's count, New York State has 113 PBBS today. (CA = 169, FL = 99, MD = 84 and OH = 74) W2FXU and his great word cruncher now edit the Tompkins Co. ARC Hilltopper—FB! Club Officers: Niagara KA2ZSC KA2MXH W2UMS WA2PUO; Utica K2BRF KA2CHX/WS2W WA2FSU WA2AZA; GRAM KC2RF KA2OQI KA2OVA WA2AIV; Liverpool WA2ISC K2QCX N2DMP KB2DIO W2GIN; Squaw Island K2TDZ WA2ENW N2AFZ K2BWK; Orleans N2GJW KA2SYY KA2BCE KA2BCF. Father Radio, W2FR, has achieved DXCC Honor Roll at 338. ANNOUNCEMENT: effective next month (November) WB2YQH is appointed as an Assistant SM for Western New York with special interest in ARRL related affairs and events in Erie, Niagara, Orleans and Wyoming counties. Bob's interests span from DX (on the Honor Roll) and contesting to club activities.

NET NAME	QNI/QSP/QND	NET NAME	QNI/QSP/QND
NYSEMO	112-011-005	NYSR	013-004-005
NYS/M*	240-115-031	NYS/E*	321-185-031
WDN/M*	342-076-031	BLUELINE	204-033-030
NY PHONE*	122-070-030	JCRQCN	409-021-029
ESS	375-100-031	TIGARDS	035-000-030
NYPON*	460-178-031	VHF THIN	032-000-004
NYSPTEN	398-049-031	BRVSvcNet	290-053-031
Lewis Co	064-003-007	GNYTN*	290-053-031
OCTEN/E*	718-096-031	OCTEN/L*	254-068-031
Q Net	442-002-029	Pathfinder	336-003-031
STAR*	354-035-031	Earlybird	185-000-022
WDN/E*	478-149-031	WDN/L*	359-074-031
NYS/L*	311-154-031	*NTS Net	

Packet Report: NA2B. Field Day: 1A N2MD 47 KD2A 52, N2EBG 184, W2CXM 198/215; 2A Battery K2EC 6, W2LZ 8, N2IQH 24, W2FMM 25, KA2WFT 26/27; 2A K2IQ 70, W2SB 109, W2UXC 223 W2QYV 257, WN2R 273, WB2E LW 287 WA2L 309, W2SAM 318, W2RUI 331, WK2K 386/492; 2A Commercial KG2F 9, W2RCX 11/15; 3A W2TZ 7, K2MP 29, K2SA 36, N2DM 148, WB2YAC 150, KE2DX 190, W2ZJ 229/280; 4A WF2L 15, NW2X 63/100; 4A Commercial W2PE 2/3; 6A W2OW 22/42; 8A WG2R 6/16; 2B-2 KA2PIB 14/14. OO reports: KA2MOO N2FHT. New appointments: (OES) WA2DAC KC2JO; (ASM) WB2YQH. Traffic (Oct): W2MTA 366, WB2OWO 270, WA2FJJ 269, NJ3V 180, K2YAI 166, N2EIA 153, KC2HJ 136, KA2QOO 135, W2FR 134, ND2S 117, KA2ZNZ 112, WB2IJH 106, WB2NLU 92, KA2DBD 71, WB2QIX 71, KG2D 66, NN2H 65, KA2ZKM 64, KA2SJG 59, N2EVG 53, KA2UTI 53, WB2OEV 37, W2PPS 36, AF2K 28, N2DLN 22, NA2B 20, N8JSO 20, N2IKR 14, KE2EA 6, W2GJ 6, WA2OEP 4, WB3CUF 1. (Sept.) N2IKR 4. HAPPY NEW YEAR ALL!

WESTERN PENNSYLVANIA: SM: John T. Fleming, NO3M @ NO3M. ASM/SGL: KA3OEM @ NM3G. SEC: WA3UFN @ WA7SSO. STM: K3SMB. BM: KC3ET @ KA3NVP. TC: N3EFN @ K3ASI. OOC: KX3V. ACC: AK3J.

NET	QNI	QTC	SESS	kHz	T/O	MNGR
WPACW	274	116	33	3585	7:00P/D	WA3UNX
WPAPTN	406	63	31	3983	6:00P/D	WA3HLN
KFN	134	28	21	3983	1:30P/M-F	N3EMD
PFN	200	169	31	3958	6:00P/D	WA3THT
WPA2MTN	342	36	31	14688	8:00P/D	KA3BGC
NWPA2MTN	589	41	30	14513	9:00P/D	KC3NY

I am sorry to tell of the passing of W3PVH, W3GSI, W3LPF, and KA3JJT (died in June). Our thoughts and prayers are with their families and friends. I would like to make a correction to the October QST column. KB3L was the founder of the USAir ARC, not the United Airlines ARC. I want to thank the many clubs that are putting the monthly WPA Section Newsletter in their club bulletins. If you don't have access to packet and would like a copy of the letter, please let me know so I can mail you a copy. I want to thank the Erie Chapter of the QCWA for the opportunity to attend their 10th Anniversary Celebration. My activity on the traffic nets will be decreasing beginning in January. I am going back to school after 27 years to get a Masters in Management Information Systems. Please send information and activity reports to my packet BBS as much as possible. I have had no support in trying to get a slow CW net going. I will continue to try to create interest. I think it is important to have an activity that will help Novices and Technicians increase their code proficiency and learn new skills at the same time. Our hobby is considered a national resource for use in disasters. Let's all work to make this resource as highly skilled as possible. If you are available during the day, give the Keystone Phone Net a try. Try around 7240 if the net is not on its regular frequency. The Section is still in need of a Public Information Officer. If you use the ARRL DX QSL bureau, be sure the country is not on the "Not Served" list. October traffic: N3EMD 254, N3FM 240, KO3T 156, NO3M 125, W3OKN 96, WA2QXA 79, W3NGO 76, WA3UNX 71, N3AES 49, W3RUL 30, W3KUN 30, KA3OEM 20, WA3HJC 15, WA3QNT 10, W3SN 7, KA3VBY 7, KA3EGE 6, K3LTV 4. September: KA3EGE 3.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9QBH. BM: K9EUI. ACC: WB9SFT. STM: K9CNP. SGL: K9IDQ. TC: N9RF. OOC: W9TT. PIO: W9EWA. DEC: WD9EBQ.

NET	FREQ	TIME (Local Illinois)
ISN	3905	1800 DAILY
ILN	3690	1830,2200 DAILY
ITN	3705	1900 DAILY
CTN	147.69/09	2100 DAILY
ILARES	3905	1630 1ST, 3RD SUNDAYS
ILLINOIS INDEPENDENT NETS		
IEN	3940	0900 SUNDAYS
ILPN	3855	1845 M-F; 0830 SUNDAY
NCPN	3915	0700 M-SAT
NCPN	7270	1215 M-SAT

NA9K, KE9RP, N9HQI, W9BUW, WJ9N, WD9DDX N9IKA, AND AA9D handled communications for Central DuPage Hospital's Mill Race Ride on October 1st. New officers of the Hamfesters Radio Club are: Pres, KA9GTX; 1st VP, KA9HDN; 2nd VP, N9DWI; Treas. KC9IC; Sec., N9FPQ; Trustee, W9LNQ. The FRRL's WGC '89 (W1LD GOOSE CHASE) was won by N9AKE, with 2nd place going to KC9UM. If you haven't heard by now, the Chicago area underwent an area code change on November 11th. All phones in area code 312 OUTSIDE the City of Chicago became area code 708. Only Chicago phone numbers remain in area code 312. The telephone numbers themselves remain the same. As this column is being written (early November) the holiday season is fast approaching, and with it an increase in traffic to be handled. A big THANKS in advance to those dedicated traffic-handlers, be it on CW, phone or packet who spend the extra time during this season to keep those messages moving. Traffic: KA9FEZ 618, W9HLX 222, W9HBI 118, W9HOT 105, K9QEW 89, K9CNP 87, WA9VLC 83, NS9F 76, W9LWH 67, WD9HQW 55, WD9CIR 46, WB9TVD 44, NC9T 36, W9KR 34, KA9JNE 32, WD9EBQ 27, KA9QXI 27, WA9SLT 14, N3AIA 11, KD9SG 9, WA9AXL 8, W9VEY/M 8, WA9RUM 7, W9LNQ 4.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WB9ZQE. STM: WA9OHX. ACC: NX9I. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: N9IPA. PM: WB9AHJ. OOC: WB9L Net Managers: ITN: KA9EIV, QIN: KJ9J, ICN: NR9K, VHF: W9PMT, IWN: KA9ERC. SEPTEMBER Net Reports:

Net	Manager	Time/Daily/UTC	QNI	QTC	QTR	SES.
ITN	3910	1330/2130/2300	2975	375	2044	92
QIN	3656	1430/0000/0300	301	149	546	59
ICN	3705	2315	142	106	779	31

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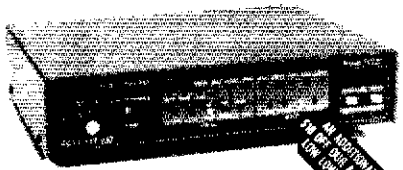

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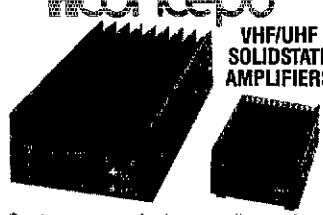

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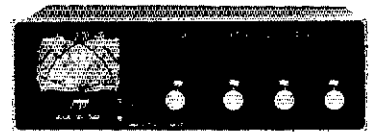

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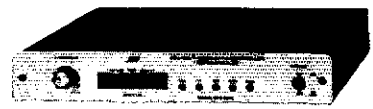

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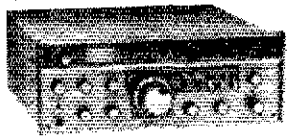

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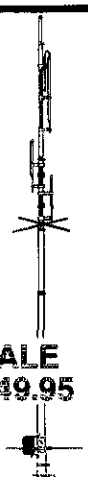

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- The unique counterpoise has four 48" long .100" diameter stainless steel rods for excellent ground isolation.

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DR-570T The Twin Band

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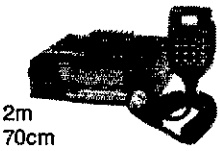


45W 2m
35W 70cm
Full Duplex Cross Band Operation
Twin Band Receiver

ALINCO

DJ-500T

2m/70cm

FM Transceiver
Dual Bander H.T.



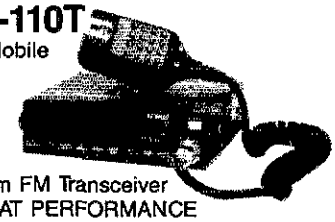
GREAT PRICE

2.5W 2M/2W 70cm
CAP + MARS MODIFIABLE

ALINCO

DR-110T

2m Mobile



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45 Watts
CAP + MARS MODIFIABLE



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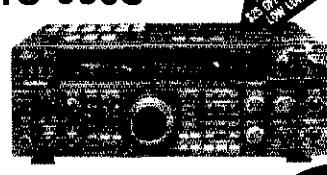

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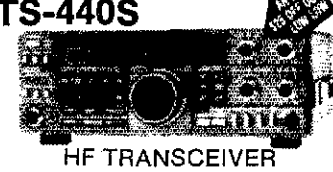

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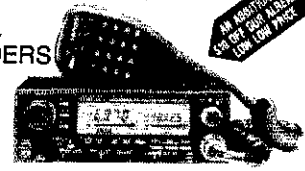

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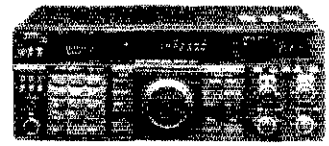

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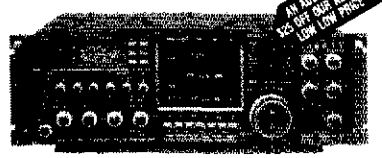

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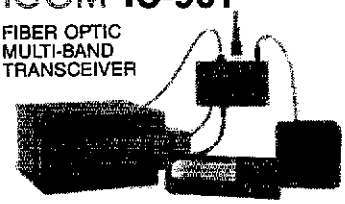

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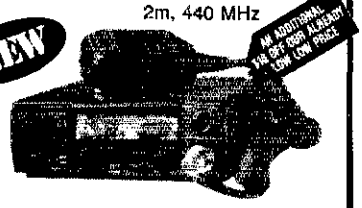
ICOM IC-2400A

2m, 440 MHz

NEW



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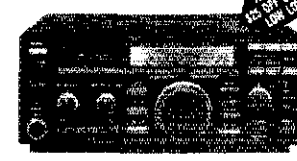

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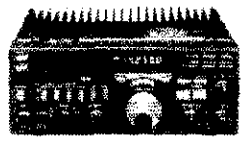

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R5 10, 12, 15, 17, 20 METERS

Communicate From the Tight Spots



R5 is the antenna designed for space age living, on small city lots, apartments, condominiums or for travel in motor homes. If you have limited space, or galaxies of space, R5 will give the most performance from your transceiver.

R5 electrical halfwave, only 16′ 4″ tall design allows the antenna to be mounted virtually anywhere, without compromising performance. It easily handles 1800 watts of power with a solid state matching network giving full band coverage of 10-12-15-17-20 meters.

Easy set-up makes this antenna ideal for portable or fixed installations. It performs without a rotator, or tower. A simple support mast and 50 ohm cable is your connection to ham friends around the world.

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MA-40	40'	21'6"	2	242	3" sq.	4½"	$ 809.00
MA-550	55'	22'1"	3	435	3" sq	6"	$1369.00
MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	$2909.00
MA-770	71'	22'10"	4	645	3" sq.	8"	$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	$3969.00
MA-850MDP*	85'	23'6"	5	1128	3" sq	10"	$5349.00

*MDP models complete with heavy-duty motor drive with positive pull down.

FREE STANDING CRANK-UP TOWERS

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	355	12⅛"	15"	$1019.00
TX-455	55'	22'	3	670	12⅛"	18"	$1539.00
TX-472	72'	22'8"	4	1040	12⅛"	21⅝"	$2529.00
TX-472MDP*	72'	22'8"	4	1210	12⅛"	21⅝"	$4069.00
TX-489	89'	23'4"	5	1590	12⅛"	25⅝"	$4399.00
TX-489MDPL*	89'	23'4"	5	1800	12⅛"	25⅝"	$6599.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets).

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	$1319.00
HDX-555	55'	22'	3	870	15"	21⅜"	$2309.00
HDX-572	72'	22'8"	4	1420	15"	25⅜"	$3959.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25⅜"	$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30⅜"	$7919.00

*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

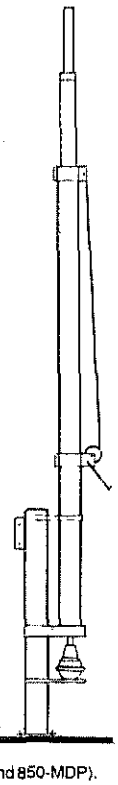
FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.

Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33'	11'4"	4	315	10"	18"	$1089.00
TMM-433HD*	33'	11'4"	4	400	12⅛"	20⅝"	$1319.00
TMM-541SS*	41'	12'	5	430	10"	20⅝"	$1429.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.

Shown w/optional MARB550 rotorbase and rotator.



Tower ratings to EIA specifications.

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36th Annual

HAMFEST

February 25, 1990

(for 36yr's the same weekend)

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IWN	3910	1310	1480	367	31	
IWN VHF Bloomington			777	470	31	
IWN VHF Kokomo			881	191	31	
IWN VHF Ligonier			604	620	31	
Hoosier VHF Nets (22)			2533	138	4450	166

D9RN for OCTOBER 192 QTC 62 ses. IN 90% by K9GBR, K9CGS, W9UEM, WA9OHX, K9ZLS, N9DWU. CAND 666 QTC in 31 ses. D9RN 100% by NR9K, K9ZLS, N9DWU. SILENT KEYS: Earl H. Kirk, W9OET, Indianapolis. Wayne Keen, KA9YFJ, Hudson In. Charles Baker, W9SJN, Portage In. Don Walsh, WA9MEJ, Terre Haute In. Welby X. Coop, WA9HJB, Muncie In. APPOINTMENTS: SEC Mike Head, WB9ZQE. The following annual awards were presented at the Fort Wayne Hamfest: ITN Award to John Wallace, WA9QHX; QIN Award to John Wilson, W9PPO; ARES award to Mike Galloway, WD9AVQ and to Jay Maple, WD9X ; and Special Service Award to Robert Witte, W9PMT. EC REPORTS: N9DUZ WD9X K9ET WA9DOL KD9HB N9DTG WA9OQT WA9HEE WB9NCE KC9CU W9CFI N9ADS N9GSX WB9UNL KA9ZOR KB9AVS KA9KOG W9EPT KA9WCQ KA9DZM WD9BKA WB9L N9ADS NX9I W9YDY N9FMO. Packet BBS reports: W9ZRX 7480, WB9SYK 1921, KD9QB 1693, WA9UXP 1594, N8GTC 2306. Public Service Reports: Jefferson County WB9AHJ King's Daughters' Hospital Frightfully Fun 5-K run also Church World Services "Crop Walk." LaPorte County Amateur Radio Awareness programs in both LaPorte and Michigan City, K9ET. N9FOZ reports 404 hours with 2 accidents, 1 lost child, 1 traffic light, transformer fire, 2 directions, 2 road hazards, and 1 medical emergency. Traffic: W9ZRX 2332, NR9K 547, W9UMH 176, WA9UXP 162, WA9OHX 149 W9ZGC 130, W9CNE 133, N9DWU 119, KD9QB 102, WD9X 75, K9SBW 73, N8GTC 71, KJ9J 69, N9BS 56, W9PPO 54, K9GBR 53, K9ET 49, NX9A 44, K9ZBM 41, NV9A 38, K9ZLS 34, WA9QCF 28, KA9QME 26, W9OCL 26, N9HZ 22, WB9QPA 22, WD9HII 18, K9DIY 16, KD9DU 13, KB9SU 13, NX9I 11, W9PMT 10, N9FMO 10, KA9ZOD 10, WB9OZZ 10, WA6OIZ 8, WD9DWD 8, WD9CIV 6, W9OZJ 6, W9BTZ 6, KB9GK 6, WB9IHR 6, K9OUP 5, AB9A 5, WB9NCE 5, NZ9S 4, W9KMY 4, W9RTH 3, W9XD 3, N9EER 1, KA9MNR 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—New officers of MANCORAD Club are: Pres. WB9ESM, V Pres. NZ9Z. SEC: KA9CPR. Treas. KA9ZTF. Officers of Namekagon Valley Wireless Association: Pres. KD9FC, V Pres. N9ETR, Sec/Treas. N9ETE; they have quarterly meetings the third or fourth Monday of month in Meeting room of Hardee's in Hayward at 7 PM. The 150-foot tower with new antennas is up for N9EGE/R 444.85 voice repeater and KD9FC-1 packet radio digital node. On January 3rd, the Four Lakes ARC will hold exams 8 AM at Fire Station, 421 Grand Canyon Drive, Madison. West Allis RAC Midwinter Swapfest January 13th, 8 AM at Waukesha County Exposition Center Forum, Highways J and FT, having exams, a packet radio meeting, and free coffee and donuts before 9 AM. The Novice Roundup begins at the end of January; help Novices in your town to get on-the-air and have some fun. Central Wisconsin Radio Amateurs have KA9LAQ working on club station changes; will have Banquet in January, ask KA9FAS for details. If present trends continue, Technician licensees will soon outnumber the Generals. Happy New Year. Traffic: WB9YPY 1949, KC9CJ 1274, WA9W 682, WG9J 530, N9IAI 289, K9GDF 243, W9LKN 228, W9CBE 180, W9YCV 152, KB9UE 146, N9BDL 138, KA9BHL 114, W9UCL 83, KE9LX 80, KA9FVX 79, K9AKG 68, W9NGP 66, WB9ICH 63, W9CXY 61, NS9Q 55, AG9G 51, N9BCX 42, K9FHI 38, K9UTQ 37, KG9B 33, KA9VIA 33, K9EP 32, W9IEM 30, KA9KLZ 30, K9GU 28, W9ODV 26, W9UW 13, W9PVD 6.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—Hi gang. Another month is history and not too bad traffic-wise. Bands were generally good, with a few notable exceptions, but we managed to come up with a traffic count of 1567 with 22 stations reporting. Too late for the last time, but on October 7th, the annual "POW/MIA Walk" (42 miles) was the big event at Isle, MN. Sponsored by the Isle VFW, communications again was provided by Amateur Radio, namely KØCRB, KCØQL, NØHWD, KAØEUR, NØFOO, KAØEXL, and KØOGI, the coordinator and NCS. Admittedly a job well done and for a meaningful cause. And, geographically at least, that leads us to the Amateur of the Month for October as Mary Broshofske, KAØAJF of Onamia. Congratulations Mary for all that you have been doing; and I love the "Feedline"—keep it up! I am also pleased to announce the appointments of Brian, KDØNH, as Net Manager of MSN/1 and Jay, KØQBE as Net Manager of MSN/2. Brian has been Net Manager of MSN/2 for about the last 4 years, and so now you will find him in the earlier time slot. Jay, KØQBE, now follows Brian as the Manager for MSN/2. That's where I started Jay...it's an honorable tradition! Congratulations to both Brian and Jay, and I know they appreciate all your help and support. Still no manager for MSPN/N (Noon Phone Net) but we haven't given up. If you have any suggestions on this, please let me know. Until next time, 73 es GL. Jim Swisher, KFØFI, STM.

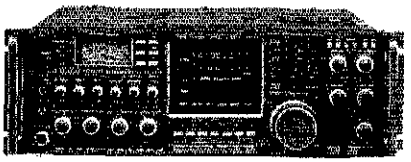
NET	FREQ	TIME	QNI/QTC/SESS	NET MGR
MSN/1	3685	6:30P	308/97/31	KDØNH
MSN/2	3685	10:00P	245/55/31	KØQBE
MSSN***	3710	6:00P	417/34/31	KAØSBY
MSPN/N	3860	12:05P	222/96/26	
MSPN/E	3860	5:30P	747/177/31	KCØT
PAW	3929	9:00A	2527/219/119	WDØBAC
MAW	3860	6:00P	333/180/22	KDØCI

***MSSN additionally sent 39 training messages. Alt. Freq. MSN/1 and MSN/2- 7070; MSPN/N-7232. Traffic: WAØTFC 286, KFØFI 277, NØFOO 123, WØGRW 120, KT9I 105, WØDM 72, KDØCI 65, KDØCL 64, NØJVV 53, KDØNH 52, KAØSBY 47, KAØARP 41, WØRIQ 37, WAØQNE 36, NØJP 35, NFØG 34, KCØT 34, KØQBE 26, WDØGUF 25, KØOGI 15, NØKHH 12, KØWPK 8. Total traffic: 1567.

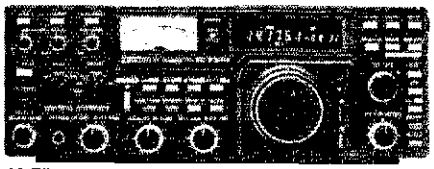
NORTH DAKOTA: SM, Bill Kurtti, WCØM—Enjoyed the Grand Forks Hamfest and Banquet. With 165 registered for the hamfest, it was a real success with another planned for next year. Special thanks to WBØITD for bringing his almost all ham family to the banquet. (Don't forget WAØWBU who got it started.) Also congratulations to the Forx Club on their 25 years of service to the Grand Forks area with their call WAØJXT. Congratulations to WDØEMY and NØFBA for working all states with 200 calls. Congratulations to KC7FK on passing her Extra. Was nice to see Gurnee's well written article in the Oct QST about the 1989 flood in Fargo. Wonder if KNØA has his



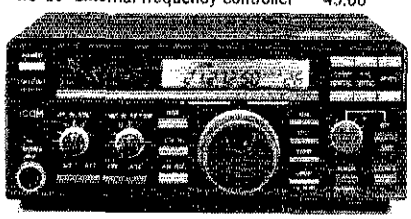
HF Equipment	Regular	SALE
IC-765 Xcvr/ps/keyer/auto tuner	3149.00	**2699**



IC-781 Xcvr/Rcvr/ps/tuner/scope	6149	**5295**



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	**1469**
PS-35 Internal power supply	219.00	**199.95**
FL-63A *250 Hz CW filter (1st IF)*	59.00	
FL-52A 500 Hz CW filter (2nd IF)	115.00	**109.95**
FL-53A 250 Hz CW filter (2nd IF)	115.00	**109.95**
FL-33 AM filter	49.00	
FL-70 2.8 kHz wide SSB filter	59.00	
RC-10 External frequency controller	49.00	



IC-735 HF transceiver/SW rcvr/mic	1149.00	**999.95**
PS-55 External power supply	219.00	**199.95**
AT-150 Auto. antenna tuner ***(Special)***	445.00	**369.95**
FL-32A 500 Hz CW filter	69.00	
EX-243 Electronic keyer unit	64.50	
UT-30 Tone encoder	18.50	
IC-725 Ultra compact HF xcvr/SW rcvr	949.00	**829.95**
IC-726 10-band xcvr/6m/.5-30MHz rx	1299.00	**1129**

Other Accessories	Regular	SALE
IC-2KL HF solid state amp w/ps	1999.00	**1699**
IC-4KL HF 1KW out s/s amp w/ps	6995.00	**5995**
EX-627 HF auto. ant. selector ***(Special)***	315.00	**269.95**
PS-15 20A external power supply	175.00	**159.95**
PS-30 Systems p/s w/cord, 6-pin plug	349.00	**319.95**
MB Mobile mount, 735/751A/761A	25.99	
SP-3 *External speaker*	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal for 751A	79.00	
PP-1 Speaker/patch	179.00	**164.95**
SM-6 Desk microphone	47.95	
SM-8 Desk mic - two cables, Scan	89.00	
AT-100 100W 8-band auto. ant. tuner	445.00	**389.95**
AT-500 500W 9-band auto. ant. tuner	589.00	**519.95**
AH-2 8-band tuner w/mount & whip	758.00	**689.95**
AH-2A Antenna tuner system, only	559.00	**499.95**
GC-5 World clock ***(Special)***	91.95	**69.95**

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VHF/UHF bases	Regular	SALE
IC-275A 25w 2m FM/SSB/CW w/ps	1299.00	**1099**
IC-275H 100w 2m FM/SSB/CW	1399.00	**1199**
IC-375A 25w 220 FM/SSB ***(Closeout)***	1399.00	**799.95**
IC-475A 25w 440 FM/SSB/CW w/ps	1399.00	**1199**
IC-475H 100w 440 FM/SSB/CW	1599.00	**1369**
IC-575A *25w 6/10m xcvr/ps* ***(Special)***	1399.00	**1129**
IC-575H 25w 100w 6/10m xcvr	1699.00	**1469**

VHF/UHF/1.2GHz mobiles	Regular	Sale
IC-47A 25w 440 FM/TTP mic ***(Closeout)***	549.00	**369.95**
PS-45 Compact 8A power supply	145.00	**134.95**
UT-16/Ex-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25w 2m FM, **TTP** mic	499.00	**439.95**
IC-28H 45w 2m FM, **TTP** mic ***(Special)***	469.00	**379.95**
IC-48A 25w 440-450 FM, **TTP** mic	509.00	**449.95**
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch	39.50	
UT-29 Tone squelch decoder	39.50	
HM-16 Speaker/microphone	34.00	
IC-228A 25w 2m FM/TTP mic ***(Special)***	509.00	**419.95**
IC-228H 45w 2m FM/TTP scan	539.00	**479.95**
IC-448A 25w 440 FM/TTP mic	599.00	**519.95**
UT-40 Pocket beep function	45.00	
IC-900A Transceiver controller	639.00	**499.95**

★ ***Closeout Special . . .***
IC-900A Transceiver controller with **UX-29H** 2m/25W and **UX-39A** 220/25W band units.
Package Price • $899.95

UX-19A 10m, 10w band unit	299.00	**269.95**
UX-29A 2m, 25w band unit	299.00	**269.95**
UX-29H 2m, 45w band unit	349.00	**319.95**
UX-39A 220MHZ, 25w band unit	349.00	**299.95**
UX-59A 6m, 10w band unit	349.00	**319.95**
UX-129A 1.2GHz 10w band unit	549.00	**499.95**
IC-901 Fiber Optic 2m/440 xcvr	1199.00	**1049**
IC-1200A 10w, 1.2GHz FM ***(Closeout)***	699.00	**599.95**
IC-2500A 35w, 440/1.2GHz FM mobile	999.00	**869.95**
IC-3210A 25w, 2m/440 FM/TTP	739.00	**639.95**
IC-2400A 45w 2m/35w 440 FM/TTP	899.00	**789.95**
AH-32 2m/440 Dual Band mobile ant	39.00	
AHB-32 Trunk-lip mount	39.00	
Larsen PO-K Roof mount	23.00	
Larsen PO-TLM Trunk-lip mount	24.70	
Larsen PO-MM Magnetic mount	28.75	
RP-1510 2m 25w repeater	1849.00	**1649**
RP-2210 220MHz 25w rptr ***(Special)***	1649.00	**1399**

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Hand-helds	Regular	SALE
IC-2AT 2m/TTP ***(Close)***	319.00	**279.95**
IC-02AT/High Power	409.00	**349.95**
IC-04AT 440 ***(Closeout)***	449.00	**369.95**
IC-2SA 2m HT	419.00	**369.95**
IC-2SAT *2m HT/TTP*	439.00	**389.95**
IC-3SAT 220 HT/TTP	449.00	**399.95**
IC-4SAT 440 HT/TTP	449.00	**399.95**
IC-2GAT 2m HT/TTP	429.00	**379.95**
IC-4GAT 440MHz, TTP	449.00	**389.95**
Special . .		
IC-32AT 2m/440 HT	629.00	**549.95**
IC-12AT 1w 1.2GHz FM HT/TTP ***(Special)***	473.00	**349.95**
IC-12GAT 1w 1.2GHz HT/batt/cgr/TTP	529.00	**469.95**

Aircraft band handhelds	Regular	SALE
A-2 5W PEP synth. aircraft HT	525.00	**479.95**
A-20 Synth. aircraft HT w/VOR	625.00	**549.95**

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC- and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.65
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	24.50
MB-16D Mobile mtg. bkt for all HTs	25.99
LC-2AT *Leather case for standard models*	54.50
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	24.50
HS-10SA Vox unit for HS-10 & Deluxe only	24.50
HS-10SB PTT unit for HS-10	24.50

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver	$999.00	**869.95**
RC-11 Infrared remote controller	70.99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 *High stability oscillator xtal*	79.00	
SP-3 External speaker	65.00	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount	25.99	
R-7000 25MHz-2GHz rcvr ***(Special)***	1199.00	**999.95**
RC-12 Infrared remote controller	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit	139.00	**129.95**
AH-7000 Radiating antenna	99.00	
R-9000 100KHz-2GHz all-mode rcvr	5459.00	**4699**

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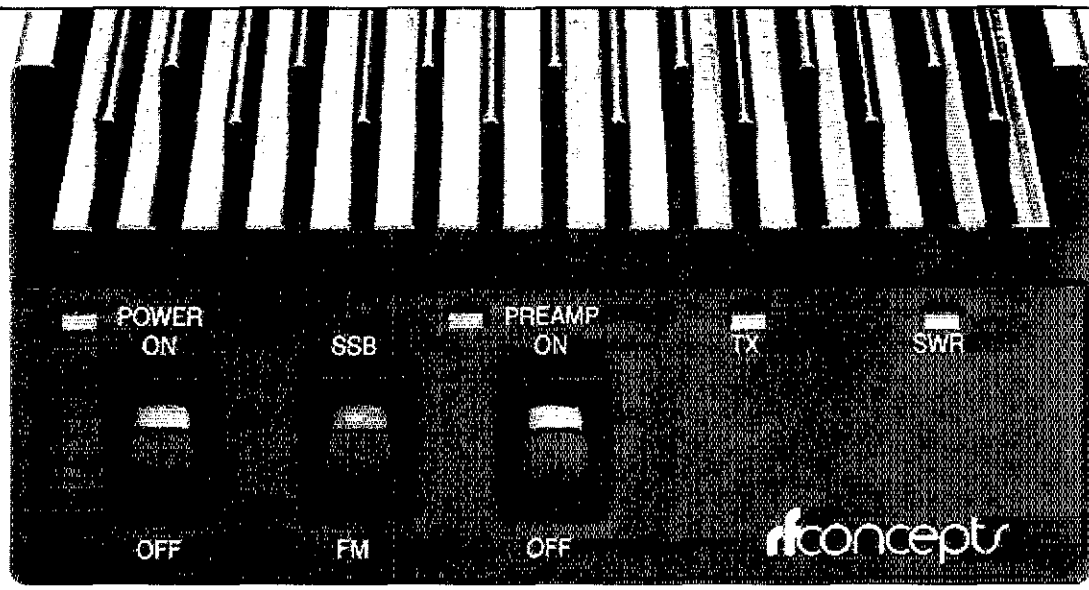

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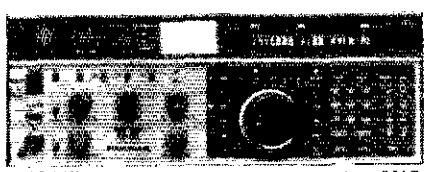
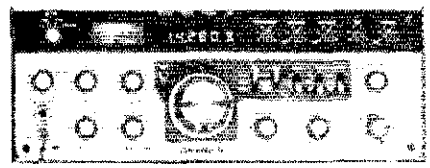


PARAGON	List	SALE
585 9-band xcvr w/ 1-30 MHz rcvr	2245.00	1899
961 Deluxe 22A ps w/speaker	239.00	219.95
256 FM transceive module	65.00	
257 Voice synthesizer	89.00	
258 RS-232 interface	65.00	
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	
562 OMNI V 9-band xcvr/xtal mixed osc	2245.00	1899



CORSAIR II	List	SALE
561 9-band digital transceiver	1495.00	1289
961 Deluxe 22A ps w/speaker	239.00	219.95
263G Remote VFO	269.00	249.95
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
603 KR-1B Dual keyer paddle	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	
Other accessories	CALL	

TITAN	List	SALE
425 1.5KW linear (SN 1000 & up)	2995.00	2589

HERCULES II	List	SALE
420 1KW Solid-State linear	1195.00	1049
9420 100A 12V p/s for 420 (air)	795.00	699.95

ACCESSORIES	List	SALE
2510B Mode B satellite converter	695.00	599.95
239 160-2m 300w dry dummy load	32.00	
238 2KW PEP 1.8-30MHz tuner	367.00	339.95
3180 80m mobile 78" high	37.00	
3175 75m mobile antenna	37.00	
3140 40m mobile antenna	37.00	
3130 30m mobile antenna	37.00	
3120 20m mobile antenna	30.00	
3115 15m mobile antenna	30.00	
3110 10m mobile antenna	30.00	
3101 42" top section stinger	7.75	
3101L 49" top section stinger	7.75	
3001 80-20m mobile matcher	18.00	

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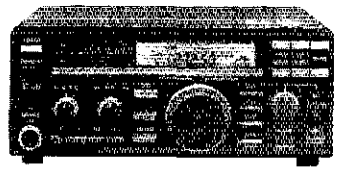
- Mobile



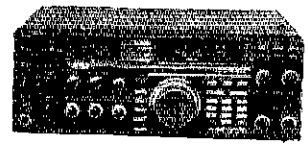
IC-725
- New, Low Cost
- HF Transceiver



IC-2SAT
- Micro-size
- 2 Meter HT



IC-765
- Competition Grade
- HF Transceiver



IC 2GAT
- Deluxe
- 2 Meter HT

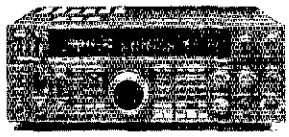


KENWOOD

TH-215A
- 2 Meter
- New Low Price



TS 950 SD
- Digital Signal Processing
- Transmit The Ultimate Signal



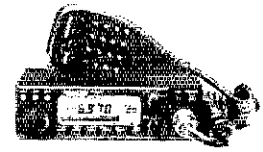
TS 440S/AT
- Popular
- HF Transceiver



TM 631A/731A
- Dual Band
- Mobiles



TM-231A
- 50 Watt
- 2 Meter Transceiver



TH 75A
- New
- 2 Meter/70 cm
- Dual Band HT

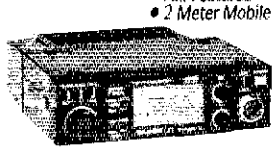


YAESU

FT 470
- Compact
- Dual Band HT



FT 212 RH
- Full Featured
- 2 Meter Mobile



FT 747 GX
- Economy
- HF Transceiver

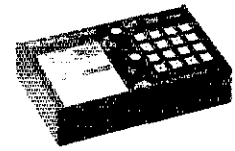


AEA

FSTV-430
- New
- ATV Transceiver



MM-3
- Morse Machine Deluxe Keyer



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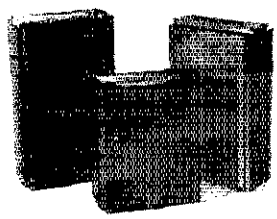

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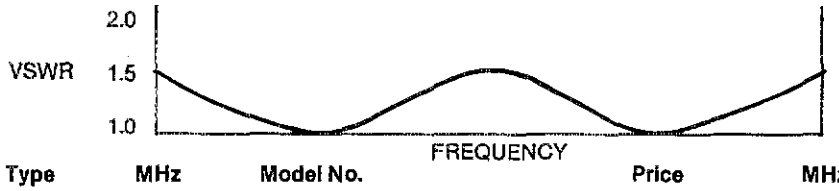

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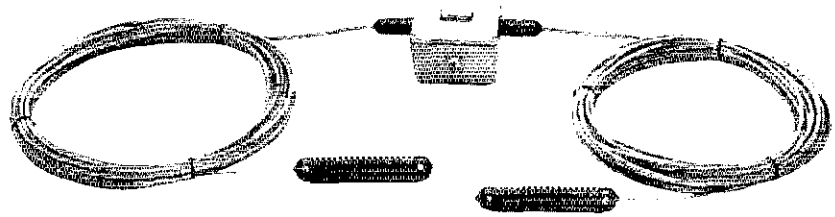
Dipole	3.5	FB-75/80X	$250.00	4.0
Dipole	1.8	FB-160X	$350.00	2.0

X-Customer must specify flat-top or inverted-vee installation configuration and center module height above ground.



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sand cleaned up yet. Would make a nice beach if there was some water around. If you have news from your area, please send it to me. Traffic: KAØFSM 46.

NET	FREQ	TIME	SESS/QNI/QTC	MGR
GOOSE RIVER	1895 kHz	9AM SU	5/83/0	NTØV
DATA	3941 kHz	6:30 da	29/570/15	NØUR
WX NETS	3941 kHz			WØGFE
WINTER ONLY 9AM-12:30PM-MONDAY-SATURDAY				
STORM NET 3941 kHz DURING STORMS ONLY				WCØM

SOUTH DAKOTA: SM, R. L. Cory, **WØYMB**—ASM: **NØABE, WAØFPR.** STM: KDØYL. SEC: KAØKPY. Congratulations to the Mobridge Area ARC on receiving a certificate of achievement from ARRL HQ for being a 100% ARRL Membership Club. Also to the Pierre ARC on receiving a certificate of appreciation from the Hughes County Director of Emergency and Disaster Services for outstanding services and also to the weather watch program. Also, sorry to learn that Eldon, WØRTD, received multiple injuries in a fall from a front-end loader. Many have talked to him via 2 meters hand-held in his hospital room. We hope that by the time this appears in print that Eldon is out of the hospital and completely recovered. The LARK club at Watertown Sept 30 special events station at the Mellette House made 398 QSOs into 40 states, Mexico and Canada. Total traffic reported for October was 440.

DELTA DIVISION

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5KR. SGL: KD5SL. TC: W5RWF. OOC: WB4ICV. Packet: WB5ASD. STM: WB4FDT. The Baton Rouge ARC conducts three Novice classes each year during the spring, summer and fall. The fall class began Oct. 12 and there are currently 15 students attending. Each session runs for 10 weeks from 7 to 9 PM on Thursdays at the Civil Air Patrol Building at the Ryan Airport. The newest edition of "Tune in the World" is being used. Al, W5OVV is the Education Chairman for BRARC. The Rosedale Repeater Association recently held their second annual fund raising Jambalaya Dinner. This was the group that provided emergency communications during the Grosse Tete Tornado Disaster. Their group has now increased to 60 members. Their weekly net is on 147.18 Fridays at 9:30 PM. The Jefferson ARC announced that the date of the New Orleans Hamfest is being changed to the first full weekend in December beginning in 1990. Congratulations to the Acadiana ARA for their fine performance in the 1989 ARRL Field Day. They competed in the 1A Class placing 6th overall and 1st in the Louisiana Section and Delta Division. Traffic: K5UPN reports CAND Oct 89 had 666 msgs in 31 sessions with La. 100% by KF5VW & K5WOD. WA5YDD DRN-5 report for Oct, 577 msg in 62 sessions with La 98% by K5WOD, WB4FTD, N5CNX, N5LRZ, KF5VW, WA5WBZ, WA5TQA & WX5C. 73 de "Wondy"- K5KR. The Louisiana CW Net meets at 7 PM on 3615 kHz. Traffic: WB4FDT 94, K5CNK 47, WA5TQA 23, W5WOD 23, WA5LHL 17.

MISSISSIPPI: SM, Butch Magee, KF5DE—ASM: Mark Henry, WD5GHW. SGL: Richard Redd, KA5WRX. TC: Jim Akers, W5VZF. SEC: Bill Fryer, N5DVR. BM: Bill Gearhiser, W5EPW. STM: Jim Leist, KB5W. It has been an interesting month here in Mississippi. We've done not only the serious things, but we had a good bit of fun also. The Mississippi Section Phone Net, through the efforts of Jim Akers, W5VZF, participated in the emergency preparedness test of the Tri-Counties airport simulated passenger aircraft crash. Dr. Jim was HF Net Control Station with N5AKZ, myself, KF5DE, and Bill N5DVR as assistant NCS. The simulation, a 727 crashing upon landing, required assistance from several sources about the area and state. MS hams from several areas participated in emergency communications, and notification of area emergency services via land line, and HF-VHF coordination. A fine job by all those participating. As I write this we are preparing for the SET for the Alabama-NOAA severe weather test. Plans are for the NAWAS to be out, therefore nearly all area conditions will be reported by Amateurs to the Birmingham ARC and NOAA via local area 2 Mtr.nets and HF Nets. Packet will play a principle role in this exercise. I'll report on the outcome next month. In the meantime, N5HGN, brother Dennis, and his clones of the QRP, indeed were the solar powered QRP-RF emanators of the Universe as 17 of 'em, with family, gathered for a weekend of fun and frolic and much QRP RF. Really big signals coming from all on Phone and CW "in-the-woods." More really big RF comes from the Section Nets as the following reports show:

NET	NET MGR.	SESS	QNI	QTC	EMERGENCY
MSPN (AM)	W5OXA	31	75	2267	
Magnolia SPN	N5HBB	31	6	738	16 (POWER)
Gulf Coast SBN	WD5JXT	31	16	1682	
Meridian ARC	KB5ASR	4	0	94	
MS Slow Net	W5YRX	22	6	146	
Rankin Co.ARC	WD5IKD	5	0	73	
MS Traffic Net	KB5W	31	212	239	

stations heard: KB5W*, N5SM*, W5DEJ*, W5JDF*, W5WZ*, KT5Z*, KG5NI*, WB4LAL, W5YRX, W5LSG, K5FJ, KF5DE. (* Indicates assigned Net Control Stations)

CAND	K5UPN	31	666	

(MS 100% by: N5SM)

5th Region (DRN5)	WB5YDD	62	577	

(MS 100% by: N5HBB, KB5W, W5HKW, KT5Z, KF5DE, N5SM)

Thanks for the input, appreciate the participation by all. See you next month, 73 from KF5DE, SM, Mississippi Section.

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO: W4TYU. Central Assistant SM WA4GLS, Western Assistant SM and ACC K4CXY. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4POY. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern Monday thru Friday. Memfest '89, the Mid-South area Hamfest, was something special! It was a turnaround from events of the last few years. We had nice crowds, good dealer participation and a lot of flea market activity. Sincere thanks to N4DON, K4FZJ, WA4ETE, KA4EBU and the many other dedicated hams who helped. To top it all off, we made money! We had 39 candidates for the FCC exams and about 60% upgraded. The following week was Tri-Cities Hamfest at Gray. ASM W4TYU was there and he reports that it was an excellent occasion, even larger than last year. They had a good exam turnout. Finally, the last weekend in October, and the Chattanooga Hamfest! ARRL-wise, Delta Division Director Joel

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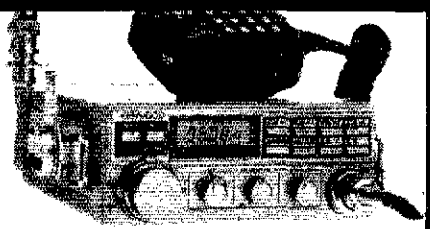

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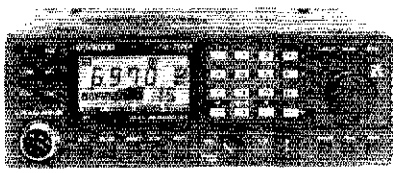

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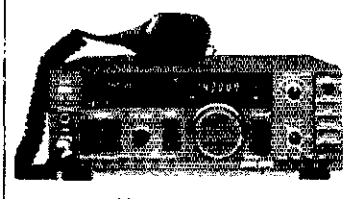

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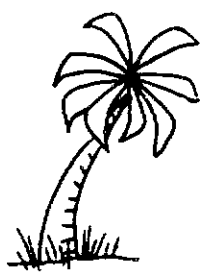

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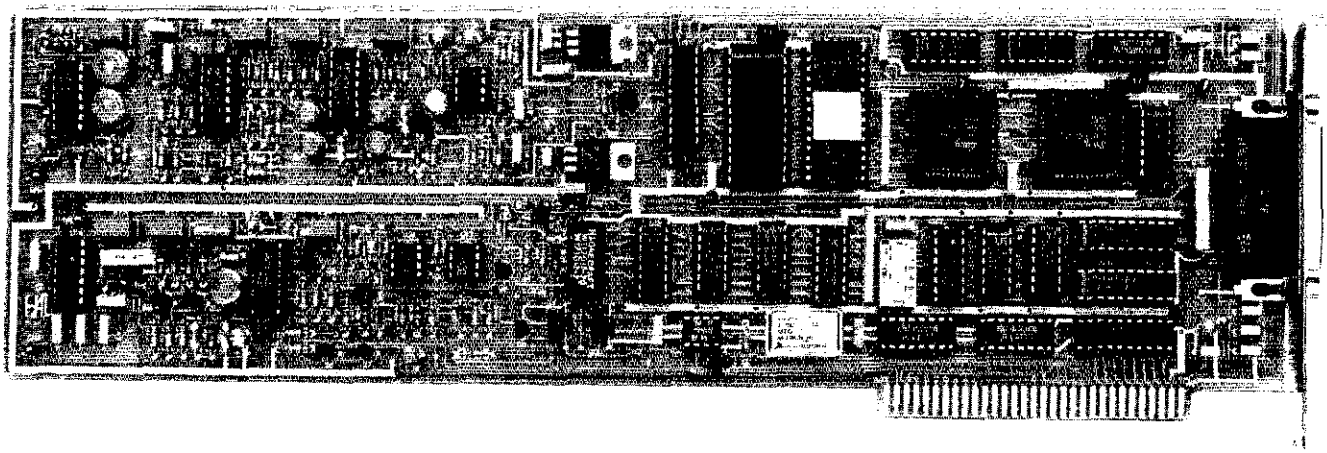

Our new PC-AMTOR plugs right into your IBM-compatible PC and gives you super AMTOR, RTTY, and CW performance. We've combined the best features of many of our other products to give you an easy to use, low cost, and very high performance PC terminal card.

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- **CW:** A new algorithm for CW—the best yet!

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- **WHAT—NO PACKET?** That's right. We offer the RPC-2000 and ST-7000 for HF Packet. HF packet uses different data rates and has special requirements. It deserves special treatment. Also, your High Frequency AMTOR, RTTY, and CW deserves better treatment than a compromise "do everything" gadget.

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MRF136	21.00	SD1229	12.00	NE25537/2SK205	3.25
MRF136Y	47.00	SD1272	12.00	NE41137/3SK124	3.25
MRF137	24.00	SD1278-1	13.75	U309 & U310	1.75
MRF138	35.00	SD1405	16.00	2N4416 & J310	1.00
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MRF150	79.50	SD1429-3	16.00	(Partial listing only - call for numbers not listed)	
MRF151G	179.50	SRF2072	12.75		
MRF153	395.00	SRF3662	29.50	SAU4 440 LIN	49.50
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MRF172	58.75	2N1522	11.95	SAV12 144 HT	23.50
MRF174	80.00	2N3553	3.00	SAV15 222	58.75
MRF208	16.50	2N3771	3.50	SAV17 144 SSW	66.50
MRF212	19.50	2N3866	1.25	M57713 144 LIN	49.50
MRF221	12.00	2N4048	11.95	M57726 144	58.95
MRF224	16.00	2N4427	1.25	M47727 144	69.50
MRF237	2.00	2N5109	1.75	M57729 440	69.95
MRF238	16.00	2N5179	1.00	M57732L	33.00
MRF239	17.00	2N5589	13.00	M57737 144	46.50
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MRF245	32.00	2N5641	16.00	M57745	89.95
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MRF248	35.00	2N5643	19.00	M57762 1296	69.75
MRF260	10.00	2N5944	11.00	M57764 806	74.00
MRF261	10.50	2N5945	10.00	M57712,M57733	Use
MRF262	10.50	2N5946	12.50	M57737,SC1019	SAV7
MRF264	12.50	2N6080	9.00	SC1027	use SAU4
MRF309	*60.00*	*2N6081*	*11.00*	*MHW710-1,2,3*	*61.00*
MRF314A	33.00	2N6082,3,4	14.75	MHW820-1	76.00
MRF315A	32.50	2N6097	20.00	MHW820-2	82.00
MRF316	64.50	2N6255	2.50	*SPECIAL TUBES*	
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MRF449	22.50	2SC1971	4.50	572B/T160L	69.95
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MRF450A	14.25	2SC2075	1.75	7581A/KT66	16.95
MRF453	18.50	2SC2094	18.50	811A	15.95
MRF454	14.00	2SC2097	28.00	Match Set 2	37.90
MRF454A	17.00	2SC2097MP	62.00	Match Set 4	75.80
MRF455	11.25	2SC2099	29.50	813	44.75
MRF455A	12.75	2SC2166C	2.00	833A	89.75
MRF458	20.00	2SC2221	8.25	833C	99.75
MRF475	6.75	2SC2237	7.00	845	58.90
MRF476	4.00	2SC2284A	24.75	M2057 GE	22.75
MRF477	14.75	2SC2289	13.75	5894	44.95
MRF479	13.75	2SC2290	14.75	6146B	14.95
MRF485MP	19.75	2SC2290MP	39.50	6550A	16.95
MRF492	14.75	2SC2783	28.50	7581/KT66	16.95
MRF497	*16.75*	*2SC3101*	*12.25*	*8950*	*19.50*
MRF515	2.50	2SC2312C	4.75	3-500Z	114.75
MRF555	3.00	2SC2379	31.25	4CX250B	79.95
MRF557	5.25	2SC2509	9.00	4CX300A	142.25
MRF559	2.25	2SC2539	19.75	4CX1000A	459.95
MRF607	2.50	2SC2559	28.25	8877	599.50
MRF629	3.25	2SC2630	23.00	*EIMAC TUBES*	
MRF630	3.75	2SC2640	15.00	8874	359.50
MRF641	20.50	2SC2641	16.00	8875	399.95
MRF644	23.00	2SC2642	28.25	3CX800A7	339.95
MRF646	26.00	2SC2694	46.75	3CX1200A7	469.00
MRF648	31.00	2SC2695	31.75	3CX1500A7	699.50
MRF660	13.25	2SC2782	32.75	3CX3000A7	719.95
MRF843,/F	21.00	2SC2879	21.00	4CX250B	99.95
MRF846	37.75	2SC2904	32.50	4CX350A	199.50
MRF873	29.75	2SC2905	34.50	3-500Z	134.75
MRF1946	15.00	40582	9.50	4-400C	159.95

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Harrison was there, as was ASM Giesler, STM Teffeteller and SM Simpson. You knew I'd be there, didn't you? I trust that I won't have to miss a Chattanooga Hamfest for many more years. I came in early on Friday night—and there was my Memphis Co-chairman, N4DON, helping Charlie, Ann, Barbara and all the rest set it up. 1989 was a good year for Tennessee, and I hope that the new year will be even better—for all of us! Traffic: WA4FMR 141, KA5KDB 49, K4WWQ 39, *K4WOP 36, WB4LAL 31, W4DDK 30, W4MI 24, WA4HKU 19,* K4CXY 14, WA4GZZ 13, W4PSN 4, W4PTI 3.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—ASM: KC4WN. SEC: WB4NHO. STM: KA4MTX (OCT). KC4FRA is now the net manager for KTN. Please give Doug your support. I have heard that several amateurs in KY passed emergency traffic involving the earthquake in California. Kentucky could have a similar situation some day, but I know we will rise to the occasion if needed. Stations reporting traffic and the number of messages handled is up! More will follow with the holiday season just around the corner.

Net	QNI	QTC	UTC	Mgr
MKPN	1323	126	31	WD4RWU
KTN	1032	65	31	KC4FRA
KYN(BOTH)	342	144	60	K4AVX/KZ8Q
TSTMN	376	43	31	KZ8Q
KNTN	232	86	39	WA4EBN
CARN	486	36	28	W4FEW
KRN	607	17	—	K4NLY

SAR (Oct.): WA4GHQ 112, K4VHF 90, KB4UJA 88, N4PET 74, KA4MTX 65, WA4EBN 61, KC4WN 50, K4AVX 37, WD4RWU 37, KI4QH 34, WA4HLW 20, WB4ZDU 18, W4TPB 17, N4PEK 17, N4LAF 13, WB4AUN 10, KB4SRD 7, WD4CQF 5, KU4A 2. PSHR KA4MTX 98, KC4WN 88, KI4QH 79.

MICHIGAN: SM, George E. Race, WB8BGY (@N8FTY)—ASM: WA1LRL (@WA1LRL). STM: WD8KQC (@NT8R). SGL: N8CNY. TC-W8YZ, OOC-WA2AJQ, ACC-N8JVA, PIO-N8KBA. Silent Keys, with deep regret: W8SCW, W8SDB. My thanks to the following who are retiring from League positions in MI. N8AYO-DEC, N8DKI-EC, WB8CCS-EC, NX8S-EC, and WD8JVQ-EC. Your years of service are greatly appreciated by all you worked with. Welcome aboard to the following new appointments: N8JCL-DEC for District 7, WB8I-EC for Bay Co., WA8PEJ-EC for Eaton Co., N8CRV-EC for Hillsdale Co., W8GZF-EC for Iosco Co., N8JGS-EC for Oceana Co. Try the new Jackson 444.325 + 5 MHz repeater. Call sign is WJ8W, operation is from the Channel 10 TV tower near downtown Jackson. Coverage is reported to be great! My soapbox for this month, Packet Radio! *With so many users, why are the* decisions concerning software, BBS's, State-wide Networking, NTS Traffic forwarding, Bulletins, LANs, operating frequencies, and all the various facets of packet being addressed by so few? Why do these few seem to be unable to agree on any kind of general scheme for overall state-wide packet operation? The hundreds of general users around the State are constantly confused by changes in BBS Software versions, paths that seemingly change from day to day, digipeaters that pop up unaware of any possible role in an overall scheme, many times interfering with established forwarding patterns, and in general the chaos that seems prevalent on packet frequencies. A new group, the Packet Technical Interest Group, has been formed in South Eastern MI. They meet the 2nd Thursday of each month at the Southfield Police station at 7:30. Contact N8JVA or WD8DWO for further information. Their goals, to discuss and implement standards, all over the State, that will end the packet chaos and confusion. This can only work if everyone gets involved to some degree. Sysops have to work together to set BBS standards that *offer solutions to problems, rather than be part* of the problem. Networking has to be organized, proper forwarding tables have to be in place, emergency network operation and NTS traffic handling need to be specifically addressed. Most importantly, end users need to be kept informed of changes, trained in packet operation, and take part in BBS traffic handling in their own areas. How about coming up with a menu driven BBS system that lets users go quickly to their area of interest? Why do we flood the BBS's with hundreds of bulletins and messages that no one ever even reads? I printed 24 hours of BBS activity at my location. *Almost 95% of the traffic was BBS forwarding and node* checks. We need to address the confusion that exists among the users. Who knows, maybe the PTIG is the beginning of the end of the perceived problems. Let's face it folks, more and more users are disgusted with the direction and growth of the MI Packet Radio system. If this trend continues, one of these days only the BBS's will be left to talk to each other. What a waste of valuable spectrum and resources that would be. Please get involved, let's turn packet radio into a viable and usable system that will meet all of our various needs, present and future. Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
MiTN	3953	7:00PM Dy	701	267	33	WD8EIB
MNN*	3722	5:30PM Dy	255	93	62	KF8AU
QMN*	3663	6:00PM Dy	781	200	95	W8SR
SEMTN	145.33	10:15PM Dy	414	102	34	N8HSC
UPN*	3921	5:00PM Dy	962	73	36	WA8DHB
GLETN	3932	9:00PM Dy	1195	52	31	NW8M
MACS*	3953	11:00AM-Sa	350	172	31	K8OCP
WSSBN	3935	7:00PM Dy	537	41	31	W8NDI
NMTN	*147.12*	7:30PM Dy	326	60	33	N8JCL
VHF Net Activity			527	0	35	N8CRV

*QMN Fast-6:30PM Dy; QMN Late-10PM Dy.; MNN Late-8:00PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. Traffic for October: KF8AU 758, N8JAT/BBS 735, KA8CPS 364, N8FTY/BBS 183, N6CRV 173, WD8KQC 170, NJ8S 167, WB8BGY 152, WB8SYA 101, WB8R 94, NY8W 93, N8FPN 91, WD8MJB 81, K8GXV 65, WA8DHB 59, K6HAP 49, W8EOI 48, WB8YDZ 47, WT8J 46, K8CQF 45, K3UWO 44, N8IIC 43, N8HSC 42, N8CNY 42, K8OCP 41, WT8G 38, K8UPE 37, W8YIQ 34, N8JCL 34, K4IHU 32, KA8BYK 32, W8IHX 26, K8ZJU 23, N8JFH 18, WB8YPG 18, WI8J 16, KA8YWV 14, KI8Q 14, N2IYA 13, WD8EIB 11, WB8POL 10, KA8JQW 10, W8GPP 8, WB8LUH 8, WB8CTU 6, KA8VMJ 6, KB8TS 6, KN8JDN 5, W8URM 5, N8EXS 5, WD8YIG 4, WT8G 3, KC8TS 2, WW8R 2.

OHIO: SM, John Haungs, WA8STX Ph: (513) 563-7373—ASM: David Kersten, N8AUH, Ph: (216) 221-6740. SEC: WD8MPV. STM: KF8J. ACC: KJ3O, BM: W8PH. TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK. PIO: K8QOE.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BN(E)	233	173	31	1845 DY	3.577	WD8C
BN(L)	242	101	31	2200 DY	3.577	K8TVG
BNR	247	70	31	1800 DY	3.605	W8EK
OSSBN	1976	867	97	1030,1615,1845	3.9725	N8IBS
OSSN	220	113	31	0645 M-F	3.577	KD8HB
OSSN	—	—	—	0800 S-SU	3.577	KD8HB
OSN	261	68	31	1810 DY	3.708	WD8KBW
OHIO SECTION ARES NET				1700 SUN	3.875	WD8MPV
OHIO SECTION WX NET				A/R	3.875	WD8MPV

During October the devastation of an earthquake hit twice. In San Jose, California on Oct. 17 and again during the Simulated Emergency Test on Oct. 21. The scenario for the SET was an earthquake with Epicenter in Murray, Kentucky. Traffic into Columbus at EMA Headquarters on 75 meters was difficult with the propagation being very poor due to solar flares. Traffic handled by packet did reach its destination but return traffic was bogged down. W8SGT at the State EMA Headquarters had *contact with 23 counties; most direct* through various nodes throughout the state, and other using the existing packet BBS systems. W8SGT received 45 messages for State EMA. 39 messages were originated from the station. Thanks to all who participated in this year's SET. The Amateurs who were deployed by the Red Cross to San Juan and St. Croix have returned, Vern Barhorst, WD4EEB; Dave Morris, N8EEK and Bob Reckner, W8IQJ, will have an interesting story to tell about their month vacation under hardship conditions in the Caribbean. Congratulations to recent upgrades: KB8GDN, N8LCZ, KB8HOD, WB8UDA, KB8DCS. Michael Patrick, Jr., WB8CZE the Section Official Observer Coordinator presented a program on the ARRL Official Observer Program at November DARA meeting. Phil Frazier, KA8TEF from Republic and Don Neisch, K8EIW from Cuyahoga Falls attended the ARRL Regional Networking Conference in Colorado Springs, CO. The trunking system is part of the "World's Largest Contiguous Trunk Network". OHKYIN'S 446.50 node K8SCH-4 is a part of this network. Walter Harris, KA8KLP was inducted into the Greater Cinti Amateur Radio Hall of Fame and elected to President of GCARA in October. Bruce Thorn, KE8TI received the LCARA "Good Ducky" award for his cooking at Field Day. Dave Heil, K8MN (J52US) will be heading for Sierra Leone, 9L land with the State Dept. shortly. By the time this issue is in print we will have elected a new Great Lakes Division Director for the next two years. The Vice Director, George Race, WB8BGY the former SM of Michigan was unopposed. Congratulations, and you can count on help from the Ohio Section Staff and volunteers in the Field Organization. Traffic: KD8KU 477, K8TVG 323, W8PMJ 281, W8BO 252, WD8DPZ 211, WD8KFN 200, KD8HB 187, K8JDI 181, KE8CV 155, WA8SSI 152, N8IIP 142, N8FWA 133, K8DHD 121, WD8IKC 119, WD8QXT 100, WB8JGW 97, N8EFB 92, K8ALV 91, KC8TW/PBB 88, W8KK 86, KC8NM 86, W8OZK 85, W8RG 85, N2NS 80, W8KN 79, WA8HED 75, KA1S 69, WD8KBW 68, W8SKP 65, W8JLW 62, W8ZOL 56, W8LDU 55, N8GOB 54, WB8KWC 49, W8BI 49, W8PBX 48, NS8C 47, KA8SON 45, N8CEI 45, WA8EYQ 39, K8IOW 39, N8JDH 39, K8LQM 36, KA8HBN 35, K8DXZ 35, KB8AKW 34, WD8RIB 33, W8BDC 32 WD8JYE 29, KC8JV 29, W8VND 28, WA8STX 28, N8HJB 27, K8CKY 27, N8XX 25, KA8CGF 24, NC8O 23, N8INP 23, W8LDQ 23, WB8HHZ 21, N8JYV 18, K8ES 17, K8JA 16, N8FPH 16, KA8RIX 16, K8WZX 16, KA8ZOW 15, N8JRV 14, KD8XL 13, W8GDQ 13, K8OQF 13, NF8B 12, N8AJU 12, KA8VYT 12, NY8V 11, KB8ESU 11, N8KTU 10, K8ET 10, N8CW 8, WD8PWG 7, KD8IC 5, WA8RLB 5, N8CZV 4, N8GIO 3, KA8BNQ 3, WA8NZE 3, KB8ICW/KT 2, W8FPA 1, WB8NHY 1, WD8CSP 0. (Sept) KF8J 132, NW8E 24, WD8CSP 2.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. SGL: KB2HQ. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. ACC: KV2A. ASM/PACKET: N2FTR. ASM/NWSLTR: WB2NHC. NET REPORTS FOR OCT. (QNI/QSP): AESN 48/5 CDN 670/57 ESS 375/100 HVN 270/28 NYP 122/70 NYPON 460/178 NYS/E 321/158 NYS/L 311/154 NYS/M 240/115 SDN 307/86. CLUB NEWS: Albany ARA held their annual auction on Nov. 10th. The Communications Club of New Rochelle is holding *a tech class in conjunction with their meetings.* Overlook Mtn. ARC in conjunction with Ulster RACES and Southern Catskill ARS assisted with communications for the March of Dimes Bike-a-thon on Oct 8 with KB2EEU WA2YOR WC2E WI2M N2JHJ N2JHM N2AAK N2AVN W2XL and KB2HEK assisting. OMARC, Ulster RACES and Mt. Beacon helped with the special Olympics on Oct 14th with WA2ZNU KD2NE N2JNE N2LL KB2GHW N5MEA W2FMY K2DPL WB2YBY W2SIS KB2BNY W2VXI assisting. Members of PEARL are going through a radiological training course. AK2E gave a presentation on the Official Observer program to Saratoga RACES at the October meeting. In November, a round-robin type question contest was held. Schenectady ARA held their auction in October. They announce new officers, N2AIG- Pres. WB2SPN-VP, WB2EAR-Treasurer. KA2DVM-Secretary, Dirs: WB2SMK K2RI N2GXH WB2WHD. West. ARA learned all about fiber optic communications. WECA had a very interesting presentation on ionizing radiation by N2IMZ. Yonkers ARC discussed linking of 2 meters and 440 MHz. AARA and SARA assisted with the Schenectady to Albany Marathon with *WA2YBM WD2AJS KA2OWW KC2VC KA2MBA N2HKQ* WB2VJC KA2OPG K2RI KA2DVM KD2XZ and WB2MCO assisting. Oct. PSHR: N5MEA WB2VUK WE2G KB2EPU WB1BTJ K2ZVI N2JBA OCT. TFC: N5MEA 151, K2LYE 136, WE2G 45, K2ZVI 45, WA2JBO 43, WB1BTJ 41, WB2IIV 34, WD2K 26, W2CJO 19, WF2M 19, KB2EPU 16, K2HNW 11, N2JBA 8.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI—ASM: N2GQR. ACC/PIO: KA2LCC. SEC: WA2UJI. STM: K2MT. OOC: NB2T. TC:W2QUV. BM: W2JUP. The *following are traffic nets in and around the section that handle* NLI:

NET	FREQ	TIME	DAY	MGR
BAVHF	145.350/R	2000	DLY	K2TWZ
NCVHF	146.745/R	1930	M-F	N2IMP
SCVHF	145.370/R	2000	S-F	KA2JMA
NYPON	3913 kHz	1700	DLY	W2MTA
NYS/M	3677 kHz	1000	DLY	N2EIA
NYS/E	3677 kHz	1900	DLY	N5MEA
NYS/L	3677 kHz	2200	DLY	W2YGW
NLT	28450 kHz	2100	WED	N2IMP

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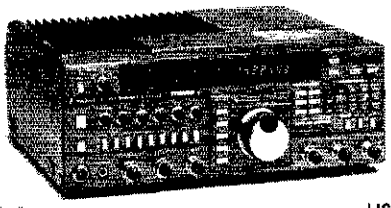

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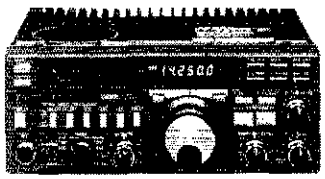
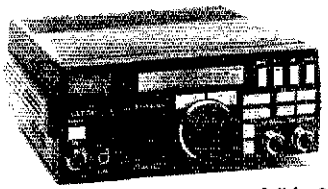
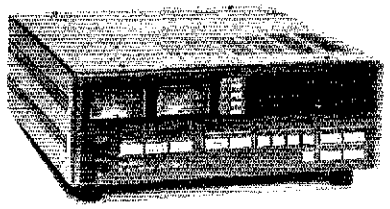
6M/767 6m module	196.00
430/767 430-440 module	296.00
440/767 440-450 module	296.00
SP-767 Speaker w/audio filters	99.00
SP-767P Speaker/phone patch	136.00
FAS-1-4R Remote antenna selector	120.00
FIF-232C Interface	95.00
FTS-8 Encoder/decoder	55.00



FT-757GX MkII 9-band xcvr	Call for Special
FP-757HD Heavy duty supply with fan	309.00
FP-700 Power supply	244.00
FC-757AT Automatic ant. tuner w/memory	429.00
FAS-1-4R Remote antenna selector	120.00
SP-767 Speaker w/audio filters	99.00
SP-767P Speaker/patch	136.00
FRB-757 External relay box	14.00
MMB-20 Mobile mount	26.00

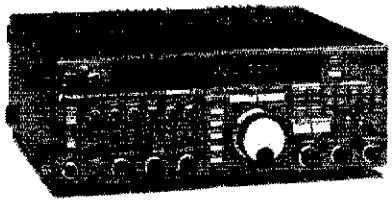


FT-747GX HF transceiver	Call for Special
FP-757HD Heavy duty supply with fan	309.00
FP-700 Power supply	244.00
SP-767 Speaker w/audio filters	99.00
MD-1B8 Desk microphone	115.00
MH-1B8 Hand microphone	29.00
FM-747 FM unit	47.00
MMB-38 Mobile bracket	14.00
TCXO-747 Increased freq. stability unit	42.00



FL-7000 Auto. tune HF linear amplifier $2279.00

Misc. accessories	LIST
MD-1B8 Desk microphone	$ 115.00
MH-1B8 Mobile microphone	29.00
YS-60 1.8-60 MHz 2kw PEP wattmeter	127.00
YS-500 140-520 MHz 200w wattmeter	99.00
YH-55 Lo-Z headphones	28.00
YH-77 Lightweight headphones	26.00



VHF/UHF Base	LIST
FT-736R 25W 2m/430	Call for Special
FEX-736-50 6-meter module	294.00
FEX-736-220 220MHz module	322.00
FEX-736-1.2 1.2GHz module	589.00
TV-736 1.2GHz ATV converter	163.00
Keyer-B Electronic keyer unit	19.00
FTS-8 Encoder/decoder	55.00
FVS-1 Voice systhesizer	37.00

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VHF/UHF Mobiles	LIST
FT-212RHT/D8 45w 2m FM w/autodial mic	$499.00
FT-712RHT/D8 35w 440 FM w/autodial mic	536.00
FT-290R MKII 25w 2m FM/SSB xcvr	610.00
FT-690R MKII 10w 6m FM/SSB xcvr	752.00
FT-790R MKII 25w 430-450 FM/SSB xcvr	681.00
FBA-8 Holder for C-cell Nicads	32.00
NC-26B Wall Charger for FBA-8	10.00
CSC-19 Soft case	16.00
MH-10F8 Speaker/Microphone	30.00
MH-10E8 Hand Microphone	24.00
FTS-7 Encoder/decoder	40.00
FT-4700RHT/C8 50/40W 2m/440 FM/TTP	799.00
AD-2 50w 2m/440 duplexer	48.00

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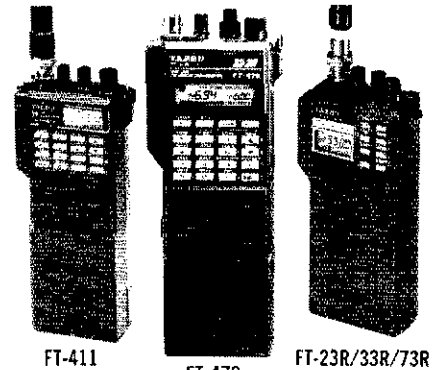
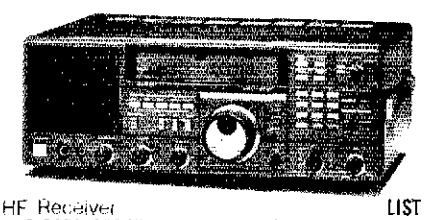
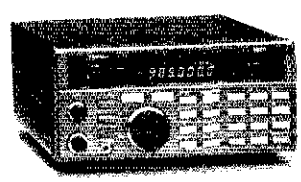


FT-411 FT-470 FT-23R/33R/73R

VHF/UHF Handhelds	LIST
FT-411 2.5W 2m FM HT	Call for Special
FT-811 440MHz FM HT	Call for Special
FT-470 2m/440 FM HT	Call for Special
FT-23R2m HT	306.00
FT-23R/TTP 2.5w 2m HT w/TTP	351.00
FT-33R 5w 220MHz HT	328.00
FT-33R/TTP 5w 220MHz HT w/TTP	373.00
FT-73R 2w 440MHz compact HT	315.00
FT-73R/TTP 2w 440MHz compact HT w/TTP	355.00



HF Receiver	LIST
FRG-8800 150 KHz-29.999 MHz Shortwave	$ 784.00
FRA-7700 Indoor active receive antenna	58.00
FRT-7700 Antenna tuner	77.00
FRV-8800 118-174 MHz VHF converter	107.00
FIF-232C Interface	95.00
FF-5 500 kHz low-pass filter for VLF	40.00
DC-8800 DC kit	4.00
FM-W/8800 FM-wide kit	21.00



VHF/UHF Receiver	LIST
FRG-9600 60 to 905 MHz receiver	$ 609.00
VU-9600 NTSC video unit	25.00

Antenna Rotors	List
G-500A Heavy duty elevation rotor	Call for Special
G-5400B Az/El rotor combo	Call for Special

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Toll Free in Wisconsin: 1-800-242-5195
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3 to 6 Vdc MOTOR with GEARBOX
Probably designed for childs toy. Lever selects 2 forward and one reverse speed. 1st gear aprox. 120 rpm/6vdc, 2nd gear aprox. 300 rpm/6vdc, Reverse aprox. 120 rpm/6vdc.
3.35" X 1.75" X 3.25"
CAT# DCM-10 $6.00

4 AA BATTERY PACK (USED)
Four AA nickel cadmium batteries connected in series to make a 4.8 volt pack. Batteries are in a 2 X 2 configuration with a 2 pin connector attached. The four batteries can be separated into single AA size solder tab nickel cadmium batteries or resoldered into other configurations.
SPECIAL SALE PRICE - ~~WERE $4.00 per pack~~ NOW $3.00 per pack
CAT# NCB-41AAU

STEPPER MOTOR
Airpax# A82743-M4
Brand new 12 volt dc stepper motor.
36 ohm coil.
7.5 degrees per step. 2.25" diameter,
0.93" long excluding shaft.
0.22" diameter shaft is 0.75" long.2 hole mounting flange, 2.675" mounting centers. 6 wire leads.
CAT# SMT-5
$10.00 each

12 VOLT DC MINI FAN
Howard Industries# 3-15-810. Operates on 12 Vdc, 0.10 amp, 1.0 watt. Compact plastic housing, 0.38" square X 1.275" thick. 9 blade fan. Two 9" pigtail leads
CAT# CF-121 $9.00 each

115 VAC COOLING FAN
STANDARD SIZE COOLING FAN.
Features die cast metal housing for strength and durability.
IMPEDANCE PROTECTED
4 11/16" square X 1 1/2" deep.
Factory new 120 Vac fans. CF1-N $9.50 each

WALL TRANSFORMERS
ALL PLUG DIRECTLY INTO 120 VAC OUTLET
6 Vdc @ 300 ma. CAT# DCTX-630 $2.25
9 Vdc @ 250 ma. CAT# DCTX-925 $2.50
18 Vac @ 1 amp. CAT# ACTX-1865 $3.50
24 Vac @ 625 ma. CAT# ACTX-2462 $3.25

LED'S
STANDARD JUMBO DIFFUSED T 1-3/4 size
RED CAT# LED-1 10 for $1.50 • 100 for $13.00
GREEN CAT# LED-2 10 for $2.00 • 100 for $17.00
YELLOW CAT# LED-3 10 for $2.00 • 100 for $17.00
FLASHING LED with built in flashing circuit operates on 5 volts.
RED $1.00 each CAT# LED-4 10 for $9.50
GREEN $1.00 each CAT# LED-4G 10 for $9.50
BI-POLAR LED Lights RED one direction, GREEN the other. Two leads CAT# LED-5 2 for $1.70
LED HOLDER Two piece holder. CAT# HLED 10 for 65¢

PHOTO FLASH CAPACITOR
Rubycon# FKX
200 mfd. 330 volts.
0.79" diameter X 1.11" high
Solder loop terminals.
CAT# PPC-200 $3.25 each
10 for $30.00 • 100 for $275.00

PIEZO WARNING DEVICE
Murata Erie # PKB6-4A0
High pitched audible alarm. Operates on 3 - 20 Vdc @ 20 ma. 1" high x 7/8" dia. P.C. board mount.
CAT# PBZ-84 $1.75 each

TIL-99 PHOTO TRANSISTOR
TO-18 case with window. For wide-angle viewing applications. Spectrally and mechanically compatible with TIL-31B. CAT# TIL-99 $1.00 each • 10 for $8.00
TIL-31B PHOTO DIODE
TO-18 case with window. Infrared emitting photo diode. CAT# TIL-31B $1.00 ea. • 10 for $9.50

SWITCHES
ITT PUSH BUTTON
ITT MDPL series. 3/4" X 1/2" gray rectangular key cap. S.P.S.T., N.O. Push to close. RATED: 0.1 amp switching, 0.25 amp carry current. P.C. mount. CAT# PB-8 65¢ each • 10 for $6.00 • 100 for $50.00
10 POSITION MINI-ROTARY
Grayhill# 56P36-01-1-10N-C
Mini rotary switch. Non shorting. 1 deck, 10 positions. .125" dia shaft X .375" long. .375" behind the panel depth. P.C. pins.
CAT# MRS-10 WAS $2.50 NOW $1.50 each
SPDT PUSHBUTTON
Marquardt# 1843
Rated 6 amps @ 125/250 Vac. Black plastic pushbutton. Switch body .92" X .94" X .88".
CAT# PB-15 $1.65 each • 10 for $1.50 each
PUSHBUTTON SWITCH
GC/Thomson# 35-426
S.P.S.T., normally open momentary push-button switch. Red plastic actuator .57" dia. Chrome bezel .66" diameter. Threaded bushing mounts in .46" diam. chassis hole. Rated 3 amp @ 250 Vac. Solder loop terminals.
CAT# PB-30 $1.00 each

22/44 PIN CONNECTOR
.156" pin spacing, 0.200" between double rows. gold contacts, P.C. mounting.
SPECIAL Same as AMP# 2-530655-6
CAT# EBC-1G $1.00 each • 10 for $8.00

NICKEL-CAD BATTERIES (RECHARGEABLE)
SPECIAL!! AAA SIZE
Panasonic# P-16AAA
1.2 volt @ 180 MAh
CAT# NCB-AAAX $1.60 each
10 for $13.50 • 100 for $125.00
AA SIZE $2.00 each
1.25 volts 500 mAh
CAT# NCB-AA
AA SIZE $2.20 each
WITH SOLDER TABS
CAT# NCB-SAA
C SIZE $4.25 EACH
1.2 volts 1200 mAh
CAT# NCB-C
D SIZE $4.50 each
1.2 volts 1200 mAh
CAT# NCB-D

N-CHANNEL MOSFET
IRF-511 TO-220 case
CAT# IRF 511
$1.00 each • 10 for $9.00
LARGE QUANTITY AVAILABLE

L.E.D. FLASHER KIT
Two L.E.D.'s flash in unison when a 9 volt battery is attached. This kit includes a p.c. board, all the parts and instructions to make a simple flasher circuit. A quick and easy project for anyone with basic soldering skills. CAT# LEDKIT $1.75 per kit

0-30 MINUTE AUTO-SHUTOFF TIMER
Sankyo Seiko Mfg.# TMCF35MYB0
120 Vac 60 hz 10 amp contacts
UL rated. Turn shaft to turn on lights or other electrical devices.
Bell rings and circuit breaks after specified amount of time. Ideal for any device that needs to shut off automatically. 2.92" X 1.9" X 2.54" behind face plate. 1/4" half-round shaft.
CAT# TMC-30 $3.00 each

RELAYS
12 VOLT D.C. COIL S.P.D.T.
Omron# G5E-184P 4 Amp contacts. 335 ohm coil.
Super cube size, .61" X .42" X .44" high.
P.C. mount with pins on DIP spacing.
CAT# RLY-787 $1.50 each
5-6 VDC SIP REED RELAY
Electrol "Blue Bay's" 6SS1A05A10
5-6 Vdc, 500 ohm coil.
S.P.S.T. normally open reed relay. 0.5 amp contacts. SIP configuration. 1" X .375" X .3".
CAT# RRLY-SIPS
$1.10 each • 10 for $10.00

TELEPHONE COUPLING TRANSFORMER
Multi Products International# A10N-HO-10/1
Primary 600 ohm
Secondary 600/600 ohm
.77" x .61" x .69" high.
6 p.c. pins on .187" centers
Primary inductance, 200 mH min. at 1kHz, 1 volt.
CAT# TCTX-1 $1.25 each • 10 for $11.00

LED CHASER KIT
Build this variable speed led chaser. 10 leds flash sequentially at whatever speed you set them for. Easy to build kit includes pc board, parts and instructions. Operates on 5 to 9 volts. PC board is 5" X 2.25". A great one hour project.
CAT# AEC $6.50 each

OPTO SENSOR
U shaped package with mounting ears. 1/8" opening 3/4" mounting holes. CAT# OSU-6 60¢ each
10 for $4.50 • 100 for $40.00

OPTO ISOLATOR
Sigmas 301T1-12S1. Signal applied to the input is coupled by means of light to isolated photo conductive cell. High reliability switching. 12 volt input.
CAT# OP-301 $1.50 each

TRANSISTORS
ORDER BY PART #
PN2222 NPN TO-92 5 for 75¢
PN2907 PNP TO-92 5 for 75¢
2N3055 NPN TO-3 $1.00 each
MJ2955 PNP TO-3 $1.50 each
MJE2955T PNP TO-220 75¢ each
MJE3055T NPN TO-220 75¢ each
TIP31 NPN TO-220 75¢ each
TIP32 PNP TO-220 75¢ each
TIP121 NPN TO-220 75¢ each
TIP126 PNP TO-220 75¢ each

A.C. LINE CORDS
(Black 6ft, 18/2, spt-2)
NON POLARIZED PLUG
CAT# LCAC 2 for $1.00 • 100 for $45.00
POLARIZED PLUG
CAT# LCP-1 60¢ each • 100 for $50.00

LOOK WHAT $1.00 WILL BUY
200 ASSORTED 1/4 WATT RESISTORS
Bent leads, carbon comp. and carbon film.
CAT# GRBS $1.00 per assortment
200 ASSORTED 1/2 WATT RESISTORS
Bent leads, carbon comp. and carbon film.
CAT# GRABRE $1.00 per assortment
50 ASSORTED DISC CAPACITORS
Most are cut (p.c. leads). Some to 500 volts
CAT# GRABDC $1.00 per assortment
15 VALUES OF ELECTROLYTICS
Contains both axial and radial styles from 1 mfd.
CAT# GRABCP $1.00 per assortment

10 AMP SOLID STATE RELAY
ELECTROL# S2181
CONTROL: Rated 5.5 to 10 Vdc (will operate on 3-32 Vdc).
LOAD: 10 amp @ 240 Vac
2 1/4" X 1 3/4" X 7/8"
CAT# SSRLY-10B $9.50 each
QUANTITY DISCOUNT
10 for $85.00 • 25 for $175.00
50 for $300.00 • 100 for $500.00

XENON TUBE
1" long flashtube prepped with 3 1/2" red and black leads. Ideal for electronic flash or strobe projects.
CAT# FLT-3 2 for $1.00

1/4 WATT RESISTOR KIT
Ideal for the workshop, this 1/4 watt resistor kit contains 10 pieces each of 42 of the most popular values (420 pieces total). Includes a divided box and a parts locator.
VALUES in this kit are: 1 ohm, 10 ohm, 39 ohm, 47 ohm, 51 ohm, 68 ohm, 100 ohm, 130 ohm, 150 ohm, 180 ohm, 220 ohm, 330 ohm, 470 ohm, 560 ohm, 680 ohm, 1K, 1.2K, 1.5K, 2K, 2.2K, 2.7K, 3K, 4.7K, 5.1K, 5.6K, 10K, 15K, 22K, 30K, 33K, 39K, 47K, 56K, 68K, 100K, 120K, 150K, 220K, 470K, 1 MEG, 5.1 MEG, 10 MEG
The resistors alone would sell for $21.05.
Complete kit • CAT# REKIT-14 $17.00

14.7 VOLT TRANSFORMER
Sprite Industries# CS-510A. 14.7 volt, 60 hz, 8.82 Va.
1.81" high X 1 7/8" X 1.47". Mounting holes on 2.32" centers.
CAT# TX-147 $3.00 each
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N2MH	-4 Queens Village	145.010	New York City
AI2Q	-4 Freeport	145.010	Nassau, W. Suffolk
W2HPM	-4 Farmingville	144.970	Central Suffolk
NR2L	-4 Water Mill	145.090	Eastern Suffolk
WB2IBO	-4 Massapequa	145.030	Backup for AI2Q-4

VE LISTINGS: LIMARC - second Saturday of each month at 9:30 AM at Salten Hall, NY Institute of Technology,Old Westbury - contact Al Jones,W2ZDB 516-676-5790 SUFFOLK COUNTY VE TEAM - second Saturday of each month at 9:30 AM at the Suffolk County Community College, Islip Arts Bldg., Selden, NY - contact George Sintchek, WA2VNV 516-751-0894; GRUMMAN ARC - second Tues. of each month, at 5:00 PM at the Grumman Rec. Center, Bldg. 800, South Oyster Bay Road, Hicksville, NY - contact Howard Liebman, W2QUV 516-354-6861; GREAT SOUTH BAY ARC - fourth Sunday each month at 12 Noon at the Babylon Town Hall Office Annex, 281 Phelps Lane, North Babylon, NY - contact Walter Wenzel, KA2RGI 516-957-5726. If your group holds regularly scheduled license exam sessions and/or classes let me know so they can be added to this listing. I have been contacted by the last secretary for the Nassau Radio Club (not the Nassau County Radio Club) and the Mid Island Radio Club, he has the records for both clubs and wants to know if anyone wants to take over the records and possibly reactivate either or both of the clubs. If you need more info or want to take possession of the records please contact me and I will forward the information. On behalf of all of those with the Grumman ARC, I want to thank Al, W2NYN for his efforts and dedication in editing the CQ de WA2LQO, I hope your successor will do as good a job. Dom, WA2UJI is looking for slides of public service activities to put together a slide presentation. If you have any slides that could possibly be used please forward them to me and I will see that Dom gets them. Traffic: WI2G 252, N2MH-4 144, N2IMP 130, N2AKZ 112, KA2VZX 64, N2GPA 52, K2MT 40, W2LWB 38, K2JLD 34, K2TWZ 32, WA2UKM 30, N2HLZ 29, KA2UFU 22, NB2D 20, KA2JMA 13, WB2ZIE 6. (Sep 89) N2GPA 69, K2JLD 59, KA2UIU 6.

NORTHERN NEW JERSEY: SM Rich Moseson, NW2L, (@KD6TH) - ASMs: KA2F/Recruitment, W2VY/Youth, NW2S/NW, KY2S/SE, KC2ZA/SW. ACC:WA2QYX. BM:K2ULR. OO/AAC:KA2BZS. PIO:NW2L. SEC:WB2HBZ, SGL:W2KB. STM:K2VX. TC:KA9Q. Ham Radio Info Line 201-680-1585. Happy New Year! Welcome to the 1990s. Congrats to 3 NNJ Field Day groups that placed 1st in their categories: Cherryville Rptr. Assn./W2GD not only led 4A, but placed #6 in the contest, period; Ramapo Mt. Contest Group/NW2D led 1A and Englewood ARA/K2ND not only won in 24A, they were the only entry in the class! (But how do 10 ops run 24 stations at once?) Speaking of contests, congrats to KE2CG as top scorer, by far, in the 1989 NJ QSO Party. Next year's party will be August 18/19. Try to get on it you can. While your calendar is open, reserve Sunday, July 8, for the 1990 ARRL Hudson Division Convention at NY Inst. of Technology in Old Westbury. Regret to report that Frank Leonard, W2NPT, is Silent Key. Frank helped bring 100s of people into ham radio during a half- century in the hobby (tnx N2IGO). Congrats to Walt, W2QR, on receipt of QCWA's "Elmer" award. Club news: Congrats to Raritan Bay Radio Amateurs as NNJ's newest Special Service Club. NW2L & WA2QYX spoke at RBRA in Nov. and presented SSC certificate. IRAC ran a demo at an Essex Co. Scout Hike-o-Ree and signed up 18 Scouts for a new ham radio Explorer post. FB. W. Orange HS's new club is up & running, with WA2YOS at the helm. Hope to see them affiliated soon. RATS & NJITARC co-sponsored ROSES-1, a packet networking symposium, on Nov. 11, at NJIT. Tri-County RA heard from W2OBJ in Nov, on "A Super Low Cost Antenna Tuner," and has an ARRL night with WA2DHF scheduled for Jan. 15. Congrats to TCRA's new officers: WA2BMB/Pres, W2GRO/VP, WB2RMH,Sec, KE2KX/Treas. Welcome KA2ZVZ as new DEC/Morris Co. We still need a DEC for Warren Co. If interested, contact NW2L or WB2HBZ. October net activity (Sess = #sessions; QNI = #check-ins; QSP = #messages handled):

Net	Freq	Time	SES	QSP	QNI
NJM	3695	1000	31	211	105
NJN/E	3695	1900	31	280	87
NJN/L	3695	2200	31	160	30
NJPN	3950	1800	36	305	71
NJSN	3735	1830	31	130	23
NJVN/E	146.895	1930	31	556	69
NJVN/L	146.490	2230	31	208	62
OBTTN	147.12	2000	31	231	73
NJTTTN	223.88	2100	31	197	26

Packet NTS 24 hr/day via WA2SNA-1 & other PBBSs. Oct. Traffic (Call/Messages Handled/PSHR Total): W2QNL/277/121 WR2E/209/88 N2XJ/136/98 W2MTO/118/ 75 W2RRX/112/96 KE2JX/74/71 N2DXP/72/61 KA2INE/ 65/75 KA2KJF/62/73 WB2FTX/57/60 K2VX/56/77 WA2PAC-T/42/82 N2DIY-T/24/49 W2CC/23/- WA2CLP/ 21/- W2XD/19/- WB2GJE/1/-. Next month: Report on the annual NJ Traffic Confab. 73 de NW2L.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—SEC: KDØBG. STM: WBØAVW. ACC: NUØP. OOC: WAØQMU. BM: KØIIR. TC: KØDAS. SGL: WRØG. Hurricane Hugo and the earthquake in the San Francisco area provided plenty of opportunity to put our training into practice. Many in the section were active handling health and welfare traffic from both areas. The Fort Madison Daily Democrat documented WBØVYG and his activities from Fort Madison. NØHZK and WAØKVB got TV coverage of their activities in Des Moines. The DMRAA assisted in the Des Moines Regatta and the Labor Day Fun Run 1989. License upgrades at the Des Moines VE session include KBØMD to Extra and KAØWIY and KAØHJZ to General. KBØFHN and KBØFHO are new Novices in Cedar Rapids. KBØERK is a new Technician. SETs were held in Des Moines and Cedar Rapids this month. KAØRQN is the DMRAA Ham of the Month. The Fort Madison ARC helped about 140 Boy Scouts participate in the Jamboree on the Air. New officers of the Davenport RAC are KAØWOW - President, KB9BNR - Vice President, WDØAMA - Secretary, and WAØOEW - Treasurer. The Eastern Iowa DX Association re-elected NUØP, WB8ZRL, and NCØO as President, Vice President, and Secretary-Treasurer, respectively. KB9BNR and his XYL are

Ameritron gives you a full kilowatt from a quiet desktop linear . . . for $995



Ameritron gives you a full kilowatt *output* of peak envelope power for only $995 -- from a whisper quiet linear that's perfect for your operating desk because it measures just 8¼" H x 14" D x 14¼" W.

You could spend over *twice* the money for a legal power limit amplifier *twice* the size -- and all you'll get is an additional 1/3 S-unit -- a difference you won't ever notice.

You also get 850 watts output on CW and even 500 watts on RTTY.

All Band Coverage

You get all band coverage: rated output on 160, 80, 40, 20 and 15 meters (10 meters with user mod/export) as well as 80% rated output on MARS and WARC bands.

Tuned Input lets solid state rigs deliver full output

The Ameritron AL-80A uses a direct switched, 100% shielded pi-network tuned input circuit that provides an excellent load for any rig. Even the fussiest solid state transmitter works flawlessly with the AL-80A.

Pi-L Output Tank

A carefully designed Pi-L output tank using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide range load impedance matching and full band coverage -- even on 160 and 80 meters -- *plus* you get an extra 10 to 15 dB of harmonic suppression.

You also get peak performance at different power levels from one end of the band to the other.

Ball bearing vernier reductions drives on both the plate and load control makes tuning precise and easy.

3-500Z Tube in shielded RF compartment gives you nearly 70% efficiency

You get the rugged time proven 3-500Z tube with an estimated life of 20,000 hours ICAS. That's nearly 20 years operating 20 hours a week -- you may never have to replace your tube.

The AL-80A is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep unwanted RF from leaking out. This keeps RFI and TVI to an absolute minimum.

A superb RF design and layout, a Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. This puts maximum power into your antenna instead of heating up your amplifier.

A whisper quiet internal computer style fan draws in cool air over the power supply components and blows it around the 3-500Z tube. This removes excessive heat and gives you reliable performance.

Built-in adjustable ALC circuit keeps your exciter from overdriving your AL-80A. The result? A clean signal without flat-topping.

A standby switch prevents harmful thermal shock to your 3-500Z filaments by keeping them lighted when you're operating barefoot.

Gutsy Heavy Duty Power Supply

The guts of the AL-80A is its heavy *heavy* duty power supply.

A husky 22 pound power transformer using a high silicone steel core, computer grade filter capacitors totaling 26 ufd, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give a stiff 2700 volts fully loaded.

Some competing high priced amplifiers using *two* 3-500Zs *can't* give you much more power output than the AL-80A. Why? Because their lightweight power supplies can't deliver enough high voltage for the tubes.

Step-Start Inrush Protection™

When you first turn on your amplifier, a massive inrush current flows.

Your house lights flicker as you hear a loud "thump" from your amplifier. This terrible inrush current stresses *all* your power supply components to their limits. Your cold tube filament suffers abusive thermal shock.

Eventually, this massive inrush current will damage your amplifier.

The AL-80A special ***Step-Start Inrush Protection™*** *stops* damaging inrush current.

By starting your AL-80A through a 10 ohm current limiting resistor, then shorting the resistor with a relay, the AL-80A gives you a start up sequence that is *easy* on your tube and power supply components.

Don't consider a linear amplifier without this critical protection.

Multi-Voltage Primary protects your amplifier and gives you peak performance

Too high a line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

The Multi-Voltage Primary in the AL-80A transformer lets you compensate for too high or too low line voltage.

With the AL-80A you get the longest component life and peak operating efficiency -- regardless of your line voltage.

Before you buy an amplifier make sure it has a multi-voltage primary.

Dual Illuminated Meters

Two large meters give you a complete picture of the operating condition of your AL-80A. They let you know right away if there is a problem.

Grid current of the 3-500Z is monitored continuously by one meter. Grid Current indicates proper amplifier operation better than any other parameter.

You also get a multi-meter that measures plate voltage, plate current, ***peak*** RF watts output and drive power/ALC detector voltage.

Comes completely factory built, tested and guaranteed to work . . . . . . *not a kit you have to build*

You get a full kilowatt right out of the box -- ready to plug in and bust through QRM in minutes.

A kit could actually end up costing you more than your best price on the AL-80A -- and leave you frustrated if you can't get it to work.

A factory built AL-80A has much higher resale and trade-in value than a kit. Why? Because Ameritron's reputation for consistent quality and workmanship is known by hams everywhere.

Two Year Warranty: Twice the protection of our nearest competitor

No other kilowatt amplifier on the market comes with a 2 year warranty. In the unlikely event that there are defects in materials or workmanship, we'll fix it free for 2 years from the date of purchase.

The 3-500Z is covered by the tube manufacturer's warranty.

Committment to Service

Even after the 2 year warranty period, Ameritron Customer Service Technicians are available to help you keep your AL-80A performing flawlessly -- no matter how long you have it. Just call 419-531-3024.

Call your dealer today

Bust through QRM with a full kilowatt from the Ameritron AL-80A -- right out of the box. Call your favorite dealer for your *best* price and order today!

Lightning Fast QSK Switch

The optional Ameritron PIN-5 QSK switch gives you lightning fast T/R switching for full CW break-in, AMTOR, Packet and other QSK modes for only $189.50.

It lets you switch the legal limit in microseconds into 2:1 VSWR loads with less than 0.5 dB receive attenuation.

Factory installation is available.

AMERITRON®

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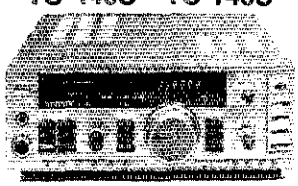
TS-440S TS-140S



YAESU



TH-75A
2M/70CM DUAL BAND HT

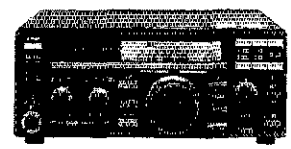
TEN-TEC



OMNI V

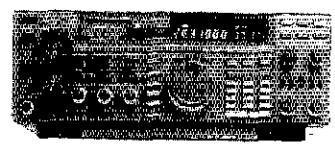


IC-32AT

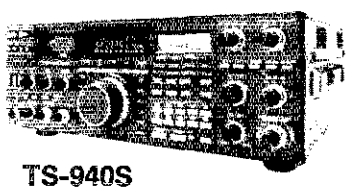


IC-725

IC-2GAT
IC-4GAT

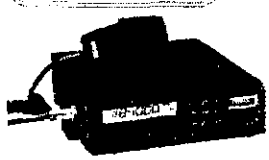


IC-765



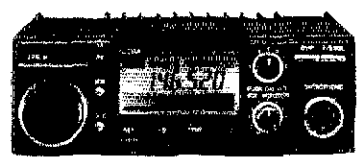
TS-940S

RANGER Communications, Inc.



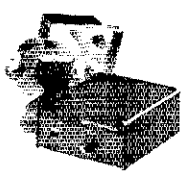
uniden





IC-228A

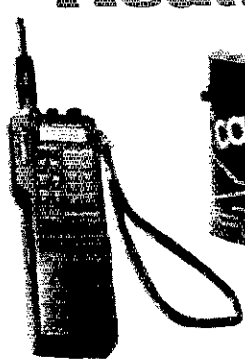
HN-2000 10-Meter Mobile Transceiver



Remote coax switch

Switch antenna from inside your station with the Remote Coax Switch. Remote and indoor control unit connect through your coax cable to eliminate multiconductor control cable. Tower- or mast-mounted remote operates up to four antennas. Handles 2000 watts PEP and has a VSWR of 1.15; or less. Frequency range is from 1.8 to 54 MHz with impedance of 50 to 70 ohms and loss at 54 MHz of less than 0.2 dB. Uses 120 VAC Control; 2⅝" H x 5½" W x 7½" D. Remote: 7¼" H x 8⅜" W x 4½" D
Kit HD-1481

Heath Company

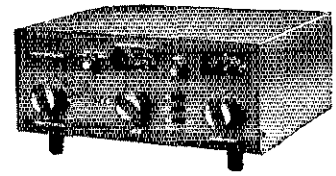




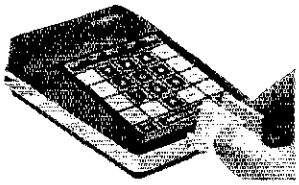
Heath cantenna dummy load

Eliminate unnecessary QRM during tune-up and minimize mistakes while performing hot gear maintenance or alignment. Handles 1 kW of RF with VSWRs less than 1.5:1 up to 450 MHz. Requires 1 gallon mineral or transformer oil.
Kit HN-31-A (3 lbs.) $24.95

DeLuxe antenna tuner
Power inputs up to 2000 watts PEP on SSB and 1000 watts CW.



Kit SA-2060A



Revolutionize your CW with the programmable μmatic memory keyer

Add programmable excellence to all your CW. Patented command strings let you store text in buffer; select speed, weight, spacing or message repeat count for each; and link them together in any sequence. A special editing feature lets you correct programming errors. Enter text and send with any setting you wish. Text can be added into a buffer message being sent. CMOS memory with battery backup retains the buffer contents and last selected setting when the keyer is without power. 1⅜" H x 4⅛" W x 6" D.
Kit SA-5010-A (3 lbs.)

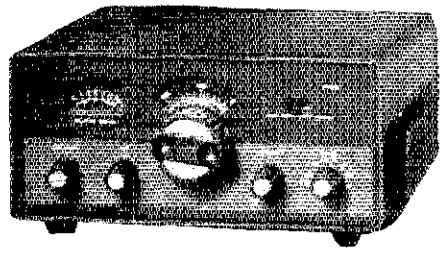
5W Dual Band Handheld Transceiver
Assembled HWS-24-HT

Pocket packet TNC

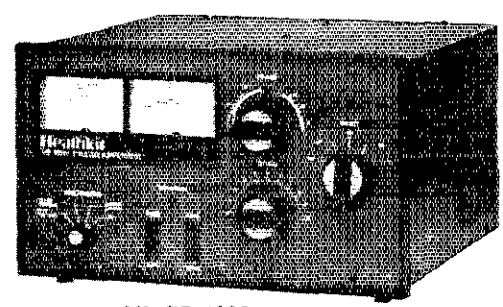


Assembled HK-21

Get high performance from the Heathkit 1000W linear amplifier



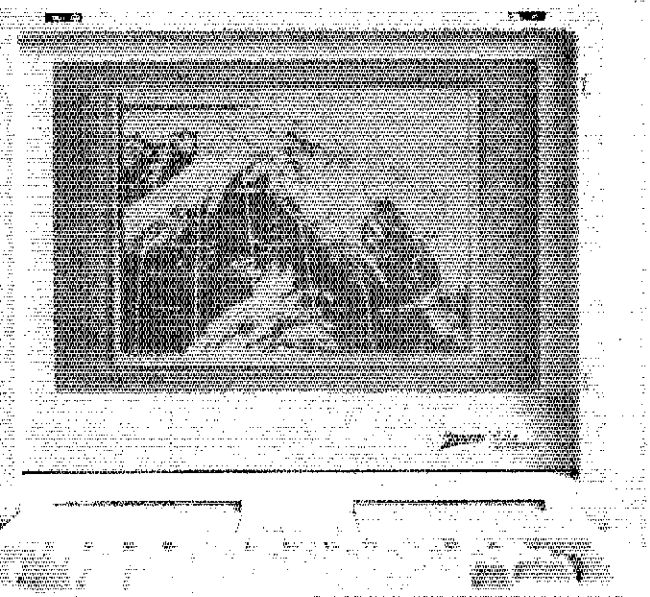
Heathkit deluxe QRP CW transceiver Kit HW-9

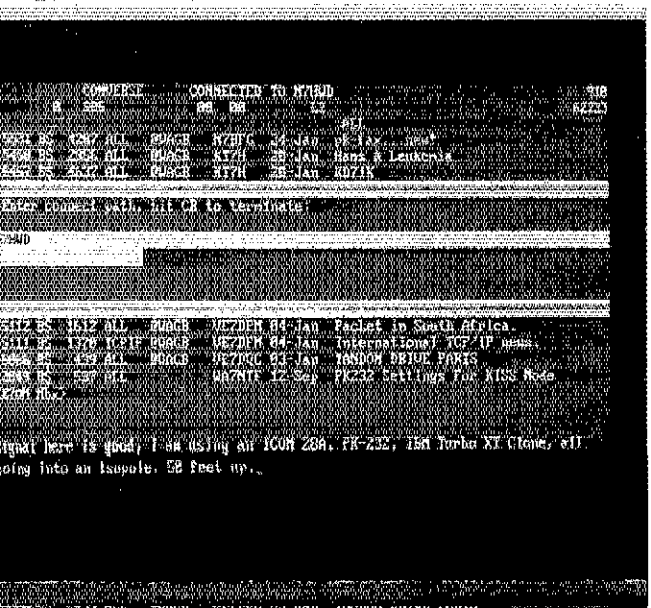


Kit SB-1000

AEA's NEW PK-232MBX With PakMail™







Now AEA's popular PK-232 multi-mode data controller has new features you've been asking for...PakMail™ Mailbox with selectable third-party traffic, seven-character AMTOR (CCIR R.625) call identity, TDM (Time Division Multiplex) receiving for SWL's, and Prioritized Acknowledgement (ACK) protocol for improved packet performance. Compatible with almost every computer or asynchronous data terminal, you can enjoy the full spectrum of amateur digital communications with AEA's new PK-232MBX.

All Operating Modes. The PK-232MBX includes all authorized amateur digital modes available today...Morse, Baudot, ASCII, AMTOR/SITOR 476 and 625, Packet, WEFAX receive and transmit, as well as commercial standard NAVTEX automated marine information services.

Superior Modem. An eight-pole Chebyshev bandpass filter limiter- discriminator modem improves the signal-to-noise ratio at the detector and virtually eliminates interference from adjacent signals. System performance has been proven superior to that of PLL modems designed for telephone line services.

PakMail.™ PakMail™ mailbox with selective control of third-party traffic is now a standard feature. Your friends can now leave you messages around the clock. Your local full-service BBS can automatically forward your messages directly to your PK-232MBX.

WEFAX Transmission and Reception. AEA brought you the first multi-mode controller to send and receive WEFAX (weather facsimile) charts. The PK-232MBX directly supports the widest range of printers on the market using the optional RS-232/printer cable.

Host Mode. Only AEA provides the type of full-featured Host Mode preferred by many professional programmers for efficient control of the PK-232MBX. AEA's Host Mode programs include PC-Pakratt with FAX for the IBM PC's and compatible MS-DOS computers, COM- Pakratt with FAX for the Commodore C-64 and C-128, and now MacRATT with FAX for the Apple Mac-Intosh.

Two Radio Ports. Independent radio connection ports allow convenient, interchangeable all-mode operation regardless of port selection. You can connect two VHF/UHF radios, an HF and a VHF/UHF radio, or two HF radios, selectable by a front-panel switch.

Signal Analysis. The PK-232MBX's internal software features AEA's exclusive SIAM (Signal Identification and Acquisition Mode). The PK-232MBX automatically identifies Baudot, ASCII, AMTOR/SITOR and TDM signals, then measures signal speed and polarity. A simple "OK" command automatically switches the PK-232MBX to the recognized mode and starts the data display.

PakMail™ Upgrade Kit. The easily-installed PakMail™ upgrade kit includes a plug-in board and new software EPROMs, and is fully compatible with all existing PK-232's. Please contact factory for details.

You Deserve The Original. AEA produced the first multi-mode data controller. The PK-232 continues to be the standard against which all other multi-mode controllers are judged; the choice of critical amateurs, commercial services and government agencies. Don't settle for less than the best.

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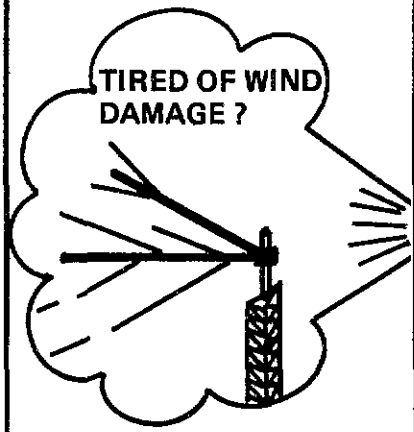
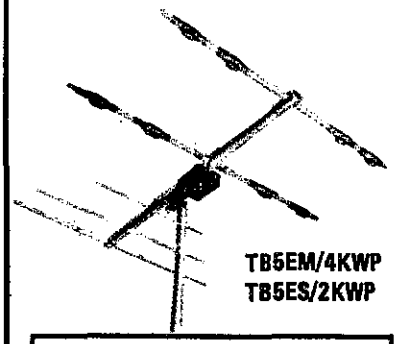


Antennas that last **"Decades"** (not months)



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20M536 5 elem. 20 Mtr.	$745.00
20M646 6 elem. 20 Mtr.	$1125.00
15M532 5 elem. 15 Mtr.	$565.00
15M845 8 elem. 15 Mtr.	$1065.00
10M523 5 elem. 10 Mtr.	$385.00
10M636 6 elem. 10 Mtr.	$785.00
2MVS814, 2 Mtr. phased	$305.00

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the proud parents of a new baby girl. Congratulations! Regretfully, WØCQC is now a Silent Key. Traffic: WØSS 156, KØGP 70, WØYLS 58, KØIPT 52, KCØKZ 48, WBØMCX 46, KAØADF 45, KØCNM 40, WBØAVW 35, KAØVBA 24.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. ACC: KØBXF. TC: KAØHEP. BM: KØJDD. SGL: NØBLD. Net Mgrs: CW WBØZNY. Voice- WØFRC. RTTY- open; Slow Speed CW-WØMYM. WX Net-WBØYWZ. PIO: WBØWSG. DECs WØOAG, WØEB, WBØYJT, WØFRC, NKØV, WBØMDF & WAØCVR. The 1989 SET will be past history by the time this report is read. If your ARES Zone did not participate, perhaps it is time to start looking into the reason why not. Congrats to Steve, WØCHJ, on being presented the Kansas Amateur of the Year award at the Wichita hamfest. WVØR, WVØQ and KBØEEB are all welcome additions to the QKS-SS, now Topeka, is well represented. Net activity as follows: (August) KSBN QNI 1246 QTC 145. KPN 326/11. KMWN 580/519. KWN 916/598. CSTN 2055/66. QKS 178/60. QKS-SS 37/9. (September) KSBN QNI 1286 QTC 92. KPN 314/7. KMWN 646/555. KWN 936/598. CSTN 2095/69. QKS 153/54 and QKS-SS 50/19. The recent disasters on the east and west coast of the USA should make us very much aware of the potential need for emergency communication that could pop up at any moment. ARE YOU PREPARED to act as NCS or LIAISON for even a short period of time? If the answer is NO, then try your hand at the section level nets to become familiar with the procedures. Traffic: KAØRCH 307, WØFIR 265, KØBXF 248, WØOYH 116, WØFRC 104, NBØZ 67, WØFDJ 61, WBØZNY 52, WØQMT 48, WØMYM 27, WAØTJU 24, KXØI 19, WOØE 14, WAØYXK 11, WTØE 10, WVØR 8, KBØEEB 1.

MISSOURI: SM, Bill McGrannahan, KØORB—October was not to be the restful month that we looked forward to. The San Francisco disaster kept our NTS people busy. Many earned EMERGENCY COMMUNICATION COMMENDATIONS (list next month). We lost one of our best, W4OIF. Just two days after Al handled 260 pieces of Hugo traffic, he became a SK. He was posthumously awarded the ARRL COMMENDATION. Asst. SM Roger Volk, KØGOB, made the presentation at that Suburban ARC meeting. On the lighter side: your SM drove to the QCWA Baton Rouge meeting, and on the way back was the guest of the Kimberling City ARC. Their new emergency vehicle is impressive. Earlier they had joined with the SMARC (Columbia) at the Boy Scout Camporee. The White River ARC has been active in this part of the state, too. The St. Peters Swapfest just missed the rain and went very well. The Monsanto ARC is modifying toys for the Easter Seal Society. Carl Hohenberger and his Official Observers put in more than 200 hours monitoring your frequencies. John Seals, WRØR, is the new STM. The South Side ARC (KC) Hamfest was jammed with hams! ARRL Dir. Paul Grauer, WØFIR, Vice Dir. Chuck Miller and your humble servant worked the ARRL booth. And last, the Prime Health Marathon was worked by WØOCT WAØKUH WØAIB KAØSXY WAØZOK KØTLM NØCIM WAØPFS KØBIX WØAV NØKUJ NØHKR NØJMR. NETS: MEOW WDØELL SESNS 31 QNI 632 QTC 78; MOSSB WBØWLU 31/737/111; ZAEN WDØELL 5/91/0; SEDALIA WØENW 5/61/0; CMEN KØPCK 4/72/0; JCRCN 4/62/0; MERAMEC KBØEVY 4/54/0; PHD WAØKUH 5/141/11; KCBARC NØIWA 5/141/1; REVERE WBØEJJ 4/217/1; HBN KØDSQ 22/425/28; CCARES KAØSXY 4/56/21; QCWA 35 WØWHK 4/58/0; KCARES KØUAA 4/43/0; SLARES KØWEX 4/149/8. Traffic: NØFBW 1513, NQØG 352, KØORB 212, AIØO 183, WAØYJX 168, WBØOIZ 112, KUØG 104, WAØHTN 99, WØOTF 69, WRØR 61, WØBMA 60, WØOUD 36, KØPCK 19, WBØUCI 18, KFØBM 17, WØRL 7, KØUAA 2.

NEBRASKA: SM, Vern Wirka, WBØGQM—The Emergency Coordinator for Dawes County is now Mike Schumacher, KBØDCZ, of Chadron. Douglas County Emergency Coordinator, James Peterson, of Omaha has changed his call sign. Peterson's call sign is now KFØFO. Kenneth Albright, WBØGMQ, of Orleans,Net Manager for ten years, has resigned. Thanks Ken for your hard work and dedication. There are several computer bulletin boards in Nebraska that contain information about Amateur Radio. The Ak-Sar-Ben Radio Club of Omaha operates a BBS which can be reached by calling 402-289-4658. In Lincoln, the KFMQ BBS phone number is 402-489-2515 and the Fliteline BBS can be accessed through three nodes: 402-421-2434, 402-421-1171, and 402-421-1376. All of these computer bulletin boards are free and can be used at anytime. Please send your club newsletters and club activity information to your Section Manager; all material sent is very much appreciated. Traffic: KØDKM 225, WDØEWH 29, WAØBOK 28, WBØGQM 8, WCØO 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H. STM: K1EIC. SEC: N4GAA. OOC: KY1F. ACC: NK1J. BM: N1API. PIO: WA1CMF. TC: W1HAD. SGL: K1AH. Well, since I keep forgetting the printer's lead time, I would like to wish everyone a healthy and safe holiday season. A special thanks to Dan, KY1F, for the outstanding job he is doing as OOC. CT had 93.6 and 98.4. rep in 1RN cycles 3 & 4 during Oct. Nice article by KA1MWU on putting up wire antennas in the ZARC news. Thanks to ECARA for their continued support and assistance with the Crop walk in Woodstock. A great big thanks to you, Jim, K1NCD for the good words he had to say about our section news column in the Cricket Wireless Assn. Newsletter. Nice job done by the Southington ARA. They participated in the annual Apple Harvest Parade and shortly after assisted in the 5-mile race, and Juvenile Diabetes Walkathon. Wow, they were pretty busy beavers. In your prayers, please remember Mary Baxter, WB1GXZ; she was very active in NTS and was loved by all. This is surely a great loss. A special thanks to all who helped in the handling of traffic into and out of the many areas that were plagued with disasters between California earthquakes and such. This type of operating does take a special effort and deserves a special thanks. Well, what's in store for the 90's. As you know, Jack, WB1ASH, and I have completed to 9600 baud packet network, and I am happy to report it's buzzing along nicely. We have now added W1HAD to our node ranks as well. Welcome aboard, Paul. Thanks to the Insurance City RC, for the support they have shown at their node site. I would like to thank the Field Services team whom I am proud to serve with. They have been a great help in 1989 as I am sure they will continue to be. We all are looking forward to serving you in 1990. Remember, send the things you would like to see in this column to me before the 11th of each month. I will try to get it all in. 73. . . Caesar.

Net	Sess	QNI	QTC	NM
CPN	30	405	104	KY1F
CN	62	372	132	W1WCG
CSN	22	90	28	N1FNN
NVTN	31	59	371	NM1K
RTN	30	200	52	WA1FCA
WESCONN	31	455	91	KA1GWE
TMRCN	5	109	3	NM1K

PBBS reports: CT Section Traffic Node: N1DCS-4 BBS, KY1T NM Received 283, Forwarded 102, Total 385. Traffic: NM1K 940, KA1JAN 185, KA1GWE 142, W1WCG 132, N1GBP 74, W1EFW 65, W1KYD 59, KY1F 44, KC1DL 34, W1WP 33, KA1UCU 25, NX1Q 22, N1GKJ 18, W1QV 17, KA1ROL 15, W1YOL 13, W1CUH 7, KA1TBM 4.

RHODE ISLAND: SM, William M. Foss, KA1JXH—On Sept 24, OSARG provided communications for the Channel 36 Family Day backoff event. W1XJ/R has been around for 20 years. Wednesday at 7:30 PM on 145.17 and 224.56 is the trivia net by NN1E & KA1BNO. Thursday at 8:00 PM on 146.70 is the Ocean State Young Amateur net with KA1PBQ. Both nets welcome everyone to check-in. Curt, WA1CRY, is doing good now after his heart attack. Traffic: W1EOF 224, KA1KML 193. PSHR 72. KA1JXH 84, PSHR 73. I hope everyone has a Happy New Year.

VERMONT: SM, Frank Suitor, W1CTM—ASM (Packet) K1AUE. ASM (Education): WB2MIC. SEC: K1LOO. STM: KT1Q. TC: W1AIM. SGL: WB1AJG. SEC K1LOO (Tom) is updating the section Amateur Radio Emergency Service (ARES) roster. District Emergency Coordinators (DEC) should review their present membership lists & notify Tom of any changes at PO Box 269, Warren, VT 05674. Gov. Kunin's proclamation of Amateur Radio Week (11/6-12) was made possible by the efforts of K1LOO (Tom) who made her a member of the Amateur Radio Associates Club. Burlington ARC held a demonstration at the University mall on November 11 in honor of Amateur Radio Week. The VT QSO Party is scheduled for Feb 3/4—contact WA1PDN (Dan) for details or send an SASE to him at 50 Liberty St., Montpelier, VT 05602. I wish to thank both GMWS (Rutland) and ARA (Warren) for the opportunity to participate in their club meeting. Ur hospitality is greatly appreciated. CVARC's new club secretary is N1FMP (Ed). Other officers are WB1AGJ, President; WA1PDN, VP, and N1FHI treasurer. SGL WB1AJG indicates that 100 applications for the new 2X3 ham plates are required to get the program started. If u wish to help, please send a photocopy of ur current FCC license. A photocopy of ur current vehicle registration and a check for $20.00 payable to the VT Motor Vehicle Department to Bob at PO Box 353 Williamstown, VT 05679. For additional info, call 433-6172 or use WA2SPL's Packet Bulletin Board. VE exams are scheduled for 9 AM on January 20 in Montpelier. Contact K1HKI (Bob) for details. Talk-in will be available on the 146.625 repeater. Recent VE upgrades include: Adv-N1FHY. General-KA1PXF/N1GAA. Tech- KA1NWH/NYZ. All VE teams are requested to provide me with a copy of all upgrades. Happy 2nd anniversary to WB1MIC-4 packet PBBS. GMWS is evaluating the possibility of placing a 220 repeater on Northeast Mt. The147.045 machine continues its reliable operation due to the TLC of WA1ONT (Bob). The Burlington Free Press article on the new Montshire Museum in Norwich was timely as it is the meeting place for the Twin State ARC. Contact KA1CRP for meeting info. Traffic: WA2SPL 1250, N1GMU 530, KT1Q 378, WA1JVV 267, N1DHT 129, KC1KI 113, NB1A 129, W1KRV 5. Section rep on 1RN was 100% on cycle 2/4 & 97% on cycle 3.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. Last month I suggested that traffic should be handled using radiotelephone, CW and the automated modes. This brought a number of responses from "I'll give up traffic handling" to ideas on how this system could be implemented. It is great to get the input. After reviewing all the replies and different suggestion, I haven't found a practical way this could be done. Maybe I'll think of a system that we can use. It certainly would be great if all the active traffic handlers would make an effort to handle traffic on all modes. Each of the clubs in the section have made plans to have Christmas Parties for their December meeting. I hope Santa delivered everything you wanted. Traffic: KA1IFC 733, KA1EXJ 164, KA1QFV 82, W1KK 68, WB1HIH 82, NX1K 51, KA1RVN 47, K1JHC 26, KA1TDL 22, KC1DI 14, WA1OPN 6, W1UD 542, KA1QGV 6, NM1U 5, W1GQP 4, W1ZPB 4, KA1MWZ 3, KI2L 1.

NORTHWESTERN DIVISION

IDAHO: SM, Don Glower, KA7T—ASM: K7REX. SEC: N7MAL. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. PIO: WG7E. Dan, K7REX went to San Francisco with the Red Cross emergency team after the big earthquake. Our hat is off to Dan for giving of his time to help in this disaster. There were many hams in Idaho who passed traffic for their victims and many tnx to them for their time and effort. Congrats to Brad, K7CDA, for being selected the new Farm Net Manager. 73s, Don. Traffic: W7GHT 346, N7MAL 288, KA7T 86, WS7U 64, W7IWU 48, KA7WZM 15, KD7ZY 11.

NET	SESS	QNI	QTC	MNGR
FARM	31	2168	216	WA7GSM
NWTN	31	818	29	WB7VAO
CD	22	118	25	KA7EEE
IMN	31	234	113	K7UBC

MONTANA: SM, Pete Peters, KF7R—SK: John Bielenberg, W7BIS, from Polson, was given a tribute at the Sept. 28th Flathead Valley Radio Club meeting: a new solar powered repeater is back up on Red Lodge Mont. 147.00/60: Upgrades: Tech: KB7IVC, KB7GPS, WB7PIU, KB7ITR. Gen: KB7ION. Extra: WB7QDL, KF7FK, KL7JGS, KF7XA, KB7IBF, KB7HYT. 15 attended QCWA Oct meeting in Helena. Emergency autodial Big Fork Mt. Key Mike, then dial 9110 for operator or 911 plus 1, 2, or 4 for sheriff's in Flathead Valley Area. 146.02/92 or 447.075/442.0750. Enter *6 to hang up: ham books and reference materials were purchased by Helena Club and donated to the Lewis and Clark County Library. These books will be in the reference section and will not be available for check out.

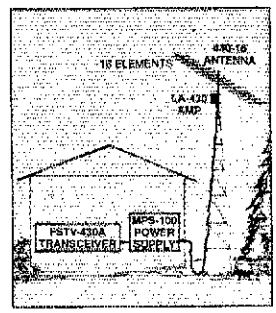
NET	QNI	QTC	NET MGR.
MSN	107	4	KF7R
MTN	1704	92	N7AIK
IMN	234	113	KA7EEE

OREGON: SM, Randy Stimson, KZ7T—ASM: KM7R. ASM: W7FBP. STM: W7VSE. SEC: KV7F. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. Tillamook Emergency Amateur Radio Service (TEARS) had their first

INTRODUCING AEA'S NEW ATV SYSTEM



Add a new dimension to your amateur radio communications with AEA's Amateur Television (ATV) system. If you hold at least a technician-class license, you can transmit and receive live or taped audio and video Fast-Scan TV (FSTV) information that rivals broadcast quality. Now you can share more than conversation over the air with this new mode of "personal communications."



It's Easy and Inexpensive. If you have a video camera or camcorder and a standard TV set, you may already own the most expensive components of an ATV system. AEA's ATV system includes a transceiver and antenna. Simply connect the camera, TV and the antenna to the transceiver, and you're on the air LIVE with one watt P.E.P.! Your TV set will monitor your transmitted and received pictures. If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier with power supply.

The FSTV-430A Transceiver features a low-noise UHF GaAsFET preamp with a typical noise figure of less than 1.5dB and a crystal-controlled or variable tuning down converter. Output is available on channel 3 or 4 for signal reception AND monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included). The AEA design is also optimized for superior video and audio quality without sync buzz even with weak signals. The FSTV-430A is the only transceiver you need to work ATV and it also allows you to use the same TV set to monitor your transmitted and received pictures.

The LA-430/50 Amplifier with Power Supply gives a boost to your ATV signal. It includes a 50W P.E.P. mast-mounted Linear Amplifier **(patent pending)** covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast- mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception, and is the equivalent of a 100W amplifier in the shack with a 3dB line loss. The amplifier is housed in a weather-resistant alodized aluminum case. The MPS-100 power supply also provides a 13.6 volt output for the FSTV-430A.



What is the advantage of Vestigial Sideband (VSB)?

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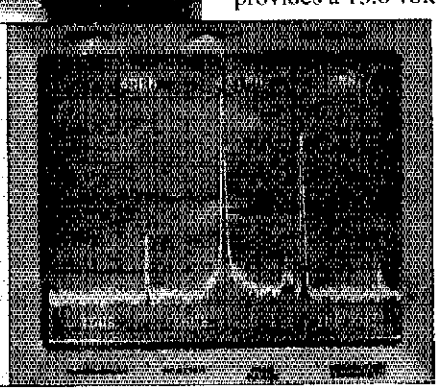

The 430-16 Antenna is a high-performance, computer-optimized yagi specifically designed for ATV operation. It features broadband frequency coverage from 420 to 440 MHZ. O-ring sealed connectors, 28 degree E plane and 32 degree H plane beam widths and 16 elements on a 10-foot boom.

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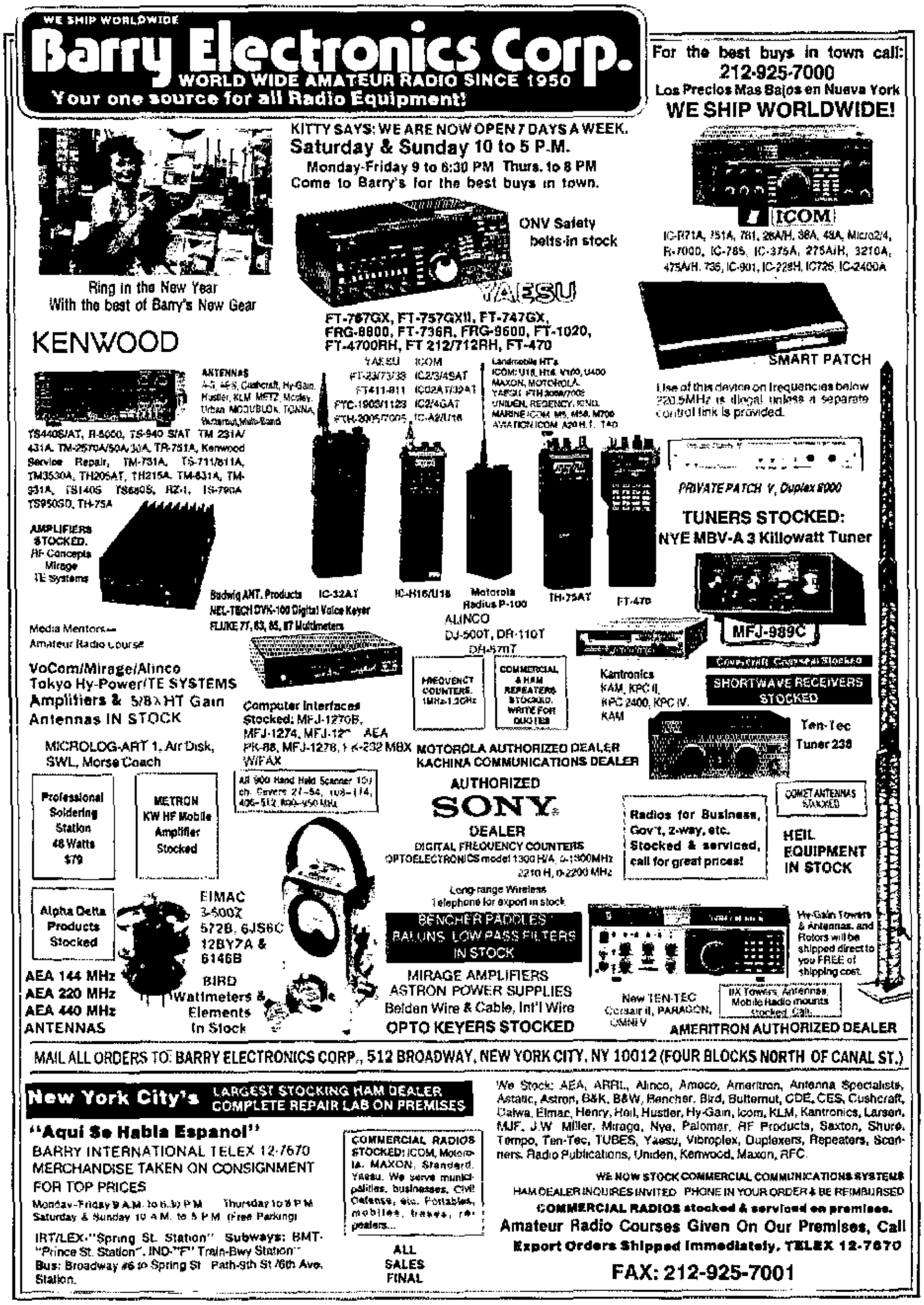
9, review their present membership lists & notify Tom of any



ham fair and it went very well. It was well attended and I hope that they will do it again next year. While I am on ham fairs. The Salem Ham Fair will be on Feb. 17th. The facilities will be enlarged and more commercial exhibits, so plan to attend Oregon's first ham fair of the year. Then the SEA-PAC ham convention will be 1st 2nd and 3rd of June at Seaside. We had sixteen counties that had Simulated Emergency Test (SET). That is more than ever before in the month of October and I contribute that to Bob Dorman KV7F, the Section Emergency Coordinator (SEC). He has done a great job organizing the ARES groups around the State and one of the big reasons is he has an HF net every Monday evening for the ECs and the AECs. Great job Bob, keep up the good work. We have had some changes in the Emergency Coordinators. Jack WA7HJV, has replaced Richard K7JKY, in Umatilla County. Dave N7IBI, had become temporary EC replacing Jim KF7KY, in Washington County. Roger W7ADV, has accepted the job of District Emergency Coordinator (DEC) for District one. Pat N7KMN, has been appointed EC for the Portland area and he turns around and marries Bren KM7R, my ASM. I sure hope there isn't a power play going on here. HI. Congratulations to the newly weds. Traffic (P) = Packet: W7VSE 404, N7BGW 268, KA7EEE 193, WB7EMO 156, WT7A 129, W7XI 115P, N7DRP 78, W7ODG 63, W7LNE 55, KA7DEF 38, KA7WFW 35, N7KUM 25, KA7AID 23, NR7F 10, W7DAN 3.

EASTERN WASHINGTON, SM, Tom Plaisance, KC7PH. STM: W7GB. SEC: WA7CBX. OOC: W7LKR. ASM: KC7MM. ACC: NQ7M. SGL: KD7AC. TC: W7DBV. ASM & WEN NM: KE7WG. PIO: WA7GQO. Congrats to Spokane Radio Amateurs officers: Pres. Warren Kelsey, N7KYH. VP: N7ZYQ. Sec. KB7HJM Treas. WA7KJY. Trustees K7EUA, W7EQU, W7EFB. Earl, W7LBK is recovering from by-pass surgery and Jerry, K7YGX from Ellensburg is recovering from the effects of a stroke he suffered in late October. Get well soon guys. By the time this column is in print, an agreement between the FCC (Bellevue office) and the Eastern Washington Section will be in effect. Those most interested in this agreement include the Official Observers (and those they observe), the Technical Coordinator and Assistants or others experiencing RFI difficulties. Contact the SM for a copy of the agreement. The northern reaches of the Section are in need of emergency communications volunteers. Contact SEC WA7CBX or the SM. 73, KC7PH @ N7HHU BBS. Traffic: WA7YEN 198, W7GB 176, W7LBK 37, N7HXT 8.

WESTERN WASHINGTON: SM, Mary E. Lewis, W7QGP—STM: KD7ME (@K7KNZ). SEC: NM7N (@N7HFZ). SGL: KD7AC. ACC: W7QGP. TC: W7JWJ. Public Law 97.259 (The Communications Amendments Act of 1982) What does it mean? It is an agreement to cooperate in a joint effort to improve rules compliance in the Amateur Radio Service. ARRL Official Observers (OOs), known as Amateur Auxiliary to the Field Operations Bureau, undergo a training and certification procedure administered by ARRL before appointment by SM. WWA has eight OOs, Bellevue, Renton, Seattle, Silverdale, and Kingston (3). The need for additional OOs and RFI teams to help fulfill this agreement between ARRL and FCC is imperative. Please contact me. Thanks to all who handled Health and Welfare traffic during the Hurricane Hugo and California earthquake. ARRL Field Forum and ARRL Section Leader, for ARRL Field Leadership published quarterly, lists info and questions on issue of changes, improvements or deletions. Affiliated clubs receive the Field Forum. Ask to see it. Please send me your newsletters. Lead time for QST is 3 months, so submit items to publish much in advance. Uniting the world's best, the 1990 Goodwill Games will be held in Seattle July 20 through August 5th. Radio Shortwave sports is a new event with 8 teams participating and each consisting of one US, one Soviet & one other foreign DX Amateur in DXing event.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: K6TI. TC: N6AMG. AT 5:04 PM on October 17, much of the earth which supports the East Bay Section moved more than I and many other long-time Bay Area residents had ever realized that it could! The power of this 7.1 Richter scale earthquake will not be forgotten by those who experienced it. The power of Amateur Radio during this time will also not be forgotten. "Closed" repeaters were suddenly "open," RACES and ARES members and just plain "HAMs" were everywhere, providing needed communications for friends, neighbors and strangers alike. Amateurs from as far away as Santa Barbara arrived to relieve the locals who were burning out after days of long hours at shelters and EOCs, and being away from their families. The NTS was very effective in delivering health and welfare traffic, and the packet BBS operators did an incredible job of getting their traffic lists moved quickly and accurately. We were all so busy doing such a fine job of responding to the public's need, that none of us had the time to get the word out to the media representatives. Amateur Radio made a significant contribution to the welfare of the citizens of the East Bay, San Francisco, and Santa Clara Valley Sections. I am proud of what we all proved to each other, in responding to this disaster. There are too many calls to list in this column, but our SEC, W6LKE, is preparing an article for publication in a future issue of "*QST*." My congratulations and thanks go to every Amateur Radio Operator who gave of his time and skill during this need. I hope we won't have to do it again soon. Traffic: WB6DOB 277, W6VOM 256, WB6UZX 97.

PACIFIC: SM, Wayne Jones, NH6GJ—October was a relatively slow month, except for the SET activities. Thanks to all who participated. The EARC held their annual elections, with KH6NJ being re-elected as president, KH6BIO returns as VP, KH6JV is the new Treasurer. NH6GJ, NH6LH, KB6VUP, NH6HC, AH6BJ, and KH6TB are directors. Congratulations! Also, congratulations go out to AH6JF. I recently received word that he placed first in Oceania 15 meters during the 1988 Peace to the World DX Contest sponsored by the USSR in 1988. The certificates and medal arrived from Box 88 through the QSL Bureau. Public Service events were at an all-time low—no one reported any! Traffic: KH6H 31, KH6S 38, NETS: 58.

SACRAMENTO VALLEY: SM, Jettie Hill, W6RFF—As your new SM, I wish to thank all of those who showed confidence in me. My address is on Page 8 of *QST*. I ask each section member to send Bob Watson, W6IEW, a note of thanks for the 4 years he put in as your SM. Bob did much in reorganizing the SV Section! Cass, KX6Z, DEC Metropolitan Sacramento,

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8562	$22.50	68881-RC12	$72.50
C64 HVY DUTY PWR/S	$24.50	68882-RC16	$105.00
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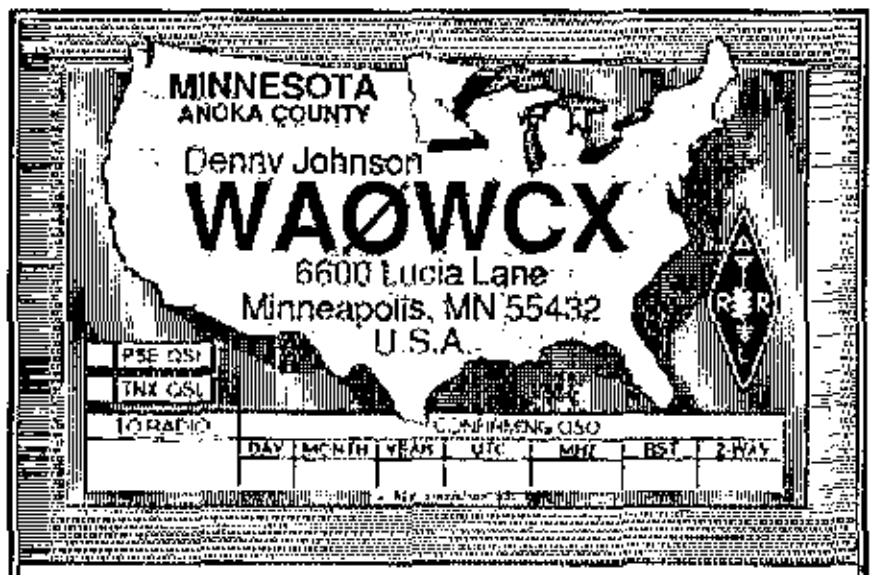

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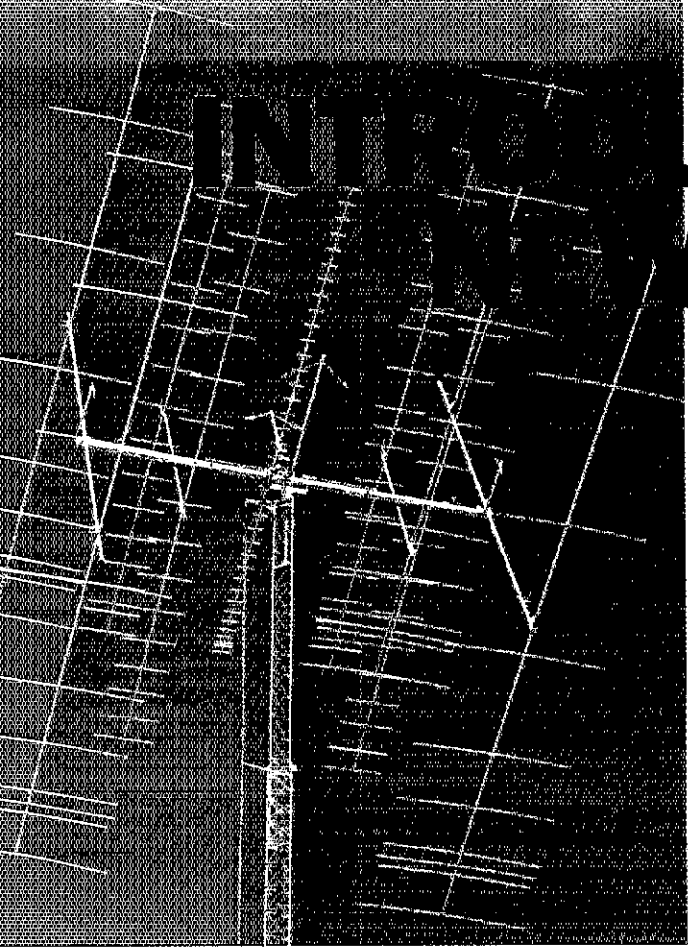
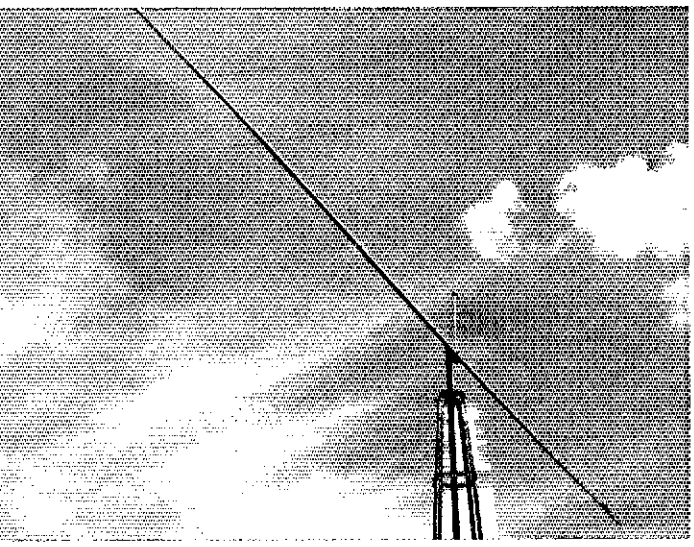


eter and 2-meter moonbounce installation. Four 6M-2WL, four
-5WL and one 432-13WL antennas in array on self-supporting
89-foot US tower at N7ML.



2M-18XXX installation at N7KQK.

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The superior engineering designs, quality and high performance that AEA built its reputation on are now available in its dynamic new line of antennas. Developed and manufactured by Mike Staal K6MYC, president of M² Enterprises and co-founder of KLM antennas, the product line includes an assortment of 2-meter, 6-meter and 440 MHz antennas and accessories for fixed or portable applications. AEA/M² antennas are already recognized for their superior performance by many moonbouncers.

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Other features include:
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Accessories. To complement the antenna line, AEA also offers various "H" frame support packages. The MT-3000 heavy-duty elevation mechanism and controller for tilting up multiple yagi arrays. Also welded aluminum power dividers for coupling multiple antennas.

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lements	5	9	11	17	18	20	14	22	N/A	16	39	N/A
oom	15'9"	39'6"	50'4"	33'	36'	41'4"	9'10"	18'	N/A	10'	30'3"	N/A
Veight	11/14	31/40	38/47	13/15	14/16	30/37	6/8	12.5/15	1.5/3	4/5	12/13	1.3/3
Vindload	2.0	5.0	5.9	2.7	2.9	6.1	1.1	2.5	N/A	0.82	2.5	N/A

m - Length, feet and inches.
ght - Weight in pounds, antenna weight/shipping weight.
dload - Windload area in square feet.
- Six meters, **2M** - Two meters, **WL** - Wavelength.
- Heavy-duty, **CP** - Circularly polarized, **EB** - Eggbeater.

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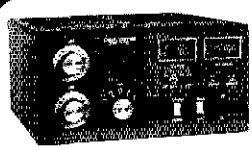

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The Barker & Williamson PT2500A Linear Amplifier is a completely self-contained table-top unit designed for continuous SSB, CW, RTTY, AM or ATV operation. Intended for coverage of all amateur bands between 1.8 MHz and 21 MHz.

Two type 3-500z glass envelope triodes provide reliability and rapid turn-on time.

FEATURES INCLUDE:

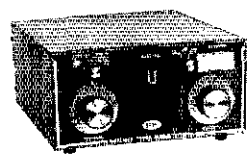
- Full 1500 watt output
- Pi-network input for maximum drive
- Pressurized plenum cooling system
- DC antenna relay for hum-free operation
- Illuminated SWR and power meters
- Vernier tuning for accurate settings
- Pi-L output for greater harmonic attenuation

Ruggedly constructed of proven design, this amplifier reflects the manufacturer's critical attention to details -- such as the silver-plated tank coil for maximum efficiency. Cathode zener fuse and internal/external cooling are among the protective and safety devices employed. Input and output impedances are 50 ohms.

Dimensions: 17" wide x 19" deep x 8"½ high
Weight: 80 lbs. (shipped in 3 cartons to meet UPS requirements)

Price: $2175.00 FOB factory. Price includes one year limited warranty.

Call or write factory for complete specifications.



MODEL VS1500A ANTENNA COUPLER

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FEATURES INCLUDE:

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- Vernier tuning for easy adjustment.

Front panel switching allows rapid selection of antennas, or to an external dummy load, or permits bypassing the tuner.

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and the Communication Reserve were very active with the Red Cross and other agencies in the Bay Area earthquake disaster. Many hams from SV went to help at the disaster sites, and many others handled hundreds of HW messages. I want to thank those appointees who have expressed a desire to continue in their posts! At the present time, there are openings for Section Emergency Coordinator and Affiliated Club Coordinator. If you are interested in one of these positions, please contact me. NOTE: all section clubs please send me a copy of your club bulletin. Traffic: WB6MIF 606, WA6ZUD 544, N6DOJ 541, WA6WJZ 380, K9JM 219, K8SRF 143, W6CFQ 130, N6LAM 127, N6CVF 104, W6RFF 57, WB6NNC 90, WB6RXF 90, WB6SRQ 5, KB6WIJ 5.

SAN FRANCISCO: SM, Dick Wilson, K6LRN—Thanks and congratulations to all who helped with the Earthquake emergency communications. In SF, EC KA7JAN had shelters and Red Cross, KK1A had 2256 msgs from St. Lukes. Marin RACES was activated. Informal nets with stations as far as Eureka area were operational on HF handling H & W tfc. W6OSN & W6DOF are Silent Keys. K6TP is recovering from a stroke. Thanks to all who helped with the Marin Century; WB6TKD, W6FCQ, N6TKD, N6VKK, N6BMW, N6AQY, W6DTV, N6FAX, K6GEV, KB6LAR, WA6UBX, WA6CBQ, WD6HCW, WA6MHO, N6QE & WB6QAW. City of Novato vs Hams dept. K6QW has been ordered by court to remove 40M beam, keep height at 35' and pay court costs. (Some compromise!) WA6JYU ordered to remove tower that was in required set back. WB6ZHD now on Packet and NCDXSPN. N6FWG is on NCN-VHF. Many SF section ops helped w/Lung Assn bike tour. K6HY & K6LRN set new CQP county records. WB6GWP is AEC-SF. Traffic: N6FWG (Aug) 41. Sept/Oct 47. KK1A 2256.

SAN JOAQUIN VALLEY: SM, Byron Smith, WA6YLB—Asst. SMs: K6YK and W6TRP. SEC: WC6U. STM: N6AWH. Recent Earthquake in the bay area kept hams from Tulare and Fresno Counties busy. Many thanks to the hams that drove to the bay area to assist the people of the bay area. Sad to report the following Silent Keys: KA6EME, WB6AEA, K6IFL, N4ASC, W6TLM and W6QDL. How about this: Adopt a school for 1990. Have each club in your area adopt a Junior High or High School to set up a Radio Club. It's a investment worth making. By this time, I will have a new QTH. Have just purchased a home in Exeter, Ca. Addr: 504 S. Joyner, Exeter, CA. 93221. You can reach me via packet radio PBBS as WA6YLB @ N6OA. Please let me know 2 months in advance for announcements. Still have appointments to be made in your area. W6DPD has a TM631A, N6BWW a TM731A K6OZL has a IC781, W6XP has a Swan Mark VI B. Remember the DX convention in Visalia April 6,7 and 8th at the Holiday Inn. Traffic: N6AWH 118, W6DPD 4

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W. SEC: N6JQJ. TC: WA6PWW. STM: N6JLJ. PIO: N6HMO. ACC: W6MKM. BM: (vacant). OOC: KA6S. OCTOBER - This month has been very memorable due to the magnitude 7.1 earthquake that hit the bay area. The Amateur Radio community responded in exemplary fashon. The ground had barely stopped shaking when various ARES/RACES nets came up and started taking damage reports. These reports were vital to the efforts of local government to asses the damage. In some areas, the damage was thankfully light, other areas in the section were devastated. Special thanks to those of you who supported the efforts to ensure that the displaced were provided with shelter and food. I cannot list every one here who assisted in this part of the operation because there were over 600 of you in our section alone! Also, although the telephone system was intact in most of the section, the overload generated a need to do health and welfare traffic. This was done to the tune of an estimated 10,000 messages handled via HF CW, 'phone, and packet. To those of you who participated in this aspect, well done! . . . I have had very little input concerning upcoming classes for the license class hotline, (408) 971-1424. Accordingly, it will begin to have information concerning upcoming club meetings as well as whatever classes I know about. The clubs described will be those for which I have information about their meeting at least two months in advance. We'll see if it works a bit better this way. Traffic: (no formal reports this month, section total is approximately 10,000). Phone numbers: Amateur Radio Classes/Clubs (408) 971-1424 License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC).

ROANOKE DIVISION

SOUTH CAROLINA: SM, Ned Moeller, N4FVU—Prior planning paid off when Hugo struck last fall. Before the big storm, Section Emergency Coordinator K8AFP conducted an EC certification workshop for previous EC & DEC appointees. Eighteen were qualified. When Hurricane Hugo blasted into SC, a full roster of ECs were in place at section emergency operation centers. A JOB WELL DONE to DEC & ECs: KA4ABW K4AOH K4AQB WV4B KB4BZA WC4C N4CBQ WA4CHC K5CVD W4DGF W8DGF W8ETJ N2FDI KI4FL W4FMZ W4FVV WA4GAW N4GIQ KC4HTA KA4IOW AA4IX KB4KAM K4KBI N4LBJ AA4LY KK4MB WA2MFU N4MNH AB4NA KK4NY N4OEG N4QWL KK4QZ KM4RB N4RMX N4ROS N4RQM WB9RXM NG4S KB4SU K4SZQ W4TUN WB4UNK & W4ZYZ. Texas SYSOP KM4DY reports his PBBS processed over 1,000 Hugo H & W msgs. GARS Hamfest in Greenwood, SC is on 20 January. Traffic: KI4FL 390, WA2GYM 307, W4ANK 145, N4MEJ 134, KA4LRM 53, W4DRF 28.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: N4GHI. SEC: WB4ZTR. ACC: KA4YUY. OOC: W8IRT. PIO: AA4VP. TC: N4UA. SGL: W4UMC.

VTN	1 PM	3907/7260	W4JLS
VSBN	6 PM	3947	KI4BR
VSN	6:30 PM	3680	N4KSO
VN(EARLY)	7 PM	3680	N4GHI
VN(LATE)	10 PM	3680	WB4KSG
VLN	10:15 PM	3947	NW3K
SVEN	7:15 PM	146.82	N3JH
STARES	9 PM	146.97	KJ4VT
DEC/EC	9:30 PM (3rd Wed)	3947	KA4NWK

As you will note from the above data, there has been several changes in the field leadership appointees and net managers. W8IRT replaces W4HU as Official Observer Coordinator, KA4YUY replaces NT4S as the Affiliated Club Coordinator, N4UA takes over as the Technical Coordinator from WX4C and NJ3H replaces NT4S as manager of SVEN. NW3K is the new call sign of KK4FV since Chuck is now an EXTRA. Many thanks to W4HU, NT4S and WX4C for their outstanding leadership and devotion in the fulfillment of their section appointments. SEC WB4ZTR reoorts that N4FZA has passed the exam and is now a "Certified EC" and WA4TVS has qualified for hazardous materials Level 1 certificate. Also, KI4W, W4TZC, KI4BR, NW3K, WB4KSG, K4MTX KJ4VT and W4JLS have qualified to receive a PSHR from League Headquarters. New "EC" appointees; N4NIG for Chesapeake replacing N4CRV who resigned after many years of service, N4VFY Nottoway County replacing KA4WBW who has moved, and AA4OG for Lunenburg County. KB4BW and his group were very active supplying communications for the Fall Special Olympics in the Roanoke area. OOC W8IRT is busy with his OOs having received reports to his questionnaire from K9MX, KE4EQ and NS3K. It is hoped that all ECs have taken advantage of the publicity amatuers have received from their efforts during Hugo and the California earthquake to contact their local emergency officials to assure that the ARES members are recognized and included in their emergency plans. Upcoming VE exams, Richmond, John Tyler Community College, Jan 6, contact N4RPI. The ARRL/VEC exam fee is now $4.95. Also, the Chesapeake DX Assn will have exams Jan 6, contact KC4YX for details. I wish all of you a very happy holiday season and the best for 1990. Hope all received their dream goodies from the man in the red suit. Will be looking forward to seeing all at the Frostfest January 14th and at the Winterfest, February 25th. Traffic: WBØTAX 910, K4DOR 858, N4GHI 757, N4HOG 634, W4SQO 215, W4JLS 195, WB4D 194, WD4MIZ 178, KC4ESG 158, K4MTX 156, AA4AT 140, N4EXQ 132, W3ATQ 127, WB4PNY 122, WB4FLT 95, WB4QOJ 94, WD4MIS 92, N4KSO 82, KJ4VT 72, WB4ZTR 69, WB4KSG 68, KD4NH 61, K4BGZ 56, NW3K 54, N6GVG 47, N6ANQ 42, AA4GL 42, WB4KIT 42, KB4CAU 42, N4RHV 40, KB4PW 34, WB4ZNB 32, WB4VMX 28, N4FZA 28, KB4NGO 25, WB4UHC 25, KB4OPR 23, K4JM 20, WB4EDB 18, W4TZC 11, WB4DQZ 10, KK8L 8, N4FNT 7, WA4TVS 7, W4YE 5, W4HU 2, WA1VRL 2, KJ4EK 2, NW4O 1.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Edie Sheffield, KAØMQA—SEC: K4UBU. STM: KBØZ. ACC: WBØDUV. PIO: WBØFQB. OOC: KAØCDN/WØJR. TC: WØLJF. SGL: WDØHNQ/WDØHNP. BM: KAØVKM. Following on the heels of Hurricane Hugo, was the San Francisco Bay area California Earthquake. Once again, Colorado amateurs were very involved with H & W traffic into the affected areas. Health and Welfare inquiries tripled that of Hurricane Hugo. WØTX, the DRC station at Mile Hi Red Cross, was activated by the EC of Denver, KBØCHT, and volunteers were recruited from Arapahoe, Jefferson, and Adams Counties ARES members along with DRC and Denver ARES members. Colorado Springs under the SEC K4UBU sprang into action for the County Disaster Services and the Local Red Cross of El Paso County. In Sterling, WDØHDR the EC and his Ass't NØKJL relayed messages for Logan County. With our packet BBS's of WØLJF, KØHOA and W1HAB taxed to the maximum, all of the Section NTS nets were utilized by the station WØTX who was handling the majority of traffic. Thanks to NØHFZ 12th Region NM for helping the section move this tremendous amount of H & W traffic. My thanks and appreciation to all of the amateurs involved for your time & efforts. 73. NETS: CWXN; QNI 1716, QNF 2700, QTC 1535 31 Sess. CWN QNI 84, QNF 361, QTC 36, 31 Sess. COL: QNI 1171, QNF 1031, QTC 67-176, 31 Sess. HNN: QNI 1751, QNF 997 QTC 167-654, 31 Sess. NCTN: QNI 235, QNF 289, QTC 61, 29 Sess. SCTN: QNI 323, QNF 404, QTC 76, 31 sess. Traffic: WØTX-3012, NØBQP 1900, KØHOA 1642, WØLJF 1275, KØYFK 631, NØHFZ 429, NØGVC 268, WBØVET 236, KAØWIE 220, WØLVI 208, WTØG 188, NØFCR 152, KØSN 125, NØAYE 108, KØTER 93, KAØMQA 45, KBØZ 36.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 94 msgs with 135 checkins. NM Roadrunner Net meets daily, 3939 @ 0100 UTC, handled 82 msgs with 1056 checkins. NM Breakfast Club meets daily, 3939 @ 6:30AM, handled 145 msgs with 940 checkins. Yucca 2-mtr Net, 78/18 handled 31 msgs with 443 checkins. Caravan Club 2-mtr Net, 66/06 with 146 checkins. SCAT Net, 66/06 handled 12 msgs with 641 checkins. Info Net 12/72, with 52 checkins. My pleasure to attend the Lubbock, TX, Hamfest, October 8th and enjoyed seeing a lot of old friends and many new ones. So sorry didn't get to the El Paso Hamfesta, but understand all had a fine time. Sorry to report the passing of W5KJO. Traffic: KF5VF 175.

UTAH: SM, Rich Fisher, NS7K— SEC/STM: Jim Brown. PIO: Lon Stuart. MARS had a SET and the Army system seemed to have a good turn out. Thanks to those who helped out. A big thanks to all of you who helped out with the Health and Welfare traffic during the Calif. earthquake. If anyone knows who the Air Force and Navy State MARS Directors are, I would like to know for my records. 73 de Rich, NS7K.

WYOMING: SM, Jim Raisler, N7GVV—

NET	FREQ	TIME	QNI	QTC	SESS	MGR
Cowboy	3923	545p	723	5	22	WB7K
Pony Express	3923	900a	212	3	5	W7MZW
Albany ARES	2 mtrs		35	0	5	WB7K
Area 5 ARES	2 mtrs		60	0	5	W7ILL

The Campbell Co ARC held their annual Halloween Patrol assisting the Gillette PD in monitoring the streets. This year, the weather kept activity rather mild, more time was spent on assisting motorists in getting out of snow banks. Please note that the 1990 Wyoming Hamfest has been moved to June 9 and 10, and not the dates I reported earlier. Need to get a message to me? Try packet, and leave message on the BBS in Sheridan.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: W4PIM. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. A special communications exercise was held Nov. 14 with amateurs assisting the National Weather Service. Packet, HF, and 2 meter FM was used in the drill which is a good exercise for the upcoming winter weather season and the tornado season next spring. A new repeater is up in Theodore on 147.80 MHz featuring a 10-meter link. A year has passed since the Army finished using part of our 420-450 MHz frequencies in north Alabama, but some amateurs in that part of the state complain that the

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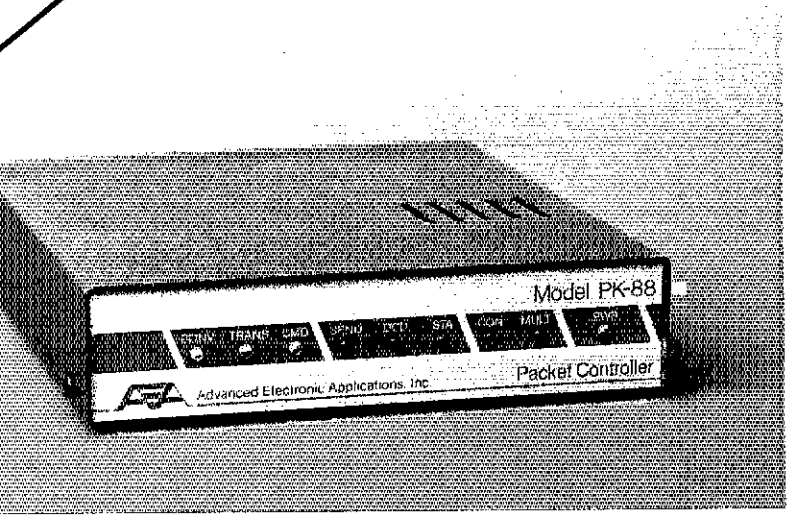

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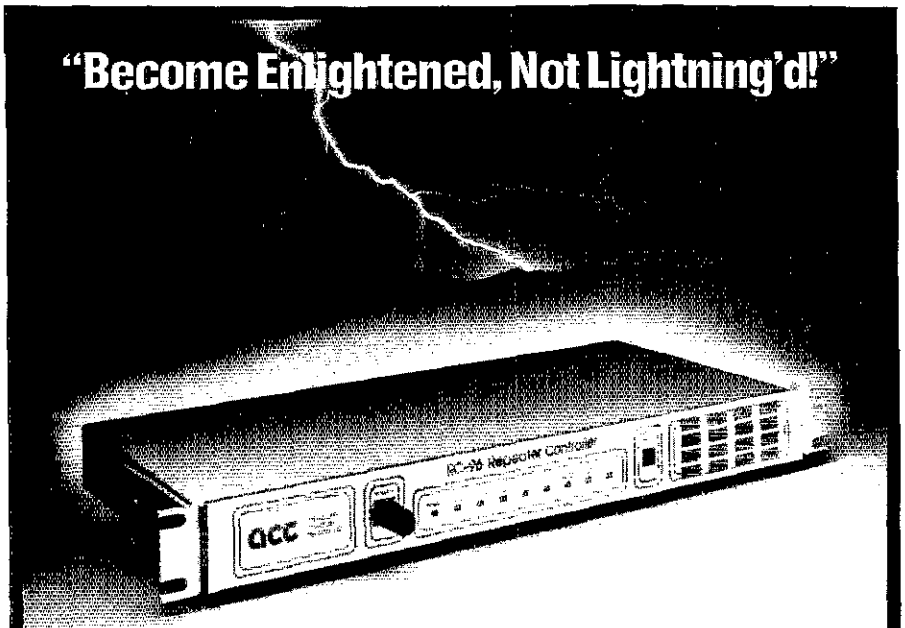

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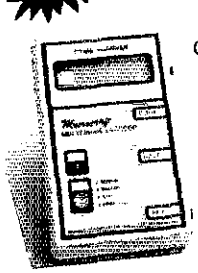

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testing has continued to hurt 440 MHz FM activity in the Tennessee Valley. The Huntsville ARC gathered together on Green Mountain for their annual picnic on October 21. We are losing one of our active amateurs from Mobile - Cal Puckett, W4YXO and his wife, Doris, are moving to Kentucky. A new "Chat" node is on the air in Mobile- MOBQSO on 145.09 MHz. Other similar nodes are on the air in Huntsville, Birmingham, and the Auburn-Opelika area. By the time you read this, we will know if our new Section Manager is Joe, WA4RNP, or Mildred, AA4XF. Whoever is elected, please give them your full support! BPL: WA4JDH. PSHR: WA4JDH, W4PIM, W4CKS. Traffic: WA4JDH 694, W4PIM 199, W4CKS 130, WO4W 12.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM: KC4MJ. SEC: NC4E. STM: WB4WQL. PACKET: W4QO, ACC: KM4IH. BM: AA4UA. OOC: W8BLA. PIO: WA4LLE. SGL: WB4UVW & TC: W4ZTL. Glad to see so many of u at Lawrenceville & it being the last section Hamfest of the year. I'm looking forward to next year. NOW is the time for ur club or group to verify the date of ur next years affair & get the info into HQ. Send all necessary info to Mrs Bernice Dunn & she will see that u get the forms etc & put it into her hamfest calendar. She can also let u know if u have any competition. Johnny, W4WKP, wants all to know that FINALLY he is an ADVANCED CLASS LICENSEE. Congrats. It is with the deepest regret that I must inform u of the following SILENT KEYS. K4YID, W4CLA, W4NTK, N4QHL, K4PLG & WJ4S. Our deepest sympathies to their families & friends & MAY GOD HAVE MERCY ON THEIR SOULS. They will be missed. PSHR honorees for Oct are: WB4DVZ, KC4BHX, KM4LS, WA4TXT & KA4HHE. Many, many issues come up regarding this fantastic hobby of ours. Our two senators & the people who u elect to Congress in ur district can have a lot to say regarding these issues. If they don't hear from us they can't help. So this coming year, let's support our hobby by getting the paper & pen out & make urself heard. The spectrum gets smaller every year & we sure don't want to lose any more frequencies. If u desire any ARRL appointment in the area that u can help in, please let me know & I will send u an FSD-187 form. Everyone can help the hobby in one way or another. Once agn, I ask that if u hear of an SK, pse send it to me or the ARRL so we can keep up. This is the beginning of a NEW YEAR & once agn I want to ask u for ur help to keep this FB section at the top. HAPPY NEW YEAR TO U & UR FAMILIES. GOD BLESS, Eddy. Traffic: KA4HHE 139, WB4WQL 76, KC4BHX 75, WB4DVZ 69, N4UZ 43, WA4TXT 22, K4BAI 11, N4MWR 8.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—PIO: Petey, WA4PUO. BM: Dave, N4GMU. TC: Ed, WØRAO. ACC: Dick, WA4BIH. OOC: John, AB6I. SEC: Rudy, WA4PUP. STM: Cotton, KB9LT. ASM: Bill, KB4LB. ASM Digital: Al, K4CY. SGL: John, KC4N. I left out of the last column RELAY CHATTER of the Sun Country ARS and The NEWSLETTER of the Sun Coast ARC. At other times, The Newsletter from Palatka Radio Club, THE COMMUNICATORS BULLETIN from Bell Tower Pioneer Radio Club and WISEQUACKS from the Walt Disney World Radio Club have been received. If you don't find your club listed in these two columns, please ask your editor to place me on the mailing list. Novice classes are being held at several locations at this time of year, and we offer congratulations to the clubs and instructors who are giving of their time and talents to help expand our amateur radio operator population. Just received a copy of the new FCC RULE BOOK and I urge all of you to get a copy. Part 97 has been reduced in size and this book makes it easy to understand. There is also step-by-step guides to the process to get your antenna tower height limits altered. Well worth it! It is time to wish all of you a prosperous and happy 1990. 73, Roy, N4ADI. Traffic: N4JAQ 259, KB9LT 249, WD4IIO 172, N4GMU 147, KI4PB 141, WC4D 100, WA4EYU 95, N4QYS 92, W4UEA 76, KI4CQ 75, AA4FG 69, N2AOX 53, KI4NN 47, KC4FL 47, N4DY 44, W4KIX 42, W4MGO 31, K4UBR 27, N4ADI 21, N4OZD 20, NF4O 18, KI4BI 15, K4UTY 12, WA4PUP 12, WA8APQ 6.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—STM: K4ZK. SEC: W4SS. TC: KI4T. BM: WD4KBW. PIO: N4PBF. AAC: W4TAH. ACC: K4EUK. SGL: KC4N. PKT MGR: K4CY. I am very sorry to report that Stan, K4BLM of Miami, became a Silent Key this month. Stan was a long-time member of the Florida Phone Traffic Net. The following note was received from Ken Shaw, K5VZN/VP2MAS: "...The eye of the hurricane went over Montserrat on Sunday, Sept. 17. I got on 20 meters on Tuesday AM, Sept 19. On Tuesday afternoon, Sept 19, VP2MAH came by. She is a native of Malta. With the help of N4JAQ and NK4X, she was able to get word to her parents and her OM's family in Germany that they were OK! Two days after the eye of Hugo went by, families on Malta and in Germany had direct word by ham radio that their children were OK!" The Martin County ARA, Common Emitter stated that the Educational Programs are progressing very nicely. They set a goal of 50 new Novices and 100 upgrades for the year- they indicate that they will exceed this goal as there are already 31 new Novices and about 50 upgrades to date. Keep up the great work! The Englewood ARS newsletter said that the 146.100/146.700 Englewood repeater is operating full bore. The antenna is now at 150 feet with an ERP of 64 watts giving excellent coverage in both Sarasota and Charlotte counties. It is open to all. KB4KXV reported that his station operated in the Navy League program at Port Everglades October 9 to 14 with 13 personnel and 461 messages. High Air Force MARS count kept the NTS total down. WD4KBW said there were 288 bulletins received and sent by W4DL 74, WA4EIC 49, WT4F 83, K4IEK 24, WD4KBW 24 and WA9VND 34. The Fort Myers ARC Modulator indicates that nominations for the Ham of the Year award are now being accepted. W4TAH, Amateur Auxiliary Coordinator, was the speaker at the October meeting of the Fort Myers ARC. The Martin County ARES/RACES Newsletter indicates that they will hold their Simulated Emergency Test during November. The Martin County Red Cross and Martin County School Board will be joining this exercise. The Gator Chapter QCWA held their first meeting October 7th. They hope to have Harry Dannals, W2HD, visit the chapter, hopefully after the Miami Hamboree. Received the first Florida Keys ARC bulletin and it was great! When I saw first I mean Vol 1, No. 1. One of the items featured was the summary of an interview of K7WDT and W8HXT on Radio Station WMUM. The Everglades ARC Beam states that it is hoped to have KI4T this month for a program on emergency preparedness. Other newsletters received

The Morse Machine

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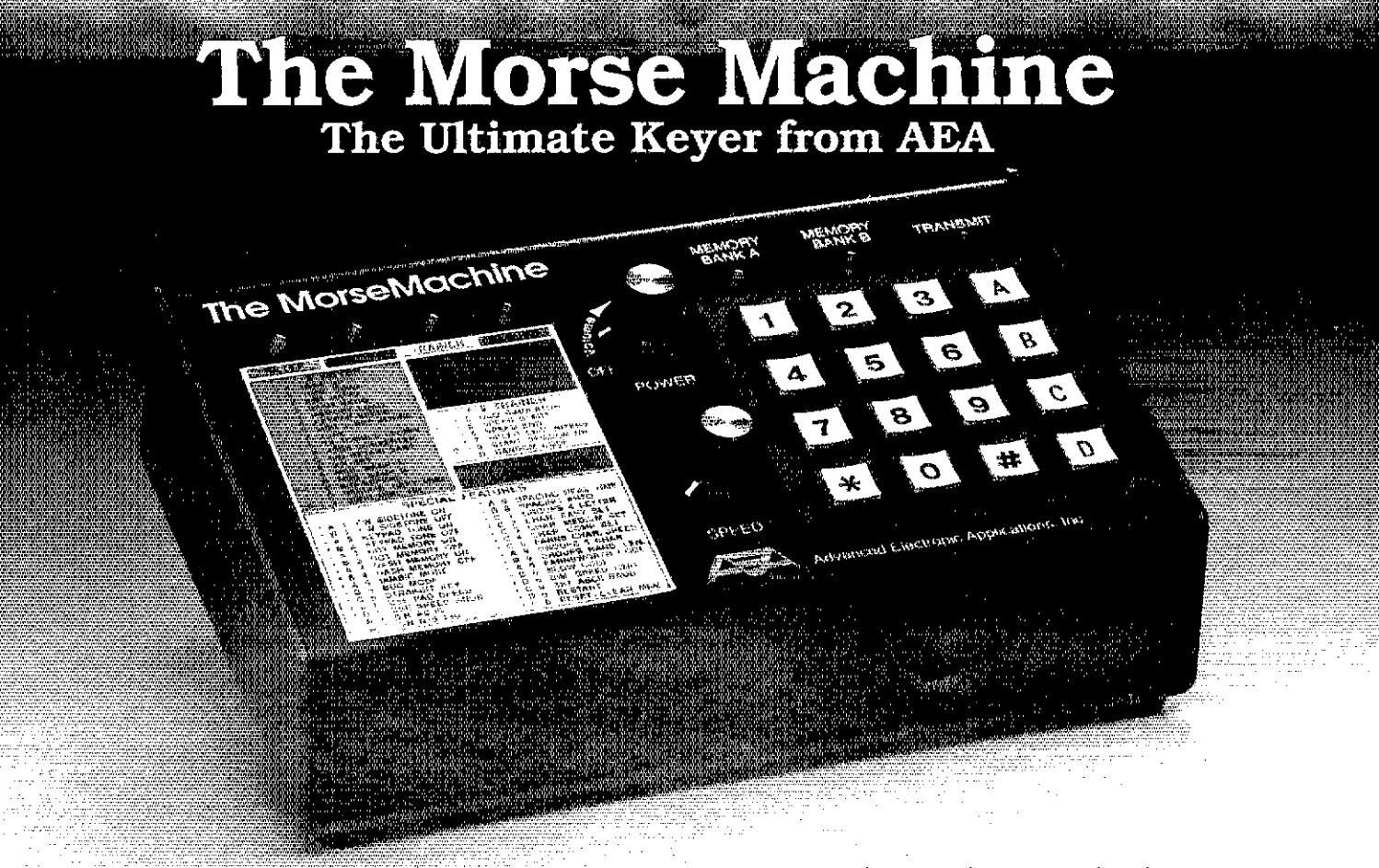

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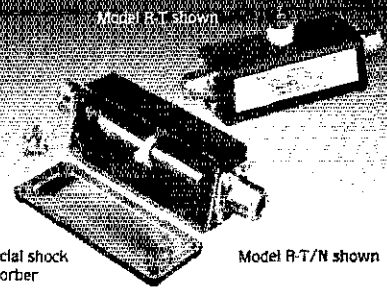

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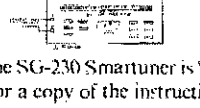

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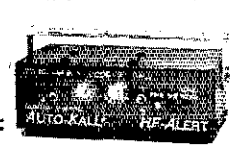

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included the Palmetto ARC Bug Juice, South Brevard ARC Spark, and the Southwest Florida Traffic Net report. KD4GR, manager of the Southeast Florida Traffic Net has appointed KB4WBY as Chairperson for the SEFTN historical committee. K4CY praised the efforts of the KP4GY-KP4GY-KP4N link and the three Florida Gateways W4DPH-W7LUS-W4NVU who contributed to the success in moving H/W into PR and the Virgin Islands via packet. Listen to the ARRL Information Net Saturdays at 8 AM on 3940 kHz. 73 de WA4PFK. Traffic: W3CUL 3278, W3VR 1258, WA9VND 503, K4SCL 423, WA4PFK 315, K4ZK 207, WB4KXV 206, W4NFK 198, N4KFU 188, WA4EIC 185, KB6ECH 170, K4EUK 170, KA4FZI 145, WT4F 143, KD4GR 140, WA4RUE 138, AA4CH 119, WB4WYG 116, KM4LP 108, K4FQU 107, W4DWN 106, WA4NBE 95, KB4WBY 92, N4MML 90, N4ORZ 85, N4ET 83, W3TLV 71, KC4VK 64, N4HAS 57, WD4KBW 53, KF4RL 50, KA4YHS 48, K3KT 44, W2DMM 40, KA4NXF 38, KB4MON 32, WB4CGK 31, KB4AXG 28, KB4UIA 27, AB4BC 25, K4JI 22, KA8GYF 22, KA4SIH 22, N4TVV 20, KA2YZM 19, N4OIA 17, KA9AKY 12, N4PKN 12, N8ABC 10, W4VQE 9, N4VLH 8, K4IA 8, N4RHJ 8, WB3EHR 8, KB4BLN 8, KA4GDU 7, WA4PIL 5, K4GVI 5, KA8RUL 5, N4PSV 4, W4NSY 3, W4MFD 2, KC4GHT 2, N4ILN 2, N4IXO 1, KB8BDL 1, W4MPV 1. (Aug.) KD4GR 111.

PUERTO RICO: SM, Alberto L. Valldejuli, WP4CSG—Sorry for being "off the air" for some time, but I had been away from the Island for some time and then came Hugo! Hugo caused wide devastation in our Island. Ham radio was vital to government and welfare agencies during this emergency. Thanks to ham radio, Civil Defense, Red Cross and National Guard had effective relief communications in all the affected areas. Thanks also to the ARRL for its assistance in providing the necessary equipment to assist in these efforts. To all those volunteers who assisted during the emergency goes our most heartfelt congratulations. A more detailed report will be filed in due course to the League for publication if it so desires. In particular, I wish to thank all those hams who assisted in manning radios for CD, RC, and NG; and to the packet radio jump team who flew in from the mainland to also lend their helping hand. I also wish to express my appreciation to Rick Palm (K1CE) and Evelyn Gauzens (W4WYR) for their most dedicated assistance in this moment of need. Without their assistance, our efforts would not have been as effective as it was. Thank you all. Traffic: PRN Sessions-31; QND 235; QTC 31; QNI 154. Individual QNIs: KP4DJ (NM), NP4XM, WP4FMH, WP4FGM, KP4GC, KP4TIN, KP4FFW, K5HK/MM, WP4FGM, KP4QG, VP2VI. Thanks, Willie (KP4DJ).

VIRGIN ISLAND: SM, Ron Hall, KP2N. ASM: KV4JC. SEC: NP2B. STM: NP2E. NM: VP2VI. This month's column is all about Hurricane Hugo. Winds in excess of 210 MPH went thru the Virgin Islands and PR on Sept. 17. St. Croix was the worst hit with 7 deaths and over 90% of all houses damaged. ARES was activated on the 16th and the EOC on all islands staffed during the storm. During the storm, stations were checking into the 146.81 repeater on the hour for status updates. After the winds died down, ARES members came on the air with whatever we could. NP2B los 90% of his roof, yet had traffic flowing within 24 hours. KV4JC lost part of his roof, but did manage to string out a longwire and pass traffic. For the first week after the storm, 20 to 25 VI stations were our only link with the mainland. VHF repeater links were re-established thru the efforts of W2IBJ & KP2O. WP2AGA setup a 2M packet digi to handle the large volume coming in. Large volumes of traffic were handled by KP2AF, WA9SQN, WP2ABG, NP2E, WP2AGL, NP2C, KE8CA, KV4FZ, NP2CM, WP2ABM, WA2AAX, KP2AV. A great job by all the VI hams! 73 de KP2N.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NM's: K6LL, K7POF, KI6ZH. Sadly I report that W7AB became a Silent Key in Oct. Bob was an excellent hi-speed CW op, and even after suffering three strokes was still able to copy 45 wpm in his head. So long, OT. KVØKV our DEC in Yuma upgraded to Extra and is now WZ7V. Congrats. Also congrats to N7KWY who recently a won scholarship award from ARRL Foundation. Troy plans to attend U. of A. and major in EE. (Tnx, "Short Skip") West Valley ARC has formed a Local Interference Committee, Chairman is Joe Nowakowski, W7FPG. FB. Please let me hear from other clubs who have LICs. West Valley operators, organized by ARES EC W9WFV, did an outstanding job of handling tfc in and out of St. Croix Island and later Charleston, S.C. during Hurricane Hugo. Participating ops in this team effort were: K8RAL, KE7DH, W7FPG, W2GOB, W6IWR, W1JH, W8JWZ, KD7KY, KM7L, NK7M, WG7P, NY7S, W7YU, W9WFV, KE7ZQ, and W6CZ. They got good coverage in local news. In Tucson K7KYW, KC7AQ, and W4DDV among others handled mucho traffic into the hurricane disaster area. Great work. Have received few reports to date of S.F. earthquake disaster, but from listening on the bands, I know there were many AZ stations participating in health and welfare traffic. Operations appeared very similar to the Mexico City disaster work several years ago. This is the highest form of public service we amateurs can subscribe to. Congratulations to all who participated. Well done! K7VCI reports very successful Palo Verde Siren Test on Oct. 4 with 55 Phoenix area ops participating. (Tnx, "Squelch Tail"). This was their sixth year of supporting this important function involving A.P.S. and AZ Dept. of Emergency Services. A.R.A. has linked their 146.680 repeater to San Diego. (tnx, N7JBZ, "Squelch Tail"). W7YS sent photo of himself, NN7D, and NN7A standing by a lake in Western Siberia in August during their operations over there signing R9ZF. He says the power line voltage in Flagstaff has gone up due to air conditioners in Phoenix and Tucson being turned off! How's that again??? Jan, N7JWM, EC for Coconino Co. sent in FB report on recent public service activities up there. Says the CARC Nov. meeting will feature ARES talks. Keep up the good work. The OPRC reports a new meeting place. It is at the Booth-Fickett Magnet School, 7240 E. Calle Arturo near Broadway and Kolb. Meeting time remains second Wednesday's at 7 PM. The OPRC/ARCA sponsored hamfest Oct. 15 was another big success this year with J.B., WA7AHF managing the show. Space running out. CU all next month, same street corner. 73 Jim.

Net	Abbrev	QNI	Traffic	Sessions	Liaison
SouthWest Net	SWN	135	94	31	TWN
Arizona Cactus Net (VHF)	ACN	210	59	31	ATEN
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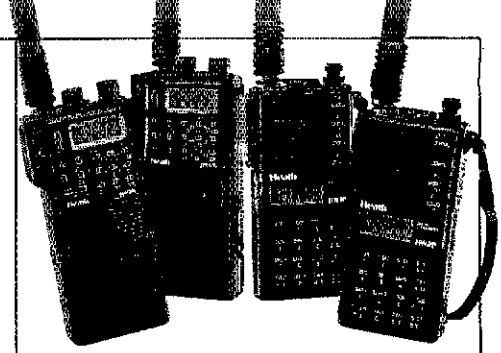

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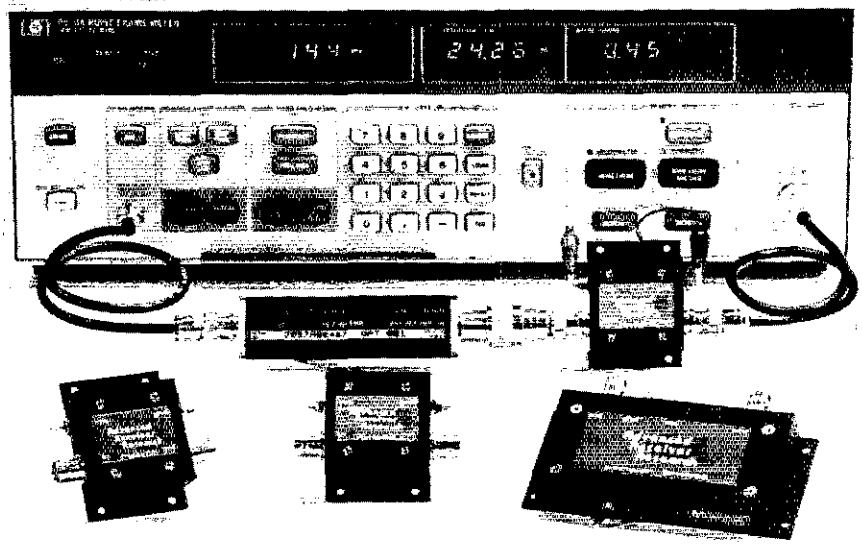

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SP220VD	220-225	≤1.9	15	0	DGFET	$59.95
SP220VDA	220-225	≤1.3	15	0	DGFET	$67.95
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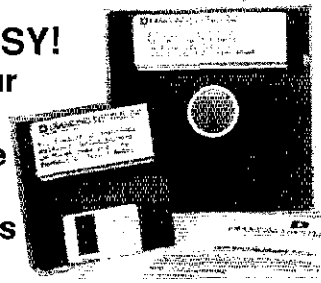

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LOS ANGELES: SM, Phineas J. Icenbice Jr., W6BF—The latest San Gabriel Valley AR Club bulletin reports that John Lonborg, N6TUB, drove 400 miles to the Santa Cruz area to help out with communications. The Santa Cruz Fire Station 2, needed help. John found his assignment by checking-in to the 6.79 (WB6J repeater). He also found that some repeaters were off the air because of power problems. It would appear that a real lesson was learned here. The major justification for repeaters and coordination is their usefulness in disaster communications. It would seem that only the repeaters with demonstrable emergency power capabilities should be coordinated, especially in the high population density areas.— John also stated that K6IYK and his packet link northward from LA deserved special mention. N6TUB, John passed hundreds of routine and priority messages through the packet setup of KI6EH. Thanks to Oct 89, KEY KLIX - a safety alert for mixing flashlight cells! According to the Government Industry Data Exchange Program GICEP, an alert was sent out concerning 1.5 volts D cells. Once cell was carbon-zinc and the other was of the alkaline type. If your sealed explosion proof flashlight EXPLODES, please check the remains for mixed cells! Some DXers have never worked a Viking on CW, WK6H thinks that he has the correct approach: use Norse Code.— The intrusion watch is still reporting 400 to 800 intrusions per month. More and more are being verified by the FCC monitoring facilities. A letter was received in July 1989, from John R. Hudak, Chief Signal Analysis Branch of the FCC Field Operations Bureau. The letter file 1110 indicates that the matter of reported intrusions in the 20-meter band is being referred to the Honolulu office for monitoring and follow up. (July 1989) The last three intruders verified for me by FCC Livermore, CA, monitoring station on Nov 4, 1989, were as follows: Emission F1B, Bearing 11 deg., 1000 Hz shift, 2 channel, Russian 14,126.44/14,125.84—Emission F1B, Bearing 11 deg. 1,000 Hz shift, one channel, Russian, 14,141.095/14,140.0902 —Emission F1B, Bearing 316 deg. 525 Hz shift, one channel, Russian/Chinese, 14,224.51/14,225.032. These stations just like the Russian WOODPECKER are intruders in our exclusive 14,000-14,250 kHz Amateur Radio Service band. One group of Amateurs were receiving QRM from these stations made the comment that the interference must be a local noisy motor noise generator. This is just the tip of the ICEBERG folks! We need some action. The new US Air Force OTH-B Radar according to the LA Times Oct. 9, 1989 one page article on New Horizons in Radar will cover 5 to 28 MHz. This may get even with the Russian Woodpecker, but it may mean much, much more interference. These units are priced at 1/2 billion dollars each, one for the east coast, one for the mid-west, one for Alaska and one for CA-Oregon border. The So. Calif. DX Packet Cluster System is a great system. For more information, send an SASE to W6PQS or have your club rep to the LA Council pick up a few extra copies for your club. The WB6EXC San Fernando Valley frequency is 145.65 and W6PQS South Bay is 145.69. Orange County is NN6U on 145.68 and San Diego is N6ND on 144.36. Traffic: K6UYK 504, W6NKE 27 (Sep) W6NKE 21.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv Co, Bob K6LKN (714 686 3823). ASM Org Co, Ralph WB6JBI (714 776 9272). ASM SB Co, Ken WA6ZEF (714 983 1272). ACC Sandy, WA6WZN reports the following clubs have been declared ARRL affiliated: Autonetics RC, Mile High Mountain RC, Moreno Valley ARA. Welcome to the fold. Words of Wisdom. Got some input, want to contributed to your newsletter, find an article of interest to your club? Let your club editor hear from you. de WV6T. From C-CARS. If you think Novice Enhancement is a flop, tune to Novice SSB segment! 28300 to 28500 MHz as no code draws closer to reality, we need to get ready to bring on a new generation of hams. de WY7C. Morango ARC, Brian W6VBM, accepted vice president job. Lonnie, W6TBI will be on board of directors. Fullerton Rd, T-Hunt rpt K6DLQ/WB6RQT/WB6GCT 23.5 de KØOV. Fm the Corona/Norco ARC, by the time disaster strikes, it is too late to train or plan. The solution: every ham who expects to take part in the disaster should stand and be recognized now. He should be willing to attend classes, workshops and exercises to become familiar with local procedures and people. When that happens (6.9 quake), we'll need all the amateurs we can get. Stations independent of the local power, amateurs who can communicate in a disaster effectively, efficiently and cooperatively. de Barry, K6ACE. TC John, WA6BFH reports a busy month, he was project man for the Riv. Co. TRASH-BUSTER event communications resource. Good show. With tricky telephone RFI problem and requests for info on technical problems, John is busy. From SM: Congrats to the Western public system, the condor 220 system and many other groups that helped out with the inquiry traffic following the Bay Area quake. An effective job was done by all. NTS Info WF6O, quake traffic really kept NTS humming. Nice job by all. AD8A, WF6O, W6SX, KA6HJK, KA6TND. BPL WF6O. Tlc count WF6O 718, W6SX 165, AD8A 75, W6ZCE 68, W6OB 56, KA6TND 52, KA6EJK 48, K6DD 48, KA6GND 27, K6EIW 18, KD6GX 18, WA6OUK 10. Packet Racket. Mike KB6GVT was elected Pres. SCARS. This group coordinates B/B forwarding totals for quake inquiry traffic. KD7XG H/F gateway over 300, KB6GVT 150, KD6SQ over 200, N6KZB 22, NF6P 23, KA6JOB 19, N6KVB 9. Traffic was from south Calif to Bay Area.

SAN DIEGO: SM, Arthur R. Smith, W6INI—TC: N6JZE. SEC: W6INI. STM: N6GW. PIO: N6PKY. The Southwestern Div Con for 1990 will be held in San Diego Aug 24-26. If you are not a member of your local radio club, you are missing out on a vital aspect of Amateur Radio. Here is a continuation of the listing of the San Diego Section clubs, meeting date/time, name, location, contact info. 2nd Thur/1930, Imperial Valley ARA, Imperial Valley Airport Conf Rm, KL7SV 352-1950. 3rd Tue/1930, ARS (PARS), Fire Station, Community Rd at Civic Center Dr, N6QEB 566-7146. 3rd Thu/1930, San Diego ARC, Skyline Wesleyan Church Rm 222, 1345 Skyline Dr. Lemon Grove. 3rd Thu/1930, San Diego Repeater Assn (SANDRA), K6GAO 755-5507. 3rd Thur/noon, Cubic ARS, WA6GAH 697-1849. 4th Mon/1930, Escondido ARS (EARS), SDG & E, 750 Citracado Pky, Escondido, N6KVP 744-1266. 4th Wed/1830, San Diego DX Club, Hindquarter Restaurant, 7040 Miramar Rd, SD, W6YA 753-8900. Various dates: Quarter Century Wireless Assn (QCWA), W6INI 273- 1120; Point Loma

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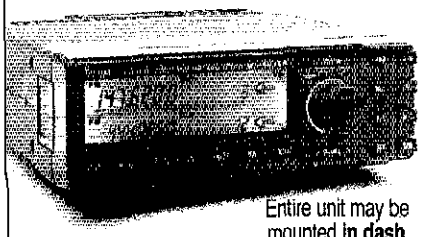
Control head is installed directly to the interface unit, making one compact unit.



Entire unit may be mounted **in dash.**

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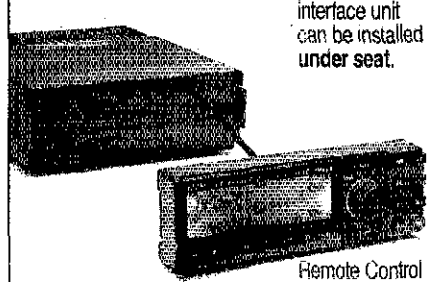
Dual band and interface unit can be installed **under seat.**



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TECH TALK from ICOM

ICOM's New IC-R9000: The SWL's Winning Edge – Part II

Last month's Tech Talk highlighted the fascinating world of shortwave monitoring and overviewed ICOM's exciting new IC-R9000 receiver. This month, we continue that discussion with a closer look at the IC-R9000's extraordinary sensitivity and selectivity enhancing designs. We will also discuss its video and computer interfacing features and review its closest equivalents, ICOM's IC-R71A HF receiver and IC-R7000 VHF/UHF receiver. ICOM is confident you will find these views informative and quite beneficial for selecting a communications receiver best suited to your particular needs.

Two very important factors influencing any receiver's performance are its weak signal sensitivity and adjacent channel selectivity, and the IC-R9000 is a leader in both of those categories. Its RF or "front end" circuits, for example, incorporate high quality FET's in HF stages and GaAsFET's in VHF/UHF stages. They are configured in balanced circuit designs to minimize noise and intermod, and to make weak signals stand out in an easy-to-copy manner. Operation of these stages is further enhanced by eleven RF bandpass filters and a Direct Digital Synthesized VFO/mixer injection signal. The superiority of DDS, incidentally, was highlighted in another recent Tech Talk. The combined operation of our previously discussed circuits delivers amazing performance and reliability in the industry-pacing manner synonymous with the ICOM name. Those designs, however, only begin the IC-R9000's story.

In addition to extensive RF or "front end" bandpass filtering, the IC-R9000 also includes an elaborate array of steep-skirted filters in IF stages. These factory-installed filters have bandwidths of 2.6kHz, 2.4 kHz and 500Hz for SSB, CW and FSK; 15.0, 6.0 and 2.6kHz for AM; 30, 15 and 6kHz for NBFM and 150kHz for WBFM. They slice out interfering signals on nearby frequencies like a knife! Since the IC-R9000's circuits are dedicated to reception rather than transmission and reception like a transceiver, some of its IF filters are also cascaded to achieve ultimate strong signal rejection at the "bottom part" of the 60 to 100db points in a bandpass curve.

Since the IC-R9000 fits a wide variety of special requirements for radio amateurs and professional monitoring systems alike, several types of video interfaces are included in its designs. First, the CRT output from its built-in five inch screen can be connected to an external monitor for large screen display of all operating parameters. This arrangement produces an impressive "mission control" setup that must be seen in operation to be fully appreciated. It is terrific! The IC-R9000 also incorporates a unique 10.7MHz video IF and detector section with its own rear panel output that can be cabled to an external video monitor. The previously discussed narrowband IF filters, incidentally, are bypassed for TV reception, thus assuring high video resolution. Finally, the video output from an external RTTY or Packet system can be connected to the IC-R9000 for direct readout on its five-inch CRT. The screen's lower area is used for this display. Its function of printed mode readout or other lower area displays like the spectrum scope, memory contents and notes readout, etc. is selected by "F" keys at the bottom of the CRT's bezel.

ICOM's IC-R9000 is also easily interfaced with any RS-232-equipped computer system, and delivers unlimited operation in a quite professional manner. ICOM's optional CI-V level converter, the CT-17, allows true RS-232 control of the IC-R9000. It is also possible to control other ICOM CI-V interfaced products with the same computer through the jacks on the CT-17.

The IC-R9000 may be combined with a CT-16 for amateur satellite communications. The CT-16 allows the IC-R9000 to control a VHF or UHF transceiver's transmit frequency; when the IC-R9000 is tuned, the matching VHF or UHF radio moves in frequency an equal amount on the amateur satellite transponder input. To use the CT-16 with the IC-R9000 you first locate your transmit signal on the down-link from the satellite and then activate the CT-16. With the CT-16 activated your VHF or UHF transceiver will track the IC-R9000 receiver as it is tuned. Your transmitter frequency will always be on frequency and ready to go as you change your receive frequency on the satellite down-link.

While ICOM's new IC-R9000 obviously stands alone as today's most innovative communications receiver with full coverage from 100kHz to 1999.8MHz, ICOM's outstanding IC-R71A and high performance IC-R7000 reflect similar design philosophy.

The IC-R71A, for example, covers 100kHz to 30MHz with amazing sensitivity, selectivity and intermod immunity. It features high stability, 32 memories, multiple scan modes, passband tuning, a tunable IF notch, superb noise blanking and much more. Its optional RC-11 remote control also operates the IC-R71A from across-the-room desk or easychair. If your interest is confined to HF, ICOM's IC-R71A is tops.

ICOM's IC-R7000 covers the upper frequency range of 25 to 2000MHz in a deluxe all-mode manner. ICOM's world-famous designs, innovative circuitry and incredible reliability plus 99 memories, scanning and a host of additional features are included in the IC-R7000.

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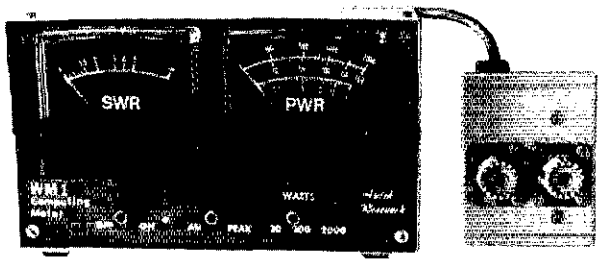

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SANTA BARBARA: SM, Thomas I. Geiger, W2KVA— ACC: KB5AH. ASMs: N. Vtra-N6MA, S. Vntra-W8AKF. PIO-N4SEQ. BM-N6TNG. STM-N6WP. OOC-W8AKF. TC-W6KFV. SEC-WB6IIY. DECs: Vntra-WB6RVA. S.Sbar-KA6KGF. N.Sbar-KI6XG. SLO-WB6IIY. The big news in October was, of course, the shaker that hit the SF Bay area. Unfortunately electronics failed us this time, and all the reports are not ready for this column. We'll carry the story next month - with a (hopefully complete) list of all who contributed their time and effort to help. The October traffic report also was lost and will appear next month. In the mean time, thanks to all of you who helped with 'Quake traffic and/or stood by to help in other ways. The November issue of QST carried the full Field Day results, and SBAR FD teams again scored major successes. K6CAB, the Conejo Valley ARC scored an impressive 23,685 in 17A Battery to place second overall in the nation. In the 4A category, the Santa Barbara ARC, K6TZ, placed second of fifteen in 6 land and seventh in category while the Poinsettia ARC, N6SR, placed fourth of fifteen. In the hotly contested 3A group Paso Robles ARC, W6LKF, was fifth of thirty one W6s. The biggest entry and hottest competition is always in 2A where the Satellite ARC, W6AB, scored third among forty seven W6s and the brand new Santa Maria Amateur Radio Telegraphy and Telephony Club (whew), WA6VNO, scored a creditable thirteenth in their first ever effort. The Santa Ynez Valley Hams, N6JNS, came in thirty fourth in that category. Finally, among the non-club entries KJ6LG, with N6AZD, scored first in California in the 2B/2 operator category, despite being off the air for the first 4 hours with a broken generator. All reports are that everyone had a grand time in America's oldest ham tradition, and many are already planning for next year. Speaking of contests, by the time you read this our own W7CB, W6OUL and W6MSG will have returned from another super CQWW/CW effort-this time from 4U1ITU in Geneva. Last time out they, and the other members of the multi-multi team, shattered the contest record from KP2A, and we expect great things from them again. I hope to give you the full story when they return. Those of you who have never tried contesting should give it a shot some time. Even low key efforts can be great fun, and the DX variety is a wonderful way to bring up your DXCC totals. The ARRL DX contests should be just around the corner by the time this column is published, so get in there and have a ball. I've gotten several letters from hams who are EXTREMELY upset with the Board of Directors decisions regarding no code licensing. It is inevitable that we sometimes face decisions that are controversial, and that the choices we make are not always the popular ones, but I'm certain that every Director voted his conscience and tried to do what he thought was best for ham radio. (Any of you who want to know my opinion are welcome to ask, but I will not use this column to editorialize!) Whether you favor no-code, or oppose it, be sure you make your feelings known to the FCC when the time comes. Remember that the ARRL proposal is only one of many, and that the final decision is still with the Commission. October testing successes-SMRA (ARRL)-To Extra: KI6QR. To General: KC6EKV, WA7WDN, Lee Edwards (Camarillo - Unlicensed). To Technician: KC6EEF, KC6EEG, KB6YOP, KC6FZQ, KC6FTA. Examiners: N6SH, WS2V, W6POE, WD6BAM, W5MUL, WR2S, K6VK, AA6BD, KI6YX, WA6JXG, WB6CNO, KA6KTU. Non-VE Assistants: Laura Schroeder, Margaret Myers, KA6WZR. Congratulations to those who upgraded, and thanks to all those dedicated VEs and assistants. 73 for now.

WEST GULF DIVISION

NORTH TEXAS: SM, Dan Dansby, W5UFI—ASMs: W5GPO, K5MXQ, W5IWE, KG5SC. STM: W5VMP. ACC: KA1CWM. SEC: N0AJP. TC: K5SXK. PIO: K5HGL. BM: W5QXK. Congratulations to Wendy Fisel, KB5DVF, on being elected Net Manager of the 7290 kHz Traffic Net. Kudos to Henry, W5YQZ, the retiring Net Manager for his OUTSTANDING leadership. George, K5MXQ, is stepping down from coordinating tfc & bulletin operations because of health reasons, but will remain as an ASM in another area. Thanks, George for all the help. ARES Net to start at beginning of year on 7273 kHz, 8:30 to 9:30 AM local time, 7 days a week per K5PG. We now have four Special Service Clubs in Section and one filing for SSC. Kudos to Don Thomas, KA1CWM, for his fine job as ACC and Ed of Section News. CAND Oct 666 in 31 sessions, DRN5 represented 100% NTX stations KA5AZK, KD5RC, W5YQZ, KF5BL, W5VMP & K5UPN. Traffic: K5UPN 2-541- 533-6 = 1082; KF5BL 217-92-386-8 = 603; W5TNT 25-317-252-8 = 602, N5PGZ 178; N5KCL 139; KC5NG 132; N5NZH 103, KB5BNU 64, KB5JNM 52, WB5CPY 45, WA5EZT 33, KB5ADE 22, AC5Z 21, W5VMP 12. 7290 Tfc Net reported 3390 QNI & 321 QTC in 49 sessions, 2 NTS liaisons per session.

OKLAHOMA: SM, Joe Lynch, N6CL— This month I regret to announce the untimely passing of Robert Quigley, KB5RS. Texoma Hamarama was its usual success. The ARRL Forum was especially enlightening and well attended. The antenna seminars were very informative. As usual, the banquet and QCWA breakfast both experienced a good participation. The weather cooperated so that the flea market was especially successful. Several OK hams are reporting very good DX on VHF. During a three day period in September, K5SW reported working 90 different grid squares on two, followed by several South American contacts on six the following days. W5NZS reported working 9H1 and CT1 on six. Through hard work by the Enid ARC the Enid City Council defeated a proposed very restrictive antenna ordinance. Many OK hams participated in H&W traffic for the San Francisco earthquake. Your SM would like to hear from you if you want to see your name in this column. All it takes is a postcard. Best wishes for the holiday season and New Year. 73 for now. Traffic: WA5EQW 543, KF5RD 151, N5IKN 107, K5CXP 58, WA5OUV 52, WA5OGC 31, WA5ZOO 27, K5GBN 18.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR— PIO: WA5UZB. TC: NZ5U. SEC: K5DG. STM: WD5GKH. BM: WA5WCY. ACC: WB5YDD. OOC: K5SBU. SGL: K5KJN. ASM: all of above plus N5TC. "THE BEXAR WIRE," San Antonio ARC, rprts Texas Hams can now have same call sign plates on more than one vehicle; rprts upgrades KB5KER to Extra, N5MVR to Advanced, KB5JGG to General, KB5YHA and KB5HYV to Technician, and one unlicensed to Novice; great going, gang. "BARN," Beaumont ARC bulletin, rprts N5BZM working on juvenile rehab project using Amateur Radio as incentive. OBS

TOUGH ENOUGH FOR THE FAST LANE

"Here's one for your record books..."

After a fun-filled day of water skiing in Mission Bay, Bob Carlson, NØAOT, of San Diego, California, hooked his 20 foot ski boat to his truck and headed home.

Forgetting that he had placed his IC-2SAT on the seat cushion of his boat, he and his two sons left the marina. Eight miles later on Highway 52 a gust of wind blew the seat cushion out of his boat and into traffic. Catching a glimpse of the cushion flying out of his boat in the mirror, Carlson tried to pull over in heavy traffic. It was a quarter of a mile before he could pull off safely. When he finally stopped, he trekked back to retrieve the boat cushion.

What he found instead was his new IC-2SAT! "I was horrified to see it laying in the highway. The radio was bent and beaten badly, the battery pack had come off and was laying nearby. It may even have been run over." Grabbing the pieces up quickly, Carlson walked back to his truck. "Just out of curiosity I put the battery pack back on. Amazingly it worked! I couldn't believe it, my mini-handheld had survived being blown out of a boat at 60MPH onto a busy freeway, and still worked!"

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Bob Carlson

Bob Carlson, NØAOT

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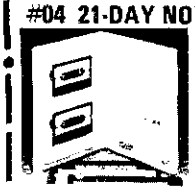

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W5KLV rprts 15 bulletins, 5 propagation fcsts given 37 readings on 7 nets in October. EC N5KAO, rprts quality turnout for BSA JOTA. Central Texas Traffic Net Mgr rprts 120 msgs passed in 60 October sessions; NTS liaison at least 2 per session; also rprts NZ5J, KY9V, N5LJF, N5NAV conducting traffic handling classes on the net. EC KG5LN rprts HARS set up communication trailer at "County Fair on the Square" in downtown Huntsville; received good publicity for Amateur Radio. DRN5 NM WB5YDD rprts 577 msgs passed in 62 October sessions; STX represented 100% by W5KLV, W5CTZ, WB5HZQ, KE5ZV, N5NAV, WV5X, KD5KQ, N5ILI, N5DFO, WB5YDD. OOC K5SBU rprts KC5TK, KB5UE, W3KO, WD5BRN, K9MBB are certified members of the Amateur Auxiliary. WA2VJL, San rprts passing earthquake traffic; also rprts demonstrating Amateur Radio, including packet, to Texas Gulf Coast Emergency Management Assn; N5LNS assisted in both affairs. 7290 Traffic Net Secretary NF5T rprts 321 msgs passed in 49 October sessions; 3390 check-ins; NTS liaison 2 per session; NM W5YQZ, N5AF, Sam Houston ARK, rprts KB5HRK, KB5JAO, KB5KMJ upgraded to General; KB5JFL, KB5JRV upgraded to Technician; one unlicensed passed Tech exam; great work and congratulations all around. Houston ECHO Society newsletter rprts PREGNANCY PROMENADE had about 300 walkers, no casualties; N5NXS, N5LGS and two daughters, N5EJX, KA5RIZ provided communication. CLARC CHRONICLE, Clear Lake City ARC, rprts upgrades KE5DQ, K5PEV, KA5JYN to Extra; KB5HFK to General; KB5KMC, KA5UKV, WD5GUL, KA5AUN, KB5ICW to Technician; one unlicensed to Technician; more good work; congratulations to all. "SCRAMBLED SCRIBBLINS," bulletin of the Ham 'N Eggs Society," La Grange, celebrated its 4th anniversary; happy anniversary! PIA KA5EEQ rprts KG5YA is new call for ex-KB5HOE, KB5XG is new call for W5JBL. PIA KG5HQ, Houston, rprts upgrades K4HMS to Extra, KB5KPG Novice to Advanced, N5JEG to Advanced, N5OHN to General and one unlicensed to Technician. OOC K5SBU doing good job of recruiting with his visits and special programs for clubs as far away as San Antonio. Traffic: WA2VJL 280, N4NAV 246, WB5YDD 224, WB5J 217, W5CTZ 122, WD5GKH 79, N5ILI 77, NZ5J 43, N5KAO 21, W5BGE 15, W5KLV 11.

WEST TEXAS: SM, Milly Wise, W5OVH—ASM: KA5PTG. ASM: WF5E. ASM: AI5S. ASM: WD5EFT. ASM: N5DO. BM: W5CBT. AEC: W5MVJ. PIO: KE5ZW. ACC: K5IS. OOC: K5KNC. TC: K5CU. H.D. Burton, W5VRE advised that the Taylor County ARES members operating from the Boy Scout Jamboree did a fine job during the SET. The top the the Panhandle ARC is a 100% Special Service Club. Congrats to Jerome Doerrie, K5IS, and all the members. Wish to express thanks to all Amateur Radio operators who handled traffic during Hurricane Hugo and after the earthquake in California. Recent Novice classes in Lubbock turned our 3 new Novices, Larry Master, Jim Carnes, Rickey Roy...after the earthquake in CA, the ARC West Texas hams of Odessa were asked by the Red Cross to pass traffic for local area residents concerning Health and Welfare. A two meter dispatch was set up from Red Cross and manned by KB5EOF, NG5R, KE5BQ, KF5LZ, N5ETX two dozen messages plus disaster welfare inquiries were passed to KF5NI who passed traffic on the numerous HF emergency nets. The San Angelo ARC members should be very proud that they achieved a seventh place ranking nationally, and won second place in the fifth call area and were first in Texas, in the Field Day results and competition with 8,582 points. Another club in West Texas achieved high ranking as the Big Bend ARC had 6,024 points which gave them 33rd in the nation. Seventh in the fifth call area and fourth in Texas. Keep up the good work for West Texas. It takes a combined effort of many persons to make a success of any activity and those who are responsible for the good hamfests at El Paso, Odessa, San Angelo, Amarillo and Lubbock in the last three months really outdid themselves. Big Spring ARC Clubhouse had a facelift in Oct. with the help of N5INC, JL, KB5ECU, JC KB5ECT, and KA5AAR, and many others. Ham of the month for Big Spring ARC in Oct. was KB5DRZ. 73. SM Milly, W5OVH. Traffic: AE5I 210, K5KKO 44, WB5OXE 36.

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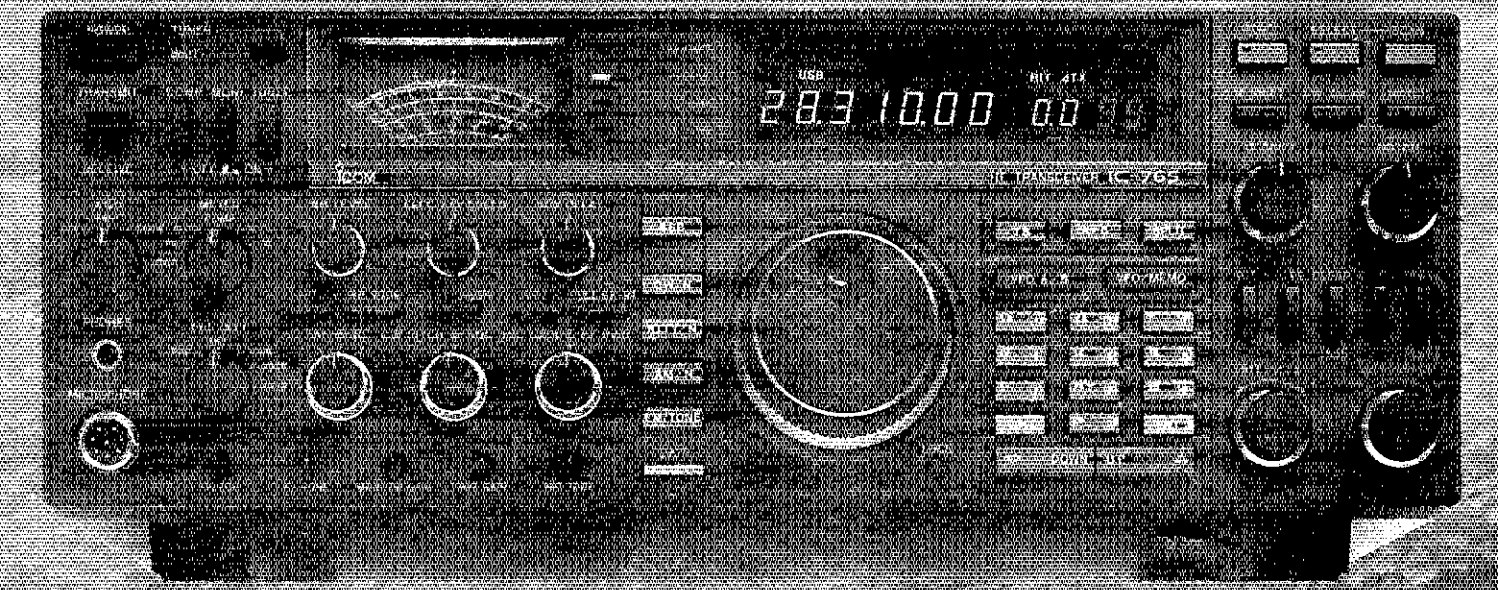

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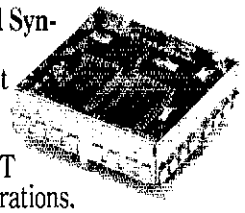

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- KWM-380 to HF-380 Conversion Kits. Includes A3 Lowpass Filter, Oscillator/Oven, "060" ROM & "HF-380" Emblem, plus instructions. $500
- SM-281 Desk Mike $59; MM-280 Mobile Mike $35; AC-2830 Headset $ 45
- KWM380 Control Interface. Curt's is the original, not a substitute $ 75
- KWM380 Speech Processor, factory sealed, AC-3802 $250
- 380Filter New Prices: 140Hz-$199; 360Hz-$149; 1.7KHz-$139; 6 KHz-$99

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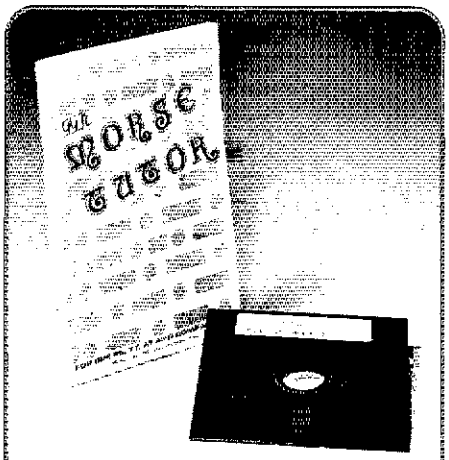

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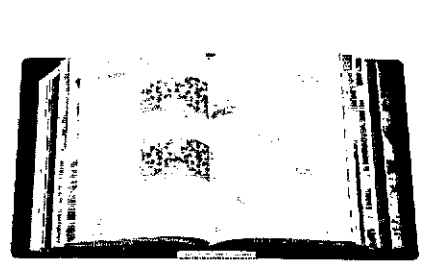

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DR-57OT



The ALINCO Model DR-57OT is a dual band transceiver offering big value in a small package. The independent main band and sub-band operation permits full duplex operation. The front panel is easy to read and understand. The LCD display lets the operator know at a glance which functions are in operation. The built-in duplexer has a single antenna output for a dual band antenna. ALINCO has listened to the consumer and in response has created the versatile DR-57OT which is truly user-friendly with minimal effort.

- *ULTRA-COMPACT BODY*
  5 7/8" (W) x 2" (H) x 8 1/2" (D)
- *HIGH POWER*
  45 watts on 2M and 35 watts on 70 cm. Approximately 5 watts low power.
- *EXTENDED RECEIVER RANGE*
  (130-169.995 MHz) on 2M, 144-147.995 MHz transmit. 440-449.995 MHz on 70 cm. (transmit and receive)
  (Specifications guaranteed on amateur bands only. Modifiable for MARS/CAP permits required)
- *SIMULTANEOUS*
  Receiving on both bands at the same time
  Scanning: intermix scan modes on both bands at the same time
- *INDEPENDENT*
  The volume, squelch and control dial are independently adjustable on both bands. You can store the following information on both bands at the same time. Priority function, choice of 37 encoding/decoding sub-tone frequencies,call channel, scan function (program, memory channel, VFO or unique open channel scan), memory skip, bell function, + or - repeater shift.

FULL FEATURES

- *FULL DUPLEX CROSS BAND OPERATION*
  Transmit on one band while receiving on the other band -- telephone style.
- *AUTOMATIC BAND EXCHANGE (A.B.X.)*
  When in the ABX function is active, an incoming signal on the sub-band will activate an automatic exchange between the main band and the sub-band.
- *PRIORITY*
  The VFO frequency is monitored for 5 seconds and then shifts for one second to the selected priority channel (In both bands at the same time).
- *DUAL SPLIT SHIFT OPERATION*
  Operates odd offset operation
- *BELL FUNCTION*
- *REPEATER REVERSE FUNCTION*
- *CALL CHANNEL FUNCTION*
- *BEEP FUNCTION*
- *20 MEMORIES (10 FOR EACH BAND)*
  Each memory channel can store frequency, repeater offset, encode/decode frequency.
- *4 SCANNING MODES*
  Program scan, memory scan, band scan and unique open channel scan (opposite to normal busy scan). Scan stops on a busy (or open channel) channel andthen resumes approximately 5 seconds after stopping even if the signal is still present.
- *REPEATER OPERATION*
  The DR-57OT can be used as a cross band repeater.

EASY TO OPERATE FUNCTION

- *LARGE AMBER MULTI-FUNCTION LCD DISPLAY*
  Visible in all conditions, it indicates main and sub-band frequencies, frequency step, "on air", "call", "CTCSS", "PRI", "REV", "-", "+", "*", "T" (tone), tone frequency, "MUTE", "LOCK", "ABX", "♪", "BUSY", "F", "S/RF meter", "REV"
- *MHz FUNCTION FOR BOTH BANDS*
  One MHz is increased or decreased per touch
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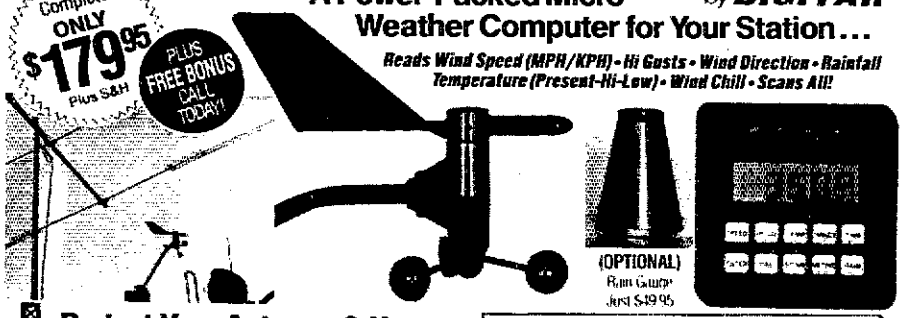

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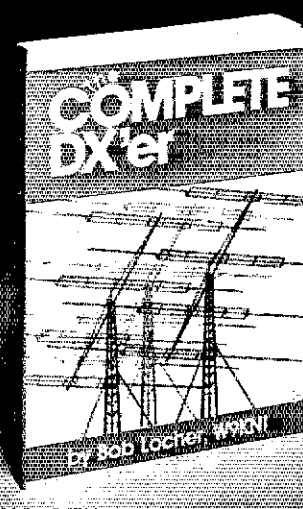

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This is the sixth and final ham radio adventure by Walker Tompkins (the real K6ATX) who became a silent key just before the book was published. 194 pages, $5.00*

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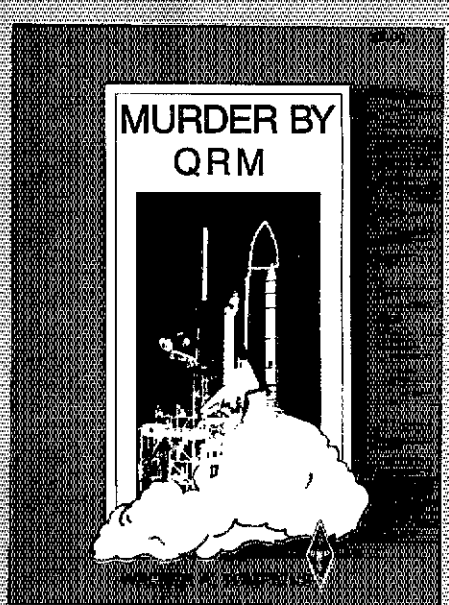
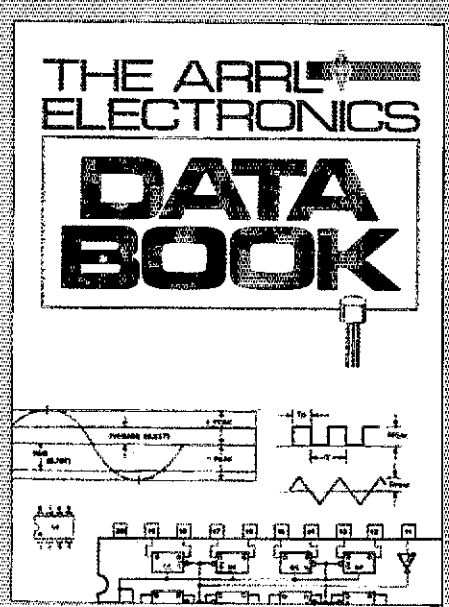
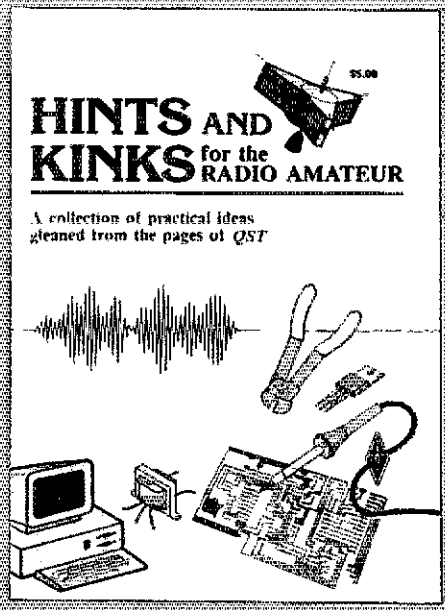


The ARRL Data Book is back by popular demand! Doug DeMaw, W1FB has completely revised and expanded the material in this handy reference for the RF design engineer, technician, radio amateur, and experimenter. This *one* source has all of those regularly used tables, charts, and those hard-to-remember formulas. You'll also find hundreds of popular circuit diagrams of oscillators, mixers, amplifiers, other active devices and their operating



parameters. This book can be used alone or to complement **The ARRL Handbook** and belongs in every technical library. Here's a brief summary and chapter lineup: **Symbols, Conversion Factors and Tables; Components and Materials** includes color codes, standard values, toroid selection charts; **Inductors and Transformers; Time and Frequency Measurement; Networks and Filters** covers attenuators and matching network design information; **Digital Basics** is 88 pages of logic, TTL Circuits, specific device descriptions, linear ICs, op-amp applications, and regulators; **Antennas and Transmission Lines; Catalog of Circuit Building Blocks** including audio amps, RF and IF small-signal amplifiers, mixers, FM detectors, oscillators, dc switches and amps, and frequency doublers; **Workshop and Lab Practices**. 234 pages, $12.00*



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Here's just a sample: **In and Around the Station:** A Universal Equipment Stand, Safe Power Wiring Practices, Stop the Fire, Not Your Gear. **Transmitting and Receiving:** A Two-Transistor Transmitter for 30 Meters, Improvements for the HW-8, FT101ZD, TS830S, SB200, and SB220. **CW Hints:** Magnetic Switch for CW Tune Up, The Sneaky Knee Key for Mobile CW. **Computers and Digital Modes:** A Message-Waiting Indicator for TNCs, Tips for the VIC 20, TRS80 and Apple II. **Antennas and Feedlines:** Inexpensive 30 and 12-Meter Arrays, Retuning Traps for the WARC Bands, Baluns, Tower and Rotator tips. **Shop Secrets:** Tips on soldering and making PC Boards and more! **Tips on Testing:** Simple Logic Probe, plus 11 pages of test equipment and tips. **Portable and Mobile:** Power supplies, antennas, mobile installation tips. **VHF and UHF:** Antennas, amplifiers, CTCSS Tone Generator and more. **Power Supplies:** Power Supplies from Old Battery Chargers, High-Voltage Supply for Mobile Amplifiers. **Taming Interference:** Telephone RFI, TVI, CATVI cures. **Miscellanea:** COR and Timer Circuit, World-Time-Finder Slide Rule, AFSK System for FAX and more. 160 pages, $5.00*

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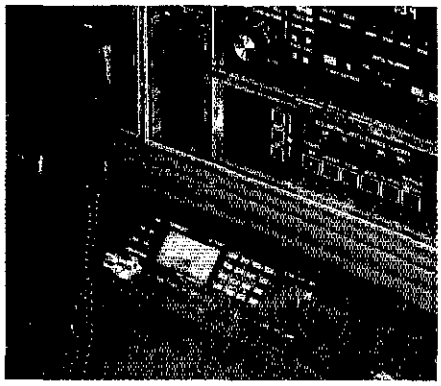

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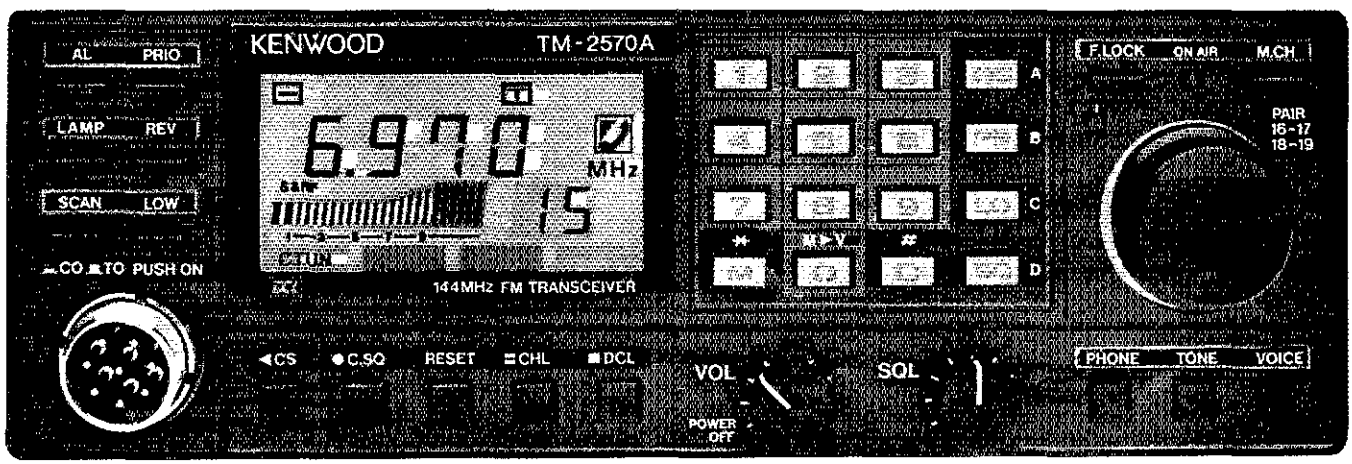

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A/3530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
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- **MC-43S** UP/DWN mic.
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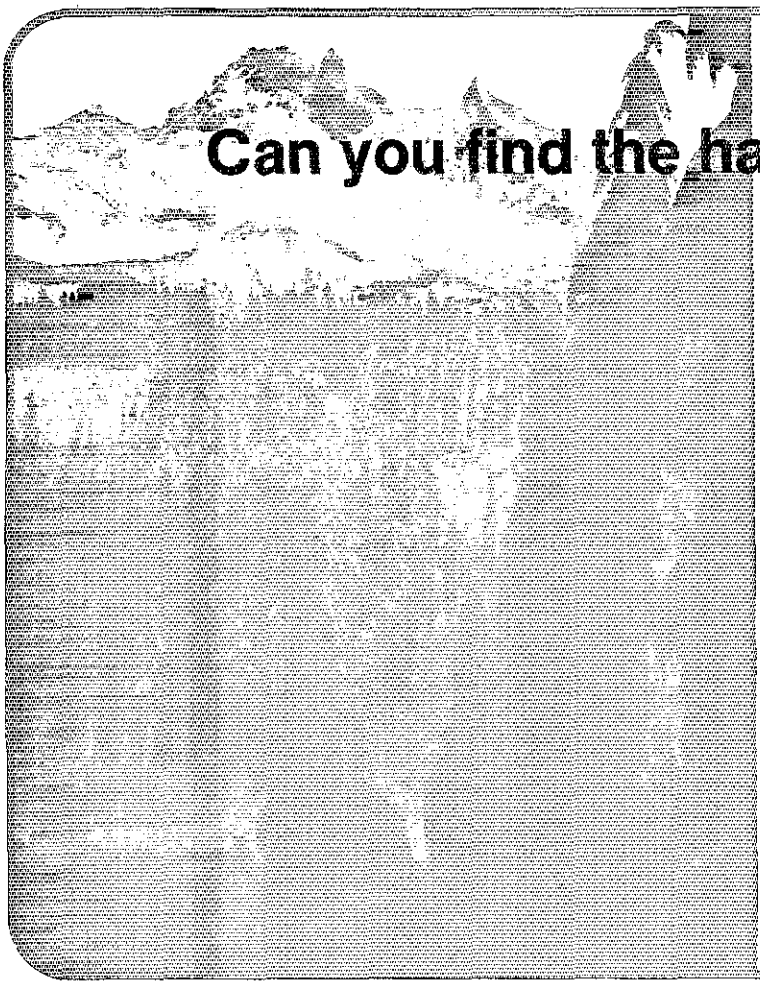

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"Heavy morning ground fog. Increasing clouds and lower temperatures. Lows of 20 to 25 Fahrenheit in the Cascades with accumulations of 5 to 6 inches new snow possible tonight." But Marc Lawrence couldn't hear the weather forecast that night. He was lying with a broken leg, up 3500 feet in the rugged Cascade range. His only means of communications were his broken ham radio transceiver and a VHF hand-held radio that was useless because of the terrain.

The night before, he had talked by ham radio to Kim, a high school senior and he had made plans to talk again to her the following night. When Kim didn't hear Marc, she became concerned — a concern that would eventually lead to the invclvement of the Oregon Mounted Posse, Oregon National Guard, Jeep Patrol, Explorers, Marion County Sheriff's Department and the Amateur Radio Emergency Service in one of the largest rescue operations ever seen in the Northwest.

Night Signals was written by Cynthia Wall, KA7ITT, in the tradition of the Tommy Rockford ham radio adventure series. $5.00 plus postage and handling (see the ARRL Bookshelf elsewhere in this issue for ordering information.)

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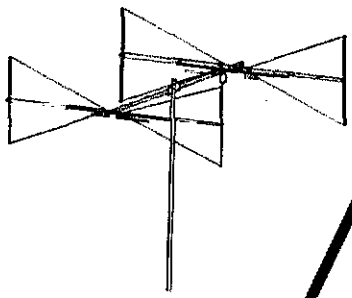

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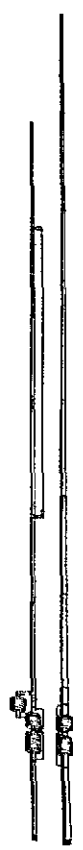

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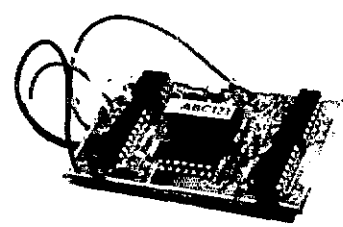

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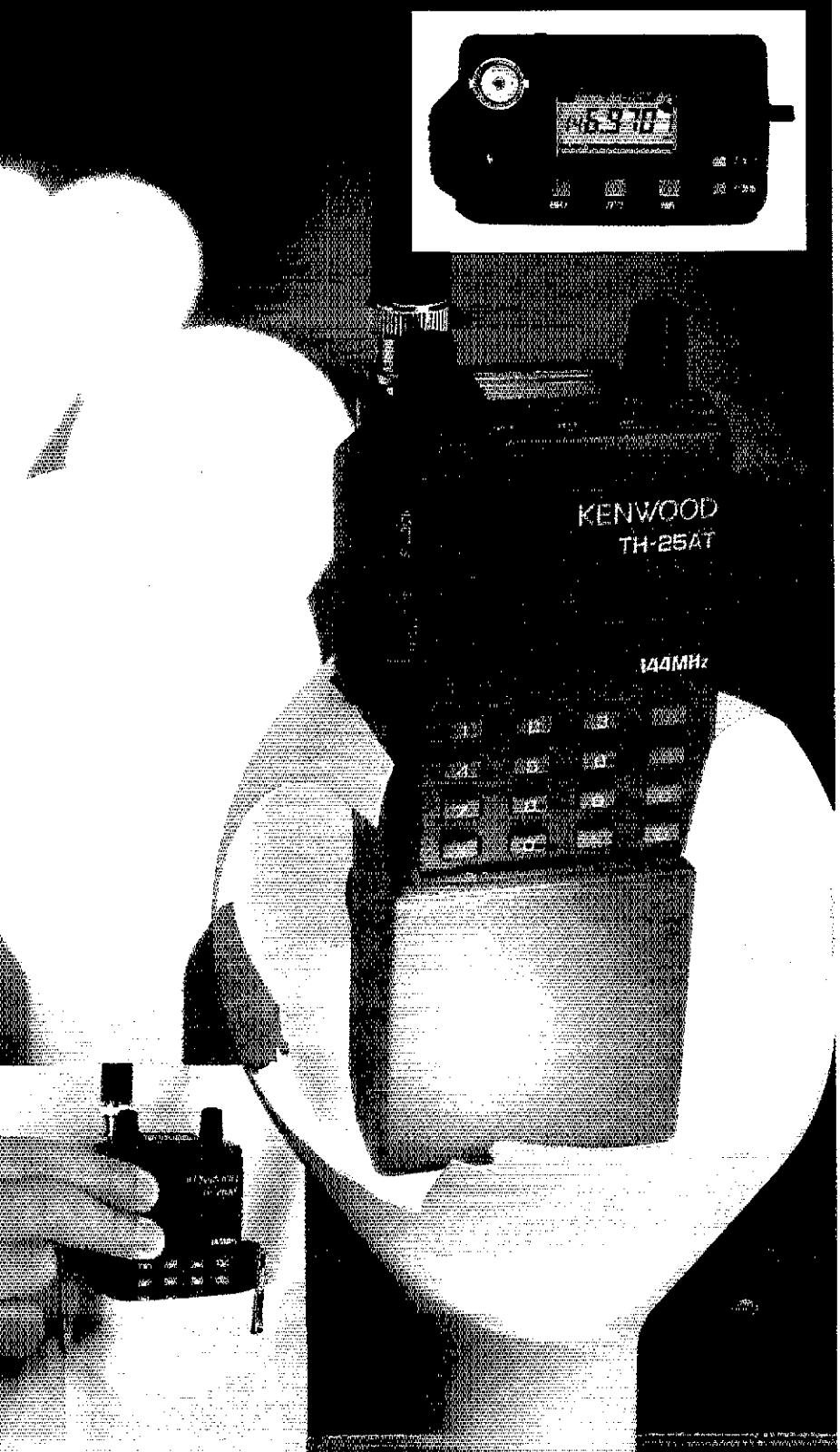

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- CTCSS encoder /decoder optional (TSU-6).
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• PB-5 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6** 7.2 V, 600 mAh NiCd pack • **PB-7** 7.2 V, 1100 mAh NiCd pack • **PB-8** 12 V, 600 mAh NiCd for 5 W output • **PB-9** 7.2 V, 600 mAh NiCd with built-in charger • **BC-10** Compact charger • **BC-11** Rapid charger • **BT-6** AAA battery case • **DC-1/PG-2V** DC adapter • **HMC-2** Headset with VOX and PTT • **SC-14, 15, 16** Soft cases • **SMC-30/31** Speaker mics. • **TSU-6** CTCSS decode unit • **WR-1** Water resistant bag

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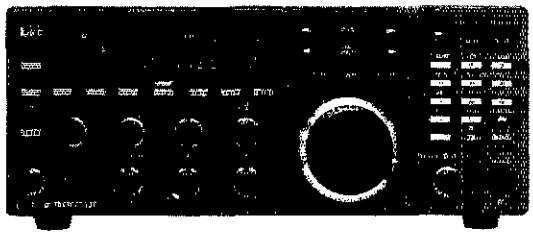
JST-135



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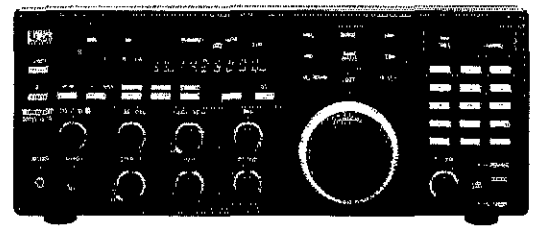
Receiving frequency range	100kHz – 30MHz
Type of emission	SSB(LSB/USB), CW AME, FM, AFSK
Frequency stability	Within ±10ppm 5 to 60 min. and within ±2ppm one hour after powered on
Power Output	150W
Dimensions	330W × 130(142)H × 280(391)Dmm
Weight	Approx. 8.5kg

JRC HF GENERAL COVERAGE COMMUNICATIONS RECEIVER
NRD-525



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Receiving frequency range	0.09 – 34MHz 34 – 60MHz(*) 114 – 174MHz(*) 423 – 456MHz(*)
Receiving mode	RTTY, CW, SSB(USB/LSB) AM, FM, FAX
Channel memory	200 channels
NOTES	*With option mounted
Dimensions	330(W) × 130(H) × 280(D) (excluding projected parts)
Weight	Approx. 8.5kg

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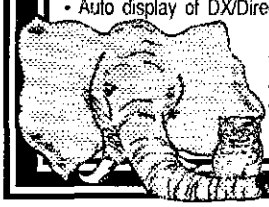

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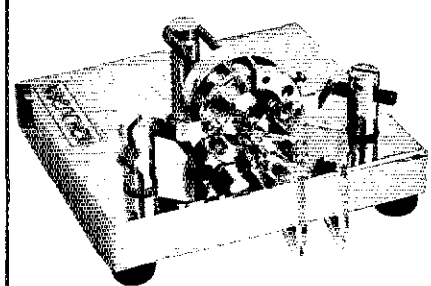

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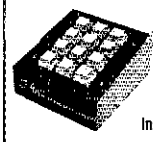

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- **Dual Watch allows reception of two bands at the same time.**
- **Automatic mode and automatic repeater offset selection.**
- **Direct keyboard frequency entry.**
- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split."
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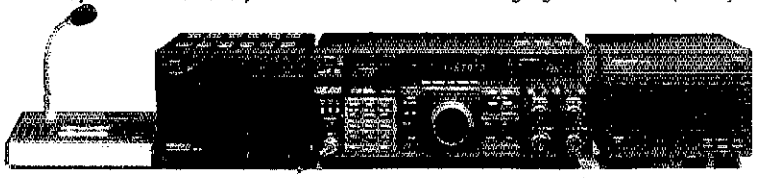
- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.
- **Multiple scanning functions.** Memory channel lock-out is also provided.
- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**
- **500 Hz CW filter built-in.**
- **Packet radio connector.**
- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.
- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.
- **Voice synthesizer option.**
- **Computer control option.**

Optional Accessories:
• **PS-31** Power supply • **SP-31** External speaker • **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit • **TSU-5** Programmable CTCSS decoder • **IF-232C** Computer interface • **MC-60A/MC-80/MC-85** Desk mics • **HS-5/HS-6** Headphones • **MC-43S** Hand mic • **PG-2S** Extra DC cable



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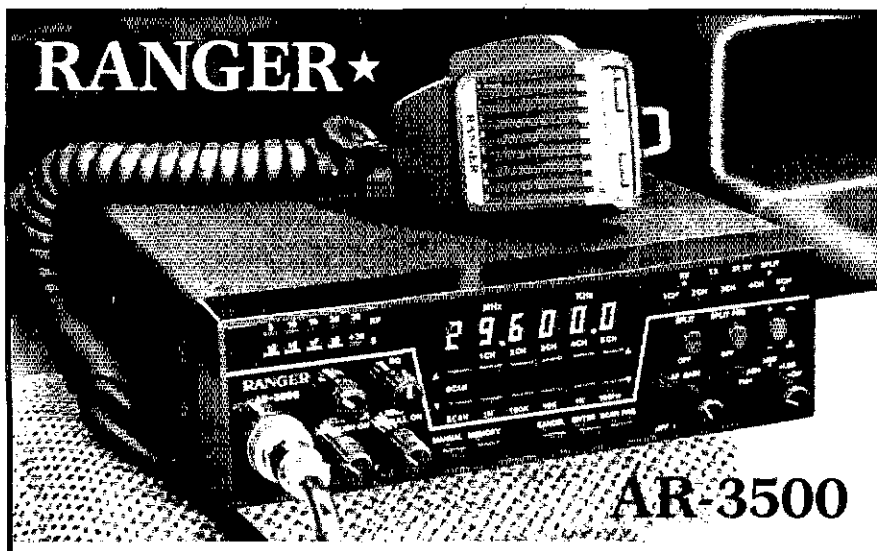

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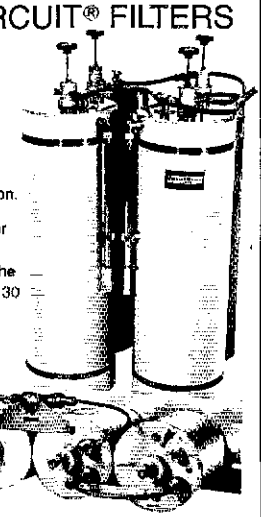

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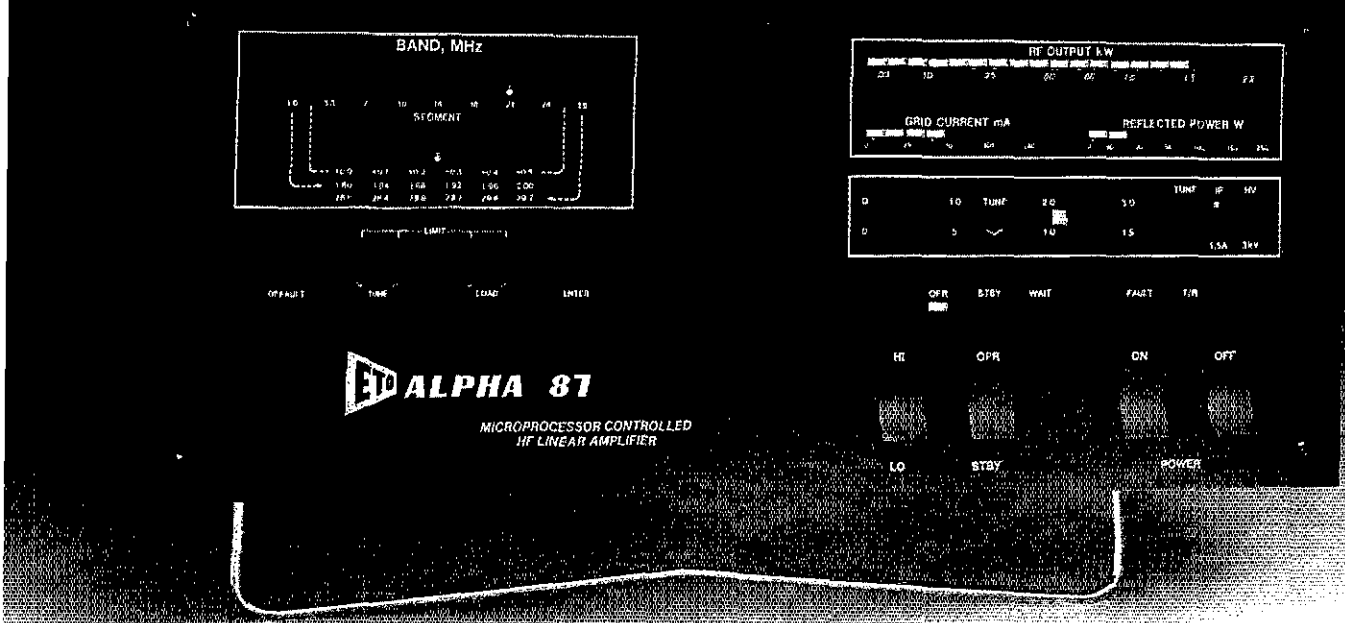

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Many of the nifty features made possible by digital technology are included. Dual VFO's with A-B-split select, the frequency stability of a PLL, 25 tuneable memories, VFO to MEM, MEM to VFO and the SCRATCHPAD feature. RS-232 interface is standard and includes remote band switching for the HERCULES II amplifier. The memories are nonvolatile RAM and are retained until you change them. The status registers and clock are backed with a lithium battery (2 year life) so that when the rig is powered up, the status is the same as when you turned it off.

The OMNI V operates USB, LSB, fast or slow QSK CW and real FSK. FM is optional. All bands from 160 through 10 meters are push button selectable. Each band position covers 500 kHz plus 30 kHz over-shoot at the band edges. The four 500 kHz segments of the 10 meter band are switched automatically as you tune through the segment limits. Tuning is in your choice of 10 Hz or 50 Hz increments on SSB, CW and FSK. With the FM option, tuning is in 100 Hz or 500 Hz increments. Up/Down buttons tune in 10 kHz or 50 kHz increments.

An auxiliary frequency tuning system is available and plugs into the rear panel. This allows you to remotely tune the frequency from the most convenient and comfortable position. It takes about 10 ms to fall in love with this option.

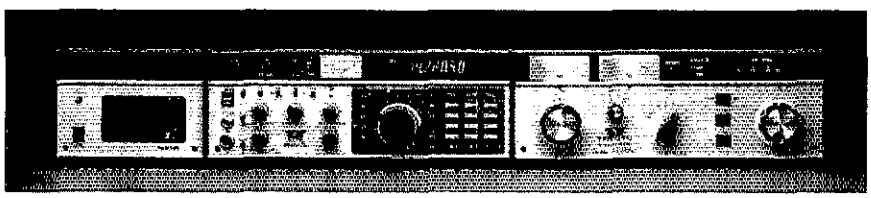
A noise blanker and audio speech processor are standard equipment as is the cw sidetone and speech monitor. The rear panel has a full complement of inputs, outputs and controls for the convenience of the all-mode operator, including an auxiliary RX antenna input. High speed key lines are provided for QSK control of a fast switching amplifier, such as the TITAN or HERCULES II. Changeover in fast QSK is less than 30 ms, great for CW and the digital modes.

The front panel is spacious and friendly. The vacuum fluorescent display uses large, bright, easy to read elements. The frequency display doubles as the 24 hour clock display when the CLOCK button is pressed. Other elements indicate VFO status and warn when the memories are full.

All four of the 6.3 MHz I-F crystal filter positions are push-button selectable, independent of mode. A second filter socket is also provided, in series, behind the standard 2.4 kHz filter in the 9 MHz I-F. This may be used for an optional 2.4 kHz, 1.8 kHz, 500 Hz or 250 Hz filter which is selected with the "NARROW" button. This adds six or eight poles into the crystal filter network and even further reduces the impact of adjacent strong signals. Most impressive!

If you do not need a general coverage receiver in your HF rig, the elegant OMNI V is a great choice. If you are also a serious DX-er and/or contester, the OMNI V is the best choice.

The OMNI V Station with Model 961 Matching Power Supply, and the Mighty Titan Amplifier.



GENERAL SPECIFICATIONS

Frequency Range: Transmit and receive on all ham bands from 160 through 10 meters in their entirety. Twelve 500 kHz segments plus 30 kHz over-shoot at the upper and lower edges of the segments.

Frequency Control: LO generated from a crystal oscillator mixed with a low noise 5.0 - 5.5 MHz phase locked loop.

Frequency Stability: Worst case, 1 PPM per degree C at 29.999 MHz.

Frequency Accuracy: +-100 Hz @ 25 degrees C.

Antenna Impedance: 50 Ohms, unbalanced.

Printed Circuit Boards: G-10 epoxy glass.

Power Required: Receive = 1.5 A. Transmit = 20 A. 12-14 Vdc.

Dimensions: HWD 5¾" x 14¾" x 17". 14.6 x 27.3 x 43.2 cm.

Net Weight: 16 lbs. 7.25 kg.

TRANSMITTER

Modes: USB and LSB (J3E), CW (A1A), FSK (F1A). Optional FM (F3E).

DC Power Input: 200 watts maximum.

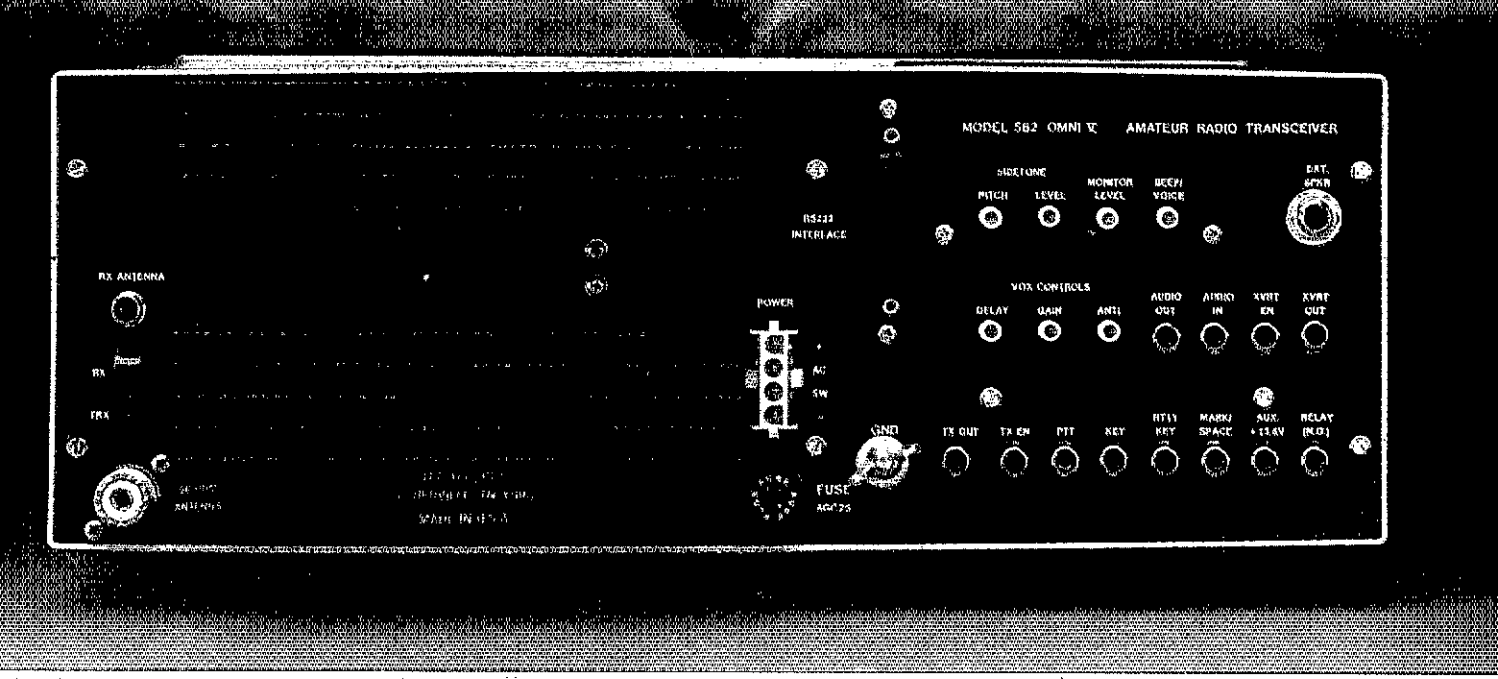
RF Power Output: ALC stabilized, adjustable from 20 watts to 100 watts (50 Ohm load) with front panel RF OUT control.

Microphone Impedance: 200 Ohms to 50k Ohms. Bias voltage for electret mic is provided in front panel connector.

CW Sidetone: Internally generated with rear panel level and tone adjustments, independent of front panel audio level control.

SSB Generation: 9 MHz, 8 pole crystal ladder filter, balanced modulator.

Carrier Suppression: Greater than 60 dB.



Impressive from either end... but it's how we make ends meet that really delivers the difference.

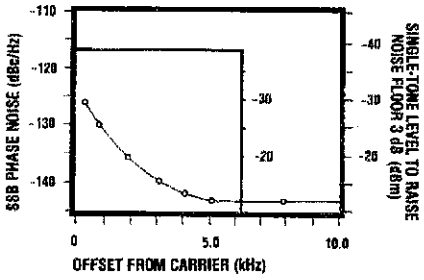
Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.
Harmonic Emissions: Greater than 45 dB below peak power output.
Third Order Intermod Products: -30 dB from two tone at 100 watts PEP.
Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.
CW Offset: 600 Hz.
FSK Shift: 170 Hz.

RECEIVER
Modes: LSB, USB, CW and FSK. FM with optional board.
Sensitivity: .15 uV for 10 dB signal to noise ratio at 1.8 kHz bandwidth. With FM option, .3 uV for 12 dB SINAD at 15 kHz bandwidth.
Selectivity:

	-6 dB BW	-60 dB	Shape Factor
Standard 2.4 kHz	2.4 kHz	3.36 kHz	1.87:1
Opt. 1.8 kHz	1.8 kHz	2.90 kHz	1.60:1
Opt. 500 Hz	500 Hz	1.40 kHz	2.80:1
Opt. 250 Hz	250 Hz	.85 kHz	3.40:1
Opt. FM	15 kHz	30.00 kHz	2.00:1

Attenuator: -20 dB.
I-F Frequencies: 1st I-F 9 MHz, passband tuning I-F 6.3 MHz.
Image Rejection: ►100 dB.
I-F Rejection: ►60 dB average.
Noise Blanker: Switchable on/off with width adjustment.
Dynamic Range: 97 dB, measured with standard 2.4 kHz filter at 20 kHz spacing. 100 dB + with cw filters.
Third Order Intercept: + 10 dBm.
Noise Floor: -133 dBm @ 2.4 kHz bandwidth.
Squelch Sensitivity: Less than .6 uV.
Receiver Recovery Time: Less than 30 ms.
Pass Band Tuning I-F Shift: + -2.3 kHz.
Audio Output: Speaker, 1.5 watts @ 8 Ohms. Fixed level 1 mw @ 600 Ohms.
Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.
Audio Bandpass Filter: 4 pole, variable center frequency 220 Hz to 1.7 kHz, 35% band width @ -6 dB.
Tone Control: Variable 15 dB roll-off @ 5 kHz.

PHASE NOISE PERFORMANCE OF THE OMNI V
-127 dBc/Hz @ 250 Hz offset from carrier.
-146 dBc/Hz @ 5 kHz offset from carrier.



Here is a graph of the phase noise performance of the OMNI V receiver. These measurements can only be made under laboratory conditions and, even then, our test equipment is at the limit of its ability to measure the noise at the narrow offsets. The significant measurements are those close-in. Note that this graph does not even go out to 25 kHz offset where many of the published measurements are made. Certainly, we invite comparison.

A WORD ABOUT COST
The OMNI V and the Paragon are the same price. Our 12 band crystal mixed oscillator is the same cost to manufacture as our general coverage synthesized oscillator. The choice between these two transceivers is based on general coverage vs. the best possible receiver performance in the ham bands.

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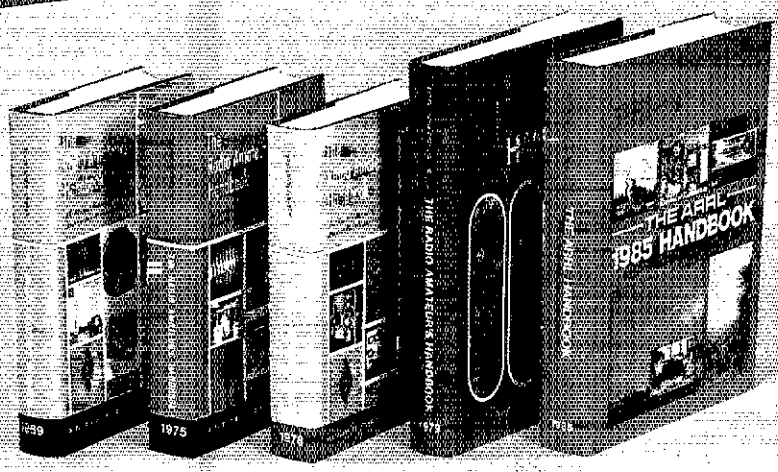
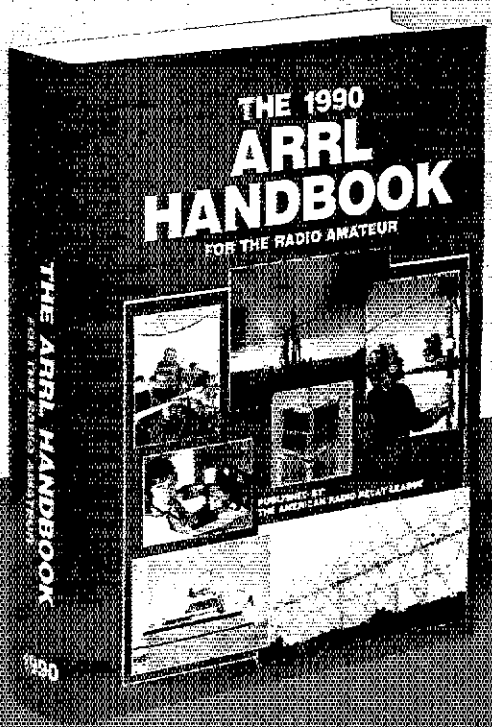




INTRODUCING THE GREAT...

If you bought one of the **Handbooks** pictured above, you're not alone. These represent over 485,000 of the 5.6 million copies of the **Handbook** purchased since 1926! ARRL's premier publication is successful because it is updated every year. The new sixty-seventh edition is no exception. With over 1200 pages and over 2100 tables, figures and charts, **the 1990 ARRL Handbook for the Radio Amateur is better than ever!**

Every ham is interested in antennas, and we've added a host of new antenna projects including three high-performance Yagis for 144, 220 and 432 MHz designed by Steve Powlishen, K1FO. Dick Jansson, WD4FAB, has completely revised the space communications chapter, which includes his innovative helical array for AO-13 Mode L.

But that's not all. You'll find many other popular construction projects that can be built in a weekend, such as power supplies, keyers, measuring devices, QRP transmitters and VHF/UHF preamps. For the more ambitious builder, there are projects like a high-performance communications receiver, high-power HF and VHF amplifiers, a 1296-MHz transverter or digital audio memory keyer.

The **Handbook** has always been famous as a reference for component data. You will find an entire chapter devoted to everything from tube and transistor specifications to aluminum tubing sizes. Also featured is the most up-to-date information on digital techniques and operating practices.

At $23, the **Handbook** remains an exceptional value for a hardcover technical publication. For shipping and handling in the US, please add $3.50 ($4.50 for UPS), elsewhere add $5 for shipping by surface mail. Save on shipping charges by visiting your favorite ARRL dealer!

Here is a description of what is covered in the **Handbook**:

The first five introductory chapters cover basics of Amateur Radio, electrical fundamentals, radio design technique and language, solid state fundamentals and vacuum tube principles. Next are 12 chapters devoted primarily to these topics, power supplies, audio and video, digital basics, modulation and demodulation, RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another four chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in two chapters. The construction and maintenance section offers 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll also find up-to-date component data that the **Handbook** is famous for. The final five chapters cover obtaining your license, station design and operation, interference, monitoring and direction finding. An abbreviations list and huge index make up balance of the book.

The American Radio Relay League, Inc, 225 Main St, Newington, CT 06111 USA

X SERIES

BASE/REPEATER ANTENNAS

X-600MA Dual-Band 2m 3-5/8λ elements, 70cm 8-5/8λ elements ●Power rating: 200W ●Weight: 5lbs ●Length: 205in. ●Wind rating: 90MPH ●Connector: UHF

X-500A Dual-Band 2m 3-5/8λ elements, 70cm 8-5/8λ elements ●Power rating: 200W ●Weight: 5lbs ●Length: 205in. ●Wind rating: 90MPH ●Connector: N

X-300A Dual-Band 2m 2-5/8λ elements, 70cm 5-5/8λ elements ●Power rating: 200W ●Weight: 3.3lbs ●Length: 114in. ●Wind rating: 112.5MPH ●Connector: UHF

X-200A Dual-Band 2m 2-5/8λ elements, 70cm 5-5/8λ elements ●Power rating: 200W ●Weight: 4lbs ●Length: 88in. ●Wind rating: 90MPH ●Connector: UHF

X-50A Dual-Band 2m 3/4λ, 70cm 3-5/8λ elements ●Power rating: 200W ●Weight: 3lbs ●Length: 87in ●Wind rating: 135MPH ●Connector: UHF

DIAMOND ANTENNA

F SERIES

F-22A 2m 2-7/8λ elements ●Power rating: 200W ●Weight: 5lbs ●Length: 126in. ●Wind rating: 90MPH ●Connector: UHF

F-23A 2m 3-5/8λ elements ●Power rating: 200W ●Weight: 8lbs ●Length: 178in ●Wind rating: 90MPH ●Connector: UHF

NR SERIES

DUAL-BAND MOBILE ANTENNAS

NR-770HA 2m 1/2λ, 70cm 2-5/8λ elements ●Power rating: 200W ●Length: 90in.

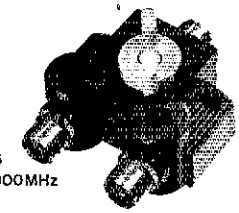
NR-770RA 2m 1/2λ, 70cm 2-5/8λ elements ●Power rating: 200W ●Length: 98in.

NR-790A 2m 3/4λ, 70cm 3-5/8λ elements ●Power rating: 200W ●Length: 87in.

NR-770SA 2m 1/4λ, 70cm 1/2λ elements ●Power rating: 200W ●Length: 69in.

CX SERIES

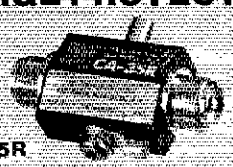
COAXIAL SWITCHES



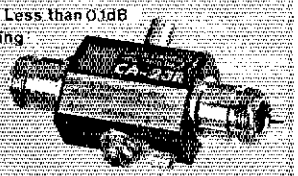
CX-210A
Wideband coaxial switch with UHF connectors
- ●Frequency range: DC-1000MHz
- ●Impedance: 50ohms
- ●Max. power rating: 1.5KW

CX-210N
Wideband coaxial switch with N connectors
- ●Frequency range: DC-3000MHz
- ●Impedance: 50ohms
- ●Max. power rating: 1.5KW

SURGE PROTECTORS



CA-35R
Surge protector with UHF connectors
- ●Frequency range: DC-500MHz
- ●Impedance: 50ohms
- ●Insertion loss: Less than 0.1dB
- ●Max. power rating: 400W PEP



CA-23R
Surge protector with N connectors
- ●Frequency range: DC-1500MHz
- ●Impedance: 50ohms
- ●Insertion loss: Less than 0.1dB
- ●Max. power rating: 200W PEP

MX SERIES DUPLEXERS AND TRIPLEXERS



MX-72
Duplexer with UHF connectors for HF, 2m and 70cm bands
- ●Coaxial cable: RG58AU 35cm

MX-72H
Duplexer with UHF connectors for HF, 2m and 70cm bands
- ●Coaxial cable: 5D2VS 35cm

MX-72N
Duplexer with UHF connectors and N connector for HF, 2m and 70cm bands
- ●Coaxial cable: 5D2VS 35cm

MX-72D
Direct connection type Duplexer with UHF connectors for HF, 2m and 70cm bands
- ●Coaxial cable: None

DUMMY LOADS

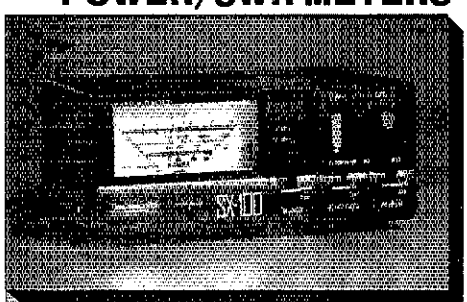


DL-30A
- ●Frequency range: DC-500MHz
- ●Power rating: 15W (average), 100W (peak)
- ●Impedance: 50ohms
- ●Input connector: UHF male



DL-30N
- ●Frequency range: DC-500MHz
- ●Power rating: 15W (average), 100W (peak)
- ●Impedance: 50ohms
- ●Input connector: N male

SX SERIES WIDEBAND POWER/SWR METERS



- ●Forward & Reflected power & SWR
- ●Selectable RMS or PEP switch
- ●3Power ranges: 5W, 20W, 200W 30W, 300W, 3KW (SX-100 only)
- ●Power meas. accuracy: 5% (typ.)
- ●Insertion loss: 0.2dB Max.
- ●Wideband performance

FIVE MODELS TO CHOOSE FROM

Model	Frequency
SX-100	1.8-60MHz
SX-200	1.8-200MHz
SX-400	140-525MHz
SX-600	Dual-Band 1.8-160 & 140-525MHz
SX-1000	4-Band 1.8-160, 430-450, 800-930, 1240-1300MHz

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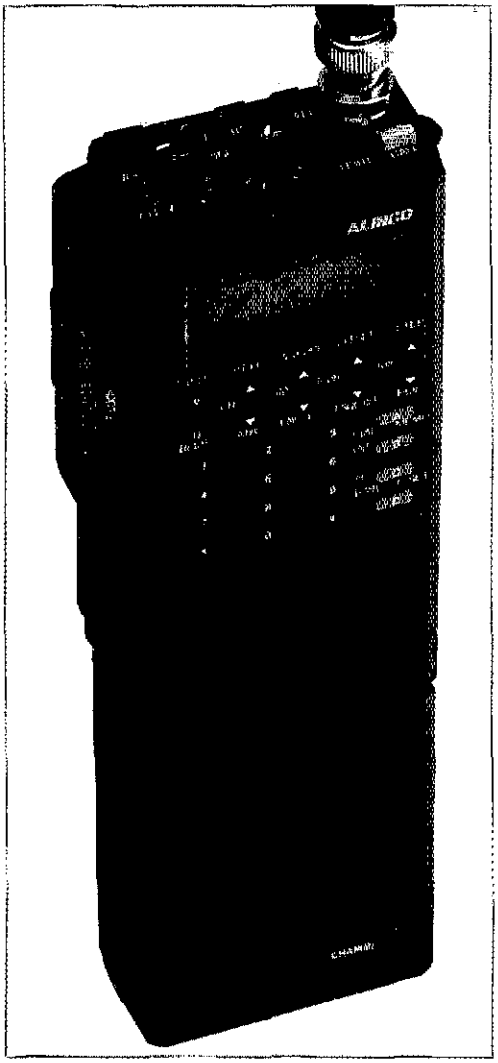

6 WATTS VHF
* 5 WATTS UHF
(* With Optional EBP-8NAZ or 13.8VDC input)

Engineered with the most advanced electronic technology, the Tiny, Tough and Terrific DJ-500T features two methods of Frequency Selection, Encode/Decode Subaudible Tones and a Single memory - 16 Digit Auto Dialer and the following plus:

- **144.00Mhz~147.995Mhz/440~450Mhz** (Frequency Coverage is Modifiable*)
- **Ultra Compact: 2 5/16" (W) x 7 1/2" (H) x 1 1/2" (D)**
- **Cross Band Full Duplex**
- **High Power Output: 2.5W (VHF) / 2.0W (UHF) with Standard Ni-Cd battery**
  6Watts (VHF) /5Watts (UHF) with Optional Battery*
- **Two methods of Frequency Selection**
  Direct keyboard entry and small, quick up and down adjustments.
- **Automatic Battery Save Function**
- **All Ni-Cd batteries have unique DC/DC converter for 13.8VDC input**
- **Programmable Odd Offsets**

- 20 Memory Channels (10 each band)
- Illuminated LCD
- Multiple Battery Options
- Function Lock
- 10 db RF Attenuator
- Unique Priority Function
- CAP and MARS modifiable (Permit required)

2-Year Limited Factory Warranty

DJ-100T
2m FM Transceiver
- 3 Watts/Standard
- 6.5 Watts/Optional

DJ-200T
220Mhz FM Transceiver
- 2.5 Watts/Standard
- 5 Watts/Optional

- LCD read out
- 10 Memories
- Dipswitch Programmable Subaudible Tone built-in
- MARS and CAP modifiable (DJ - 100T) (Certificate required)



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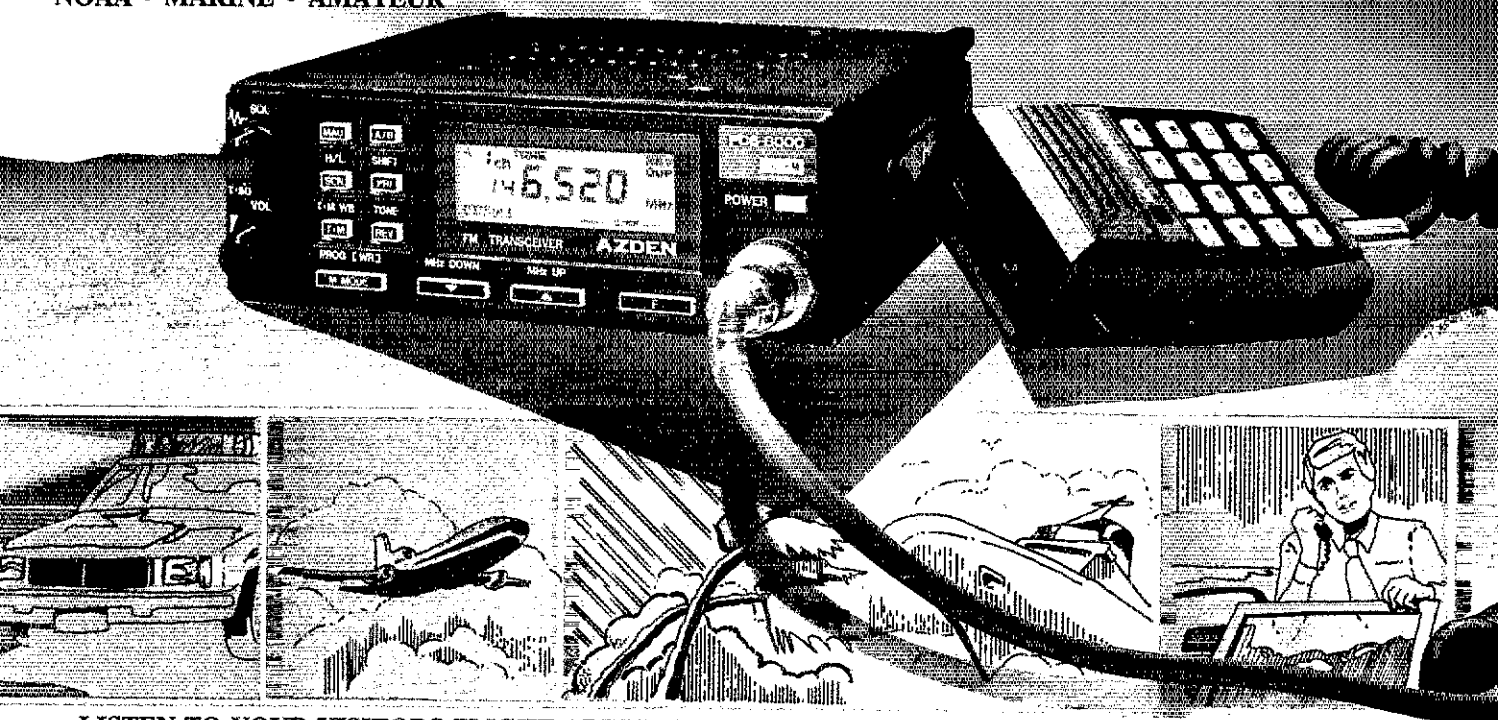

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MODELS: PCS-6000H 50 WATTS!! ***Also coming soon PCS-6200 220MHZ, PCS-6300 70CM and PC-10 10 Meter FM Handheld.*** **CMOS AND ADVANCED SURFACE MOUNT TECHNOLOGY PROVIDE UNPRECEDENTED COMMERCIAL QUALITY AND RELIABILITY.**

UNPRECEDENTED WIDE REQUENCY COVERAGE: The PCS-6000 receives 118.00 to 135.995 MHZ AM Aircraft/136-173.995 MHZ FM and transmits 140.100 to 150.000 MHZ. Modifiable to ALL MARS and CAP frequencies (proof of authorization/license required)

TINY SIZE: Only 2 inches high, 5½ inches wide and 7¼ inches deep!! Easily fits anywhere, even in the smallest car!

20 CHANNEL MEMORY IN TWO BANKS PLUS 1 TEMPORARY CHANNEL (TM): Two memory banks, A and B have 10 memory channels each. The memories store frequency, shift width, offset information, and PL tone frequency as programmed. *An extra memory channel (that we call TM-temporary memory) is provided to allow you to store any operating condition instantly again and again!!*

UP TO 21 NONSTANDARD SPLITS: Program any split in any channel.

VERSATILE SCANNING FUNCTIONS: Dual memory scan, programmable band scanning, hold scan and delay scan functions are provided, with selectable delay time. ALL memory channels are tunable independently.

PRIORITY CHANNEL MONITORING: Memory Channel B0(the first channel in memory bank B) is monitored every four seconds regardless of any operating condition. When a signal is received, a beep is heard.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PROGRAMMABLE FREQUENCY STEPS: In memory, frequency steps can be set at 5KHZ to 20KHZ in any increment.

BUILT-IN PROGRAMMABLE TONE ENCODER: 57 different tones are built in for instant programming of PL tones into memory channels and microcomputer. Tone frequency can be entered independently in RX and TX. A tone decoder is available as an option.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 5 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

FEATHER-TOUCH TUNING CONTROL KEYBOARD: The LED backlighted light touch keyboard performs all tuning operations simply by pushing the key(s) and key actuation is audibly verified.

LARGE LCD (LIQUID CRYSTAL DISPLAY): The LCD display shows the operating frequency, S/RF, memory channel in use and various other operating functions. The LCD is back-lighted by green LEDs, making it possible for you to read the display even in total darkness.

FULL 16 KEY TOUCHTONE PAD MICROPHONE: DTMF Microphone functions as auto-patch when transmitting.

DIGITAL S/RF METER: Shows incoming signal strength and relative transmitter power.

MICROPHONE CONTROLS: Up/Down memory and frequency control.

TRUE FM, NOT PHASE MODULATION: Unsurpassed intelligibility and audio fidelity. High/Low Power: 25W/45W or 5W/10W (6000/6000H). Output-Fully adjustable.

SUPERIOR RECEIVER: Sensitivity is better than 0.15 Microvolt for 20-DB quieting. Commercial-Grade design assures optimum dynamic range and noise suppression.

AUDIO OUTPUT: 2 Watts or more.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

OTHER FEATURES: Rugged dynamic touchtone DTMF microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.

WARRRANTY: 1 YEAR LIMITED.

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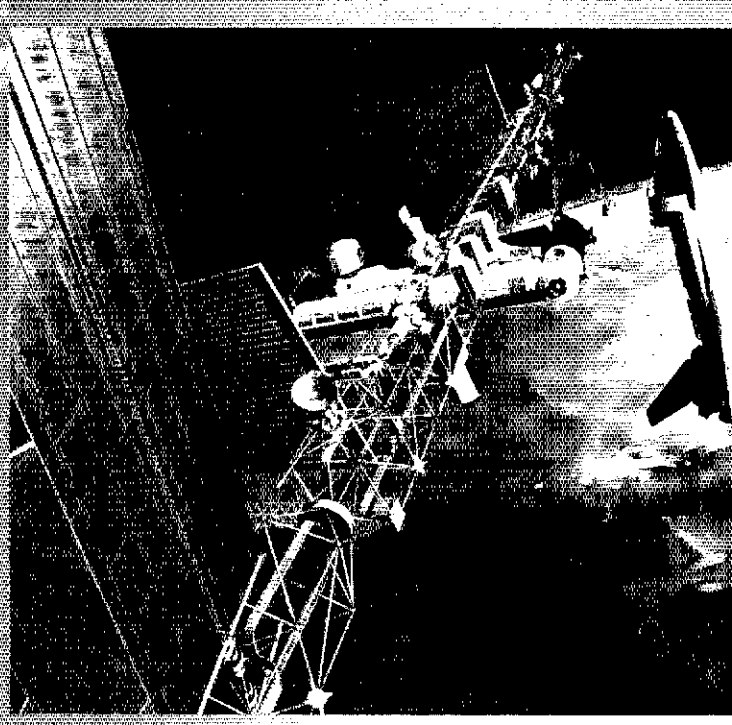

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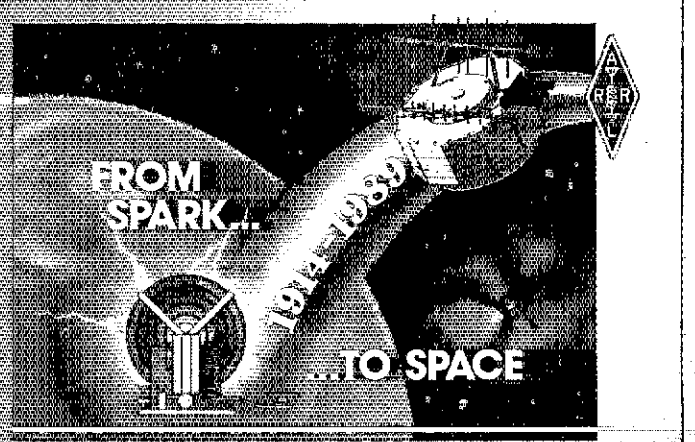

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The American Radio Relay League

225 Main St, Newington, CT 06111



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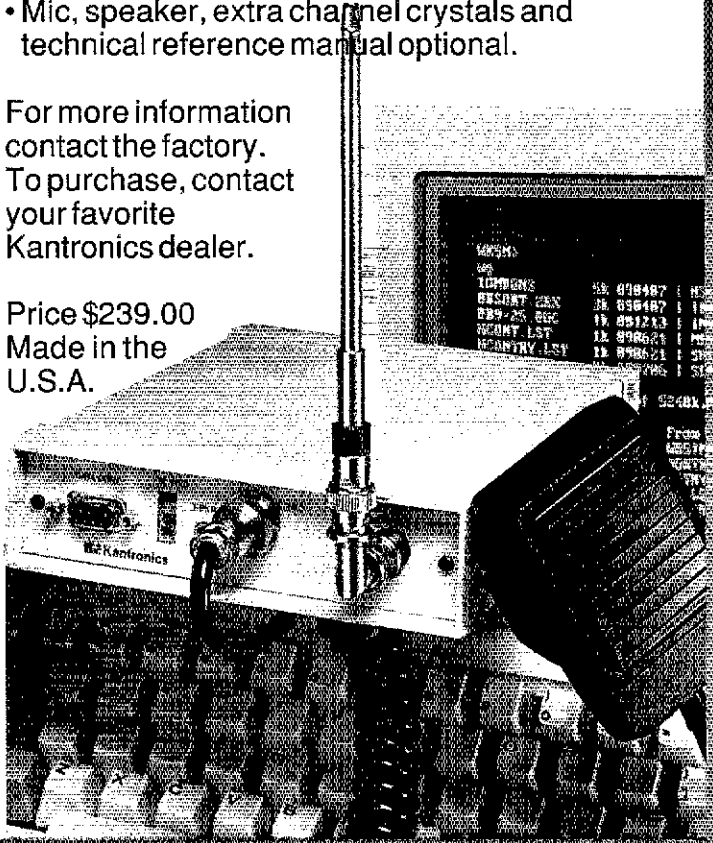

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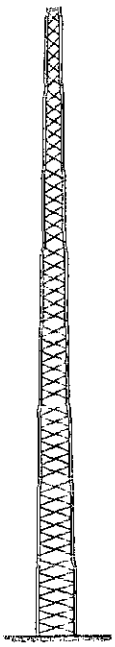

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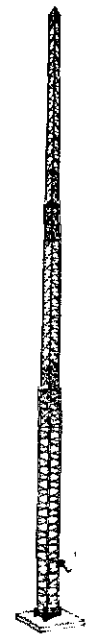

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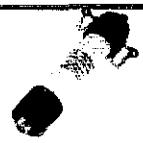
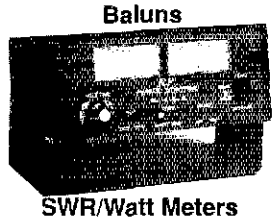


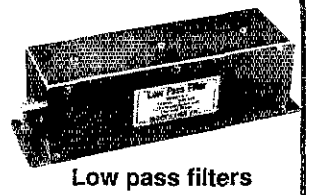
Baluns



Dummy loads



SWR/Watt Meters



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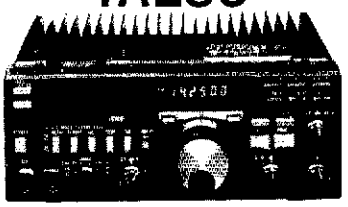

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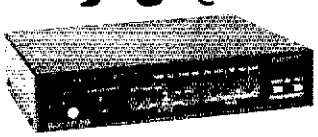

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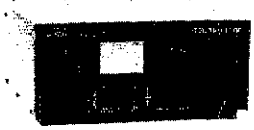

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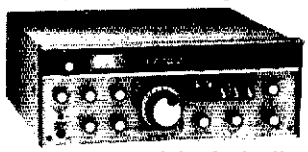

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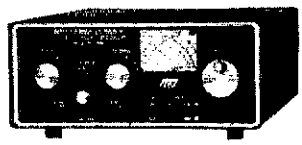

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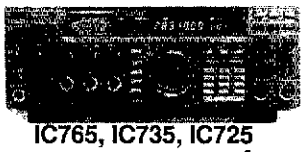
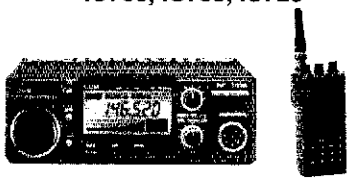


IC765, IC735, IC725



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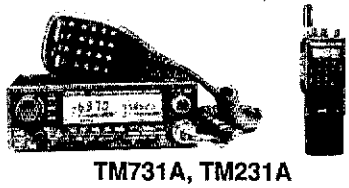

TM731A, TM231A
TH75A, TH215A, TH25AT

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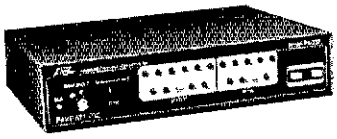
FT767GX, FT757GX/II



FT212RHT, FT470, FT411

AEA



PK-232MBX,PK-88

PACKET

KANTRONICS



KAM

MFJ



1270B, 1274, 1278

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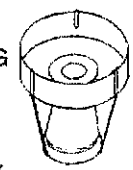

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Antenna Compendium Vol 2

Antennas continue to be a topic of great interest among radio amateurs. ARRL continues to receive many more papers than can possibly published as articles in QST. Once the first ***Antenna Compendium*** was published in 1985, we started a new collection of material. Six of the papers in this 208-page volume contain listings of BASIC programs suitable for use with an IBM PC or compatible computer. ARRL offers separate from the book, a 5¼-inch (360k) computer diskette which contains eleven BASIC programs in ASCII text format, and one compiled Pascal program.

Here's a list of topics: New design and construction data for verticals, steerable arrays for the low bands, steerable array of verticals, inverted bobtail curtain, a simple phased array feed system that works, theory of unipole antennas, low-profile paired verticals for HF, multiband loaded counterpoise for vertical antennas, multiband groundplane for HF, tunable vertical, ⅝-wave VHF antenna, experiments with HF and MF ⅝-wave antennas, new techniques for rotary beam construction, attic tri-bander, yagi pattern design factors, half-loop antennas, coil shortened quads (½-size example for 40-M), 14-30 MHz LPDA for limited space, antenna trap design using a home computer, suburban multibander, fat dipoles, swallow tail antenna tuner, coaxial resonator match, simple broadband 80-meter dipole using multiple coaxial stubs, J-pole antenna for ARES/RACES operation, portable 2-meter antenna, half-wave handle antenna for your hand-held, controlled current distribution antenna, end-coupled resonator (ECR) loop, balloons as antenna supports, kite supported long wires, computer-aided antenna selection guide, guide to antenna modeling, window slot antenna for apartment dwellers, polar pattern plotter for the C64, VHF Sniffer (absorptive wavemeter), additional aspects of the balun problem, servo-controlled antenna tuner, remotely controlled antenna coupler, phase-shift design of Pi, T and L Networks, sunspots, flares and HF propagation, and visible phenomena of the Ionosphere. Separately the book (#2545) is $12 and the diskette (#2626) is $10. Book and Diskette (#2863) available together for $18

Novice Notes: The Book

Here's just what the newly license ham ordered: A collection of popular articles from the popular "Novice Notes" series in QST. You'll find basic information on operating (getting on) and equipment and antennas (getting on and getting out). Find out what you should do before your license arrives; how to buy used gear; all about antenna tuners and antennas; logging and QSLing; awards chasing; tips on phone, cw and digital operating; believing in yourself — the "Can Do" attitude. This book is packed with practical information. #2561 $6 plus postage and handling.

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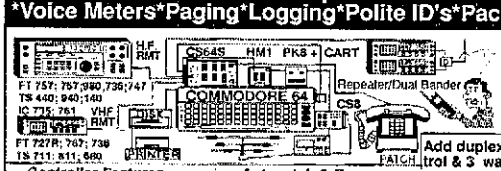
Engineering Consulting's computer controlled Ham Shack
See system variables, control & reprogram all via packet!
Ultra Comshack 64 Repeater Controller
HF & VHF Remote Base*Autopatch*CW Practice*Rotor Control
***Voice Meters*Paging*Logging*Polite ID's*Packet Voice B.B.S.**



Model CS64S $ 359.95
includes: Interface, disk, cables, Manual
Ultra Options

Controller Features
*Change variables remotely from touchtones or Packet
*Unlimited voice vocabulary!
*Alarm Clock, auto execute
*Individual 4 digit user codes
*Disk & Printer logging of users, tel #'s, lapsed time
*18 Rotating Polite ID's
*16 External relay controls
*2, 5, & CTCSS Tone Paging
*CW Practice with voice
*Security mode, T.tone mute
*Voice announces each user call sign when logging on

Autopatch & Reverse
*1000 (18 digit) tel #'s stored
*Quick dial & quick answer
*Directed, general page
*Selected restricted patch
*Telephone control input
Dual Combined Remotes
*18 Macro/Scan memories
*Scan up/down; 100Hz steps
*Monitor & lock modes
*Operate splits, combine HF & VHF radios as Dual VFO's
*Automatic mode selection
*Talking S Meter; Voltmeter
*Voice Beacon rotating msg

Add duplex tel. Remote Base control & 3 way patch..TLCN.. $159.95
External relays; 3 DPDT relays +5 Open Col. Trans. Sw...CS 8..$89.95
*Rotor control D.C. to digital display & Voice; for all rotors ...HM1...$59.95
*2 Voice Meters & 2 Alarm Inputs; 8 Relay On/Off Control..PK8.$159.95
*Reprogram & Control via Packet; Packet to Voice B B S ..PK1....$89.95
*EPROM Autoboot CART....$109.95
*C64 & 1541 12V.Switching supply crystal controlled ...DCPS...$129.95
*Digital Voice Rec/PB 32 or 64 sec. voice Mailbox & ID Tail.DVM $179.95
*Manual (REFUNDED) MN1..$ 20.00

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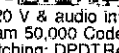
C64 OR IBM Mini Cat
Allows H.T. to scan 100 Channels & programs H.T for field use! Digital "S" Meter; comment fields; auto resume & delay; Scan Lockouts; Loads FT727 in 15 sec. Hardware, cables, & disk included for C64 or IBM
Model 727 $49.95

Touchtone Decoder
4 digit sequence; & QUAD expansion 4 relay option


8/20 V & audio in; Field Program 50,000 Codes: Mom. & Latching; DPDT Relay; Wrong digit reset; LED for digit valid & latch; inc. 24 Pin connector QUAD option adds: four 2 Amp. relays; 5 digit master on/off control for each relay.
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Touchtone to RS232 300 Baud Interface

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Crystal 60Hz 9VAC 5V, 2A. C64 & 1541
DCPS $129.95

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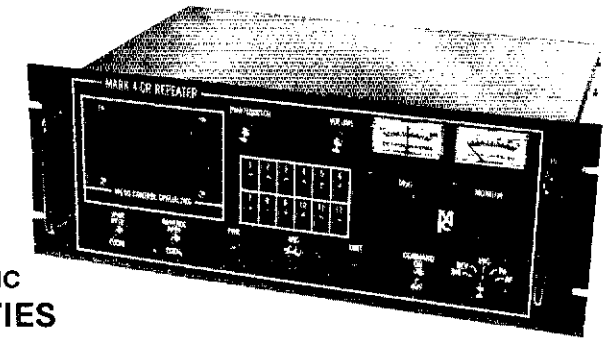
2 meters, 220, and 440!



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With a Hy-Gain VHF or UHF DX antenna, you don't worry when it rains or storms in the middle of a contest. Because the antenna stays tuned in the center of the band, without drifting, thanks to heavy-duty element insulators and to a weatherproof, encapsulated type N feedpoint connector.

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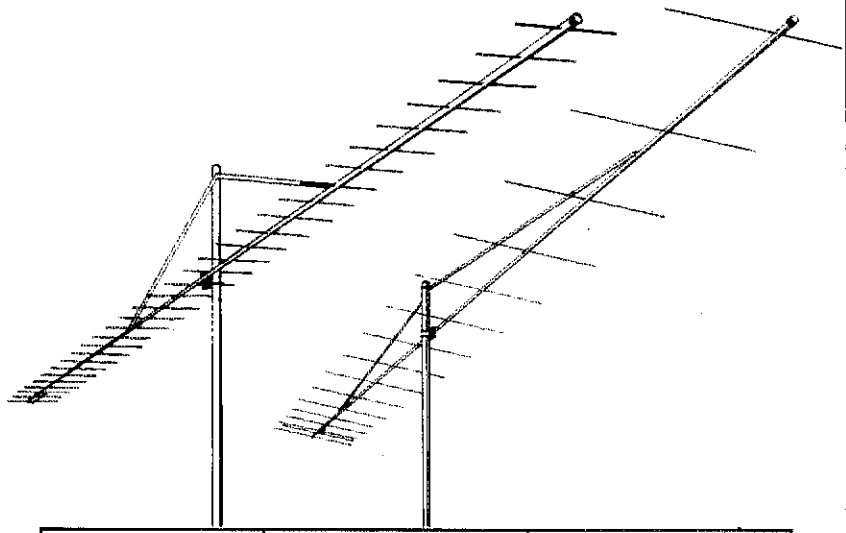
For worry-free DX-ing, choose the 31 element 7031-DX for 420-438 MHz, or the 15 element 215-DX for 144-146 MHz. For a complete catalog with detailed specs on these and all our other amateur products, please write to Telex/Hy-Gain, RF Communications Dept., 9600 Aldrich Avenue South, Minneapolis, MN 55420.



Mechanical	7031-DX	215-DX
Number of Elements	31	15
Element Diameter	3/16 in. (4.8 mm)	3/16 in. (4.8 mm)
Element Lengths	10½-13⅜ in. (267-352 mm)	34⅜-39¾ in. (878-1010 mm)
Boom Diameters	1-1¼ in. (25-32 mm)	1-1¼ in. (25-32 mm)
Boom Length	288¾ in. (24.06 ft.) (7.33 m)	334½ in. (27.88 ft.) (8.5 m)
Turning Radius (max)	12'7" (3.8 m)	14' 1½" (4.3 m)
Wind Area	1.9 sq. ft. (0.18 sq. m)	2.75 sq. ft. (.256 sq. m)
Wind Survival	90 mph (155 km/hr)	90 mph (155 km/hr)
Weight (net)	9.25 lbs. (4.2 kg)	13.56 lbs. (6.15 kg)
Boom Support	7/8, 5/8 in. tubular (22, 16 mm)	7/8, 5/8 in. tubular (22, 16 mm)
Mast Size Accepted	1½-2⅛ in. (38-52 mm)	1½-2⅛ in. (38-52 mm)
Polarization	Horizontal	Horizontal
Electrical		
Gain		
Beamwidth		
Front/Back		
Sidelobe Levels		
Typical VSWR	1.2:1	1.2:1
Maximum Power	1 kW ave, 2 kW pep	1 kW ave. 2 kW pep
Freq. Range (useable)	420-438 MHz	144.0-146.0 MHz
Elec. Boom Length	10.42 wavelengths	4.03 wavelengths
Connector	Type N - female	Type N - female

TELEX® hy-gain®

TELEX COMMUNICATIONS, INC.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is $1.00 per word. This includes firms or individuals offering products or services for sale. A special rate of 30 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

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 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received January 14 through February 13 will appear in April *QST*. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) 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.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

5) 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.

6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

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CLUBS/HAMFESTS/NETS

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.260 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 1409 Cooper Drive, Irving, TX 75061.

INTERESTED In Public Service? Join your Local Radio Emergency Associated Communications Team. In Pennsylvania call 717-938-6943 or write REACT, 1160 Old Trail Road, Etters, PA 17319.

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$499.95 per Package plus Shipping (Quantities Limited)

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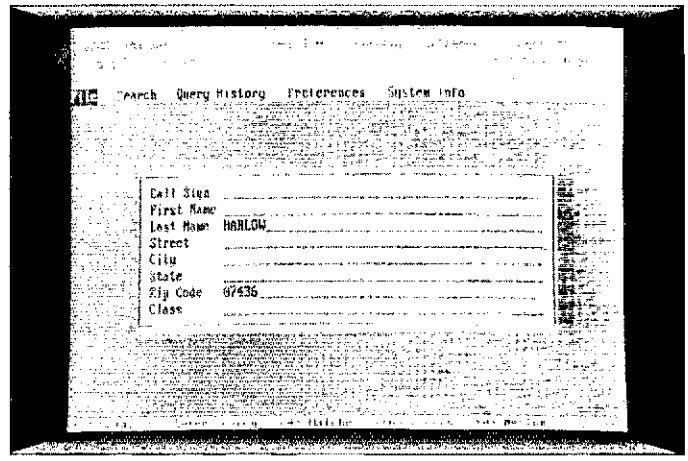

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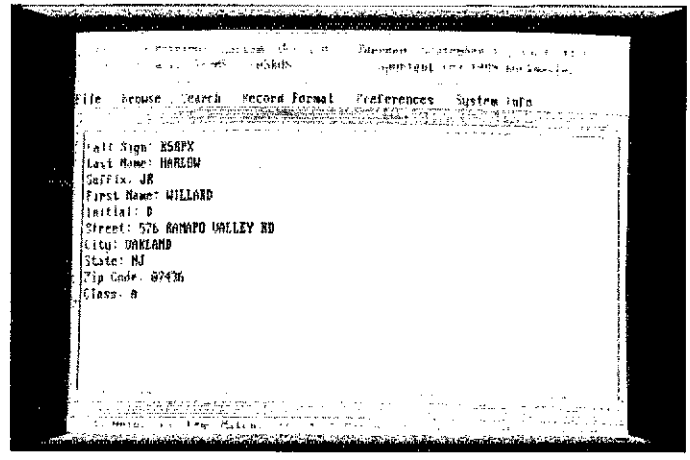

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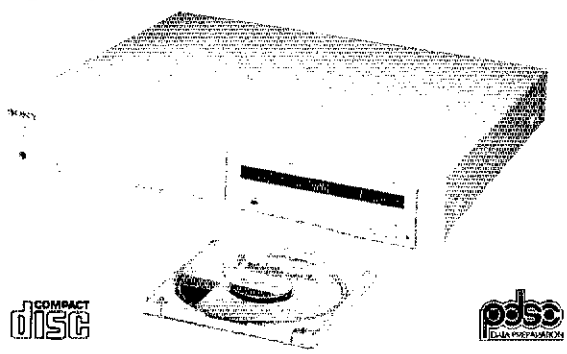

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- Small, lightweight and weatherproof
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- For full legal power and more
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Only $29.95

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D-40	40/15	66	24.95
D-20	20	33	22.95
D-15	15	22	25.95
D-10	10	16	25.95
Shortened dipoles			
SD-80	80/75	90	35.95
SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66	37.95
PD-8040	80,40/15	130'	39.95
PD-4020	40,20/15	66	33.95
Dipole shorteners — only, same as included in SD models			
S-80	80/75		$13.95/pr
S-40	40		12.95/pr

All antennas are complete with a HI-Q Balun, No. 14 antenna wire, insulators, 100' nylon antenna support rope (SD models only 50'), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

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Nylon guy rope, 450 lb. test, 100 feet	$4.49
Molded Dogbone Type antenna insulators	1.00/pr
SO-239 coax connectors	.55
No. 14 7/22 Stranded hard drawn copper antenna wire	09/ft.

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Dealer inquiries invited

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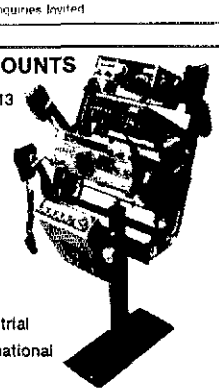
MM 10013

MM 1007



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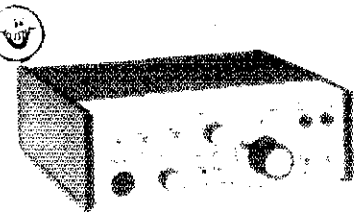

With our TC70-1 70cm ATV Transceiver you can easily transmit live action color video and audio from your home TV camera, VCR or camcorder by simply plugging the composite video and line audio into the front panel 10 pin VHS connector or rear panel phono jacks. Add 70cm antenna, coax, 13.8Vdc and TV set and you are on the air...it's that easy!

The TC70-1 typ. 1.5 W p.e.p. output properly matches the Mirage D15, D24, D1010-ATV, & D100 amps linear range for 15, 50 or 70 W. Also matches RFConcepts 4-32 for 15 W. These amps are available from us along with KLM broadband antennas.

* GaAsfet converter varicap tunes 420-450 MHz down to your TV on ch 2, 3 or 4. Shielded cabinet 7x7x2.5"
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CITRUS COUNTY Florida Hamfest January 29, 1990. National Guard Armory, Seven Rivers Drive, off US 19 in Crystal River, FL. Set-up 3 PM Friday and 7 AM Saturday. Public at 9 AM. Admission $4 (SASE) until Dec. 20, 1989, $5 thereafter. Indoor tables $8, outdoor flearmarket $5. Vendors must purchase admission. Del Slocum, 904-726-0725 or SHARC Hamfest, 3101 E. Oakton, Hernando, FL 32642.

INDIANA: South Bend Swap & Shop, Sunday December 31, 1989, last day of 1989 before New Years Day at Century Center downtown, on US 33, oneway north between Trustcorp Bank Building and river. Four lane highways to door from all directions. Tables: $5/5 ft. Round: $15/8x2.5. Rectangular: $20/8 ft. Wall locations. Talk-in 52-52 & area repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts, K9IXU, 1889 Riverside Drive, South Bend, IN 46616, phone 219-233-5307.

MISSISSIPPI School for Math and Science is a school for gifted students (11th and 12th grades) and is planning to start radio club but funds nonexistent. Need any gear donated. Send to: Chris Conner, N5MZD, Box W-1345, Columbus, MS 39701.

DO YOU Know The True Father Of Radio? Nikola Tesla was vindicated, as the true father of the radio art, by the US Supreme Court in 1943. Find out more by attending the International Telsa Symposium, late July 1990. For more information contact: Steve Elswick, 719-392-6404 or the International Tesla Society Inc., 330A West Uintah Street, Suite 215, Colorado Springs, CO 80905-1095.

THE EXPLORERS CLUB'8, Amateur Radio Committee, a non-profit organization, seeks donations of ham equipment. Donations will be used to equip and support international scientific expeditions. Contact: Greg, WA2EPK, 45 Hall Road, Chatham, NJ 07928, 201-635-1335.

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CANADIAN QSL Cards, send $1 for samples refundable with your order. M. Smith, VE7FI, 18610-62nd Avenue, Surrey, BC CANADA V3S 4N9.

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QSL's—Quality for less is back! See our display ad in this issue of *QST*. Harry A. Hamlen, P.O. Box 1, Stewartsville, NJ 08886.

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QSL CARDS—Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, Dept. B, 310 Commercial, Emporia, KS 66801.

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DON'T Buy QSL Cards until you see my free samples. Also I specialize in custom cards and QSL business cards. Write or call for Free Samples and custom card ordering information. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

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QSLS QUALITY And Fast Service For 30 Years. Include call for free decal. Samples 50 cents. Ray, K7HLR, Box 331, Clearfield, UT 84015.

GAILS QSLs, overnight, $6/100. Stamp for samples. 1150 Muenz, Wright City, MO 63390.

FULL COLOR QSL Cards made on Kodak paper from your negative, slide or print. $32.95 per 100. Request samples (enclose $1). Bizcard Co., Box 191-T, Stevensville, MI 49127.

PHOTOS, Postcards—Become QSLs. Clear stick on labels. New! "Kall Kards". Stamp brings details. K-K-L, Box 412, Troy, NY 12181-0412.

CUSTOM CALL SIGN ... for your car ... van ... or truck. Adheres to metal or glass! Transfer instantly vehicle to vehicle! Display Amateur Radio & your call in white lettering on 2¼ inch x 8 inch flexible plastic. Order magnetic or suction mounted version on black ... blue .. or red background! $8.50 each ... 2/$15 ppd. Sign On, 1923T Edward Lane, Merrick, NY 11566.

QSLs $28.50 500. SASE samples. ARRL membership cards available. Don Ellis, K3LQQ, 84 Chapel Drive, Zephyrhills, FL 33544, 813-973-1238.

FULL COLOR—3,000 $325; 6,500 $425; 12,500 $600; 25,000 $750. WA8CZS, 1-614-452-6375.

NEW DIMENSION QSL's, 6600 Lucia Lane, Minneapolis, MN 55432, 612-571-5881. A thousand dimensional QSL's for only $39.95 shipping included! Send stamp for samples or see our display ad in this issue of *QST* and order now!

MFJ's *Deluxe* 300 Watt Tuner

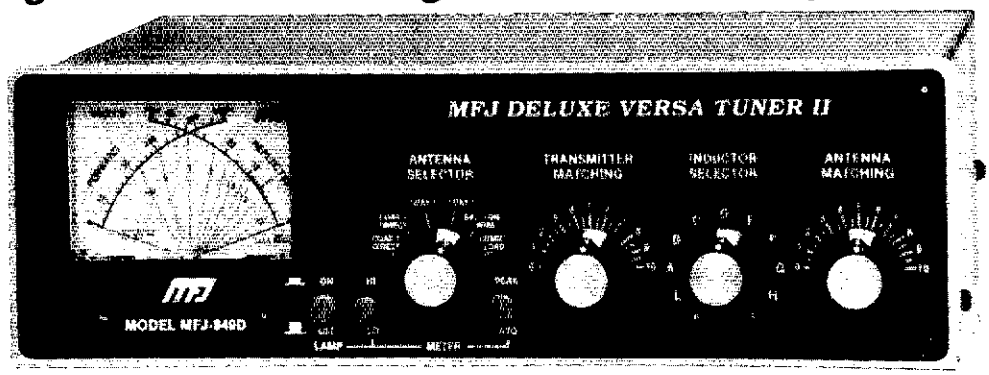
... *gives you* ***full*** 1.8-30 MHz coverage, a ***peak reading*** (and average) Cross-Needle meter, built-in ***dummy load,*** antenna switch and balun ... all covered by a ***full one year unconditional guarantee*** ... for only $149.95

MFJ-949D

$149.95

Made in U.S.A.

- ***Peak reading meter***
- ***Built-in dummy load***
- ***Covers 1.8 to 30 MHz***
- ***1 full year guarantee***



You won't find all these useful features in *any* other 300 watt tuner -- not even at twice the price.

***New* peak reading meter**

The new ***peak*** and average reading Cross-Needle meter in the MFJ-949D shows you SWR, forward and reflected power -- all in a single glance.

Without a ***peak reading*** wattmeter you just won't be able to tell if your rig is putting out all the peak SSB power it's designed for. Don't be without one if you want top performance.

Built-in dummy load

A built-in 300 watt 50 ohm dummy load makes tuning up your rig soooo easy. How do you tune up your rig without one?

An external dummy load will cost you about $30 more -- plus it takes up valuable space at your operating position and requires another cable.

***Full* 1.8 to 30 MHz coverage**

The MFJ-949D gives you **full** 1.8-30 MHz coverage.

Make sure the tuner you're considering covers *all* the HF bands.

Don't get a tuner that keeps you from operating all the frequencies you've worked for -- now or in the future.

Plus more . . .

You get a versatile 6-position antenna switch and a 4:1 balun for balanced lines.

You can run up to 300 watts PEP and tune out SWR on coax, balanced lines or random wires.

***Unconditional* Guarantee**

You get a *full one year unconditional guarantee.* That means we will repair or replace your MFJ tuner (at our option) *no matter what* for a full year.

Others give you a 90 day *limited* warranty. What do you do *after* 90 days? Or *before* 90 days when they say, "Sorry, it's your fault"?

What's really important?
***precise* control for minimum SWR**

What's really important is your tuner's ability to get your SWR down to a minimum -- and the MFJ-949D gives you more precise control over SWR than *any* tuner that uses two tapped inductors.

Why? Because the two *continuously* variable capacitors in the MFJ-949D give you *infinitely* more positions than the *limited* number on two switched coils.

This gives you the precise control you need to get minimum SWR and maximum power into your antenna.

After all, isn't that why you need a tuner?

High efficiency *and* a compact size:
***performance* is most important**

The MFJ-949D uses a *single* airwound coil. Using only one inductor takes up a minimum of space and there's no mutual coupling problems.

The excellent form factor of the short fat coil gives you highest Q. Plus you get plenty of inductance that gives you a much wider matching range than other designs.

This results in a highly efficient tuner that puts maximum power into your antenna *and* a compact 10 x 3 x 7 inch size that complements your rig and fits right into your station.

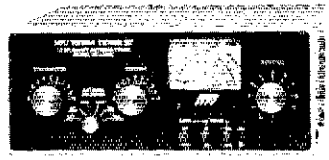
Competing tuners using *two* tapped coils *require* a large cabinet -- not just to house the coils but also to help reduce detrimental coupling between the inductors. The result? *A tuner that's* ***bigger*** *than your radio.*

Your very best value

The MFJ-949D gives you your very best value, first-rate performance, proven reliability and the best guarantee in ham radio . . . all from the *most trusted* name in antenna tuners. Don't settle for less. Get yours today!

MFJ's 1500 Watt Tuner

MFJ-962C
$229.95



For a *few* extra dollars the MFJ-962C lets you use your barefoot rig now and have the capacity to add a 1.5 KW PEP linear amplifier later. It covers 1.8 to 30 MHz.

You get MFJ's *new* ***peak*** and average reading Cross-Needle SWR/Wattmeter.

You also get a 6-position antenna switch and a teflon wound balun with ceramic feed-thru insulators for balanced lines. Measures just 10⅝x4½x14 7/8 inches.

How can an American manufacturer like MFJ give you more tuner for your money than clearing houses for foreign competition?

MFJ tuners are made in America.

Here's how MFJ gives you more tuner for your money than *any* clearing house for foreign competition.

MFJ builds every tuner cabinet from scratch using the latest high-speed computer controlled punch presses.

MFJ manufactures, assembles and tests every PC board that goes into MFJ tuners.

Instruction manuals and other materials are printed in MFJ's print shop.

MFJ tuners go directly from our factory to your dealer. We're not just an importer adding profits, tariffs and import charges.

With MFJ's efficient in-house manufacturing and straight to your dealer distribution you get the most tuner for your money.

WHY CHOOSE AN MFJ TUNER?

Hard-earned Reputation: There's just no shortcut. *MFJ is a name you can trust* -- more hams trust MFJ tuners throughout the world than all other tuners combined.

Proven Reliability: *MFJ has made more tuners for more years than anyone else* -- with MFJ tuners you get a highly-developed product with proven reliability.

First-rate Performance: MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere.*

One full year *unconditional* guarantee: That means we will repair or replace your tuner (at our option) *no matter what* for a full year.

Continuing Service: MFJ Customer Service Technicians are available to help you keep your MFJ tuner performing flawlessly -- no matter how long you have it -- just call 601-323-5869.

Your very best *value:* MFJ tuners give you the most for your money. Not only do you get a *proven* tuner at the lowest cost -- you also get a one year *unconditional* guarantee and *continuing* service. That's how MFJ became the world's leading tuner manufacturer -- by giving *you* your very best *value.*

Choose your MFJ tuner with confidence! You're getting proven performance and reliability from the most trusted name in antenna tuners. Don't settle for less.

Call or write for a *free* full-line MFJ catalog with all 10 of our tuners and tons of ham radio accessories!

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P.O. Box 494, Mississippi State MS 39762
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Include shipping and handling

MFJ ... making quality affordable

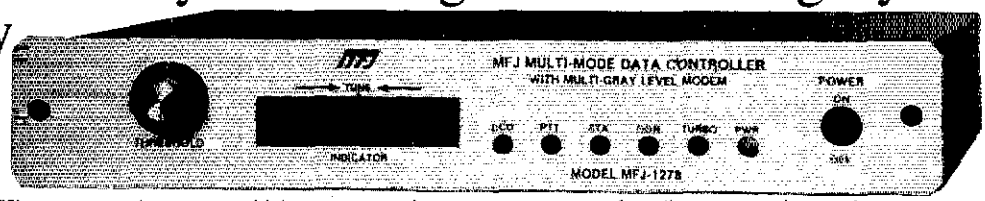
MFJ gives you *all 9* digital modes

and *keeps on* bringing you state-of-the-art advances

. . . while others offer you *some* digital modes using 3 year old technology

MFJ-1278

$279.95



No 3 year old technology at MFJ!

Using the latest advances, MFJ brings you 9 exciting digital modes and *keeps on* bringing you state-of-the-art advances.

You get tons of features other multi-modes just don't have.

Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and full featured Contest Memory Keyer.

You can't get all 9 modes in *any* other multi-mode at *any* price. Nobody gives you modes the MFJ-1278 doesn't have.

The best modem you can get

Extensive tests in ***Packet Radio Magazine*** prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

The MFJ-1278 is the *only* multi-mode with a ***true*** DCD circuit for HF. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

Exclusive Built in Printer Port

Only the MFJ-1278 has a dedicated printer port that lets you plug in your Epson or IBM compatible printer.

You don't need to buy an optional $40 cable just to plug in your printer.

20 LED Precision Tuning Indicator

MFJ's unequaled tuning indicator makes it really easy to work HF packet. Unlike others, you use it the same for all modes -- not different for each mode. Just tune your radio to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp clear details. MFJ-1278 is the *only* multi-mode with a built-in multi-gray level modem. It lets you transmit *and* receive multi-gray level FAX/ SSTV pictures with an appropriate terminal program.

Only MFJ can transmit FAX . . .

Most packet stations can *receive* FAX.

But only the MFJ-1278 lets you *transmit* FAX without internal modifications that disable other modes.

So now you can send your own pictures, maps and diagrams by FAX to stations throughout the world.

Too bad they can't send theirs to you . . . *unless* they disable other modes.

One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to miss new modes and features that come out *tommorow.*

Why? Because your MFJ-1278 comes with a coupon good for one ***free*** eprom upgrade exchange that'll add new features.

Plus More . . .

Plus you get . . . 32K RAM (not 16K), ***free*** AC power supply, Host mode that lets MFJ-1278 serve as a KISS interface or dumb modem, fast throughput anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 *and* TTL serial ports, *standard* 850 Hz RTTY shift, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW key paddle jack, speaker jack that lets you monitor CW sidetone, transmit and receive audio and packet connect bell, ***new*** fully intergrated instruction manual with *Fast Start*™ section and more in a 9½ x 9½ x 1½ inch cabinet.

Get on the air instantly Just plug it all in

All you need is an MFJ-1278, your rig, any computer and a terminal program.

With an MFJ Starter Pack, $24.95, you just plug it all in, wire up your mic connector and you're on the air.

Order MFJ-1284 for IBM compatibles (includes Picture Passing); MFJ-1287 for Macintosh; MFJ-1282 for C-64/128; MFJ-1283 (tape) for VIC-20.

No Matter What™ Guarantee

You get MFJ's one year No Matter What™ Guarantee.

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a year.

Others give you a *limited* warranty. What do you do when *they* say, "Sorry, your *limited* warranty doesn't cover *that?*"

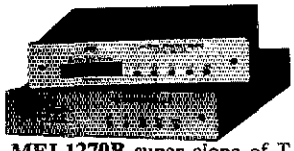
Get 9 new ways of having fun

Don't settle for 3 year old technology.

Choose the only multi-mode that gives you the latest advances and all 9 modes.

Get 9 new ways of having fun *today!*

MFJ Packet Radio



MFJ-1274 **$159.95**

MFJ-1270B **$139.95**

MFJ-1270B super clone of TAPR's TNC-2 gives you more features than *any* other packet controller -- for $139.95

You can double your fun by operating VHF and HF because you get ***high performance*** switchable VHF/HF modems.

You get the Easy Mail™ Personal Mailbox with soft-partitioned memory so you and your ham buddies can leave messages for each other 24 hours a day.

In MFJ's new WeFAX mode you can print full-fledged weather maps to screen or printer and save to disk using an IBM compatible, C-64/128 or Macintosh.

A new KISS interface lets you run TCP/IP. They also come ***NET ROM*** compatible.

You also get 32K RAM and a free 110 VAC power supply (or use 12 VDC).

For dependable HF packet tuning, the MFJ-1274 gives you a high resolution tuning indicator -- and it's only $20 more.

MFJ Video Digitizer



Here's Aimee. This unretouched picture was shot directly from a VGA monitor. We digitized Aimee with a camcorder, MFJ-1292 "Picture Perfect" Video Digitizer and IBM compatible computer.

Create fascinating digitized snapshots to transmit with your MFJ-1278 of *anything* you can point your camcorder at!

The new MFJ-1292 "Picture Perfect" Video Digitizer connects your video camera to your IBM compatible computer so you can capture digitized video snapshots on disks.

You get an easy-to-install plug-in card for your computer, handy contrast and brightness control unit and complete software for only . . . **$199.95.**

You can create your own QSL card from digitized snapshots by using drawing or paint software to add graphics and lettering -- and you can transmit it with included MFJ picture passing software.

You can use your digitized snapshots in any desk-top publishing program that uses the popular PCX format. MFJ-1292 lets you capture pictures in VGA, EGA, CGA, Hercules or Raw Data formats. Get yours today.

MFJ Packet Pictures

Transmit and receive high resolution EGA and CGA color pictures via packet radio with new MFJ picture passing software.

You can set up your own picture bulletin board and exchange pictures with others -- even if you're not there.

MFJ-1288, $9.95, works with virtually any packet controller and IBM compatible computer. It's included ***free*** with MFJ-1284 IBM starter pack and MFJ-1292 Digitizer.

Nearest Dealer/Orders: 800-647-1800

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FAX: (601) 323-6551; Include s/h.

MFJ . . . making quality affordable

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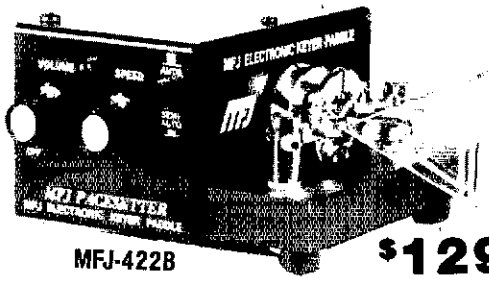
BEST OF MFJ

MFJ, Bencher and Curtis team up to bring you America's most popular keyer in a compact package for smooth easy CW



MFJ-422B **$129.95**

The best of all CW worlds - a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. You get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 V battery or 110 VAC with MFJ-1305, $9.95.

The keyer mounts on a Bencher paddle to form a small (4 1/8 x 2 5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

America's favorite paddle, the Bench, has adjustable gold-plated silver contacts, lucite paddles, chrome plated brass, and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only $79.95 to mount on **your** Bencher paddle.

Artificial RF Ground

MFJ-931 **$79.95**



You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise. MFJ-931 also lets you electrically **place a far away RF ground directly at your rig** - no matter how far away it is - by tuning out the reactance of your ground connection wire. 7½x3½x7 in.

Antenna Bridge

MFJ-204B **$79.95**



Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge.

No other equipment needed - take it to your antenna site. Determine if your antenna is too long or too short, measure its resonant frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built-in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 V battery or 110 VAC with AC adapter, $9.95.

Super Active Antenna

'World Radio TV Handbook' says MFJ-1024 is "a first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise factor... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. MFJ-1024 covers 50 KHz to 30 MHz



Receives strong, clear signals from all over the world. 20 dB attenuator, gain control. ON LED Switch two receivers and aux. or active antenna. 6x23x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector. 3x2x4 in. 12 VDC or 110 VAC with MFJ-1312, $9.95.

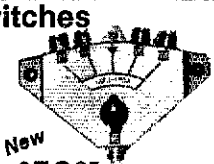


MFJ-1024 **$129.95**

MFJ Coax Antenna Switches







$34.95 MFJ-1701 **$21.95** MFJ-1702 New **$59.95** MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year **unconditional** guarantee. **MFJ-1701, $34.95.** Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Black aluminum 10x3x1½ inch cabinet. **MFJ-1702, $21.95.** 2 positions. Cavity construction. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. **MFJ-1704, $59.95.** 4 position Cavity Switch with Lightening/Surge protection device. Center Ground position. 2.5 KW PEP, 1 KW CW. Extremely low SWR. Isolation better than 50 dB 500 MHz. Negligible loss. 50 ohm. 6¼x4¼x1¼ in.

"Dry" Dummy Loads for HF/VHF/UHF







MFJ-260 **$28.95** MFJ-262 **$69.95** MFJ-264 **$109.95** New

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. **MFJ-260, $28.95.** Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 30-60 MHz. 2½x2½x7 in. **MFJ-262,$69.95.** Handles 1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in. **MFJ-264, $109.95.** Versatile UHF/VHF/HF 1.5 KW Dry Dummy Load. An MFJ first. Gives you low SWR to 650 MHz, usable to 750 MHz. You can run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches. SO-239 connector

New MFJ-1286 Gray Line DX Advantage

$29.95 MFJ-1286



Snag rare DX for only $29.95! The MFJ-1286 is a computerized DXing tool that predicts DX propagation. Even the casual DXer can work rare DX by knowing when conditions are best for DX. The Gray Line is the day/night divider line where the most amazing DX happens every day. Now you'll know **exactly** when to take advantage of it.

Gives detailed world map. Shows Gray Line for any date/time, UTC in 24 user chosen QTHs, time zones and more. IBM compatible. Any graphics.

MFJ's Speaker/Mics

For Kenwood, Icom, Yaesu, Santec

MFJ-284 or MFJ-286 **$24.95**



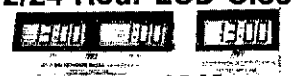
MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk.

You get a wide range speaker and first-rate electret mic element for superb audio on **both** transmit and receive.

Earphone jack, handy tapel/pocket clip, PTT, lightweight retractable cord. Gray. One year **unconditional** guarantee.

MFJ-284 fits Icom, Yaesu, Santec. **MFJ-286** fits Kenwood.

12/24 Hour LCD Clocks



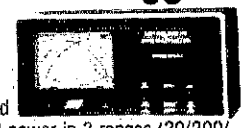
$19.95 MFJ-108B **$9.95** MFJ-107B

Huge 5/8 inch bold LCD digits let you see the correct time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4½x1x2; MFJ-107B 2¼x1x2.

Lighted Cross/Needle SWR/Wattmeter

MFJ-815 **$69.95**



MFJ Cross-Needle SWR/Wattmeter shows you SWR, forward and reflected power in 3 ranges (20/200/2000 watts forward/5/50/500 reflected). Push button range selection. 1.8-30 MHz.

Mechanical zero adjust for movement. SO-239 connectors. Light requires 12 VDC or 110 VAC with MFJ-1312, $9.95.

Deluxe Code Practice Oscillator

New MFJ-557 **$24.95**



MFJ-557 Deluxe Code Practice Oscillator has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Also portable because it runs on a 9 volt battery (not included) or an AC adapter ($9.95) that plugs into the side.

Earphone jack for private practice. Tone and volume controls for a wide range of sound. Speaker. The key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8½x2¼x3¾ in. One year **unconditional** guarantee

MFJ AC Voltage Monitor

$19.95 MFJ-850 New



Prevent damage to rig, computer or other gear. Monitor AC line voltage for potentially damaging surge/brown out conditions on 2-color expanded 95-135 volt scale.

Plugs into any AC outlet. 2% accuracy. 2¼x2¼x1½ inches.

• One year **unconditional** guarantee • 30 day **money back** guarantee (less s/h) on orders from MFJ • Add $5.00 each s/h • **Free** catalog

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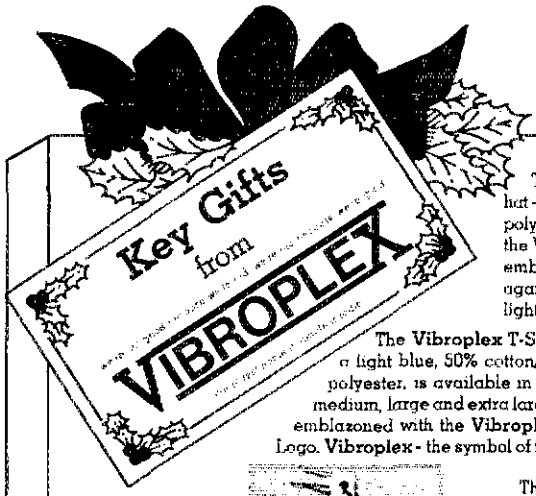
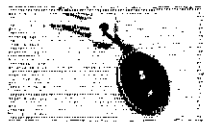


The Vibroplex hat - fully adjustable, polyester front with the Vibroplex emblem set against a light blue background.



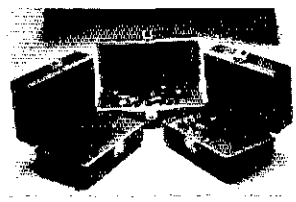
The Vibroplex T-Shirt, a light blue, 50% cotton/50% polyester, is available in small, medium, large and extra large sizes, emblazoned with the Vibroplex Bug and Logo. Vibroplex - the symbol of the serious ham.





The Vibroplex bug trademark makes an attractive key chain for car or home.

Protect your investment in your Vibroplex key. This attractive carrying case, in a black morocan grained finish is molded from hi-impact styrene to withstand rugged use. The aluminum valance forms a protective edge and makes an attractive, quality finish. A handy carrying handle and a positive latch and you'll feel like the old pro telegraphers who made Vibroplex the symbol of the trade.



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The Vibroplex Company, Inc./98 Elm St/Portland, Maine 04101
NOW CALL TOLL FREE! 1-800-AMATEUR

SOUTH FLORIDA ARRL CONVENTION

FEBRUARY 17th & 18th, 1990

SARASOTA, FLORIDA

CHECK FEBRUARY'S HAMFEST CALENDAR

Tickets - $5 Advance $7 at the DOOR

CONTACT: Hadley Carrigan at 181 N. Adams Dr., Sarasota, Florida 34236 Tel # (813) 388-2868

RFI KIT

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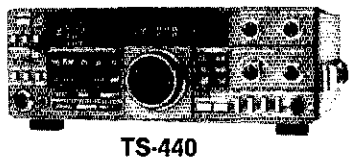

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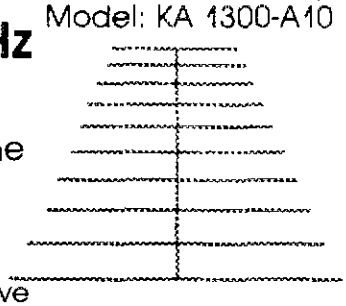

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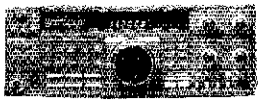

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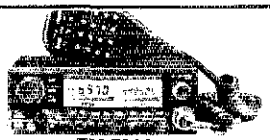

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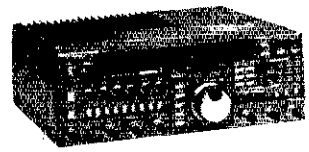

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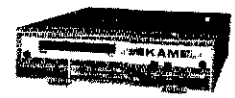

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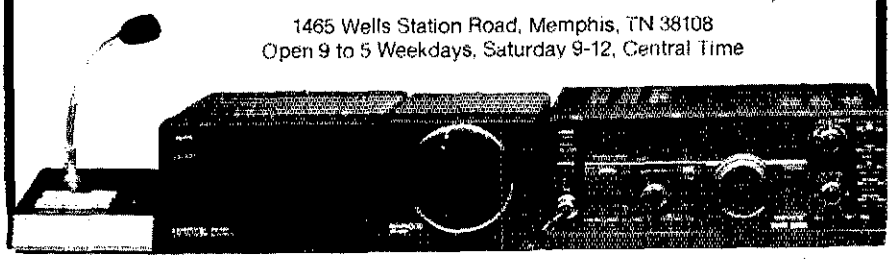

1 ANTENNA = 9 BANDS

The GARANT GD-6 dipole was tested and recommended by TCA (The Canadian Amateur; similar to OSTI) in June 1985. The GD-6 and GD-8 were tested and recommended as first choice in a test of three wire antennas by the CNIB (Canadian National Institute for the Blind.) TCA and CNIB confirmed that the GARANT GD-antennas need no tuner on all bands tested.

MODEL	BANDS	MAX. LENGTH
GD-5	40-30-20-15-10M	67'
GD-6	80-40-20-17-12-10M	137'
GD-8	80-40-30-20-17-15-12-10M	137'
GD-9	160-80-40-30-20-17-15-12-10M	255'

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Aries-1

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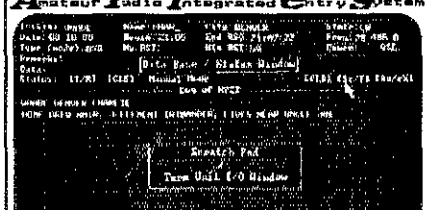

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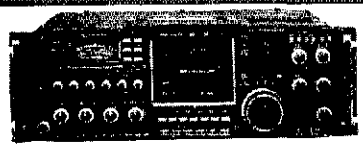

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IC-735 Gen. Cvg Xcvr	1099.00	Call $
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UHF		
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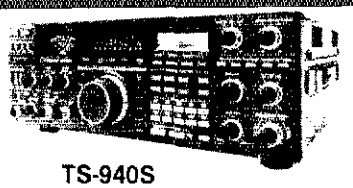

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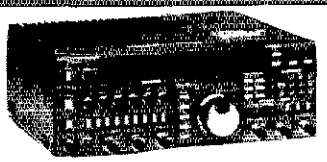

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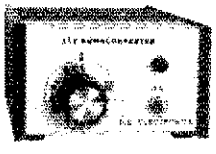

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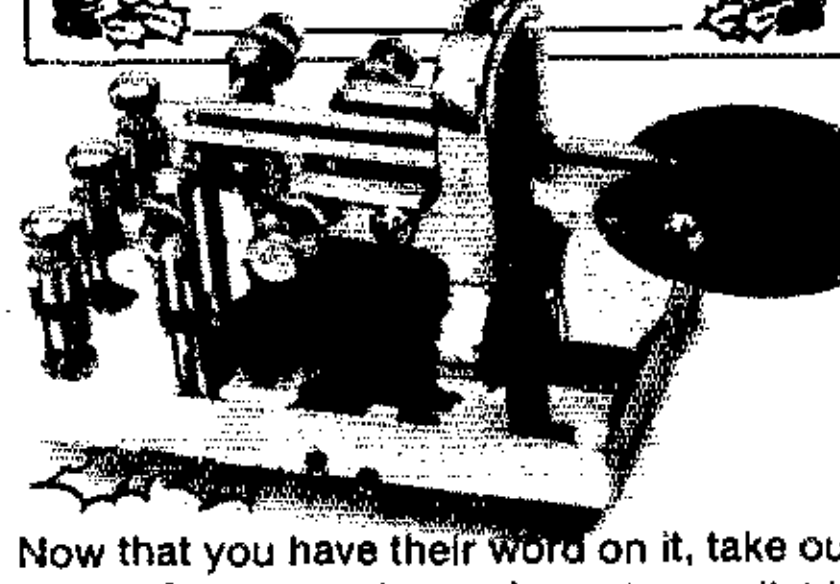

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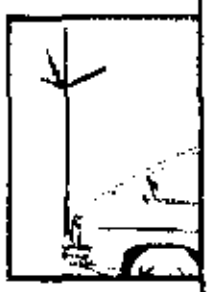

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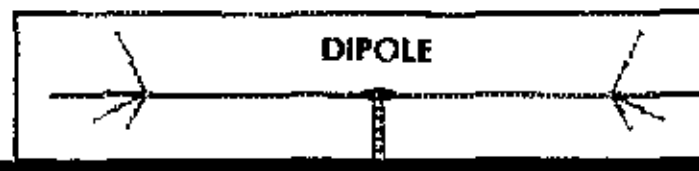

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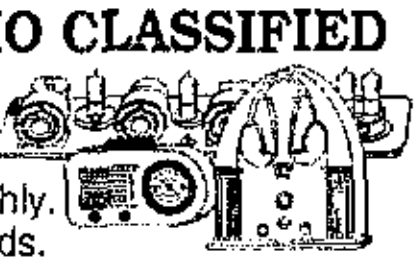

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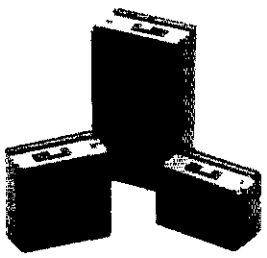

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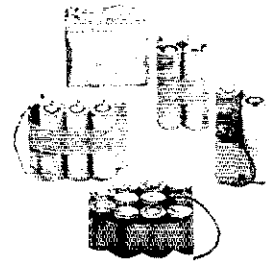

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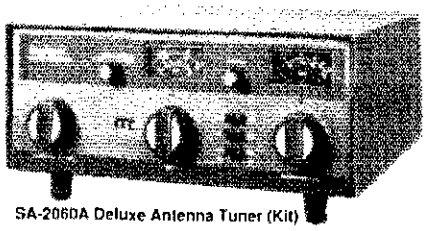

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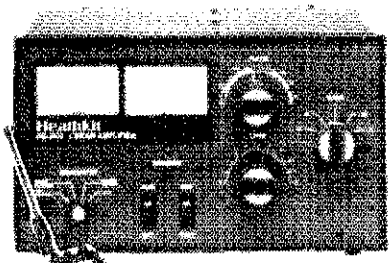

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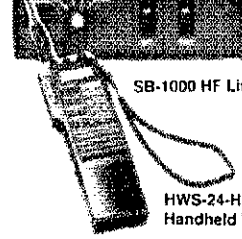

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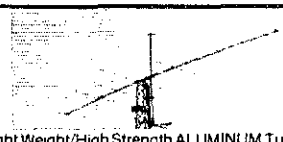

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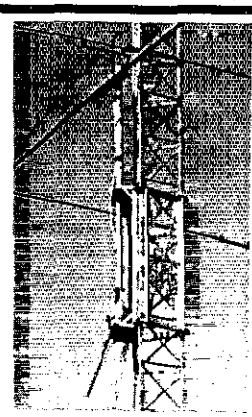

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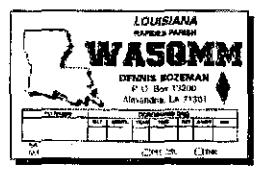

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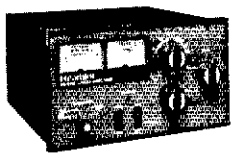

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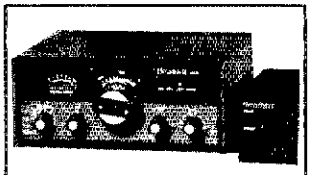

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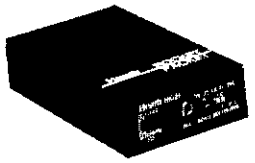

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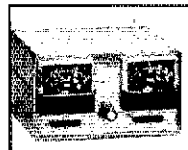

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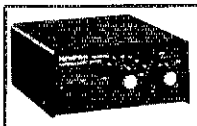

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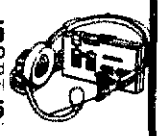

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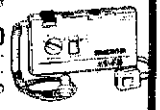

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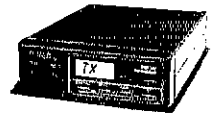



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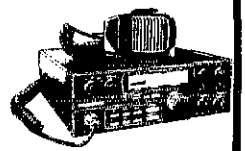

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HR2510 ... $239.90

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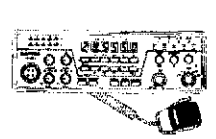

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U050AS, Moldavia, urgently requests donations of Amateur Radio equipment of all types. Contact WB2DND.

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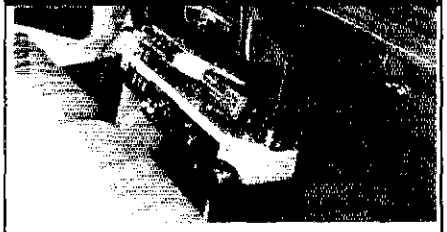

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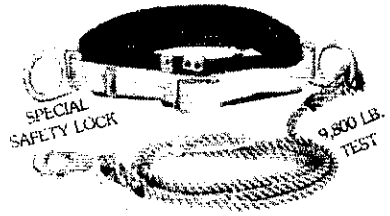

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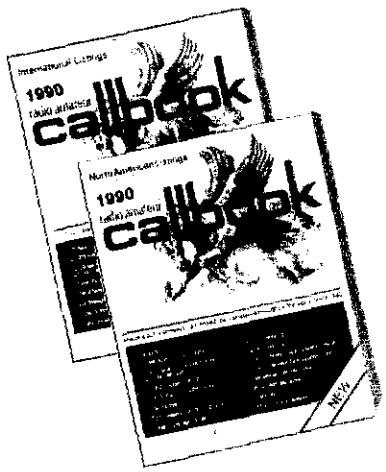

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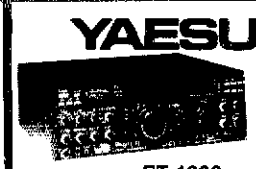

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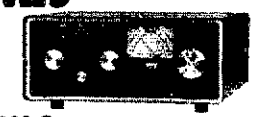

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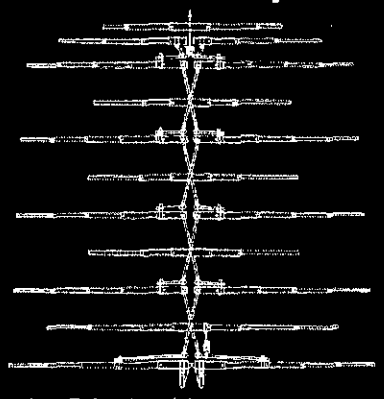

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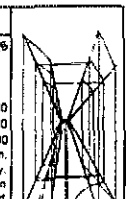

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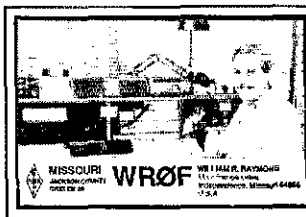

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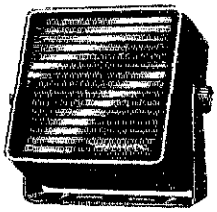

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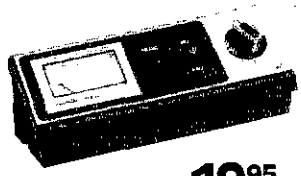

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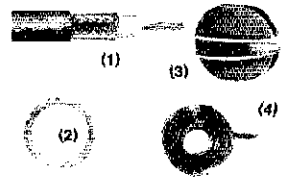

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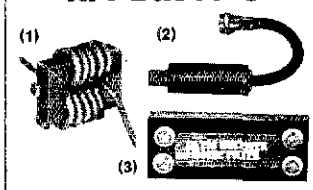

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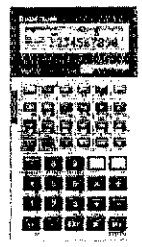

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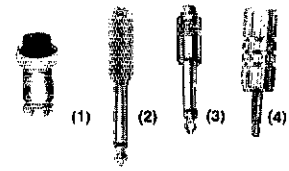

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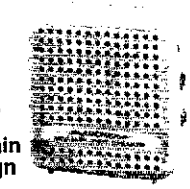

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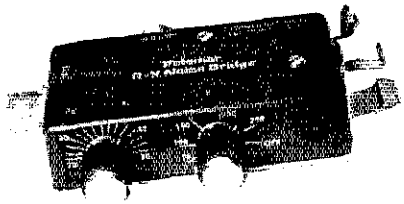

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ANTENNA/TOWER SALE!



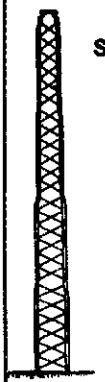
hy-gain
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price in Continental U.S.A.!



ROHN
Self Supporting Towers On SALE!
FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$449
HBX48	48 ft	10 sq ft	303	$589
HBX56	56 ft	10 sq ft	385	$699
HDBX40	40 ft	18 sq ft	281	$559
HDBX48	48 ft	18 sq ft	363	$689

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.



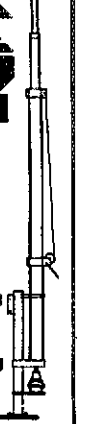
ROHN
Guyed Tower Packages

- World Famous Rohn Quality and Dependability
- Rugged high wind survival provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for 70 mph wind zone. 90 mph wind zone packages slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$849	$1229	$1549
60'	939	1389	1839
70'	999	1719	2159
80'	1199	1869	2369
90'	1289	2039	2579
100'	1369	2199	2989
110'	1449	2459	3209
120'	1669	2619	3429

US TOWER CORPORATION



These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting—
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock-

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.Load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

**Note-towers rated at 50 mph to EIA specifications*

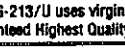
RG-213U



$.39/ft $379/1000 ft. Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X



$.22/ft $209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086



$.45/ft $439/1000 ft.

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HANDLINE/HELIAX®



Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket.....$.79/ft.
½" LDF4-50 Andrew Heliax®.....$1.99/ft.
⅞" LDF5-50 Andrew Heliax®.....$4.99/ft.
select connectors below
Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.5	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Heliax®	$29	$29	$29	$29
⅞" Heliax®	$55	$55	$55	$55

Amphenol Silver PL259.....$1.50
UG21B N Male.....$3.50
9086/9913 N Male Connector.....$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga.....$.10/ft.
¼ mile 18ga copper-clad steel wire.....$30
Dog bone end insulator.....$.79 ea.

VAN GORDEN

1:1 Balun.....$15 Center Insulator.....$8
Dipole Kits.....D80 $31.95/D40 $28.95
Short Dipole Kits.....SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line.....$29.95
G5RV all band antenna.....$49.95

ALPHA DELTA

DX-A 160-80-40 Sloper.....$49

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A3 3-el Tribander.....
A4S 4-el Tribander Beam w/S.S. Hdwre.....
A743 & A744, 30/40 mtr KIT for the A3 & A4.....
R4 20-10 mtr Vertical.....
AP8 80-10 mtr Vertical.....
AV5 80-10 mtr Vertical.....
D40 40 mtr Dipole.....
40-2CD 2-el 40 mtr Beam.....
A50-5 5-el 6 mtr Beam.....
215 WB NEW 15-el 2 mtr Beam.....
230 WB NEW 30-el 2 mtr Beam.....
4218 XL 18-el 2 mtr Beam.....
3219 19-el 2 mtr Beam.....
424B 24-el 432 MHz Beam.....
ARX2B 2 mtr Vertical.....

hy-gain — CALL FOR SPECIAL PRICES!

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Discoverer 3-el Conversion Kit.....
EXPLORER-14 SUPER-SPECIAL.....
QK710 30/40 mtr. Add-On-Kit.....
V2S 2-mtr Base Vertical.....
V4S 440MHz Base Vertical.....
TH5MK2S Broad Band 5-el Triband Beam.....
TH7DXS 7-el Triband Beam.....
TH3JRS 3-el Triband Beam.....
205BAS 5-el 20-mtr Beam.....
155BAS 5-el 15-mtr Beam.....
105BAS 5-el 10-mtr Beam.....
204BAS 4-el 20-mtr Beam.....
64BS 4-el 6-mtr Beam.....
12 AVQ 20-10 mtr vertical.....
14 AVQ 40-10 mtr vertical.....
18 AVT/WB 80-10mtr Vertical.....
18HTS 80-10 mtr Hy-Tower Vertical.....
23BS 3-el 2 mtr Beam.....
25BS 5-el 2 mtr Beam.....
28BS 8-el 2 mtr Beam.....
214BS 14-el 2-mtr Beam.....
2BDQ 80/40 mtr Trap Dipole.....
5BDQ 80-10 mtr Trap Dipole.....
BN86 80-10 mtr KW Balun W/Coax Seal...

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $99 G7-144 2-mtr Base $129
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical $159.95 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $149.95 Delivered
- Full Legal Power
- Automatic Band Switching

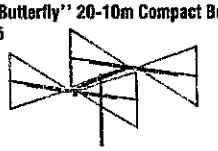
Accessories:

RMK II Roof Mtg. Kit.....$59.95
STR II Stub-Tuned Radials....$39.95
TBR160 160m Coil Kit.....$59.95
30m Add-on Kit.....$39.95
17/12m Add-on Kit.....$39.95



FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam
$259.95



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- Element Length 12.5 Feet

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KT34A 4-el Broad Band Triband Beam.....$419
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ROTORS

Alliance HD73 (10.7 sq. ft. rating).....$129.95
Alliance U110 (3 sq. ft. rating).....$49
Telex CD 4511 (8.5 sq. ft. rating).....$Call
Telex HAM 4 (15 sq. ft. rating).....$Call
Telex Tailtwister (20 sq. ft. rating).....$Call
Telex HDR300 Heavy Duty (25 sq. ft. rating).$Call

ROTOR CABLE

Standard 8 cond cables $.25/ft. (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.45/ft (vinyl jacket 2-#16 & 6-#18 ga)



ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G.....$54.50 45G.....$153.50
25G.....$65.50 55G.....$197.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	CALL FOR PRICES
FK2558	58 ft.	13.3 sq. ft.	
FK2568	68 ft.	11.7 sq. ft.	
FK4544	44 ft.	34.8 sq. ft.	
FK4554	54 ft.	29.1 sq. ft.	
FK4564	64 ft.	28.4 sq. ft.	

25G Double Guy Kit.....$299.
45G Double Guy Kit.....$319.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating).....$.15/ft
1/4 EHS Guywire (6650 lb rating).....$.18/ft
5/16 EHS Guywire (11,200 lb rating).....$.29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating).....$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32").....$.45
1/4 CCM Cable Clamp (1/4" Cable).....$.55
1/4 TH Thimble (fits all sizes).....$.45
3/8EE (3/8" Eye & Eye Turnbuckle).....$6.95
3/8EJ (3/8" Eye & Jaw Turnbuckle).....$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle).....$9.95
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle).....$10.95
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle).....$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle).....$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle).....$16.95
3/16" Preformed Guy Grip.....$2.49
1/4" Preformed Guy Grip.....$2.99
6" Diam - 4 ft Long Earth Screw Anchor.....$19.95
500 D Guy Insulator (5/32" or 3/16" Cable).....$1.99
502 Guy Insulator (1/4" Cable).....$3.49
5/8" Diam - 8 ft Copper Clad Ground Rod.....$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating).....$.32/ft
HPTG4000 Guy Cable (4000 lb rating).....$.52/ft
HPTG6700 Guy Cable (6700 lb rating).....$.72/ft
9901LD Cable End (for 2100/4000 cable).....$9.95
9902LD Cable End (for 6700 cable).....$11.95
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GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$49	$89	$129	$149
.25 in Wall	$69	$129	$189	$249

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- 200 Watts Output
- All Amateur Bands
- Dual Receive
- DDS-Direct Digital Synthesis

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- 160-10M/General Coverage Receiver
- Band Stacking Registers

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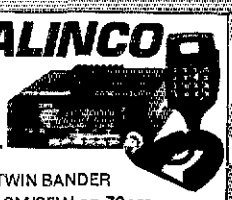

DR-570T

VHF/UHF TWIN BANDER

- 45W on 2M/35W on 70cm
- Receive on both Bands at Same Time
- Extended Receiver Range
- More Features for the Money Than Anyone Else

CALL TODAY!

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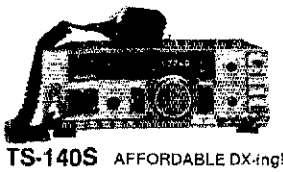

TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

YAESU



FT-736R VHF-UHF BASE STATION

- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz • 100 Memories

ICOM

IC-725 NEW ULTRA-COMPACT HF TRANSCEIVER

NEW!



- USB/LSB/CW, AM Receive Optional Module for AM Transmit and FM TX/RX
- 160-10M Operation • 100 W Output
- Receive 30 kHz to 33 MHz
- 26 Memories with Band Stacking Registers

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TM-701, 25W, 2M/440 MHz
TH-75, 2M/70cm HT

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COMPACT DUAL BAND FM HANDHELD (2M/70CM)

21 Memories for Each Band
Dual VFO's for Each Band
Up to 5 Watts Power
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Built-in 10-Memory DTMF Autodialer

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IC-24AT

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- 5W Output
- Crossband Full Duplex
- 40 Double-Spaced Memories
- 4 DTMF Code Memories

CHECK OUT ALL THE FEATURES!

ASTRON



• RS7A	$49	• RS35M	$159
• RS12A	$70	• VS35M	$174
• RS20A	$89	• RS50A	$199
• RS20M	$109	• RS 50M	$219
• VS20M	$124	• RM50M	$259
• RS35A	$139	• VS50M	$232

uniden

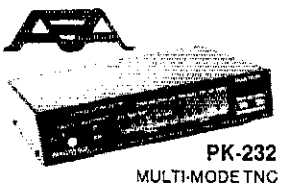
HOT WINTER SPECIAL



HR-2600 10 Meter Mobile

$229.95 Delivered

Great Deals On Scanners Too! CALL



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THE ORIGINAL MULTI-MODE TNC

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- Made In USA

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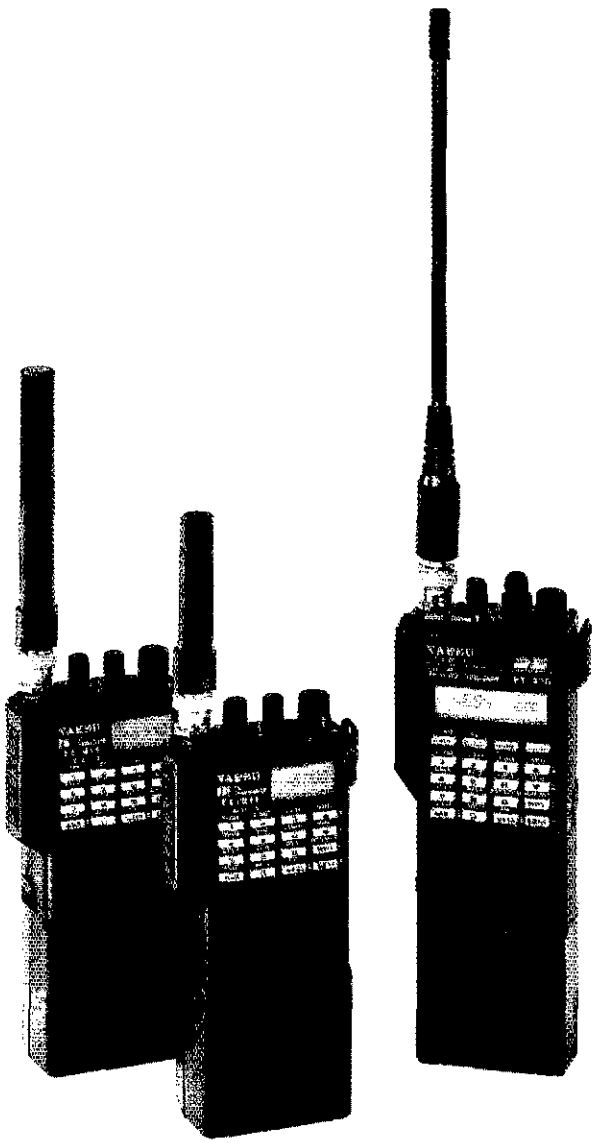
Compare...Ours & Theirs

Choosing the radio that's right for you can be pretty confusing. That's why we decided to make it as simple as possible for you to see how these Yaesu hand-helds stack up against the competition. No boasts, no sales pitches, just a factual side-by-side comparison of "ours" versus "theirs." Because Yaesu quality speaks for itself.



2 METER HANDHELD SPECIFICATIONS	YAESU FT-411/811	ICOM IC-2SAT/IC-4SAT	KENWOOD TH-215/TH-415
Memory Channels	**49**	48	10
VFOs	**2**	1	1
Memory Channels Store Any Offset	**49**	10	10
Wide Receiver Frequency Range (MHz)—VHF	**140-173**	138-174	141-163
Wide Receiver Frequency Range (MHz)—UHF	**430-450**	440-450	438-450
Built-in CTCSS Encode/Decode	**Included**	Option	Encode Only
Memory DTMF Autodialer	**10**	None	None
CTCSS Paging	✓	Option	—
Programmable Battery Saver	✓	✓	✓
Backlit LCD Display	✓	✓	✓
Backlit DTMF Keypad	✓	—	—
APO, Automatic Power Off	✓	✓	—
1 MHz Up/Down Stepping	✓	✓	✓
Vinyl Case	✓	Option	Option
Scan For CTCSS Tone	✓	—	—
Built In VOX	✓	—	—
Clock	—	✓	—
Odd Split, Any Tx Or Rx Frequency In Any Memory Channel	**49**	10	1
Suggested Retail Price	**$406.00***	$439.95*	$349.95*

DUAL-BAND HANDHELD SPECIFICATIONS	YAESU FT-470	ICOM IC-32AT	KENWOOD TH-75A
Memory Channels	**42**	20	20
VFOs Per Band	**2**	1	1
Wide Receiver Frequency Range (MHz)—VHF	**130-180**	138-174	140-164
Wide Receiver Frequency Range (MHz)—UHF	**430-450**	440-450	438-450
Built-in CTCSS Encode/Decode	**Included**	Option	Encode Only
Memory DTMF Autodialer	**10**	None	None
Dual Receive With Balance Control	✓	—	✓
CTCSS Paging	✓	—	✓
Cross Band Full Duplex	✓	✓	✓
Programmable Battery Saver	✓	✓	✓
Backlit LCD Display	✓	✓	✓
Backlit DTMF Keypad	✓	—	—
Alternating Band Scan	✓	✓	✓
Cross Band Repeater	✓	—	—
Power Output on 2 Meter and 440	**2.3W**	5.0W	1.5W
APO, Automatic Power Off	✓	—	✓
1 MHz Up/Down Stepping	✓	✓	✓
Memory Channels Store Any Offset	**42**	20	20
Vinyl Case	✓	Option	Option
Odd Split, Tx Or Rx. Any Frequency In Any Memory Channel	**42**	20	2
Suggested Retail Price	**$576.00**	$629.00	$549.00

YAESU

17210 Edwards Road Cerritos, CA 90701 (800) 999-2070

Data and prices obtained from latest available manufacturers' brochures & printed material. October, 1989.

*VHF Radios only.

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KENWOOD



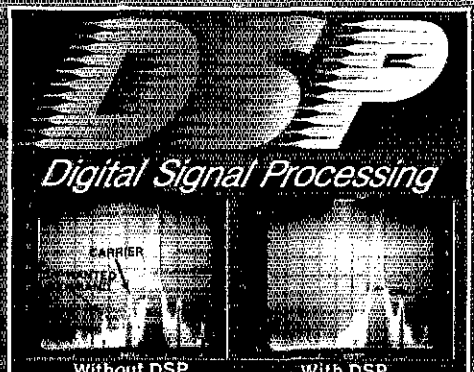
TS-950SD

"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

The Ultimate Signal.

- **Dual Frequency Receive Function.** The TS-950SD can receive two frequencies simultaneously. The sub-receiver has independent controls for frequency step size, noise blanker and AF gain and its own digital display!
- **New! Digital AF filter.** Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.
- **New high voltage final amplifier.** 50 V power transistors in the 150-watt final section, results in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.
- **New! Built-in microprocessor controlled automatic antenna tuner.** The new antenna tuner is faster and you can store the settings in memory! (Manual override is also possible.)
- **Outstanding general coverage receiver performance and sensitivity.** Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides from 100 kHz to 30 MHz. The intermodulation dynamic range is 105 dB.



- **Digital Signal Processor.** DSP is a state-of-the-art technique that maximizes your transmitted RF energy. Your signal stands out because it is much more pure than your competition! You can even tailor your transmitted CW or voice signal waveshape!
- **High performance IF filters built-in.** Select various filter combinations from the front panel. For CW: 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!
- ***Multi-Drive Band Pass Filter* (BPF) circuitry.** Fifteen band pass filters are available in the front end to enhance performance.
- **Famous Kenwood interference reduction circuits.** SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB) switchable AGC circuit, and all-mode squelch.
- **Built-in TCXO for highest stability.**
- **Built-in electronic keyer circuit.**
- **100 memory channels.** Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.
- **Digital bar meter.**

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Optional VS-2 voice synthesizer • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

KENWOOD U.S.A. CORPORATION
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P.O. BOX 1075, 959 Gana Court
Mississauga, Ontario, Canada L4T 4C2

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Optional Accessories
• VS-2 Voice synthesizer • SP-950 External speaker w/AF filter • SM-230 Station monitor w/pan display • SW-2100 SWR/power meter • TL-922A Linear amplifier (not for QSK)



Specifications, features and prices subject to change without notice or obligation.
Complete service manuals are available for all Kenwood transceivers and most accessories.