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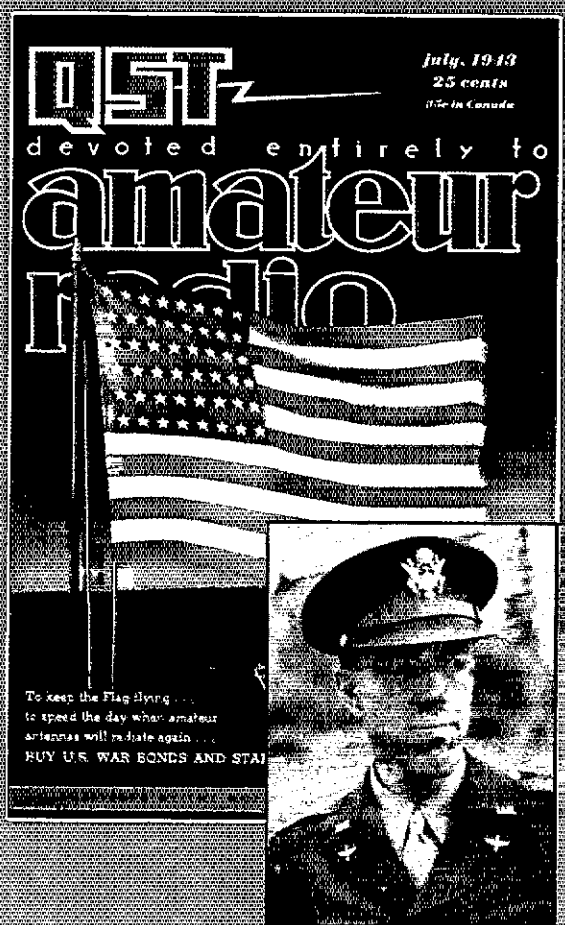
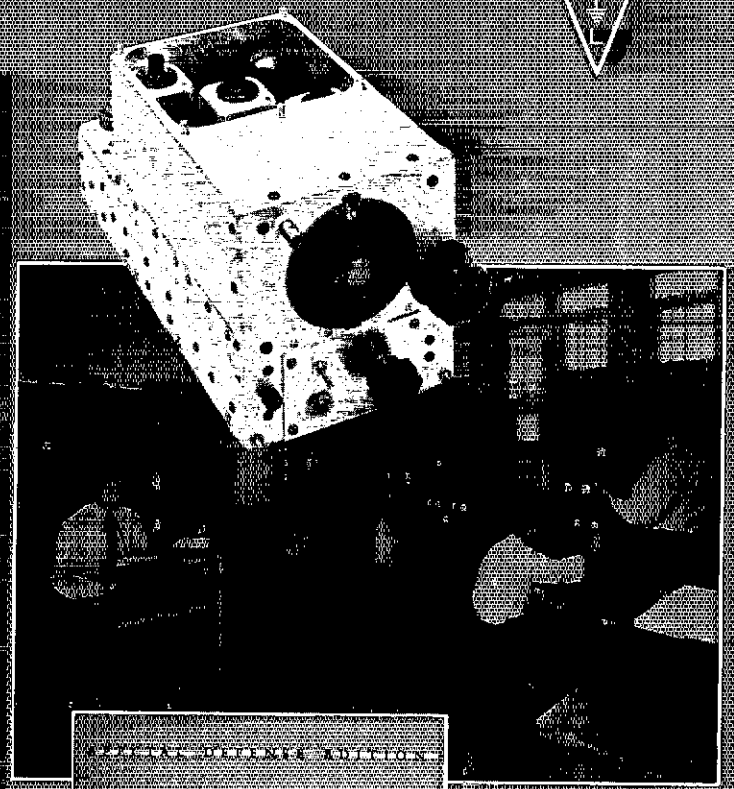
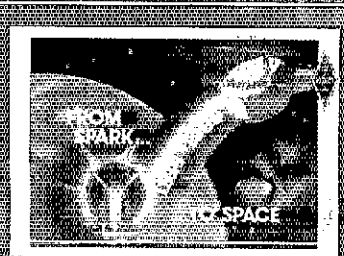
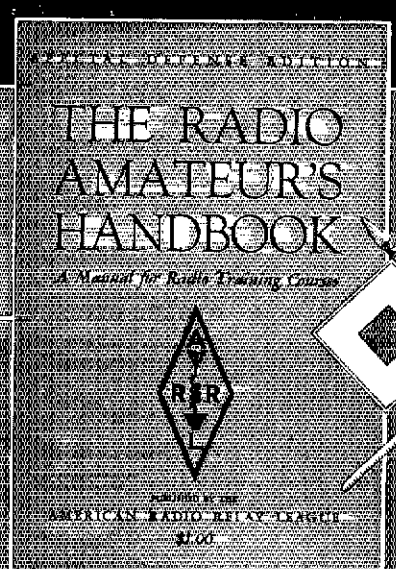
THE 40s

THE WARTIME YEARS

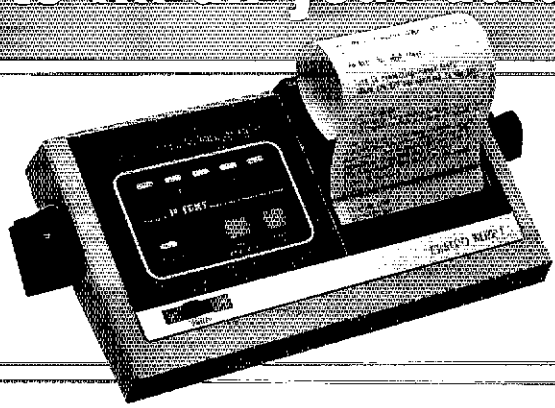








HENRY RADIO IS THE PLACE
....THE BEST PLACE
to fill all your data communications needs

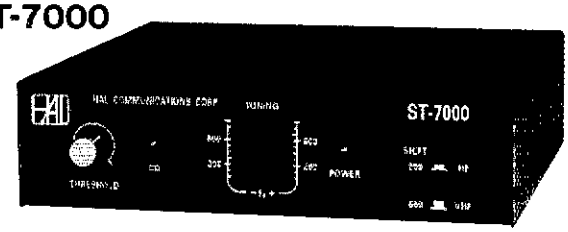


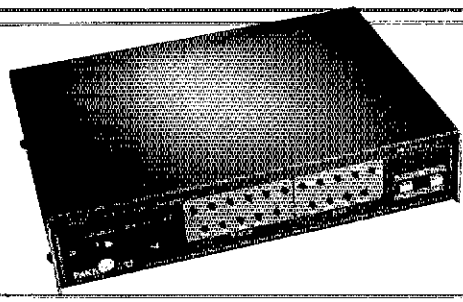
The TEMPO MPP1

...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.

HAL Communications' ST-7000

HF-Packet Modem. . .a high performance modem designed specifically for 300 baud HF-Packet. It offers no-compromise performance to assure optimum operation under the most demanding signal conditions. Techniques developed for government and military use are used in the ST-7000. AGC-controlled AM signal processing provides a wide dynamic range. All filters and detectors are optimized for 300 baud HF-Packet. It offers the 200 Hz shift mode and a wider 600 Hz shift mode, each supported by separate 6-pole input filters and a 40 db AGC system.

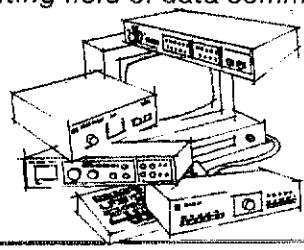




The PK-232 by AEA

...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. **Watch for the new and exciting AEA FSTV-430. Have fun on amateur TV!**

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 enterting 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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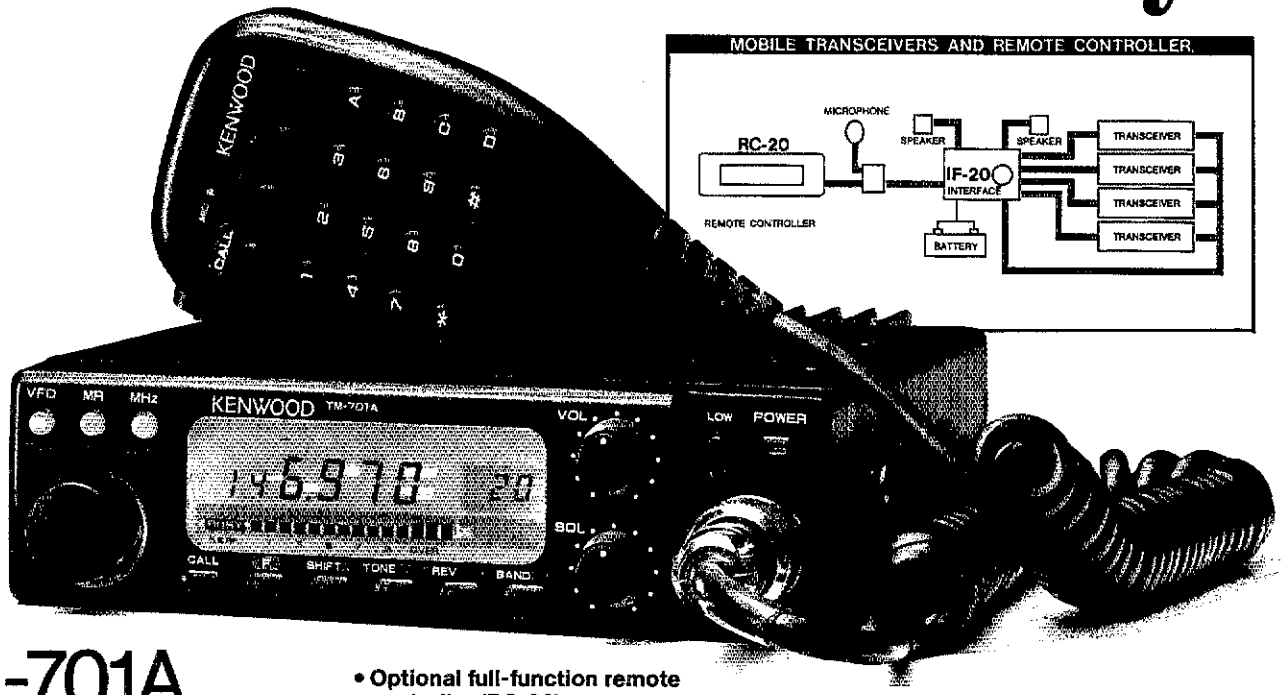

TM-701A

Dual Bander

The TM-701A combines two radios into one compact package. You get 25 watts on 2 meters and 70cm, 20 memory channels, tone encoder built-in, multiple scanning, auto repeater offset selection on 2 meters, and a host of additional features!

- **20 multi-function memory channels.** 20 memory channels allow storage of frequency, repeater offset, CTCSS frequency, frequency step, and Tone On/Off status, CTCSS and REV, providing quick and easy access during mobile operation.
- **25W on 2m and 70cm.**
- **Selectable full duplex-cross band (Telephone style) operation.**
- **Easy-to-operate front panel layout.**
- **Multi-function microphone supplied.** Controls are provided on the microphone for CALL (Call Channel), VFO, MR (Memory Call or to change the memory channel) and a programmable function key. The programmable key can be used to control one of the following on the radio; MHz, T. ALT, TONE, REV, BAND, or LOW power.
- **Easy-to-operate illuminated keys.** A functionally designed control panel with individually backlit keys increases the convenience and ease of operation during night-time use.
- **Optional full-function remote controller (RC-20).** A full-function remote controller using the Kenwood bus line may be easily connected to the TM-701A and mounted in any convenient location. The new controller is capable of operating all front panel functions.
- **Built-in dual digital VFO's.**
  - **a) Frequency step selection (5, 10, 15, 20, 12.5, 25kHz)**
  - **b) Programmable VFO**

  The user friendly programmable VFOs allow the operator to select and program variable tuning ranges in 1 MHz band increments.
- **Programmable call channel function.** The call channel key allows instant recall of your most commonly used frequency data.
- **Programmable tone encoder built-in.**
- **Tone alert system—for true quiet monitoring.** When activated this function will cause a distinct beeper tone to be emitted from the transceiver for approximately 10 seconds to signal the presence of an incoming signal.
- **Easy-to-operate multi-mode scanning.**
  - **a) VFO scan**

    Band scan, Programmable band scan.
  - **b) Memory scan plus programmable memory channel lock-out**
  - **c) Dual scan**

    Dual call channel scan
    Dual memory scan
    Dual VFO scan
  - **d) Scan stop modes**

    Time operated scan (TO)
    Carrier operated scan (CO)
  - **e) Scan direction**
  - **f) Alert**

    When the AL switch is depressed memory channel 1 is scanned for activity at approximately 5 second intervals.
- **MHz switch.**
- **Lock function.**
- **Repeater reverse switch.**

Optional Accessories

- **RC-20** Full-function remote controller
- **RC-10** Multi-function remote controller
- **IF-20** Interface unit handset • **MC-44** Multi-function hand mic. • **MC-44DM** Multi-function hand mic. with auto-patch • **MC-48B** 16-key DTMF hand mic. • **MC-55** 8-pin mobile mic. • **MC-60A/80/85** Desk-top mics. • **MA-700** Dual band (2m/70cm) mobile antenna (mount not supplied) • **SP-41** Compact mobile speaker • **SP-50B** Mobile speaker • **PS-430** Power supply • **PS-50** Heavy-duty power supply • **MB-201** Mobile mount • **PG-2N** Power cable • **PG-3B** DC line noise filter • **PG-4H** Interface connecting cable • **PG-4J** Extension cable kit • **TSU-6** CTCSS unit

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

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A HANDFUL OF OPTIONS

ICOM's incredibly rugged and reliable handhelds are designed to fit your lifestyle with a full array of interchangeable accessories. They size up/down in operating time and output power with optional battery packs, and their rapid desktop chargers keep you talking longer. ICOM speaker mics clip on to belts or lapels, and headsets with VOX deliver hands-free operation. Exercise your options with ICOM!

Field-Proven Dependability

ICOM handhelds have trekked the frozen arctic, traveled cross-country in bicycle races, been dropped from towers and run over by vehicles, yet continue operating with amazing dependability!

2-Meters

Enjoy incomparable performance with ICOM's seven watt IC-2GAT, professional quality IC-02AT, pocket-size IC-μ2AT and rugged IC-2AT. All units sport expanded frequency coverage for MARS and CAP operations and exceptionally selective receivers for high intermod immunity. The IC-2GAT and IC-μ2AT include reception from 139 to 163MHz and NOAA weather copy.

440MHz

ICOM's six watt IC-4GAT and ultra compact IC-μ4AT are front-line winners covering 440.0-449.9MHz with phenomenal quality and reliability. They represent 70cm operation at its best!

Dual Band Triumph

The amazing IC-32AT operates full duplex on 140-150MHz and 440-450MHz with five watts output on both hands. Also receives 139-174MHz and stores any Tx and subaudible tone offset in 20 memories. Truly an FM'ers dream rig!

1.2GHz

ICOM's unique IC-12GAT sets the pace with full featured operations from 1260.0 to 1299.0MHz in today's most revolutionary handheld.

Customize Your Handheld

with ICOM's full line of versatile accessories and options. Visit your dealer or request ICOM's ham catalog for the full picture.

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OUR COVER

Radio amateurs served the military in numerous important roles during World War II. Featured are the July 1943 *QST* cover, HQ Communications Manager Lt Col F. E. Handy, W1BDI, the 1942 Special Defense edition of *The Radio Amateur's Handbook*, the Signal Corps logo, the postwar W1AW, refurbished after 3½ years of inactivity, and a BC-455-B Command receiver.

CONTENTS

April 1989
Volume LXXIII Number 4

TECHNICAL

NEWS AND FEATURES

OPERATING

DEPARTMENTS

Others May Try to Imitate, But...

Only One Can Be The Best

Morse Code - Baudot - ASCII - AMTOR - Packet - Facsimile - Navtex

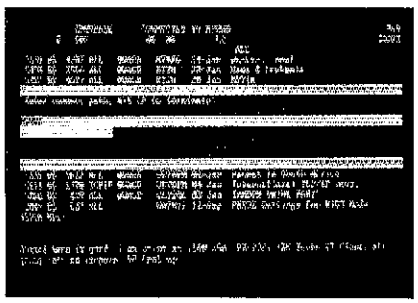
Amateur Net Price $319.95

It's a lesson you learn very early in life. Many can be good, some may be better, but only one can be the best. The PK-232 is the best multi-mode data controller you can buy.

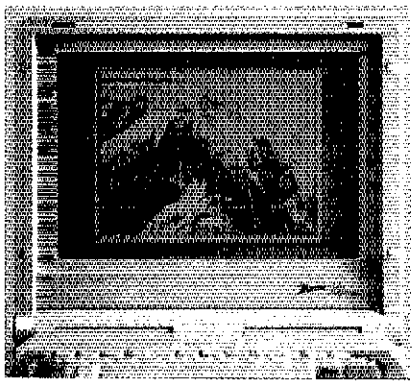
1 Versatility

The PK-232 should be listed in the amateur radio dictionary under the word Versatile. One data controller that can transmit and receive in six digital modes, and can be used with almost every computer or data terminal. You can even monitor Navtex, the new marine weather and navigational system. Don't forget two radio ports for both VHF and HF, and a no compromise VHF/HF/CW internal modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold control.

The internal decoding program (SIAM[tm]) feature can even identify different types of signals for you, including some simple types of RTTY encryption. The only software your computer needs is a terminal program.



PC Pakratt Packet TX/RX Display



Facsimile Screen Display

2 Software Support

While you can use most modem or communications programs with the PK-232, AEA has two very special packages available exclusively for the PK-232....PC Pakratt with Fax for IBM PC and compatible computers, and Com Pakratt with Fax for the Commodore 64 and 128.

Each package includes a terminal program with split screen display, QSO buffer, disk storage of received data, and printer operation, and a second program for transmission/reception and screen display of facsimile signals. The IBM programs are on 5-1/4" disk and the Commodore programs are plug-in ROM cartridges.

3 Proven Winner

No matter what computer or terminal you plan to use, the PK-232 is the best choice for a multi-mode data controller. Over 20,000 amateurs around the world have on-air tested the PK-232 for you. They, along with most major U.S. amateur magazines, have reviewed the PK-232 and found it to be a good value and excellent addition to the ham station.

No other multi-mode controller offers the features and performance of the PK-232. Don't be fooled by imitations. Ask your friends, or call the local amateur radio store. We're confident the PK-232 reputation will convince you that it's time to order your very own PK-232.

Call an authorized AEA dealer today. You deserve the best you can buy, you deserve the PK- 232.

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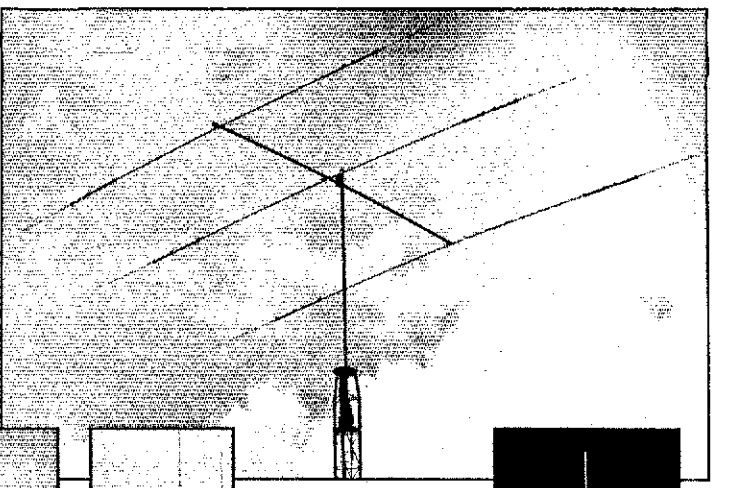
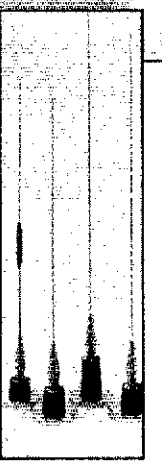
From Novice to Extra Class Cushcraft has the antenna you need.

Cushcraft offers high performance antennas to make every phase of your ham radio activity more satisfying. We have been creating innovative and exciting new products for more than 35 years. Call or write for a free copy of our full line antenna and accessory catalog or see your local dealer.

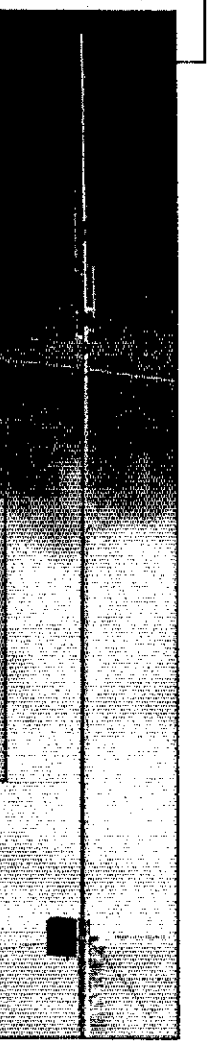


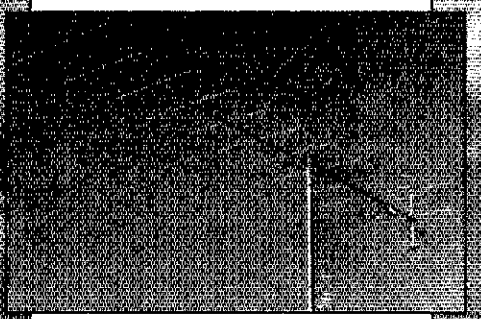


HF TRIBAND BEAM. *A3.* The most popular compact 10,15, 20 meter beam. *A4S.* A high performance 18' long wideband beam with all stainless steel hardware. 40 meter add on kits for each

CUSHCRAFT / SIGNALS MOBILES *"The choice of professionals"* can improve your mobile performance. Models for 70 cm, 2 and 6 meters.

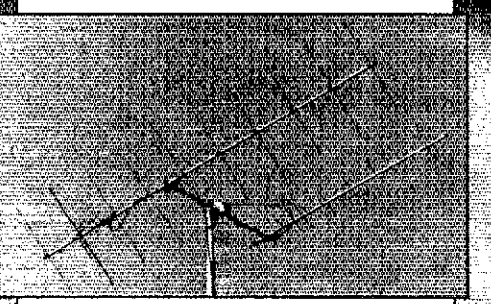
AP8 VERTICAL. Covering 10,12, 15, 17, 20, 30, 40, 80 Meters. Great choice for Novice to Extra class.





BOOMERS. The contest winners and distance record holders. Computer enhanced design for better gain, pattern and strength. There are VHF and UHF models for SSB, FM and other activities.

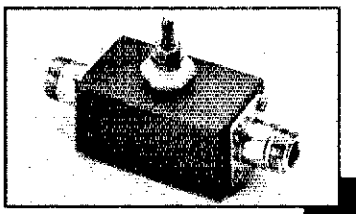
RINGO RANGER II. Still the world's favorite 2 meter, 70 cm or 220 MHz omni antenna, with more gain. A must for your FM or packet station.



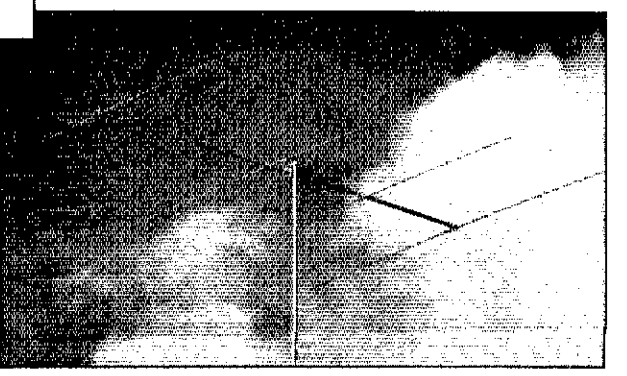
OSCAR PACK. A complete antenna system for satellite users. Includes 70 cm uplink, 2 meter downlink antennas and mounting kit.

R4 HALFWAVE 10, 12, 15, 20 METER VERTICAL. Amazing performance in a small space without ground radials. Automatic broadband operation.

FAST ACTION GAS TUBE LIGHTNING ARRESTERS. Protect your valuable radio equipment. High and low power models with SO-239 or N connectors.



SKYWALKER MONORAND. 10, 12, 15 and 20 meter yagis for more contacts, less waiting and a better signal. Preferred by contesters and DX-Peditions.



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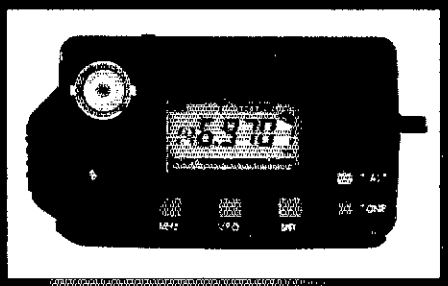
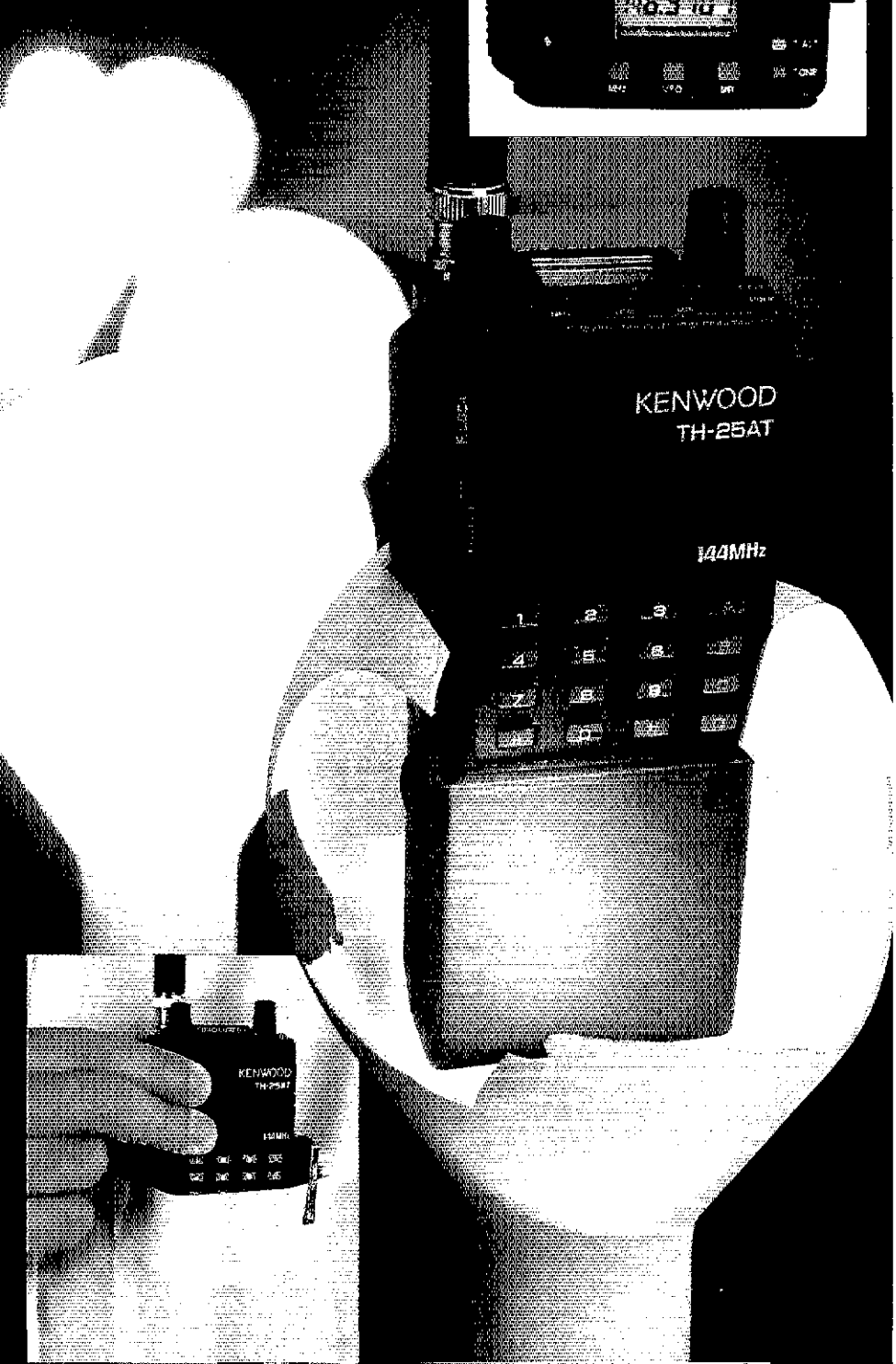


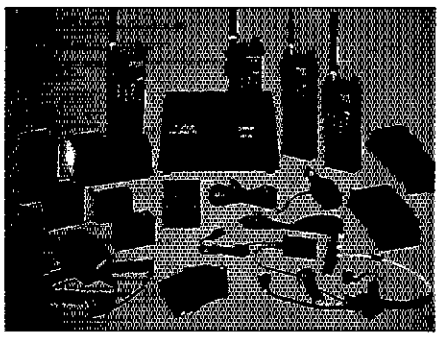


TH-25AT/45AT

New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)
  TH-45AT: 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder/decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.



Optional accessories:

• **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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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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All-mode tri-bander!

Warp Drive!

TS-790A
Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as Doppler shift compensation. Other features include dual receive, automatic mode selection, automatic repeater offset selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ±3 ppm.
- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!
- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**
- **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."
- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.
- **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 terminal.**
- **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

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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Vice Director: Howard S. Huntington, K9KM 85 South Burr Oak Dr, Lake Zurich, IL 60047

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Vice Director: Bruce L. Meyer, WØHZR, 9410 Blaisdell Ave S, Bloomington, MN 55420 (612-881-2909)

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Vice Director: Allan L. Severson, AB8P, 1275 Ethel Ave, Lakewood, OH 44107 (216-521-1565)

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Vice Director: Paul Vydareny, WB2VUK 259 N Washington St, N Tarrytown, NY 10591-2314 (914-631-7424)

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PAUL GRAUER,* WØFIR, Box 190, Wilson, KS 67490 (913-658-2155)
Vice Director: L. C. "Chuck" Miller, WAØKUH 7000 North East 120, Kansas City, MO 64166 (816-781-7313)

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Vice Director: Mrs. Evelyn Gauzens, W4WYR 2780 NW 3rd St, Miami, FL 33125 (305-642-4139)

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Vice Director: Wayne Overbeck, N6NB 14021 Howland, Tustin, CA 92680 (714-731-6178)

West Gulf Division
JIM HAYNIE, WB5JBP, 3226 Newcastle Dr Dallas, TX 75220 (214-352-6180) home; 4515 Prentice St, Suite 112, Dallas, TX 75206 (214-368-7710) business
Vice Director: Sam C. Sitton, KV5X, 1800 Jessie James, Edmond, OK 73034 (405-340-1357)

*Executive Committee Member

Section Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 15 divisions of the League are further arranged into 69 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

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South Texas — Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)
West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

THE AMERICAN RADIO RELAY LEAGUE, INC

The American Radio Relay League, Inc, is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"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.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA. Telephone: 203-668-1541 Telex: 650215-5052 MCI. MCI MAIL (electronic mail system) ID: 215-5052 FAX: 203-665-7531 (24-hour direct line)

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-660-1200.

"It Seems to Us ..."

Present at the Creation

March 1914. The American Radio Relay League is but a gleam in the eyes of two enthusiastic Hartford radio amateurs: Hiram Percy Maxim, a noted inventor and industrialist, and his 17-year-old friend Clarence Tuska. Over the next couple of months they would persuade the Radio Club of Hartford, which they had helped to found in January of that year, to support them in getting the Relay League off the ground.

How Maxim and Tuska first met is one of the great American stories. If in 1911 a young high-school boy hadn't found the nerve to confront a prominent man at his own front door, it might never have happened—and the formation of the ARRL itself might never have occurred. Here is the story, excerpted from May 1979 *QST*, in the words of someone who witnessed it: Hiram Hamilton Maxim, HPM's son.

"In 1911, when I was a boy of 11, I had a schoolmate friend, John Garret, who had made a wireless set with which he could telegraph back and forth with another friend and schoolmate, Harmon Barber. John Garret lived on the corner of Farmington Avenue and Prospect Avenue in Hartford. I was living with my family at 550 Prospect Ave. The distance they bridged was three blocks. John had made the sending and receiving set himself from equipment then available.

"I told my father about John's wireless and further told him that he could telegraph back and forth with Harmon Barber. My father, being a little skeptical, suggested that he give John a short message to send to Harmon who would then telephone back the answer. This was done, the correct answer came back at once, and Hiram Percy Maxim was hooked on 'radio' from then on for the rest of his life.

"I was just as interested. Together we immediately started to get some kind of an outfit to put out a signal and to receive. He first bought a receiving set from a firm in New York, but it was so unsatisfactory that something had to be done. My father saw in Harris Parker's toy store at the corner of Ann and Asylum Streets in Hartford a receiving set for sale that looked much more sophisticated than what we had. He bought it and brought it home one evening. We went right at it with great excitement, but couldn't seem to make it work, to our intense disappointment. So, the next day he sadly took it back to Harris Parker's.

"The next evening, the doorbell rang. My father answered the door and found a rather unusual-looking young man with black hair and brilliant, striking, greenish eyes. He said his name was Clarence Tuska, that he had made the set my father had just returned and he had come to find out why my father couldn't make it work. At that moment began a lifelong association between the two in the radio world that led to the founding of the American Radio Relay League, the C. D. Tuska Radio Company, and a close association with all of us in many ways."

Clarence Tuska had put the receiver in the toy store for sale on consignment. On going to the store to collect his money, he'd found the set on a rear counter and was told, "The man who took the set returned it and said it was no good." His recollection of the encounter that followed is captured in "A Memorable Meeting," January 1964 *QST*:

"I came directly to the point, and give or take a word or two, I can almost remember saying in one breath: 'Mr Maxim, I am the boy who made the wireless set you got at Harris Parker's and you returned it saying it was no good and I want to know why!'

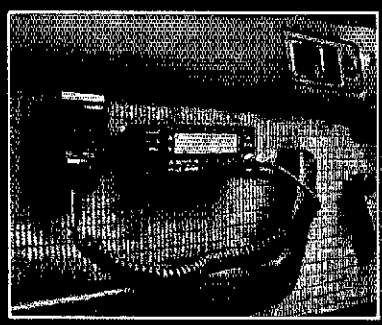
"This was obviously no trivial matter to be handled at the open door. Either we were to be shut out or invited in. I was never sure what prompted him to ask us in other than he was naturally kindly and always gentlemanly. He quickly disposed of the 'no good' comment by explaining: 'I did not tell Mr Parker that it was no good or did not work. I told him it would not serve my purpose and that I wanted something better—something more professional.' Before we said good night, [we] had Mr Maxim's order for a loose coupler, a variable condenser, a crystal detector and a pair of Brandes Navy phones."

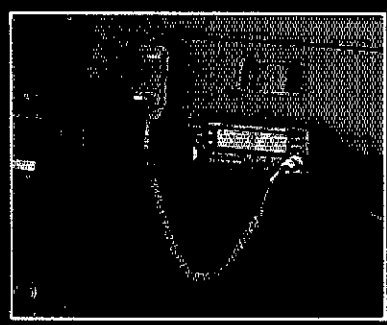
Hiram Percy Maxim was President of ARRL from its formal creation, 75 years ago next month, until his death in 1936. Tuska, the League's first Secretary and first Editor of *QST*, served in the Signal Corps during World War I and ultimately followed a path into radio manufacturing and patent law. His amateur license lapsed, but he maintained an interest in the League's growth and progress until his death in 1985.

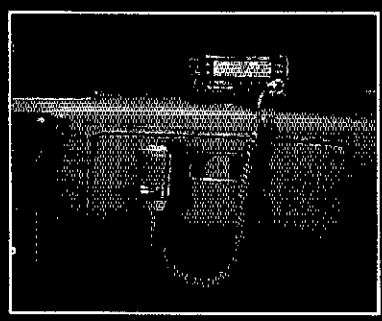
From loose couplers to packet radio; from spark to space. All that progress spans but a single lifetime. Hiram Hamilton Maxim, the instigator of his father's interest in radio and witness to all that followed, is now 89 years old. I spoke with him just the other day to extend an invitation to the July rededication of the Maxim Memorial Station, W1AW, now in the throes of renovation. Thanks to the generosity of League members from coast to coast and throughout the world, the station that is operated and maintained in his father's memory will be a showplace of Amateur Radio service and progress into the next century, and beyond.

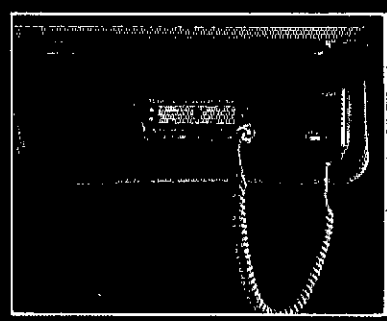
How different, how empty, our Amateur Radio world might be had it not been for two extraordinary personalities: the schoolboy and the inventor.—*David Sumner, K1ZZ*

YAESU'S DUAL BANDER GOES PLACES OTHER MOBILES DON'T.









FT-4700RH control head (1 15/16" x 5 7/8" x 1")

Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat.

High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70 cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu specialty, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz), or 430-450 MHz on 70 cm. Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

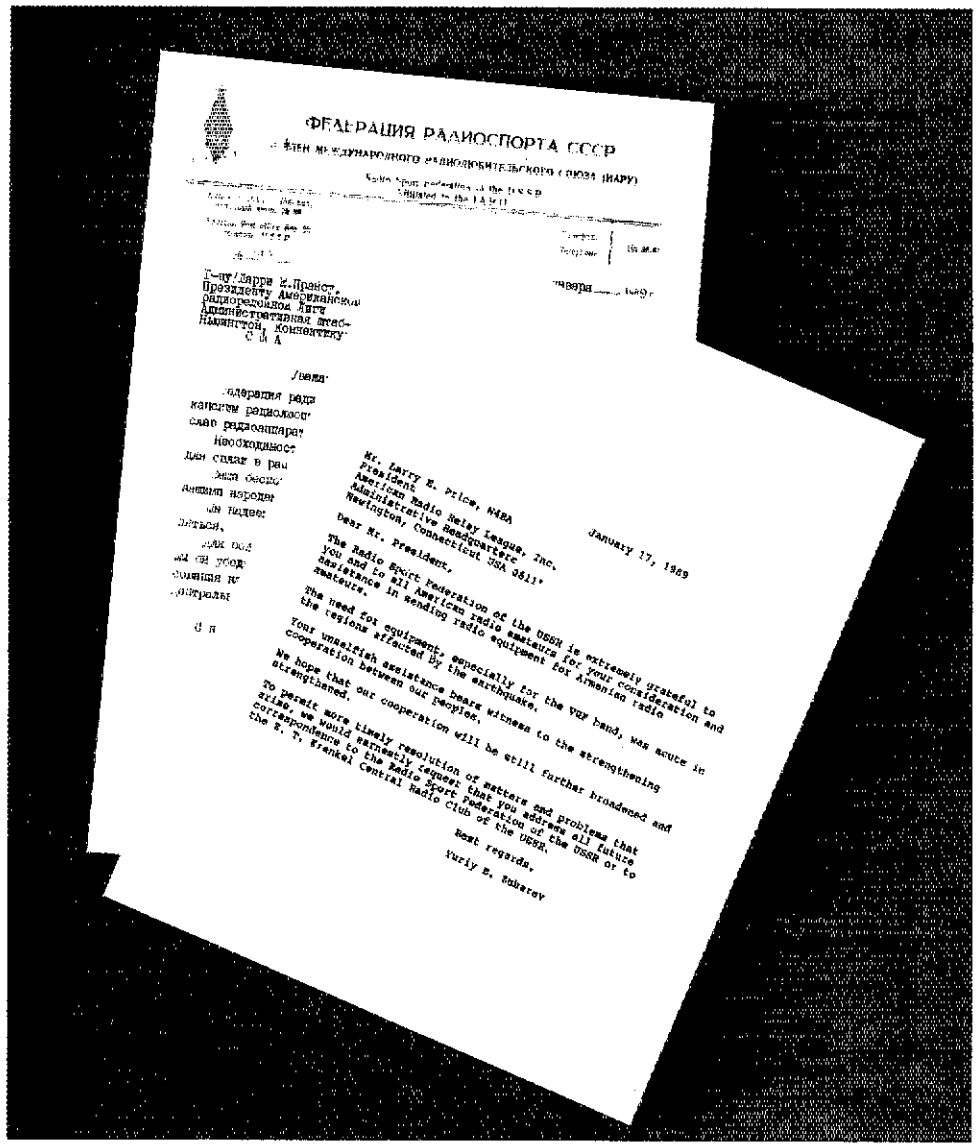
Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation, Yaesu's FT-4700RH really fits!

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847. Prices and specifications subject to change without notice. Specifications guaranteed only within amateur bands.

YAESU

UP FRONT in QST

Amateur Radio Comes Through: ARRL President Larry Price, W4RA, received a letter from the President of the USSR Radio Sport Federation thanking US amateurs for their assistance after the recent earthquake in Armenia. Amateur Radio played an important role in Armenian disaster-relief efforts, including assistance in reuniting family members who had been separated. For more on Armenia, see the story beginning on page 14 of this issue.



ФЕДЕРАЦИЯ РАДИОСПОРТА СССР

Mr. Larry E. Price, W4RA
President, Radio Relay League, Inc.
Administrative Headquarters
Newington, Connecticut, USA 0611'

January 17, 1989

Dear Mr. President,

The Radio Sport Federation of the USSR is extremely grateful to you and to all American radio amateurs for your consideration and assistance in sending radio equipment for Armenian radio amateurs.

The need for equipment, especially for the VHF band, was acute in the regions affected by the earthquake.

Your unselfish assistance bears witness to the strengthening cooperation between our peoples.

We hope that our cooperation will be still further broadened and strengthened.

To permit more timely resolution of matters and problems that arise, we would earnestly request that you address all future correspondence to the Radio Sport Federation of the USSR or to the E. T. Krenkel Central Radio Club of the USSR.

Best regards,

Yuriy E. Zubarev

Want a Place in Up Front in *QST*?

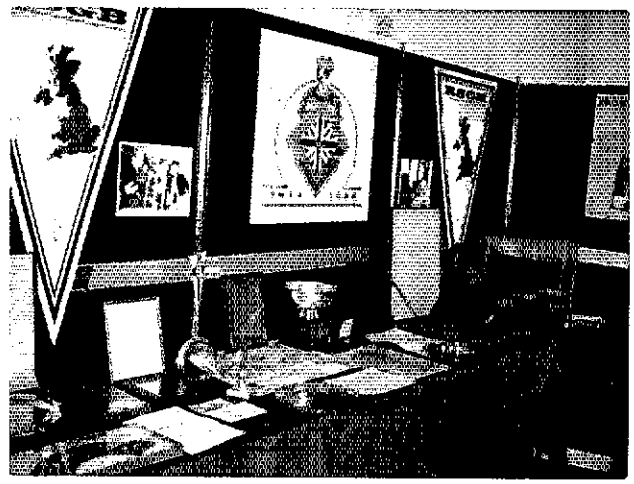
Have a news item or an interesting twist concerning Amateur Radio with a good color photograph? It just may be the ticket for inclusion in a future edition of Up Front. Here are some hints to improve your chances of getting that item in print. 1) Be sure the information is of interest to most hams. 2) Photographs must be in color; transparencies reproduce the best. 3) Send all material to ARRL, Up Front Editor, 225 Main St, Newington, CT 06111.

The Dangers of VOX: You might want to avoid using VOX in the immediate vicinity of a "repeater," according to Scott Behnke, KL7IVQ, of Ewa Beach, Hawaii. Scott always turns off the VOX when "Ben Gann," his pet parrot, is nearby. Sounds reasonable, in light of present third-party limitations. *(photo courtesy KL7IVQ)*

It's official! The design submitted by Kyle Thompson, W6BNJ, of San Jose, California, was chosen as the official NTS logo by the ARRL Board of Directors at its January 20-21 meeting in Hartford. Kyle, whose design was chosen from four finalists, will receive an engraved plaque, an *ARRL Operating Manual* and recognition in field periodicals *Section Leader* and *Field Forum*. Congratulations to Kyle on his FB design!

The Show Must Go On: A 44- × 10-foot mobile office has been installed next to W1AW to house the code-practice and bulletin transmitters during the renovation of the brick building. Membership Communications Services Manager John Lindholm, W1XX, says service to W1AW's listeners will be interrupted as little as possible. *(photo KC1MP)*

Visiting RSGB? In London with half a day to spare? Take the tube to King's Cross Station and then catch the train for the 20-minute ride up to Potter's Bar. You'll enjoy your visit to Lambda House on Cranborne Road, seeing the production facilities, station and mementos of RSGB's 75th anniversary. *(photos W1YL)*



Easy Does It

While ALC is an essential feature of modern amateur equipment, it is not the answer to all linear amplifier overdrive problems. Check out AG6K's article on page 18 of this issue for info on how to avoid overdriving a linear amplifier.

Need an Antenna for a New Band?

Looking for an inexpensive good-performing antenna for the new 17-meter band? K7KGP's article on 5/8-wave antennas, beginning on page 19, may be just the info you're looking for.

Don't Be a Lid!

Courtesy and good amateur operating practice have always been important, and still are. Offering all amateurs a reminder of this is NR5Q's story on page 44. Take it to heart!

League Lines

W1AW renovation begins! Construction work on the renovation of W1AW has begun and is scheduled to be completed for ribbon-cutting in July. During the reconstruction, W1AW will operate from temporary quarters in a trailer adjacent to the present building, and the same antenna system will be used.

During the move, some scheduled transmissions may have to be omitted, and operation by visitors may have to be curtailed during certain periods. Recently, W1AW has been active many weekdays in the 10-meter Novice/Tech phone band around 28.460 MHz beginning at 2100Z.

17-meter band! The new 18.068-18.168 MHz band is quite popular. For complete details on this new band, along with the new FCC rule changes, see the Happenings column on page 58.

17 meters is a good DX band. HQ staffer Nao Akiyama, N1CIX, worked 75 DXCC countries on 17 meters in just 28 days during February for his ARRL Diamond Jubilee Award (sorry, there are no single-band endorsements for this award). See October 1988 *QST* for details on the Diamond Jubilee Award.

The ***Eighth ARRL Amateur Radio Computer Networking Conference*** will be held on Saturday, October 7, at the Air Force Academy in Colorado Springs, Colorado. Topics this year are expected to include HF Packet modems and protocol, AX.25 Versions 2.1 and 3.0, packet satellites, higher-level protocols, network development and international matters.

Prospective contributors should request an author's kit and identify the topic of their paper immediately. Author kit requests and papers should be sent to Lori Weinberg at HQ. The deadline for receipt of camera-ready manuscripts is August 28, 1989. Proceedings will be available at the conference and by mail from ARRL HQ.

Do you have ***experience in writing school curricula, critiquing educational publications*** or similar activities? At the January 1989 ARRL Board of Directors meeting, Minute 127 authorized staff to implement an Educational Advisor program. Interested? Send information on your area of abilities and expertise to Rosalie White, WA1STO, Educational Activities Branch at HQ.

General Motors is conducting a survey of Amateur Radio use in medium and heavy duty trucks. If you operate mobile from a medium duty or heavy duty truck, please write and describe the bands you operate, the power output and the antenna location. Letters may be sent to EMC Department, General Motors Proving Ground, 40-EMC, Milford, MI 48042.

Open house. The ARRL HQ building will be open Sunday, June 11, from 10 AM to 4 PM. If your club or group wants to schedule a visit, please notify Membership Communications Services at HQ. Be sure to bring a copy of your license if you'd like to operate W1AW; however, operating time may be limited due to construction. There is also a local hamfest held in Newington that same day.

Traveling this summer? If you are planning a trip to a foreign country other than Canada and are interested in the possibility of operating there, ***you must apply for a license even if the US has a reciprocal Operating Agreement with that country.*** You can obtain information about operating from virtually any country by writing the Regulatory Information Department at HQ. Please include an SASE. Remember that many countries require a minimum of 4-6 weeks lead time for processing of reciprocal permit requests, although some do offer walk-in processing.

Traveling to Canada? US amateurs traveling to VE-land are reminded that the US has automatic reciprocity with Canada. All that is needed for operation north of the border is your original license. Visitors must use the appropriate VE/VO/VY identifier, such as N4YE/VE2 when visiting Quebec.

First 1296-MHz Worked All Continents (WAC) awards. It has been nearly 13 years since the first VHF/UHF WAC was achieved on 432 MHz, and recently the barrier was broken on 1296 MHz as well! The first 1296 MHz World WAC award was achieved by Willy Bauer, LX1DB, in January 1989. The first North American WAC award was achieved by Allen Katz, K2UYH, the following month.

VHFers! Don't forget the ARRL Spring Sprints in April. 144 MHz—April 10, 220 MHz—April 18 and 432 MHz—April 26. For further details see the Contest Corral column in this issue.

Remember the ***ARRL National Convention*** on June 2-4 in Dallas/Ft Worth, Texas. Complete details will appear in next month's *QST*.

For a couple of years, ARRL and the Radio Sport Federation of the USSR have been discussing the possibility of sponsoring a ***"Soviet-American Goodwill Contest"*** every third year. To get the ball rolling, the editorial staff of *Radio* magazine in Moscow has volunteered to administer an event on April 9 as an experiment. Check it out in Contest Corral on page 88.

Armenian Earthquake— A Ham Digs In

A moving, personal story of a northwestern amateur's role in relieving the anguish of Armenia earthquake victims in an outstanding example of Amateur Radio's international goodwill and public-service capabilities.

By John M. Ladd, N7HZG
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Author John Ladd, N7HZG (center), with Gene Shulgin, UZ3AU (l), and Peter Strezev, UA3AOC, (r), *(photos by Steven K. Castello)*

The December 7 earthquake that struck Soviet Armenia left thousands dead and hundreds of thousands homeless. As a new member of the Seattle/King County Disaster Team, I traveled to Armenia with 32 other fire fighters, paramedics, nurses, physicians and support personnel to bring in 100,000 pounds of medical supplies, provide emergency medical care and perform search- and-rescue operations in the field. My primary role was to provide communications for our team using Amateur Radio. This article is an attempt to share with my fellow hams that experience, both the tragic and the good, and to give credit to those people who helped the Armenian people and aided our team in the work.

The Seattle/King County Disaster Team is a nonprofit organization comprised of volunteers within the state of Washington. The group has a wide range of resources at its command including emergency medical and fire-fighting skills, dog-search teams and interpreters. The team's previous responses involved earthquakes in Mexico City (1985) and El Salvador (1986).

The group began mobilizing December 9, even before all the travel details had been worked out with the US State Department and the Soviet government. Members were working on everything from relief supply donations to the team's transportation right up to departure. My primary job was to secure 2-meter portables and a small HF station for use in the field. I was unsure of how the Soviets would react to the radio equipment and my planned operation. I had no idea if hams were already working in the disaster area or of the conditions I might find.

Manufacturers and Local Hams Pull Through

Although there were many ifs, the local amateur community was more than willing to help. Through Randy Brink, KD7IK, the word was put out on the local DX repeater that 2-meter hand-helds were needed. Ed Lutz, K7DZ, responded by loaning his ICOM IC-2AT. ICOM America in Bellevue loaned three IC-2ATs with chargers and spare battery packs. Advanced Electronic Applications, Inc (AEA) of Lynnwood donated 10 Hot Rod™ portable antennas and an Isopole™ 2-meter base antenna to round out the VHF picture.

For HF gear, Harry Lewis, W7JWJ, and his wife Mary, W7QGP, loaned an Atlas® 180, power supply, two wire antennas and a tuner. By the time the plane, a 747 cargo carrier donated by Flying Tigers, left Seattle/Tacoma airport December 13, all the radio gear had been secured. After joining up with the 19 members of Medical Teams International, only the long 18-hour flight to Armenia remained.

A Toast In Our Honor

We arrived at Yerevan Airport the next day and spent the first hour getting acquainted with officials from Yerevan and local hospitals. Then, while it was being decided what Yerevan hospital would be our main base of operations, 13 trucks were secured, and the unloading of the medical supplies and our gear began. It was quite impressive to see the trucks backed up to the 747, with human chains of Americans

and Armenians unloading tons of bandages, medicine and equipment. It was the first of many moving moments I would witness.

By 11:00 PM, the supplies had been unloaded. We placed our personal gear on buses, said good-bye to the flight crews of our plane and left for the heart of Yerevan to spend the night at National Republic Hospital, our main base of operations while in Armenia. When we arrived, we were greeted by an administrator of the hospital, treated to a toast in our honor and then given empty rooms in which to rest, sleep if we could, and generally prepare for the coming day.

Off To Leninakan

The next morning, December 15, we met at 7:30 in the lobby of the hospital to plan our operation. It was decided that the Medical Teams International people would stay in Yerevan, working out of the hospital to assist the local physicians. Our team would travel to Leninakan, one of the hardest-hit cities. Our gear was loaded onto a bus, and we set off up through the mountains to Leninakan, the second largest city in Armenia, 65 miles away.

The trip took four hours as the road was crowded with traffic and heavy equipment. The bus was slow as it was loaded down with tents, generators and medical supplies. The time was put to good use checking equipment and making plans for our field operation. There were a few tense moments when passing checkpoints guarded by tanks and soldiers, but we quickly learned that everyone we met was friendly and helpful.

As we entered Leninakan, there was a definite change of mood on the bus. One minute we were discussing plans, talking among ourselves; the next, total silence. Through the windows of the bus, the scene had changed from countryside to one of destruction. No street in which the bus traveled was spared. Apartment buildings that had once stood five stories were flat. Piles of rubble were in the streets. It seemed that at every crushed building we passed, there were local rescue workers searching for victims. The stacks of coffins, hundreds upon hundreds, color coded black for infants and children, red for teenagers and plain wood for adults, were a sobering sight.

Disaster Team member Julie Campbell, RN, attends to an Armenian patient, as Soviet troops look on.

We Set Up Camp and Meet Soviet Hams

Once in the city center, the team leaders went to the KGB headquarters which had become the main operations center for all relief operations in the city. It was here that our group met with Office of Foreign Disaster Assistance officials. While making plans to set up our camp, I was introduced to two amateurs from Moscow: Peter Strezev, UA3AOC, and Gene Shulgin, UZ3AU. Peter and Gene had come down from Moscow three days after the quake and set up UK3F/UG in a room across the hall from the OFDA office. They were operating both an HF station with links to Yerevan via UG7GWO and Moscow, and a VHF station for communications with many operators in the field.

We took a few minutes to get acquainted and then began making plans. Their men in the field would report back from sites where there was the possibility of trapped victims; word was then sent out to rescue teams. When I explained the purpose of our team and my concern about operating, they told me not to worry. We made arrangements for me to check in with them on 146.00 MHz as soon as we got our camp pitched.

As it turned out, while returning to our bus, we were directed to a site where sounds were heard from under the rubble. After working past dark, we drove approximately four miles to the edge of the city to set up camp next to the Austrian Army Medical Team.

Immediately, we had our first and most serious equipment failure—we lost our generator after 10 minutes of operation. Had it not been for the Austrians and a very large propane flood light they loaned us, we would have had to set up camp in the dark. Later, after we made an attempt at dinner, most members turned in, hoping to get some sleep before beginning operations the next day.

The communications tent with the antenna mast in the foreground.

Team Check-in Schedule

Dawn on December 16 brought a cold morning and the beginning of our team's rescue efforts. We deployed teams of medics and fire fighters along with dog-search team members. Each team leader carried a 2-meter hand-held tuned to 146.00 and followed a check-in schedule: upon arrival at a search area, an on-site status report and a final check-in when returning to camp. This procedure worked well, and also allowed Peter, monitoring 146.00 at headquarters, to keep track of the field teams and relay information when required.

Search operations were going on 24 hours a day with teams working in shifts during our entire stay at the camp. At least twice a day, I would contact Peter for updates on our team. He relayed requests to our people in Yerevan, so we could get needed supplies brought to camp.

On our last night in Leninakan, one of the more dramatic incidents took place. It was about 11:30 PM local time, and it was snowing hard. We still had one team out working with the Austrians. Most of the team members in camp were getting some needed sleep when Peter called me with information about a site. A local man had come into headquarters with a report that snow wasn't sticking to the rubble, and he felt that there was someone still trapped under it alive.

With Peter getting more information about the location, I informed our team leader, and a search team was ready in minutes. The only problem was getting transportation from our camp to the site. While we were working on that, Peter called back and canceled the search for our team. As it happened, another team had

ARRL Sends Packet Stations To USSR

As part of the Armenia effort, the League sent six donated packet VHF stations to the USSR at the request of Leonid Labutin, UA3CR, one of those in charge of radio communications. Leo had requested assistance in the form of portable packet-radio stations to help the Soviets develop their fledgling packet-radio network in response to the emergency.

Leo is well known to North American amateurs by his long involvement in the amateur satellite program and in the joint Canadian-Soviet SKITREK last year. He passed the Extra Class exam during a visit to Atlanta last November, and now holds AB4LZ.

Thanks to *QST* columnist Vern Riportella, WA2LQQ, donations of equipment were lined up from Tandy Corporation (six Model 102 laptop computers), Yaesu USA (six FT-23R transceivers), and AEA (six PK-88™ TNCs, a PK-232™ data controller and six Hot Rod™ antennas).

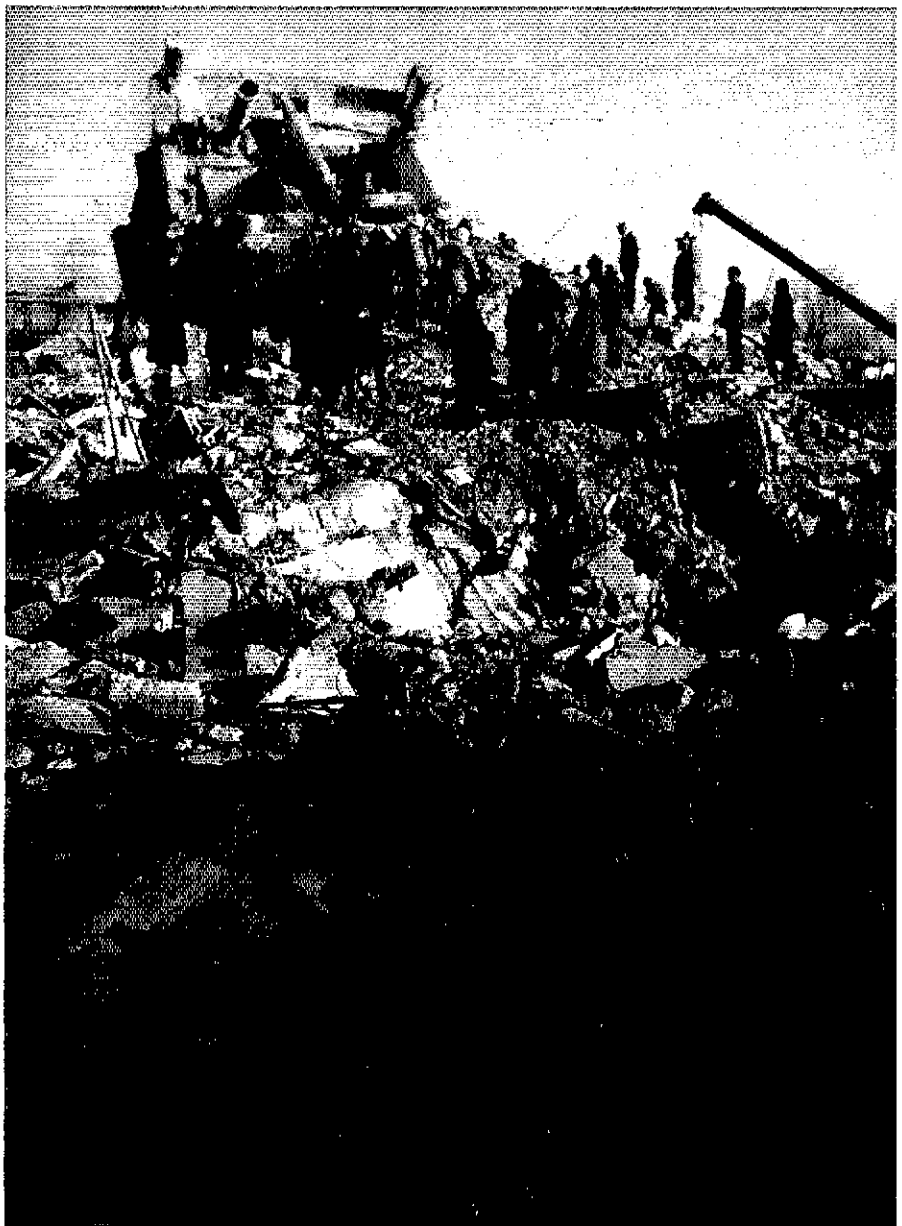
The donations were shipped to HQ, and employees of the ARRL Laboratory spent two days making up cables to integrate the donated equipment as six complete, separate packet stations. The League added a supply of batteries and other accessories to the shipment.

The stations were packed and given to Riportella, who delivered them to Kennedy Airport, where they were flown to Moscow on December 21.

As reported in March *QST*, page 57, the equipment was put to use in helping to reunite separated families and friends.

ARRL Headquarters staff monitored relief communications efforts, reported network and regulatory information via W1AW and answered hundreds of telephone calls from amateurs, friends and relatives of Armenian residents and the media.—*Rick Palm, K1CE*

A site in Leninakan where the Seattle/King County Disaster Team worked.



sent some members to the new dig. The next morning, Peter informed me that a 14-year-old boy had been pulled alive from the rubble.

In addition to the search-and-rescue operations, our team also opened a walk-in clinic at our camp that treated an average of 200 patients a day, distributed hundreds of items of clothing and blankets and supplied a local first-aid station with medical items.

We Break Camp and Go Home

As cold and as tired as we were, it was difficult to break camp on December 20. Many of the people who came to the clinic became instant friends, and many more brought gifts for us and shared what food they had. In the midst of all the destruction, I was brought to tears more than once by the warmth and love of the Armenian people. It was especially difficult to say good-bye to Peter and Gene. In the short time of five days, we had become fast friends, and when they came to camp that afternoon to say so long, it was a sad moment.

The return bus ride to Yerevan was a bit faster and quieter than the trip to Leninaken. Three-quarters of the team were sick, and everyone was exhausted. The beds at the National Republic Hospital were again offered to us, and they were welcome after sleeping on the ground. We also got badly needed hot showers. Due to a weather problem that grounded our plane in the States, we spent two days in Yerevan recovering and flew out in two groups on December 22.

As good as it felt to get home on Christmas Eve, I must say I felt a bit of sadness. It was difficult to return home to a warm house and a sure supply of food, when I know how the people of Armenia are suffering right now. One thing that brings comfort is that I learned that the Armenians are a very warm and giving people, but are also strong and proud. They will survive this disaster and rebuild their cities to their former beauty. I also reconfirmed the fact that Amateur Radio operators the world over are a giving bunch and will rise to the challenge, no matter what the call.

John Ladd, N7HZG, has been a professional fire fighter for 17 years, working for the City of Bellevue, Washington for the past seven years. He has been an amateur since 1966. Ladd joined the Seattle/King County Disaster Team for the Armenia mission and has since been placed in charge of communications for the group.

Amplifier-Driver Compatibility

Modern linear amplifiers require much less drive than the 100+ watts many transceivers provide. Here's a simple cure for the splatter that results when automatic level control fails to take up the slack.

By Richard L. Measures, AG6K
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About ten years ago, when amplifier tubes were much less costly, the two-tube amplifier was in vogue. During the last few years, a number of new amplifier designs, many of which use only one high-mu triode operating grounded-grid in class AB_2, have appeared on the market. A single-tube amplifier has some advantages over a two-tube design: reduced parts count and cost, and the elimination of the possibility of a push-pull parasitic-oscillation between two tubes.[1] But the high-gain triodes now commonly used in single-tube amplifiers have a major drawback: They require *much* less drive (less than 20 to 75 W per tube for full output) than that produced by contemporary transceivers (100 W or more). Overdrive is *guaranteed* when one of these tubes is driven with 100 W; depending on the tube type (the 3CX800A7, for instance), 100 W can overdrive *two* (or even three!) high-gain tubes.

Overdrive pushes an amplifier tube out of linearity and into gain compression.[2] Increasing drive beyond the point at which compression begins causes a slight increase in power output and a great increase in intermodulation-distortion (IMD) products (splatter). In my experience, driving a tube into compression boosts the desired signal by another 1 to 1.5 dB or so—1/6 to 1/4 of an S unit[3]—at the receiving end, while splatter increases dramatically. Obviously, trashing part of a band for the sake of a fraction of an S unit is hardly a reasonable tradeoff!

Why ALC Isn't the Solution

In theory, at least, amplifier-to-transceiver automatic level control (ALC) is supposed to take care of the overdrive problem. ALC is a form of negative feedback in which a dc control voltage corresponding to the amplifier drive or output is applied to the amplifier driver—nowadays, usually a transceiver—to reduce drive when the amplifier drive or output rises above a predetermined level. In practice, ALC has a serious flaw: *It doesn't act until the amplifier has already been overdriven.* Because detecting overdrive and generating a control voltage involves the charging of several capacitors, and charging capacitors takes time, ALC is like trying to close the barn door when the horse is halfway out of the barn. Result: The amplifier is briefly overdriven until the ALC circuitry builds up enough feedback voltage to reduce the transceiver output, and generates splatter at the beginning of words and loud speech components.[4]

Better Protection Against Overdrive

Fig 1 shows a simple and inexpensive way of correcting the overdrive. If a cathode resistor (R_C) is installed between the RF drive coupling capacitor, C3, and the cathode of the amplifier tube, an RF-negative-feedback voltage will be developed across R_C when the tube amplifies RF. This negative-feedback voltage reduces the driving voltage developed at the cathode and helps to keep tube operating in its linear region. The greatest negative-feedback voltage is developed at the peak of the driving-signal waveform. In other words, the harder the cathode is driven, the greater the voltage drop across R_C. This reduces the net drive applied to the cathode and keeps the tube from being overdriven. R_C converts the excess driving power to heat.

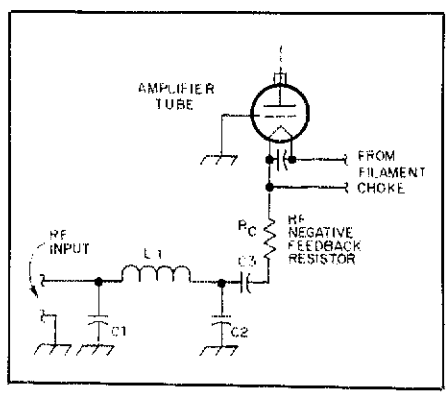

Fig 1—Addition of a cathode resistance, R_C, adds negative feedback to an amplifier and makes it more resistant to overdrive. Because R_C increases the amplifier input impedance, the values of the input-network reactances (C1, C2 and L1) may require adjustment when R_C is added. C3 is a dc blocking capacitor. See the text for how to find the resistance and power-handling capability necessary at R_C.

The negative feedback due to R_C also improves amplifier linearity by reducing IMD to a level lower than that attainable when the tube is driven at its rated driving power without R_C. In addition, R_C reduces the amplifier gain at VHF and UHF, reducing the chance of VHF or UHF parasitic oscillation.

A Case Study

The optimum value for R_C depends on the power difference between what the transceiver supplies and what the amplifier needs, and the cathode impedance of the amplifier tube(s). Here is an actual case: a commercial, single-3-500Z, Amateur Radio amplifier driven by a contemporary 100-W transceiver. The potential for overdrive is severe because a 3-500Z can be driven to its maximum anode-current rating (400 mA) by about 55 W.[5] Assuming that the input and output networks associated with it have been properly adjusted, however, a 3-500Z driven by 100 W will draw *500 mA* from its anode supply. This causes a dramatic increase in IMD because the surplus 45 W or so of drive power does not cause a *linear* increase in the 3-500Z's anode current. (If the 3-500Z *were* capable of operating linearly at 100 W drive, its anode current would increase to about 727 mA instead of 500.) Driven by a 100-W transceiver, this 3-500Z is definitely operating in compression whenever voice peaks outrun the amplifier-driver ALC. (I note with alarm that the manual for this amplifier states that 500 mA of anode current is okay for a 3-500Z! Perhaps the amplifier's design engineer[s] did not read the tube

[1]Notes appear on p 20.

manufacturer's specification sheet for the 3-500Z!)

I installed a 20-Ω R_C at the 3-500Z cathode as shown in Fig 1. The anode current decreased to 420 mA with 100 W drive applied to the amplifier. (Remember, these numbers obtain with the amplifier *correctly tuned*; more on amplifier tuning later.) Would this fix be sufficient?

Even though 420 mA is 5% above the 3-500Z's 400-mA maximum-anode-current rating, the IMD performance of the R_C-modified amplifier is excellent. The anode current could probably be reduced to about 400 mA if a 22-Ω resistor were used for R_C. But, if it works well enough, why fix it?

The Power Rating of R_C

The power rating of R_C (or, if multiple resistors are used at R_C, the total power rating of the resistors that compose it) depends on the type of service in which the amplifier will be used. For example, if long-winded RTTY operation at full power is contemplated, a 40-W rating for R_C is appropriate. If SSB or CW operation is the norm, a resistor capable of dissipating much less power can be used. (The average duty cycle for CW is about 30%; for normal SSB voice operation, about 15%.) If high-quality "flameproof" resistors are used at R_C, parts rated at relatively low dissipations can be used because such resistors can safely dissipate about 2½ times their published rating for 1 hour in free air at room temperature. They do even better in moving air.

In our case-study 3-500Z amplifier, R_C (20 Ω) comprises four 20-Ω, 2-W flameproof resistors connected in series-parallel. This 8-W resistance has proven satisfactory for CW and SSB operation, and no electrical or physical changes have been observed in the resistors.

The Effect of R_C on Amplifier Input SWR

The input impedance of a cathode-driven 3-500Z is about 120 Ω. Installing a 20-Ω R_C increases this impedance to about 140 Ω. In the case-study amplifier, the addition of R_C degraded the amplifier input SWR on some bands and improved it on others, depending on whether the output impedance of the unmodified input network was too low or too high to begin with. If, for instance, the network's output impedance was too high to start with, adding 20 Ω slightly improved the match, and, hence, the input SWR.

If you would like to improve your amplifier's input SWR—whether or not you have installed RF-negative-feedback resistance in the cathode(s) of its tube(s)—it is important to remember that the impedance-transformation ratio of a pi network cannot be altered without changing the values of *two* of the three network reactances. If the input SWR shifts as you adjust the slug-tuned inductor in an amplifier-input pi network, this is because the network resonance, and not the network transformation ratio, changes as you adjust the coil. If the network transformation ratio is incorrect, one of the network capacitors (usually fixed) must also be changed in value. To increase the output impedance of a tuned input circuit like that shown in Fig 1, it is usually best to increase the value of the input capacitor (C1)[6] and reduce the inductance of L1 by backing its slug out slightly. This technique slightly increases, rather than lowers, the Q of the input pi network. (I prefer to slightly increase the Q of the input network because the transistor-final transceivers I've seen work better when feeding a tuned input circuit with a higher-than-average Q.)

Finding R_C for Your Amplifier

The exact value of R_C necessary for every possible case cannot be calculated with a formula. The process of finding the correct value of R_C involves an educated guess followed by some cut-and-try experimentation. (See the sidebar for practical examples of how the resistance and power dissipation of R_C vary with the application.) A starting value for R_C in a 70-W-drive amplifier driven by a 100-W driver is 10 Ω. For a 35-W-drive amplifier and 100-W driver, try an R_C of 50 Ω. Tune the amplifier for maximum power output with maximum drive power applied. If the resulting anode current exceeds the manufacturer's specifications for the amplifier tube(s), more resistance is needed at R_C. If the resistor(s) comprising R_C change(s) color and/or resistance after extended use, use higher-wattage resistors at R_C.[7]

Amplifier Tuning

Some owners of overdriven amplifiers attempt to correct excessive anode current by underloading the amplifier—that is, by increasing the loading capacitance in the amplifier output network. This decreases anode current at the expense of excessive grid current and amplifier nonlinearity. Don't do it! Another incorrect method of reducing excessive anode current during tune-up is to reduce drive power and then, during normal operation, to apply normal (read: *excessive*) driving power. This causes splatter and excessive grid and anode currents. The importance of proper amplifier tuning is described in the sidebar on p 26 of March 1989 *QST*.[8]

Construction Notes

If you build R_C from multiple resistors, leave an air gap of at least 1/8 inch between the individual resistors so that they do not roast each other. I do not recommend using phenolic-cased carbon-composition resistors for R_C because they are intolerant of overload. Flameproof metal-film and metal-oxide-film resistors are much more durable and overload-tolerant.

Summary

More power output is not *always better.* Short of anode-current saturation, driving a vacuum tube into compression increases its power output, *but in a nonlinear, splatter-producing way.* A linear amplifier stays linear only when it is tuned properly *and not overdriven.*

The 100-W-output transceivers ubiquitous today are capable of severely overdriving the high-gain triodes commonly used in modern Amateur Radio linear amplifiers. ALC is an imperfect cure for such overdrive because it cannot act fast enough to keep an amplifier from being overdriven on sudden voice peaks, and because it goes into action only after overdrive has already occurred. Overdrive on voice peaks is better reduced by installing series resistors between the amplifier input network and

(continued on page 20)

Two More Examples

Because of the many possible amplifier-driver combinations, and because a given tube type may be used within its ratings through a wide range of operating conditions, finding the correct resistance and power rating for R_C may require experimentation. Here are two practical examples of how one R_C doesn't fit all:

A Single 8877

An amplifier based on a single 8877 triode was clearly being overdriven by a 100-W transceiver. This situation was predictable because, according to the tube's manufacturer, Eimac®, the 8877 requires only 75 W drive for maximum output under the conditions present in the overdriven amplifier. The overdrive problem was corrected with an R_C of 10 Ω. The resistor installed comprised four 10-Ω, 2-W metal-film, flameproof resistors in series-parallel.

Two 3CX800A7s

A linear amplifier that uses a pair of 3CX800A7s in grounded grid can be driven to full output by about 45 W. To make such an amplifier compatible with a 100-W driver, install a 40-Ω resistor in series with the cathode of each tube. Each of the two 40-Ω resistors should comprise five 200-Ω, 2-W (3 W for RTTY use) metal-film resistors in parallel.—*Richard L. Measures, AG6K*

Simple 5/8-Wave Verticals for 12 and 17 Meters

Here's how to turn a 30-meter quarter-wave vertical into a 5/8-wave radiator for the 12-meter band. And there's a bonus: You can use the same approach to use your quarter-wave 40-meter vertical as a 5/8-wave antenna on 17 meters!

By John J. Reh, K7KGP
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Need an antenna for the 12-meter (24.89 to 24.99 MHz) band? A quarter-wave vertical for 30 meters works great on 12 meters—as a 5/8-λ antenna. A simple feed-point modification is all that's necessary to use the 30-meter vertical as a low-angle radiator for 12 meters. The same principle can be applied to a 40-meter antenna: Using the same technique, a 7-MHz quarter-wave vertical can serve as a 5/8-λ antenna on the new 17-meter (18.068 to 18.168 MHz) band.

Antenna Characteristics

The characteristics of the quarter-wave vertical are generally familiar to us, but because 5/8-λ verticals aren't as widely used on the HF bands, their characteristics aren't as commonly known. I recommend Paul H. Lee's (N6PL) book on vertical antennas[1] to anyone interested in learning more about verticals and antenna analysis in general. Much of the information presented here came from ideas I got from this book.

The 5/8-λ vertical is a good low-angle radiator that, when properly designed and adjusted over average ground,[2] produces useful radiation from about 8 to 40° above the horizon. Maximum radiation is at about 18°. In addition, a 5/8-λ vertical has considerable gain at low angles over a quarter-wave vertical.

A half-wave dipole would have to be installed at a height of about 0.8 λ to achieve an 18° angle of radiation; thus, for those of us who don't have towers, masts or trees tall enough to achieve such heights, the 5/8-λ vertical is a practical alternative.

Over average ground, the quarter-wave vertical produces useful radiation from 10 to 55° with maximum radiation occurring at about 30°. For the antenna system described here, this radiation angle is an advantage—signals in the 17-meter band arrive at lower angles, in general, than those on 40 meters. Thus, this antenna performs nearly optimally for both bands.

[1]Notes appear on page 20.

Construction Details

I decided to ground mount my vertical after reading an article on the 5/8-λ vertical by Don Reynolds, K7DBA, in *The ARRL Antenna Compendium, Volume 1*.[3] K7DBA points out that if the 5/8-λ vertical is operated as an elevated groundplane antenna, it has little or no advantage over a quarter-wave vertical operated in the same manner. Both the low-angle radiation and gain advantages of 5/8-λ verticals are lost. This is because of edge diffraction around the finite ground plane. K7DBA's conclusions are based upon actual measurements taken at the University of Washington antenna laboratory.

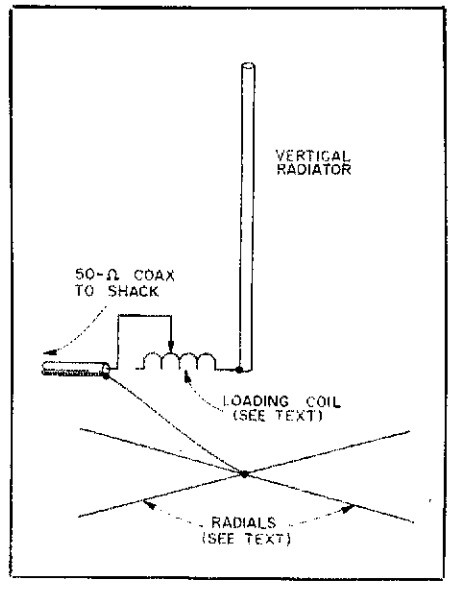


Fig 1—The 5/8-λ 17-meter/1/4-λ 40-meter vertical. A switch or relay can be used to remove the loading coil from the circuit for 40-meter operation. Move the coil tap for best SWR on the higher-frequency band. The radial system should be as extensive as possible for maximum efficiency. See *The ARRL Antenna Book*, Chapter 3, for more information on ground systems for verticals.

The 12-Meter Vertical

When I designed the 17-meter vertical, the band was not yet available to US amateurs, so I decided to erect a 5/8-λ vertical for the 12-meter band to test the principle. As mentioned earlier, such an antenna also functions as a quarter-wave vertical on the 30-meter band. It seemed best to me to test the concept on the 12- and 30-meter bands, and then provide parameters for the 17- and 40-meter bands based upon my results.

The antenna I used is an old aluminum multiband vertical I had lying around—a veteran of many previous vertical-antenna experiments. I chose a length of 25 feet, 3 inches based on scaling N6PL's 20-meter 5/8-λ vertical[4] for the 12-meter band. The length-to-diameter (L/D) ratio of my antenna is about 460. The input impedance of a vertical that is substantially longer than a quarter wavelength (ie, 5/8 λ) is particularly sensitive to the L/D ratio of the radiating element. If you decide to duplicate my design with a vertical having a different L/D ratio, your results may be a bit different. The design frequency of my vertical is 24.95 MHz.

After installing the ground system (a description follows), I measured the input impedance (Z_i) of the antenna with a noise bridge. On 24.95 MHz, Z_i had a resistance of about 50 Ω, and a capacitive reactance of about $j155$ Ω. On 10.125 MHz, Z_i was just under 50 Ω, and was purely resistive. To tune out the reactance at 24.95 MHz, I installed a series inductor (see Fig 1), and moved a tap along the coil until I found resonance at the design frequency. The easiest way to find resonance is by measuring the antenna's SWR. Use a good-quality coil for the series inductor. The loading coil I used has a diameter of 2½

inches, and has 6 turns per inch (B & W stock no. 3029[5]). 3¼ turns were required to establish resonance on 12 meters. The SWR on 12 meters is 1.1:1, and on 30 meters, 1:1.

To change bands from 12 to 30 meters, I just move the coil tap to the end of the coil closest to the vertical element. Alternatively, a single-pole switch or relay can be installed at the base of the antenna for band switching.

The Ground System

The importance of good ground systems for vertical antennas cannot be overemphasized. Maximum RF current density—and therefore maximum ground losses—for quarter-wave verticals occurs in the immediate area of the base of the antenna. Conversely, maximum current density and the associated ground losses for a 5/8-λ vertical occur about ½ λ away from the antenna base. It is important to have the lowest possible losses in the immediate ground area around both types of antennas.

Excellent articles discussing radial systems and vertical-antenna systems have been written by John Stanley, K4ERO, and Charles J. Michaels, W7XC.[6,7] Pertinent portions of these articles are reprinted in *The ARRL Antenna Book*.[8] This material is recommended reading for those who plan to build antenna systems like those discussed here. Remember: A poor ground system results in decreased efficiency, and thus weaker low-angle performance—which is what we *don't want*.

As an adjunct to a radial system, I decided to use a 6- × 6-foot aluminum ground screen at the base of the antenna. (I prefer copper screening, but I couldn't locate any.) The aluminum screen makes a good tie point for the radials and conducts ground currents efficiently. You can do without the ground screen if you like, but it does help to cut losses.

I installed 17 copper-wire radials, each about 33 feet long, spaced evenly around the ground screen. More radials would be better still. Each radial is bolted to the screen using corrosion-resistant no. 10-24 hardware. (*Do not attempt to connect copper directly to aluminum.* The electrical connections between these metals will quickly deteriorate.) My radials are made of insulated wire, and lie on top of the ground. Radials can also be made of bare wire, and can be buried a few inches. My yard is so rocky that burying radials is unthinkable, but if you need to mow the grass in the area of the antenna, you can bury the wires to avoid damaging them (or yourself!).

The rocky ground around my house, it seems to me, must be a very poor RF ground—but I always have good results with vertical antennas, provided I use a good radial system. The ground screen is bolted to the ground side of the antenna via heavy gauge wire. Use large wire or braid for this connection, because current flow is fairly heavy at this point.

Table 1

Band	Height	Required matching inductance (μH)
12 meters	23'5"	0.99
17 meters	32'3"	1.36

Results

When I put up my 30/12-meter antenna (spring 1988), propagation was erratic on 12 meters, but I made a number of contacts. For a comparison antenna, I used a phased array of extended double Zepps (EDZs) for 12 meters.[9] Not surprisingly, the phased array, with its 7 or 8 dB gain, gives signal strengths several decibels greater—in its favored directions—than the 5/8-λ vertical. Nevertheless, the vertical gives a respectable account of itself.

The vertical performs very well on 30 meters. I have worked into the New England states (a distance of about 2300 miles) several times using a 100-W rig. Using the same rig, I've also worked several Japanese stations—a distance of about 4800 miles—and received good reports. Although I need to further evaluate this antenna, it appears to work very well.

Adapting the Antenna to the 17- and 40-Meter Bands

Table 1 gives specifications for the 5/8-λ vertical on 12 and 17 meters. If your existing 40-meter vertical is a few inches longer than 32 feet, 3 inches, try using it anyway—a few inches isn't too critical to performance on 17 meters.

Summary

I have presented nothing new in this article—I have merely followed the precepts of wiser and more experienced minds. Thanks to all who have gone before.

Notes

[1]P. H. Lee, *The Amateur Radio Vertical Antenna Handbook*, 2nd edition (Hicksville, NY: CQ Publishing, 1984).

[2]For more information on the effects of ground on antenna systems, including definitions of ground types, parameters for ground constants and geographical factors, see G. L. Hall, ed, *The ARRL Antenna Book*, 15th edition (Newington: ARRL, 1988), chapter 3.

[3]G. L. Hall, ed, *The ARRL Antenna Compendium, Volume 1* (Newington: ARRL, 1985), pp 101 to 106.

[4]See note 1.

[5]B & W coil stock is available from RADIOKIT, PO Box 973, Pelham, NH 03076, tel 603-635-2235.

[6]J. Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, Dec 1976, p 13.

[7]C. J. Michaels, "Some Reflections on Vertical Antennas," *QST*, Jul 1987, p 15.

[8]See note 2.

[9]J. Reh, "An Extended Double Zepp Antenna for 12 Meters," *QST*, Dec 1987, p 25.

Amplifier-Driver Compatibility

(continued from page 18)

the cathode(s) of the amplifier tube(s). This technique reduces drive and tends to improve amplifier linearity through degeneration. Finding the proper cathode resistance often involves cut-and-try experimentation.

If you would like to discuss this subject with me on the telephone, call me. I can usually be reached at 805-482-3034. Three minutes on the telephone is more effective than my spending 30 minutes at my typewriter!

Notes

[1]Push-pull and push-push oscillations can occur only in an amplifier stage that uses more than one active device. A push-pull parasitic oscillation is much less destructive than the dreaded push-push parasitic oscillation, which can make an amplifier go bang and parts go kaput. A push-pull parasitic is characterized by both amplifier tubes getting very hot and drawing maximum anode current; it does not cause destructive arcing as does a push-push parasitic, and can be stopped by unkeying the amplifier. (For more information on parasitics, see "Improved Anode Parasitic Suppression for Modern Amplifier Tubes," *QST*, Oct 1988, pp 36-38, 66 and 89.)

[2]A linear amplifier is said to be in gain compression when its output increases with increasing drive but does not increase in linear proportion to drive. Gain saturation is reached when increasing drive causes no further increase in output.

[3]As commonly defined, an S unit represents a 2:1 signal voltage change, which is equal to a 4:1 power ratio—a 6-dB change.

[4]You can observe this phenomenon in your own amplifier if you can receive on two frequencies at once and feed the audio from each frequency to its own channel in stereo headphones. Tune one receiver/ear to your SSB signal, and apply enough RF attenuation at the receiver input to keep the signal from driving the S meter offscale. (RF attenuation is necessary because receiver overload can cause splatter to be generated in the receiver.) Tune the other receiver/ear off-frequency about 4 kHz. When the amplifier is overdriven—usually at the beginning of words and strong speech components—splatter will be audible in the off-tuned receiver/ear.

[5]This depends on the voltage applied to the tube anode. For a given power output, drive power requirements decrease with increasing anode voltage. Drive power requirements for a given tube type also vary with circuit configuration, and class and frequency of operation.

[6]This can be conveniently done by temporarily paralleling C1 with a mica-dielectric, compression-tuned variable capacitor. Alternately adjust the variable capacitor and L1 until the input SWR is acceptable. Remove the variable capacitor and measure its value with a capacitance meter. Install a fixed, mica capacitor of the nearest standard value in parallel with C1.

[7]Metal-film resistors decrease in resistance under conditions of prolonged overload. Under sudden, catastrophic overload, they open like fuses.

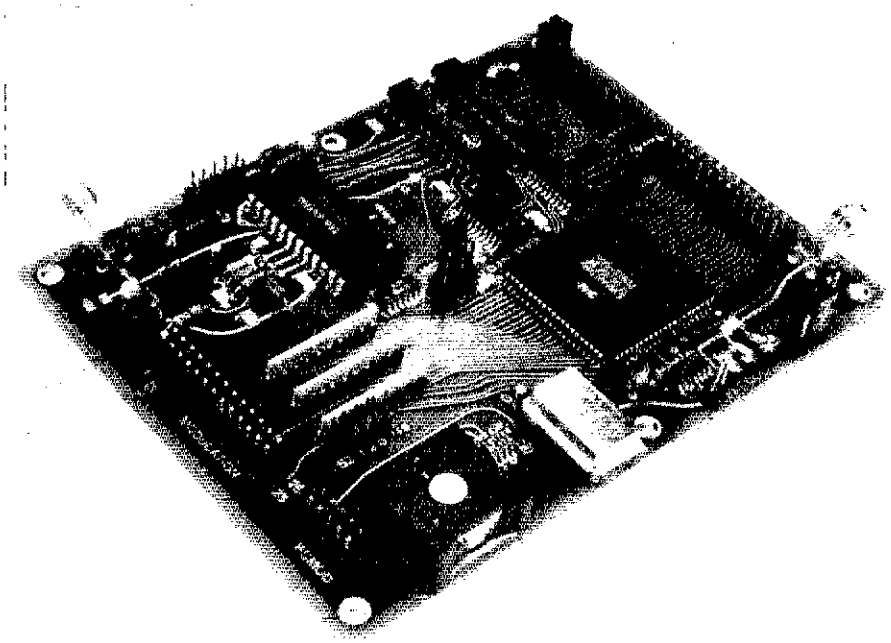
[8]R. Measures, "Calculating Power Dissipation in Parasitic-Suppressor Resistors," *QST*, Mar 1989, pp 25-28. Despite what some amplifier instruction manuals may state, it is *impossible* to adjust an amplifier for linear operation without applying *maximum peak drive* in the form of pulses (such as a string of CW dits) or a steady carrier, or as part of the two-tone linearity test. See R. Measures, "Adjusting SSB Amplifiers," *ham radio*, Sep 1985, pp 33, 35-36.

New Products

DIGITAL RF SOLUTIONS DIRECT DIGITAL SYNTHESIZER

☐ Digital RF Solutions, of Santa Clara, California, has introduced the DRFS-DX2070™ direct-digital synthesizer (DDS). The DX2070 features low spurious response (better than −70 dBc, guaranteed), numeric FM and/or PM, fast frequency change capability (200 ns, typ), low phase noise and high frequency resolution (1.2 Hz, standard; cascadable to nHz range). Applications for the DX2070 include receiver and transmitter LOs, test-equipment synthesizers, chirp and Doppler radar systems and spread-spectrum radio systems.

The DX2070 can be controlled by a serial quadrature generator, a 24-bit parallel bus or a microprocessor. Control can be done via an 8-bit microprocessor, and serial tuning is usually done via an optical encoder. An external clock is required; up to +10-dBm clock levels are acceptable. For more information, contact Digital RF Solutions Corp, 3080 Olcott St, Santa Clara, CA 95054-3209, tel 408-727-5995 (in CA) or 800-782-6266 outside California. —*Rus Healy, NJ2L*



DAVIS RF ANTENNA WIRE

☐ Davis RF, of Carlisle, Massachusetts, has introduced a line of high-quality, low-cost antenna- and station-construction materials, including no. 14 antenna wire. Davis' stranded-copper wire is made of 168 strands of no. 36 solid wire, woven like rope into 7 bundles of 24 strands each, to provide good strength and excellent flexibility. This wire is strong enough that it can be tied to insulators—directly, in knots. Prices are as follows: 275-foot roll (minimum order), $34 (delivered to continental US addresses); additional lengths, $0.12 per foot (delivered in continental US). Continuous lengths of up to 4000 feet are available.

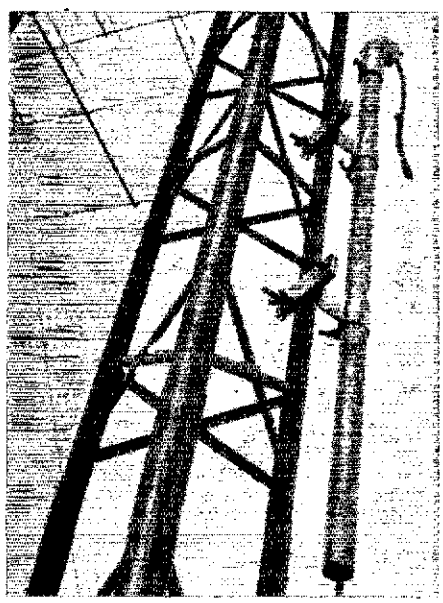
Other notable items available from Davis RF include coaxial cable, RF connectors, coaxial relays, aluminum antenna tubing, porcelain antenna insulators and open-wire feed line. Catalog available. Minimum quantities apply to most orders—contact Davis RF, PO Box 230, Carlisle, MA 01741, for more information.—*Rus Healy, NJ2L*

CATS ROTATOR-BRAKE DELAY

☐ Craig's Antenna and Tower Service (CATS, run by Craig Henderson, N8DJB) manufactures a brake-release-delay circuit for the popular CDE/hy-gain® Ham M, Ham 2, 3 and 4 and Tailtwister rotators. The delay circuit was designed around the internal-size restrictions of the Ham M control box. The Brak-D-Lay circuit provides a 7-second window immediately after manual rotation is stopped, during which the rotator's brake wedge is held off. After the delay, the wedge is released, keeping the rotator from being turned unintentionally. Brak-D-Lay includes instructions for mounting in each of the rotators listed above. Price: $25. Available from CATS, 7368 SR 105, Pemberville, OH 43450, tel 419-352-4465.—*Rus Healy, NJ2L*

GIN POLE KIT

☐ IIX Equipment Ltd offers a new gin pole kit designed to fit stamped-steel, open-leg-type towers (such as the Rohn BX series). The GP21X gin-pole kit consists of a pulley and two adjustable clamps designed to fit tapering, open-type tower legs. These clamps can be spaced any distance apart. A gin pole pipe is not included. Price: $199.50. For more information, contact IIX Equipment Ltd, PO Box 9, Oak Lawn, IL 60454, tel 312-423-0605.



Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

Advisory Committee Members	May 1988, p 55
Club Contest Rules	Jan 1989, p 104
Considérate Operator's Frequency Guide	Jan 1989, p 77
DXCC Annual Listing	Jan 1989, p 71
Frequency/Mode Allocations	Jan 1989, p 77
Hamfest Calendar Rules	This issue, p 80
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Third-Party-Traffic Agreements	Oct 1988, p 63
VUCC Annual Listing	*Dec 1988, p 85*
What is Amateur Radio?	Mar 1989, p 54

The Coaxial Resonator Match and the Broadband Dipole

It's easy to build a dipole with the coaxial resonator match. The SWR bandwidth of the antenna is almost *triple* that of a conventional dipole!

By Frank Witt, AI1H
20 Chatham Road
Andover, MA 01810

Out of the search for a simple dipole with acceptable SWR over the entire 80-meter band has come a matching technique with broadbanding properties and potential for many applications. This antenna and matching technique are extensions of work described by the author in October 1986 *QST*.[1] A review of that article is recommended as background.

In the sections that follow, the complete description of an 80-meter broadband dipole is provided, including performance data and construction details. Then, for those who want a better understanding of how it works, an explanation of the theory behind the broadband dipole and the coaxial resonator match is provided. Some other applications are described, one of which will be of great interest to 80-meter DX hunters.

An 80-Meter Broadband Dipole

Fig 1 shows the detailed dimensions of the 80-meter coaxial-resonator-match broadband dipole. Notice that the total length of the coax is an electrical quarter wavelength, has a short at one end, an open at the other end, a strategically placed crossover and is fed at a T junction. (The crossover is made by connecting the shield of one coax segment to the center conductor of the adjacent segment and by connecting the remaining center conductor and shield in a similar way.) At AI1H, the antenna is constructed as an inverted-V dipole with a 110° included angle and an apex at 60 feet. The measured SWR v frequency is shown in Fig 2. Also in Fig 2 is the SWR characteristic for an uncompensated inverted-V dipole made from the same materials and positioned exactly as was the broadband version. SWR measurements were made with a Daiwa Model CN 520 cross-needle SWR/power meter. Corrections were made

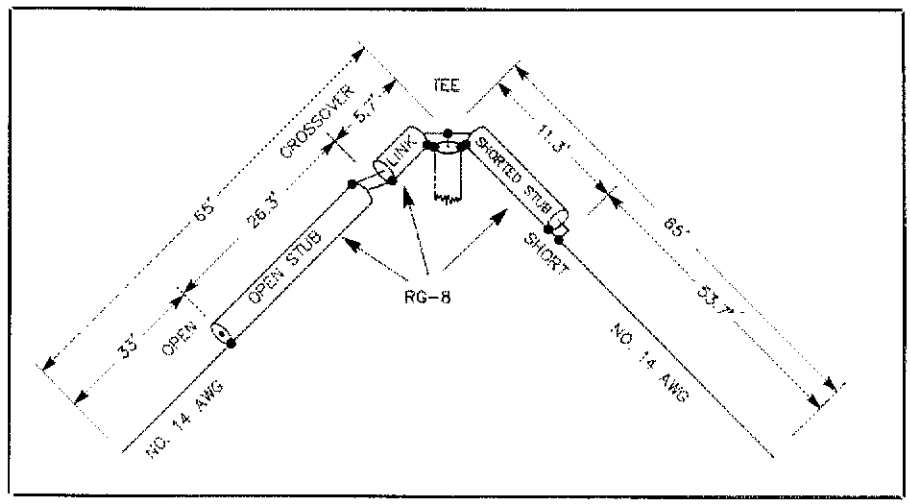

Fig 1—Coaxial-resonator-match broadband dipole for 80 meters. The coax segment lengths total ¼ wavelength. The overall antenna length is the same as that of a conventional inverted-V dipole.

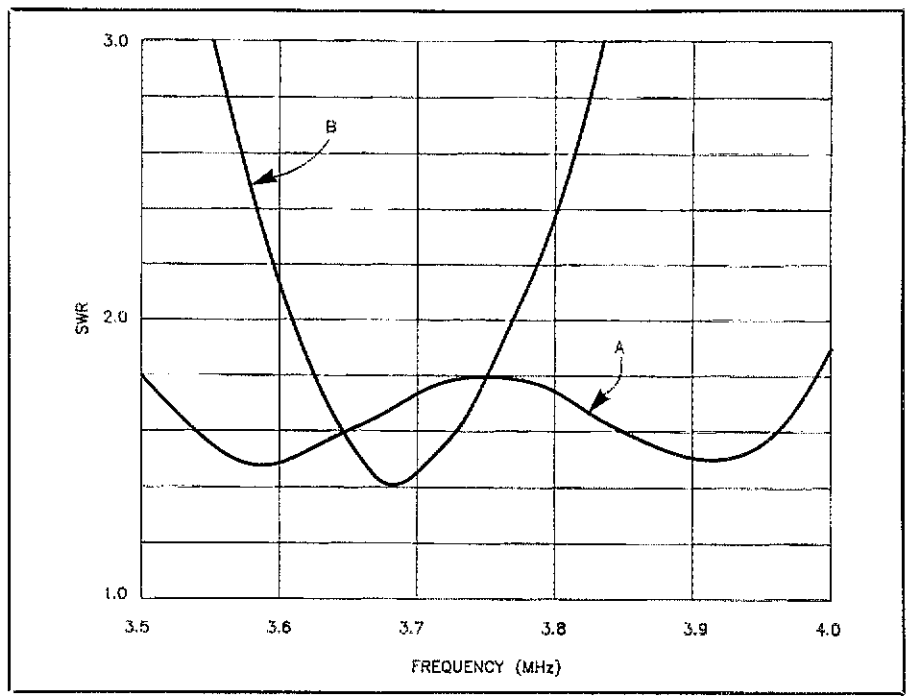

Fig 2—Curve A, the measured performance of the antenna of Fig 1. Also shown for comparison is the measured SWR of the same dipole without compensation, curve B.

[1]Notes appear on p 27.

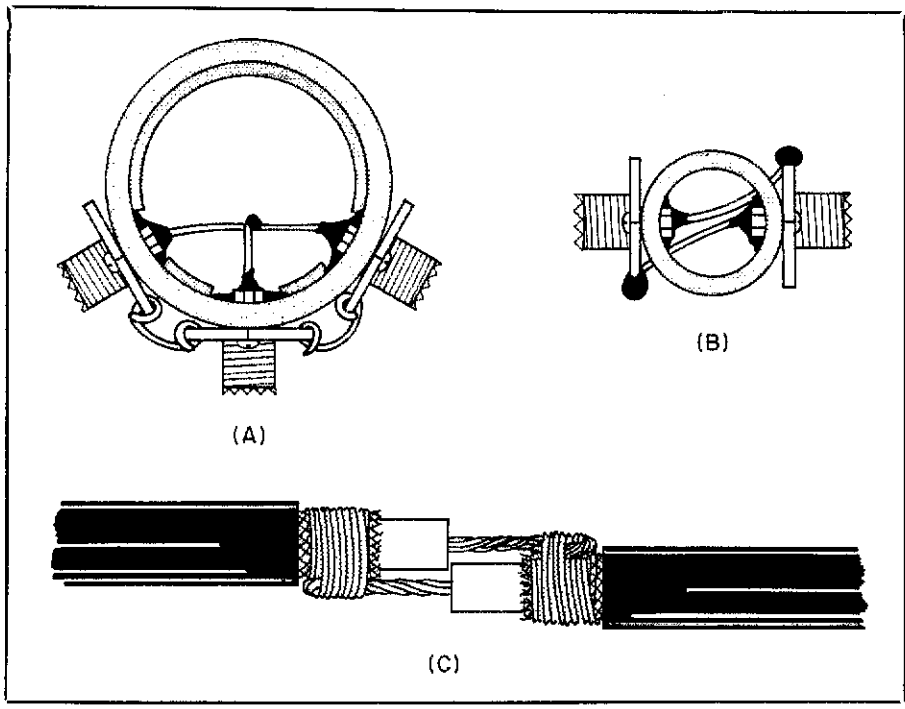

Fig 3—T and crossover construction. At A, a 2-inch PVC pipe coupling can be used for the T, and at B, a 1-inch coupling for the crossover. These sizes are the nominal inside diameters of PVC pipe that fits these couplings. The T could be standard UHF hardware (an M-358 T and a PL-258 coupler). An alternative construction for the crossover is shown at C, where a direct solder connection is made.

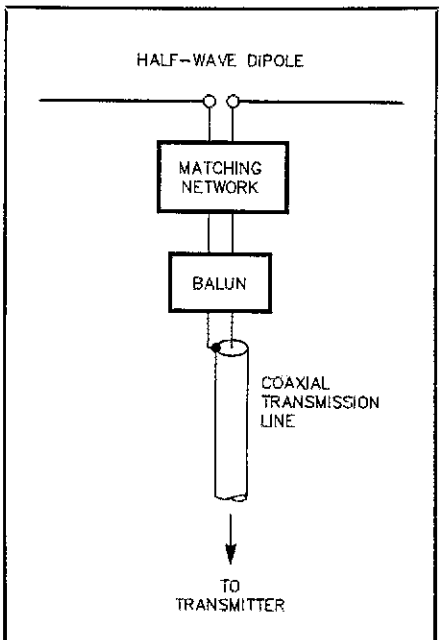

Fig 4—The broadband antenna system.

for the cable loss between the antenna and the meter.

The antenna, made from RG-8 coaxial cable and no. 14 AWG wire, is fed with 50-Ω coax. The coaxial cable should be cut so the stub lengths of Fig 1 are within ½ inch of the specified values. PVC plastic pipe couplings and SO-239 UHF chassis connectors can be used to make the T and crossover connections, as shown in Fig 3 at A and B. Alternatively, a standard UHF T connector and coupler can be used for the T, and the crossover can be a soldered connection (Fig 3C). I used RG-8 coax because of its ready availability, physical strength, power handling capability and moderate loss. An RG-58 model was also designed and built, and it performed well electrically. I don't recommend the RG-58 version, however, because it is too fragile. For example, the coaxial cable stretches enough from its own weight to affect the tuning. Also, RG-58 will have substantially lower power-handling capability than RG-8.

Cut the wire ends of the dipole about three feet longer than the lengths given in Fig 1. If there is a tilt in the SWR-vs-frequency curve when the antenna is first built (a lopsided "W" shape), it can be flattened to look like the shape of curve A in Fig 2 by increasing or decreasing the wire length. Each end should be lengthened or shortened by the same amount. Try 6-inch changes at each end with each adjustment. Increasing the dipole length will lower the SWR at the low end of the band; decreasing the dipole length will lower the SWR at the high end of the band.

A word of caution: If the chosen coaxial cable is not RG-8 or equivalent, the dimensions will have to be modified. For example, RG-8X has a different insulation material than RG-8, and its use would dictate different segment lengths. The following cable types have about the same characteristic impedance, loss and velocity factor as RG-8 and could be substituted: RG-8A, RG-10, RG-10A, RG-213 and RG-215.

Important point: The calculated coaxial segment lengths were based on the assumption that the Q and radiation resistance at resonance of the uncompensated dipole were 11.5 and 70 Ω, respectively. If the Q and radiation resistance differ markedly from these numbers because of different ground characteristics, antenna height, surrounding objects and so on, then different segment lengths would be required. In fact, if the dipole Q is too high, broadbanding is possible, but an SWR under 2:1 over the whole band cannot be achieved. More is said on the practical limitations of the coaxial resonator match in a later section of this article.

What is the performance of this broadband antenna relative to that of a conventional inverted-V dipole? Aside from the slight loss (about 1 dB at band edges, less elsewhere) because of the nonideal matching network, the broadband version behaves essentially the same as a dipole cut for the frequency of interest. That is, the radiation patterns for the two cases are virtually the same. In reality, the dipole itself is not "broadband," but the coaxial resonator match provides a broadband match between the transmission line and the dipole antenna. This match is a remarkably simple way to broaden the SWR response of a dipole.

Broadbanding the Dipole

Fig 4 shows a broadband antenna system

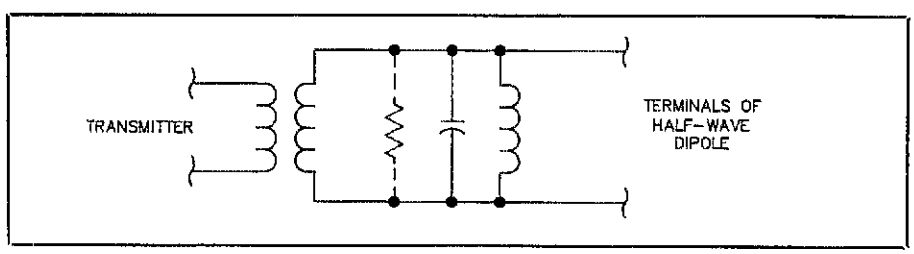

Fig 5—The matching network topology. The resonant circuit provides broadbanding by compensating for the reactance of the dipole, while the transformer adjusts the impedance level of the antenna feed to an optimum value.

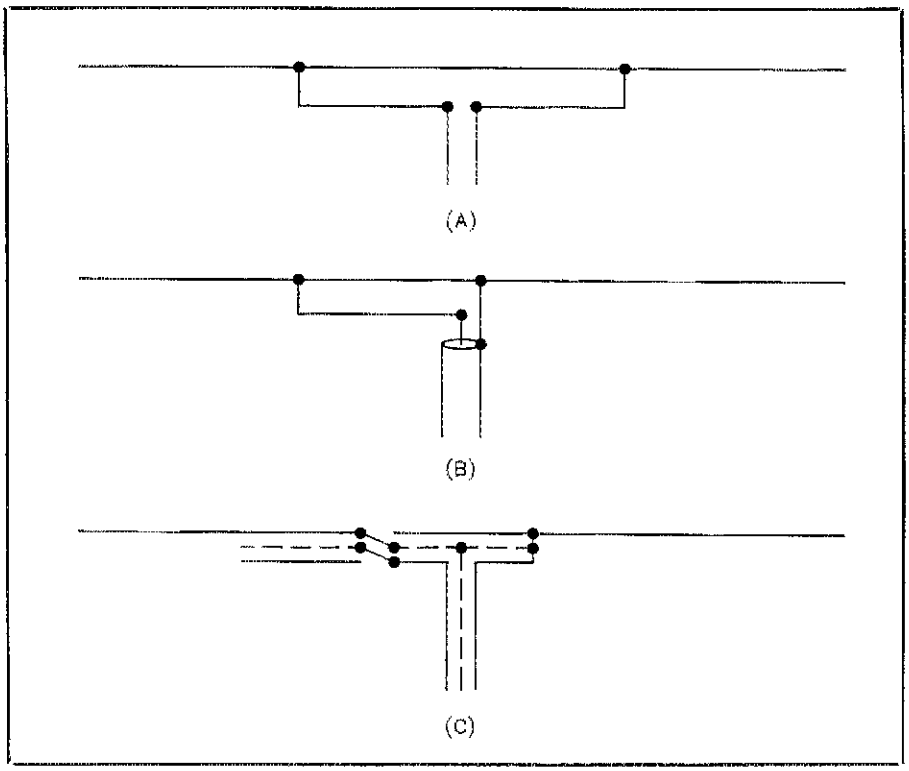

Fig 6—Dipole matching methods. At A, the T match; at B, the gamma match; at C, the coaxial resonator match.

containing a coaxial (unbalanced) transmission line, a balun, a matching network and the half-wave dipole antenna. Use of the balun is recommended in order to prevent radiation from the feed line.

The matching network is a transformer and a resonant circuit, as shown in Fig 5. Such an arrangement has been used in the past to achieve broadbanding.[2-4] The resonant circuit will have a finite Q, and this is the value of Q that determines the loss of efficiency caused by the matching network. The resonant circuit can be realized with LC components or with transmission-line segments. In fact, the transformer function can be performed with the same components. In the reference of note 1, it was shown how an LC resonator can act as the transformer as well. The transmission-line transformer can also be used to achieve the necessary impedance transformation, as is shown shortly.

The Coaxial Resonator Match

The coaxial resonator match performs the same functions as its predecessors, the T match and the gamma match, ie, that of matching a transmission line to a resonant dipole.[5] These familiar matching devices, as well as the coaxial resonator match, are shown in Fig 6. The coaxial resonator match has some similarity to the gamma match. It allows connection of the shield of the coaxial feed line to the center of the dipole and it feeds the dipole off-center, although center feed is also possible. The

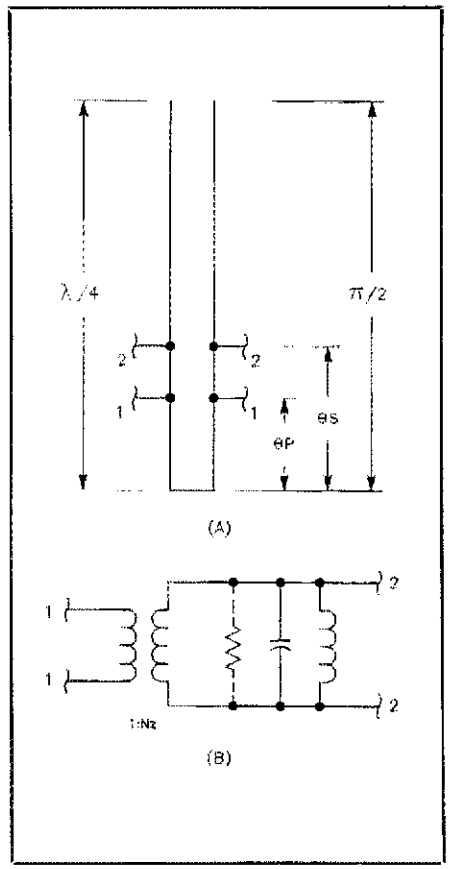

Fig 7—The quarter-wave resonator used as a transformer. Notice from the equivalent circuit of B that a simple piece of transmission line can provide the function of a tuned transformer.

coaxial resonator match has a further advantage: It can be used to broadband the antenna system while it is providing an impedance match.

The coaxial resonator match is a resonant transformer made from a quarter-wavelength piece of coaxial cable. It is based on a technique used at VHF and UHF to realize a low-loss impedance transformation.[6] Fig 7 shows how a quarter-wavelength transmission line with a short at one end and an open at the other end will provide transformer action over a limited band. Note that the equivalent circuit consists of a transformer with a parallel-tuned circuit connected across its secondary. The equivalent resonator has a Q, QN, which is related to the loss of the coax at the frequency of interest:

$$QN = \frac{2.774\ F0}{A \times VF} \qquad \text{(Eq 1)}$$

where

F0 = resonant frequency (MHz)
A = resonator transmission-line attenuation (decibels/100 ft)
VF = velocity factor of resonator coax

The approximate impedance transformation ratio is given by

$$NZ = \frac{\sin^2 \theta S}{\sin^2 \theta P} \qquad \text{(Eq 2)}$$

where θS and θP are the electrical angles (lengths) of the secondary and primary taps, respectively, measured from the shorted end of the resonator.

For example, if the secondary tap were 0.1 wavelength from the short and the primary tap were 0.06 wavelength from the short, then

$$NZ = \frac{\sin^2 (2\pi \times 0.1)}{\sin^2 (2\pi \times 0.06)} = 2.5$$

For the practical application of matching the coaxial cable to the broadband dipole, the desired impedance transformation ratio can be readily obtained. The resonator transformer impedance transformation ratio is analogous to a conventional transformer, where

$$NZ = \frac{NS^2}{NP^2} \qquad \text{(Eq 3)}$$

where NS and NP are the number of secondary and primary turns, respectively. The resonator impedance level (impedance of resonator inductance or capacitance at resonance) is given by

$$ZN = \frac{4\ ZR}{\pi} \sin^2 \theta S \qquad \text{(Eq 4)}$$

where ZR = characteristic impedance of line (ohms).

Off-Center Feed

The reason for the use of coaxial cable

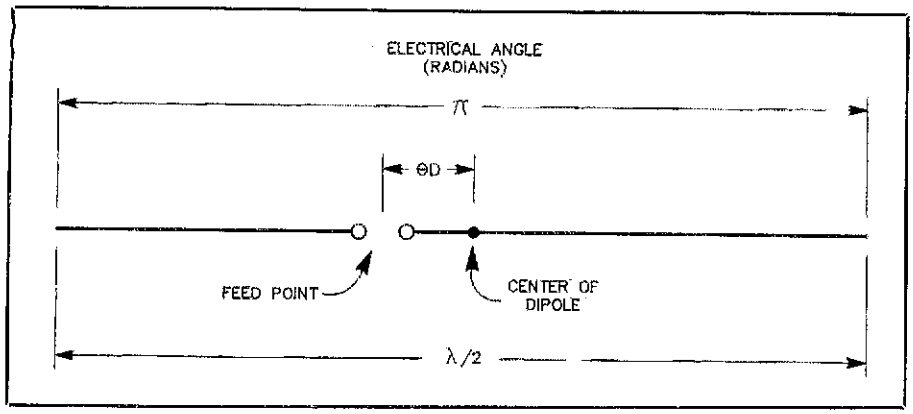

Fig 8—The dipole with off-center feed. See text regarding the feed-point impedance.

for the resonator will be seen later. But first, consider the concept of feeding the dipole off center. In most cases, half-wave dipoles are split and fed at the center. However, off-center feed is possible and has been used before. Two examples are the so-called Windom antenna and the dipole using the gamma match. Fig 8 shows a dipole with off-center feed. If you assume that the current distribution over the dipole is sinusoidal in shape, with zero current at the ends and maximum current at the center (and this is usually a very good assumption), then the radiation resistance at resonance is modified as follows.

$$RAF = \frac{RA}{\cos^2 \theta D} \qquad \text{(Eq 5)}$$

where

RAF = the radiation resistance at the feed point (ohms)
RA = the radiation resistance at the center of the dipole (ohms)
θD = the electrical angular distance off of center

For example, if the radiation resistance of the dipole at its center were 72 Ω, then, if it were fed off center by 0.03 wavelength ($\theta D = 2\pi \times 0.03 = 0.188$ radians), the radiation resistance at the feed point would be

$$RAF = \frac{72}{\cos^2 0.188} = 74.6 \text{ ohms}$$

In the practical cases I considered, the change in antenna feed-point impedance arising from off-center feed is small, but it should be taken into account for best results.

The Coaxial Resonator Matched Broadband Dipole

All of the necessary elements of the broadband dipole have now been described. It remains to assemble them into an antenna system. If you compare Figs 5 and 7, you can see that the coaxial resonator match contains the necessary elements for matching and broadbanding. The off-center feed concept provides the finishing touch.

Fig 9 shows the evolution of the broad-

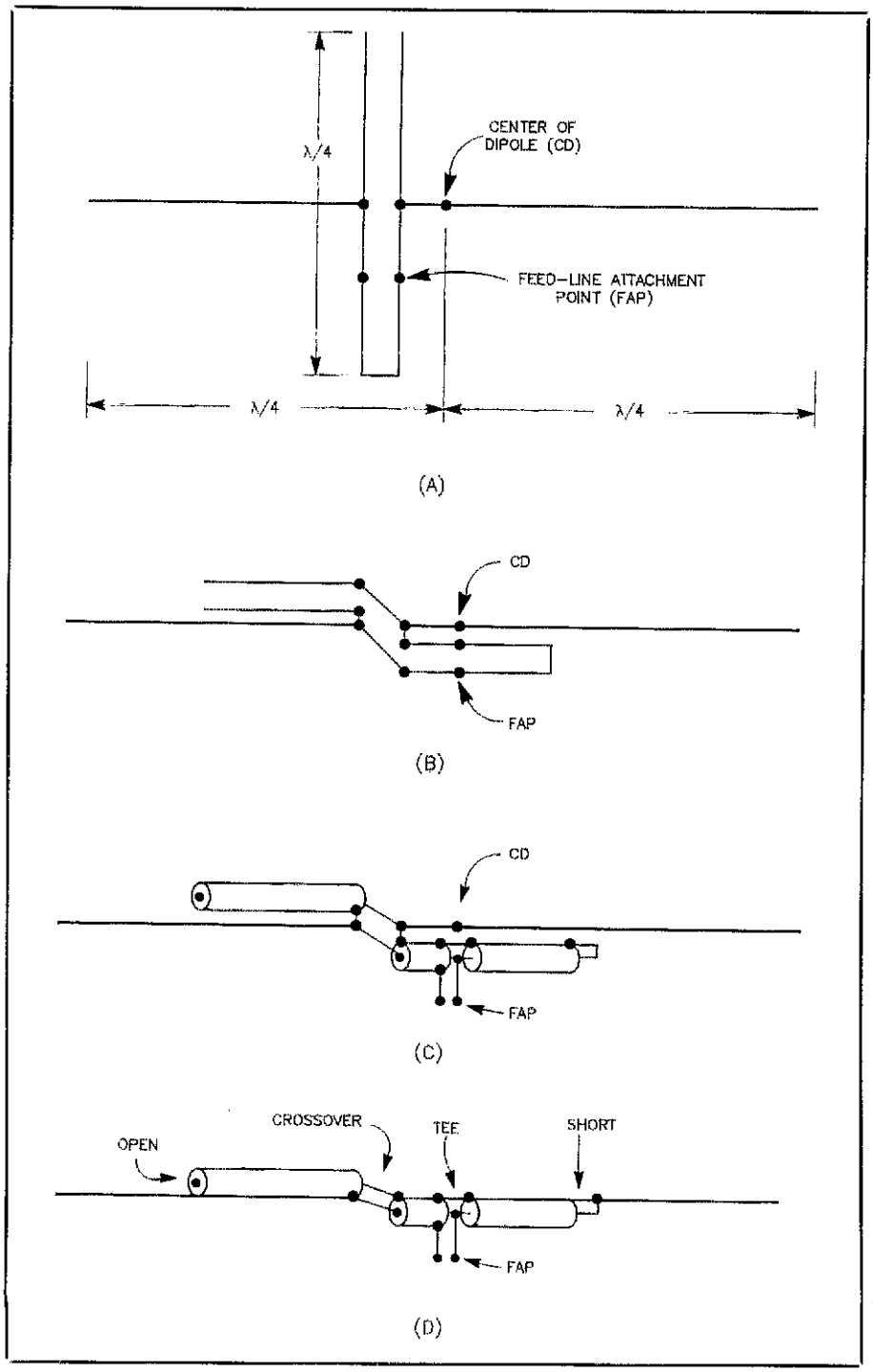

Fig 9—Evolution of the coaxial-resonator-match broadband dipole. At A, the resonant transformer is used to match the feed line to the off-center-fed dipole. The match and dipole are made collinear at B. At C, the balanced transmission-line resonator/transformer of A and B is replaced by a coaxial version. Since the shield of the coax can serve as part of the dipole radiator, the wire adjacent to the coax match can be eliminated, D.

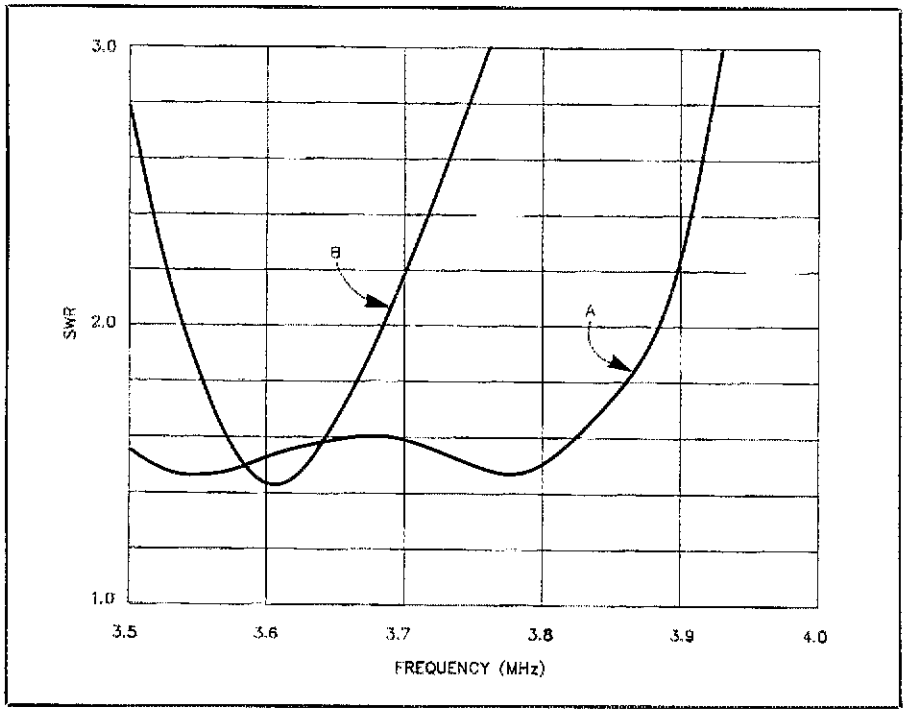

Fig 10—Measured SWR performance of the 80-Meter DX Special, curve A. Note the substantial broadbanding relative to a conventional uncompensated dipole, curve B.

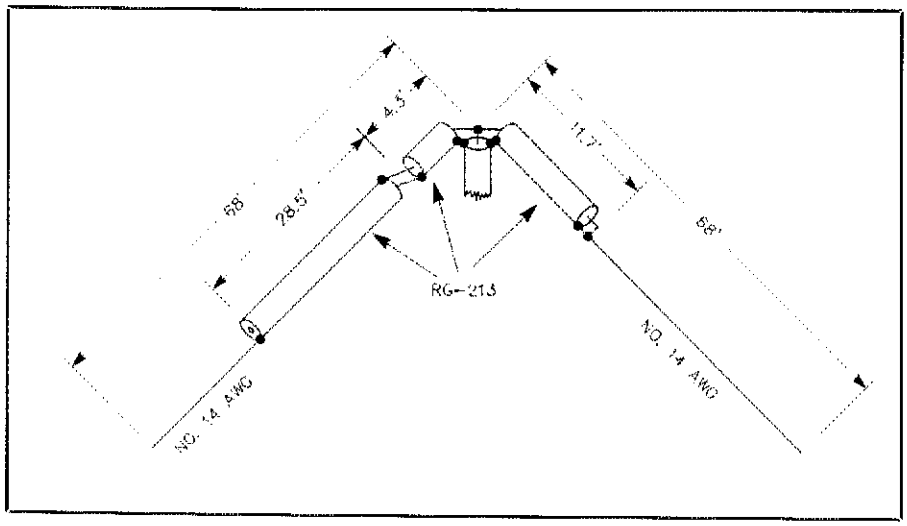

Fig 11—Dimensions for the 80-Meter DX Special, an antenna optimized for the phone and CW DX portions of the 80-meter band. Also see Fig 12.

band dipole. Now it becomes clear why coaxial cable is used for the quarter-wave resonator/transformer; interaction between the dipole and the matching network is minimized. The effective dipole feed point is located at the crossover. In effect, the match is physically located "inside" the dipole. Currents flowing on the inside of the shield of the coax are associated with the resonator; currents flowing on the outside of the shield of the coax are the usual dipole currents. Skin effect provides a degree of isolation and allows the coax to perform its dual function. The wire extensions at each end make up the remainder of the dipole, making the overall length equal to a half wavelength.

The coaxial resonator match, like the gamma match, allows you to connect the shield of the coaxial feed line to the center of the dipole. If the antenna were completely symmetrical, then the RF voltage would be zero (relative to ground) at the center and no balun would be required. In the real situation, some voltage (again referred to ground) does exist at the dipole midpoint (as it does with the gamma match), but in many practical cases no balun is required. If one is used, it should be of the "choke" or "current balun" variety.[7,8] A longitudinal choke can be made by threading several turns of coax through a ferrite toroid, or a commercial variety, such as the W2DU balun, is appropriate. I've used the coaxial resonator matched broadband dipole both with and without a balun with little difference in SWR characteristic. However, there are situations where the balun would be required. To be safe, use a balun.

A useful feature of an antenna using the coaxial resonator match is that the entire antenna is at the same dc potential as the feed-line potential, thereby avoiding charge buildup on the antenna. Hence, noise and the potential of lightning damage are reduced.

Other Applications

The design of Fig 1 can be modified to yield an "80-Meter DX Special." In this case the band extends from 3.5 MHz to 3.85 MHz. Over that band the SWR is better than 1.6:1 and the calculated matching network loss is less than 0.75 dB. See Fig 10 for measured performance of an 80-Meter DX Special built and used by Ed Parsons, K1TR.

Design dimensions for the 80-Meter DX Special are given in Fig 11. The coax segment lengths are based on the assumption that the dipole Q and radiation resistance at resonance are 13 and 60 ohms, respectively. The calculated SWR for the uncompensated dipole and the coaxial resonator matched broadband dipole are shown in Fig 12. Since most amateurs do not know what Q and radiation resistance would exist for their installation, it is desirable to know how sensitive the SWR characteristic is to those parameters. With the aid of a simulation program, a deviation study was made for Q over the range 10 to 16 and radiation resistance ranging from 50 to 70 ohms. In the analysis, the coax segment lengths were not changed from the values shown in Fig 11. The results, given in Fig 13, show that the coaxial-resonator-matched dipole is very robust. The SWR is less than 2:1 over virtually the entire 3.5- to 3.85-MHz band for the wide range of Q and radiation resistance values simulated. An obvious application of the coaxial resonator match is to broadband a 160-meter dipole to cover the entire 1.8- to 2.0-MHz band. A design similar to the 80-meter antenna described in this article would have an SWR better than 1.5:1 over the whole 160-meter band. The calculated matching network loss is less than 1.1 dB.

The same concept might be applied to broadband a Yagi array, where you must usually settle for a compromise among gain, front-to-back ratio and SWR bandwidth. By applying the coaxial resonator matching principle, the SWR bandwidth of the array might be made wide enough that the gain and front-to-back ratio could be better optimized. This conjecture was sug-

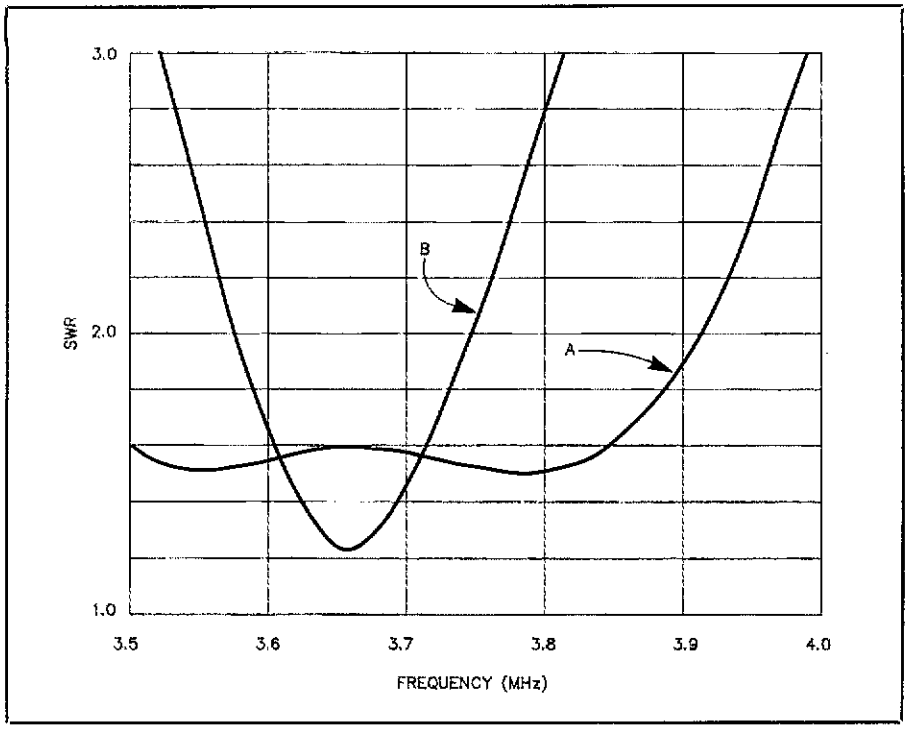

Fig 12—Calculated SWR response of the 80-Meter DX Special, curve A, and a conventional dipole, curve B.

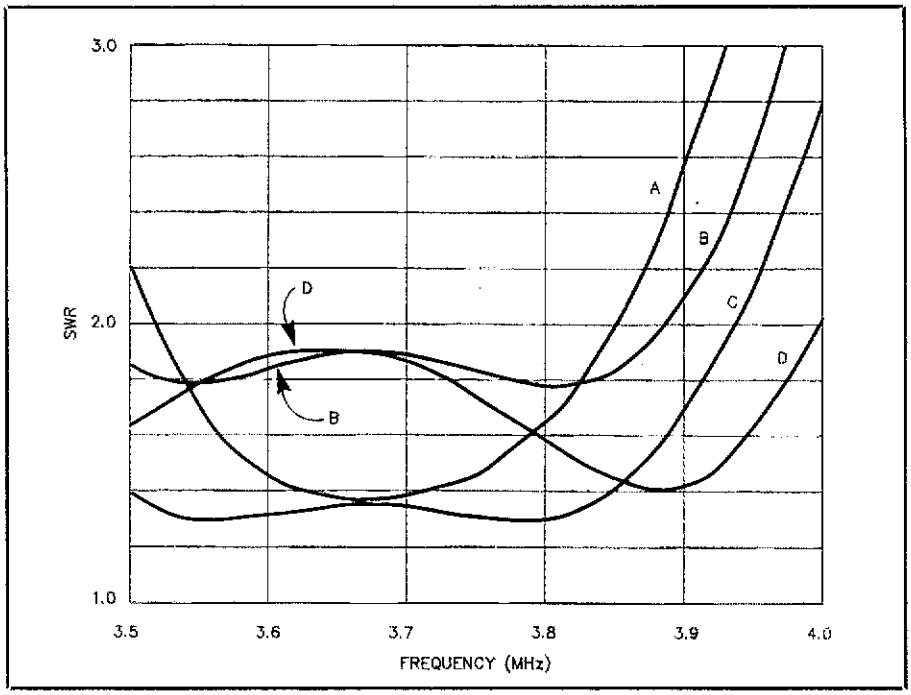

Fig 13—The results of a deviation study reveal the expected performance of the antenna of Fig 11 for a variety of conditions. The various curves were obtained with these parameters. Curve A: Q = 16, R = 70 Ω. Curve B: Q = 16, R = 50 Ω. Curve C: Q = 10, R = 70 Ω. Curve D: Q = 10, R = 50 Ω.

gested by John Kenny, W1RR.

The coaxial resonator match can be applied to monopoles as well. In this case, one of the coax segments could be located "inside" one of the radials. Other applications include full-wave loops and 3/2-wavelength center-fed antennas.

Summary and Acknowledgments

The coaxial resonator match is a form of matching network for use between the transmission line and the antenna. This match, which becomes an integral part of a dipole antenna, serves not only as a matching device, but also has inherent broadbanding properties. The 80-meter broadband dipoles presented as practical examples ably demonstrate the utility of the coaxial resonator match. This antenna achieves a long-sought-after goal of realizing a simple dipole that is well matched over the entire 80-meter band.

I am indebted to my wife, Barbara, N1DIS, for her encouragement throughout the course of this project. Also, several discussions with John Kenny, W1RR, provided inspiration during the course of the development of the coaxial resonator match. Further, an example of a broadband dipole shown to me by Reed Fisher, W2CQH, initiated my investigation which led to the relatively efficient design presented in this paper. I am grateful to Ed Parsons, K1TR, who first constructed and evaluated the 80-Meter DX Special.

A complete description of how one can use the coaxial resonator match in other applications is planned for presentation in *The ARRL Antenna Compendium, Volume 2.* [Appearance is scheduled for later in 1989—Ed.] That paper also contains design equations for computing the segment lengths of the coaxial resonator match.

Notes

[1]F. J. Witt, "Broadband Dipoles—Some New Insights," *QST*, Oct 1986, pp 27-37.
[2]J. Hall, "The Search for a Simple, Broadband 80-Meter Dipole," *QST*, Apr 1983, pp 22-27.
[3]R. D. Snyder, "Broadband Antennae Employing Coaxial Transmission Line Sections," United States Patent no. 4,479,130, issued Oct 23, 1984.
[4]R. C. Hansen, "Evaluation of the Snyder Dipole," *IEEE Transactions on Antennas and Propagation*, Vol. AP-35, No. 2, Feb 1987, pp 207-210.
[5]G. L. Hall, Ed, *The ARRL Antenna Book* (Newington: ARRL); 14th ed (1982), pp 5-13—5-14; 15th ed (1988), pp 26-16—26-18.
[6]*The Radio Amateur's Handbook*, 52nd ed (Newington: ARRL, 1975) pp 54-55.
[7]M. W. Maxwell, "Some Aspects of the Balun Problem," *QST*, Mar 1983, pp 38-40.
[8]R. W. Lewallen, "Baluns: What They Do and How They Do It," *The ARRL Antenna Compendium, Vol. 1* (Newington: ARRL, 1985), pp 157-164.

Frank Witt, AI1H, was licensed in 1948 and has also held the calls W3NMU, K2TOP, W1DTV and EI3VUT. He holds BS and MS degrees in Electrical Engineering from Johns Hopkins University and now manages a microwave telecommunications system development department. He is a Senior Member of the IEEE. In addition to antenna design, he enjoys incremental development of all kinds of ham gear. He is one of the five hams in his family, including his wife, Barbara, N1DIS, and three of their sons, Mike, N1BMI, Chris, N1BDT, and Jerry, N1BEB. Some of his other interests include boardsailing, tennis and cross-country skiing.

Frank has a weekly schedule with W3OWN, VP9HK and WA2NVG on approximately 3.82 MHz on Thursdays at 9:30 PM Eastern Time. They welcome others interested in broadband antennas.

Adding an Echo-As-Sent Switch to Your PK-232

If you use your PK-232 for non-split-screen AMTOR, try this handy modification.

By Paul Newland, AD7I
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I'm not much for modifying commercial products. The designers of these products spend much time and effort to create a good piece of gear for the customer, and in most cases, designers and manufacturers *don't* want the customer to go messing around with their designs. Despite my aversion to field-generated modifications, I feel that some mods are worthwhile. One such modification for the Advanced Electronic Applications PK-232 multimode communications processor is described here.

The Problem

I often use an IBM® PC or a TRS-80® Model 100 computer for a terminal when operating AMTOR ARQ with my PK-232. I don't use one of the common terminal-emulator programs that provide split-screen operation (transmit buffer in one half, received information in the other) with either of these computers. I ran into a problem using these hardware configurations: Basically, I had no idea how much of the text in the transmit buffer had been sent at any given time (see the sidebar, "AMTOR ARQ").

To solve this problem, I added an echo-as-sent (EAS) switch to my PK-232. As currently offered, the PK-232 has two echo modes. (Echoing simply refers to displaying the transmit characters on your terminal or computer screen.) The first echo mode echoes the text to be transmitted as it enters the PK-232 from your terminal or computer. The second echo mode echoes the characters as they are sent on the air. Echo mode selection (as entered or as sent) is controlled by the software parameter EAS. The PK-232's default setting for EAS is OFF (echo as entered). When EAS is ON, you do not see any echo as you type characters on your terminal. Instead, you see characters echoed as the PK-232 sends them to the radio. In this mode, you only see each block of characters once, so if many retries are required, the screen won't be cluttered with the text each time the PK-232 sends it to the radio.

Here's an example of where EAS can be helpful. Assume you're in AMTOR ARQ mode, typing away at warp speed, and you notice that the ERR and/or RQR lights are flashing at you more often than the TFC LED, indicating that the radio channel is not favorable. It's going to take a while for all the characters in the transmit buffer to get to the receiving station under these conditions, because a lot of retries are required. You could watch the PK-232's LEDs to get an idea when the transmit buffer will be empty, but it is difficult to estimate how fast the characters are moving and how much text is left in the buffer at any given time. Enter the EAS parameter. Probably the easiest way to estimate the rate of character transfer is to watch the characters as they are sent over the radio channel. If you set EAS to ON, that's exactly

AMTOR ARQ

I'm a real fan of AMTOR—especially AMTOR ARQ. ARQ has some exceptionally useful capabilities, such as selective calling, excellent error control and, most important to me, I *know* that the other station receives my transmissions. With AMTOR FEC or Baudot RTTY, I don't know when my transmissions take any "hits" en route to the receiving station; using AMTOR ARQ, I know the information is error free. This is an especially important consideration for unattended receiving stations.†

My only beef about AMTOR ARQ (and, to a lesser extent, about packet radio) is that when band conditions get bad, the system may have to make many retries to get the information through without errors. In this situation, my typing can get many lines ahead of the communications processor. With conventional Baudot or ASCII RTTY, and even AMTOR FEC, this is not a problem. The communications processor always sends the data at full speed, because there's no provision with these modes for the receiving station to interrupt and ask for repeats, slowing down throughput.

I can't type more than 60 WPM, but when conditions are bad and I'm using AMTOR ARQ, throughput is sometimes as slow as 10 WPM.†† I am patient enough to wait for the characters to be transmitted over a poor radio channel, but with most AMTOR communications processors, when I'm not using a split-screen terminal I have no idea how many characters have been sent and how many are still in the buffer.††† To solve this problem, I came up with the modification described in this article.—*Paul Newland, AD7I*

†Unattended operation under 50 MHz in the US requires a Special Temporary Authority (STA) from the FCC. Stations in other countries may not have this limitation.

††A similar problem exists in CW operation, but CW's slow speed isn't caused by retries. Because many CW contacts take place between 12 and 20 WPM, this is also a situation in which operators type transmitted data faster than it is sent.

†††This is *really* a problem when I've entered a bunch of characters into the transmit buffer and then wonder if I have time to run to the fridge for a soda before the buffer empties!

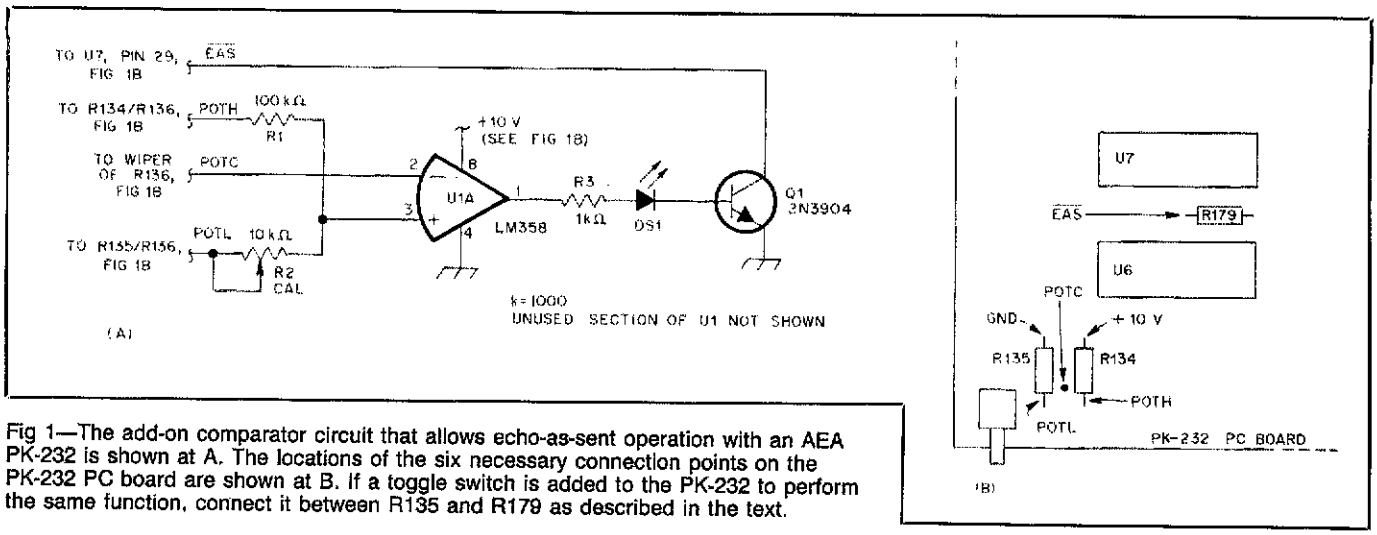


Fig 1—The add-on comparator circuit that allows echo-as-sent operation with an AEA PK-232 is shown at A. The locations of the six necessary connection points on the PK-232 PC board are shown at B. If a toggle switch is added to the PK-232 to perform the same function, connect it between R135 and R179 as described in the text.

what you'll see on your screen, and you can more easily estimate when the buffer will be empty.

When the buffer has emptied and you want to send more text, or when you're ready to receive text from the other station, you have to set EAS to OFF. If you don't, you won't get any echo as you type text into the transmit buffer, which is very confusing. This is where the problem comes in: EAS, because it is a software parameter, can only be turned on and off by keyboard control. This is a pain, because to switch the EAS mode on or off, you need to exit the converse mode, enter the command mode, issue the EAS ON/OFF command and then reenter the converse mode. What's needed is a *quick* way to switch the EAS parameter to OFF, ON and back to OFF again.

The Modification

All you need to add to the PK-232 to get quick control of the EAS parameter is a hardware switch that is logically ORed with the software EAS parameter. If the software EAS mode is ON or the hardware switch is closed, characters are echoed as sent. Otherwise, characters are echoed as entered. Fortunately, an unused input on the PK-232's microcomputer serves as the hardware EAS switch input. Any user who wants to add an EAS hardware switch to the PK-232 need only drill a hole in the front panel and add a switch to control the EAS switch input. That's the simplest way to implement the modification.

I didn't want to drill any holes in my PK-232, but I *really* wanted the EAS switch feature! I noticed that the THRESHOLD control on the PK-232 isn't used in AMTOR operation, so the PK-232 ignores this control when in the AMTOR mode. I decided to add a small circuit to sense when the THRESHOLD control is set to minimum and use that input to drive the EAS switch input. I did this, and it works great!

I designed the circuit in Fig 1A to switch the EAS line OFF when the THRESHOLD control is more than about 20° away from the full-counterclockwise position. When the THRESHOLD control is closer than that to the minimum setting, EAS is ON. If you don't mind drilling a hole in the front panel, all you need to do is add a switch, as shown in Fig 1B.

Circuit Construction, Operation and Calibration

I built the circuit shown in Fig 1 on a 1- × 1-inch piece of perf board from junkbox parts. Even if you have to buy everything new, it shouldn't cost you more than $5 for everything. About the only requirement for Q1 is that it should be an NPN type. DS1 can be just about any small LED—it provides an easy means of adjusting the circuit, and it provides an additional voltage drop between U1A's output and Q1's base. This ensures that Q1 is off when U1A "wants" it off.

To install the circuit in the PK-232, locate the six necessary connection points in the PK-232 in Fig 1B. R134 and R135 are located next to the THRESHOLD control. (Five of the six connections to the new circuit are in this immediate area.) I simply tack soldered the wires from the new circuit to component leads to install the mod. The plated-through hole nearest the edge of the PC board between R134 and R135 is connected to the wiper of the THRESHOLD control. The EAS switch input should be connected to the end of R179 closest to pin 1 of U7. R179 is the only resistor between U6 and U7 (both are 40-pin ICs). If you're adding a switch to the cabinet of the PK-232, simply connect one lug of the switch (an SPST toggle), to R179 (the end closest to U1, pin 7). Connect the other lug of the switch to R135 (the end closest to U5). That's all there is to it.

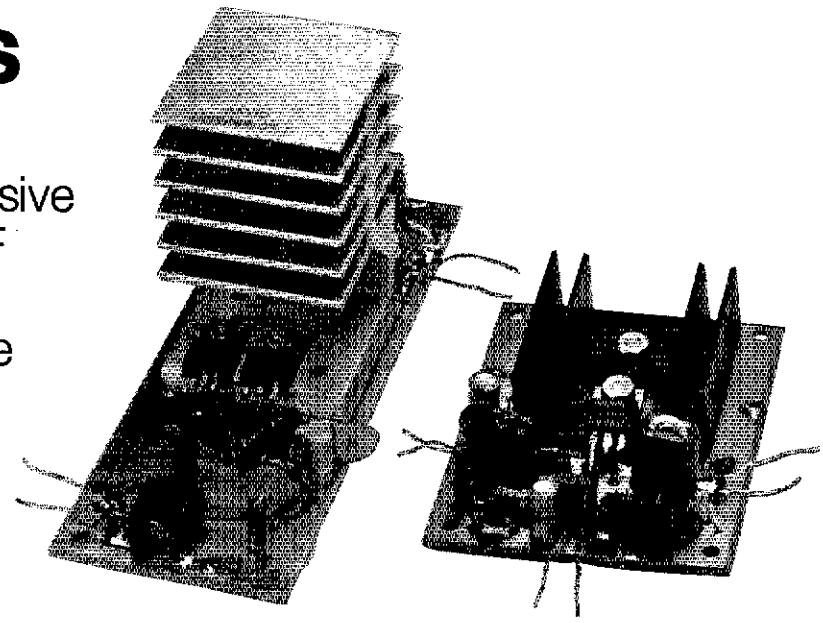
The circuit shown in Fig 1A operates as follows. U1 operates as a comparator. One arm of the THRESHOLD control is connected to the minus input of U1, providing a reference voltage. R2 is adjusted so that when the THRESHOLD control is fully counterclockwise, the voltage at the plus input of U1 is more positive than the minus input, causing the output of U1 to go near the positive supply voltage rail. This turns on DS1 and Q1, pulling pin 29 of U7 in the PK-232 low and turning on the EAS switch. When the THRESHOLD control is not within 20° of its fully counterclockwise position, the pull-up resistor (R179 in the PK-232) brings Q1's collector to +5 V, and EAS is set to OFF.

To calibrate the circuit, turn on the PK-232 and rotate the THRESHOLD control fully counterclockwise. Next, turn R2 fully to the stop that causes DS1 to go out. Slowly rotate R2 away from the stop until DS1 comes on, and then rotate R2 a bit farther. To check the setting of R2, turn the THRESHOLD control up until DS1 goes out. If the position of the THRESHOLD control is within 20° or so of its fully counterclockwise position, you're all done. If not, readjust R2.

Summary

The modification described in this article makes for much-enhanced AMTOR ARQ operation with a PK-232 and a non-split-screen terminal or computer. Similar modifications can probably be made to similar communications processors—if the programmers have provided the necessary "hooks." If you have a communications processor other than the PK-232, contact the manufacturer to see if such a mod is possible with your unit. QST

Power-FET Switches as RF Amplifiers



Switching FETs are inexpensive and can perform well as RF power amplifiers in the HF spectrum. Many of them are also suitable at VHF.

By Doug DeMaw, W1FB
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Are you still using bipolar transistors in your homemade RF power amplifiers? They are fine devices, but they have some special design requirements that are not necessary when we use power MOSFETs as RF amplifiers.[1] Unfortunately, power FETs that are designed for RF service are costly—often more expensive than bipolar transistors that deliver comparable output power. But what about the common switching FET? If it is designed for high-speed switching, why shouldn't it work as an RF amplifier? The fact of the matter is that many switches do perform nicely as RF amplifiers.

A Review of FET Advantages

Thermal runaway, which affects bipolar transistors when their junctions become too hot, does not occur with power FETs. An increase in bipolar-transistor junction heat causes an increase in transistor gain. The greater the gain, the hotter the transistor becomes. This domino effect can destroy the transistor quickly. Power FETs, on the other hand, have decreased gain with increases in heat. This is a self-protection feature. Also, many RF bipolar transistors can self-destruct in the presence of high SWR, especially when there is a finite or infinite load condition. Power FETs are immune to SWR damage, except when high SWR causes self-oscillation of sufficient magnitude to cause the P-P drain-source voltage to exceed the maximum ratings of the FET.

Bipolar transistors exhibit a marked increase in gain as the operating frequency is lowered. In theory, but not in practice, the gain increases 6 dB per octave as the frequency is lowered. This phenomenon leads to severe instability and possible

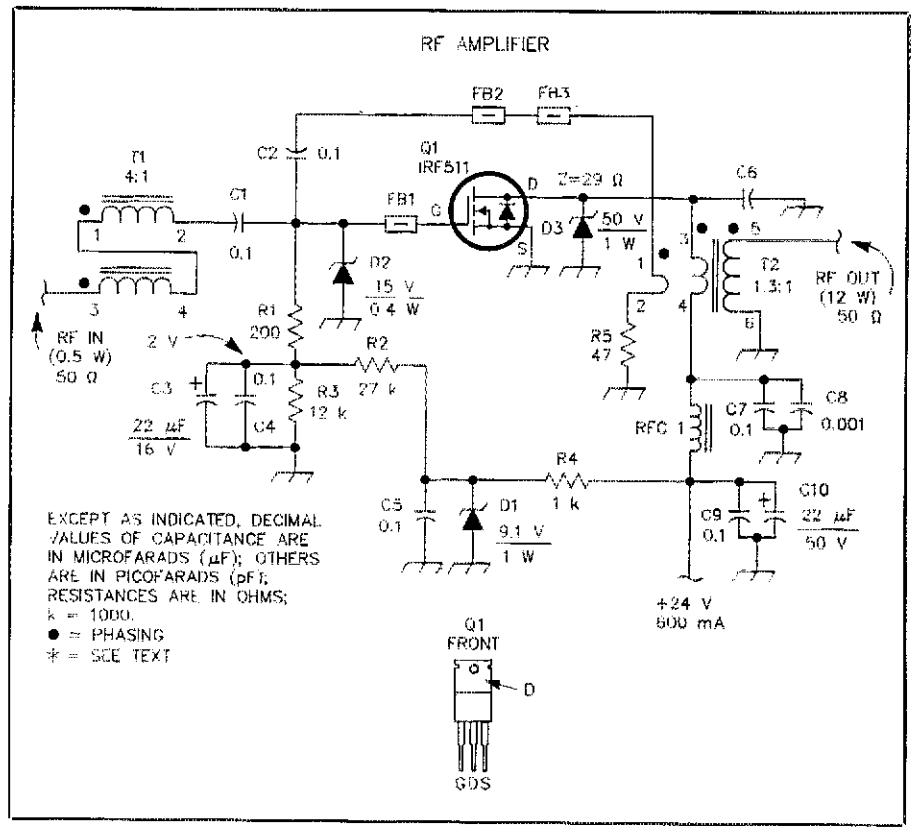


Fig 1—Schematic diagram of a 12-W power FET class-C amplifier with negative feedback. Polarized capacitors are electrolytic or tantalum. Others are disc ceramic, 100 V or greater. Resistors are ¼-W carbon composition, except for R1 and R4, which are ½-W units. Numbered components not listed below are numbered for discussion and layout purposes.

C6—See text for X_C value.
D1—9.1-V, 1-W Zener.
D2—15-V, 400-mW Zener.
D3—50-V, 1-W Zener.
RFC1—10 turns of no. 26 enam wound on Amidon Assoc FT-37-43 toroid.
T1—Broadband transformer, 4:1 Z ratio. Use 12 bifilar turns of no. 28 enam wire on an Amidon Assoc BN-43-302 balun core.
T2—Broadband transformer, 1.3:1 Z ratio. Use 1 turn of no. 24 hookup wire for winding 1-2. Use 4 turns of no. 26 enam wire for winding 3-4. Use 5 turns of no. 26 enam wire for winding 5-6. Wind on an Amidon Assoc BN-43-3312 balun core. Observe polarity of the windings (dots).
Z1, Z2, Z3—Mini ferrite bead. Amidon Assoc FB-43-101.

[1]Notes appear on page 33.

thermal runaway if gain leveling is not used. Normally, the gain is controlled (flattened over a wide range) by means of negative feedback from the transistor collector to its base. This is done with an RC or RCL type of network (see Fig 1). Power FETs do not have this gain-increase characteristic within their normal frequency ratings. Therefore, feedback is not often used in FET amplifiers.

Linearity is somewhat better with power FETs than it is with bipolar transistors. High-order IMD (intermodulation distortion) products are lower in an FET linear amplifier than they are when bipolar devices are used. Also, the input and output capacitances of FETs change very little with frequency, whereas they vary markedly with bipolars. This makes matching and feedback-network design a simple matter.

FETs exhibit a very high input impedance. The inherent gate resistance is several megohms, whereas power bipolars have a base impedance on the order of a few ohms (less than 10). This also simplifies the input-circuit design. A resistor may be used to set the FET input impedance (Figs 1 and 2). The FET gate current is in microamperes, which allows us to use simple resistive dividers to set the gate-bias level.

FET Disadvantages

Were it not for internal capacitance and resistance, most FETs would work into the GHz range, owing to their internal structure. Unfortunately, their structure encourages VHF self-oscillation, which requires special design steps to ensure amplifier stability. Parasitic oscillations of high magnitude can destroy an FET instantly. The P-P gate voltage swing cannot exceed ±20 without putting the device in jeopardy. Excessive gate voltage punctures the thin layer of silicon oxide gate insulation, and this shorts the gate to the transistor junction. Drain-source breakdown occurs quickly if the maximum V_{DS} (drain-source voltage) is exceeded.

Power FETs are designed for operating voltages from 24 upward. I am aware of no power FET that operates efficiently at 12 volts, although some have been marketed for 13.6-V land-mobile use. At the lower operating voltages a power FET saturates quickly, which greatly limits the output power. For example, the circuit in Fig 2 delivers 25 watts of RF output at 24 V dc. The output power drops to 12 watts when the supply voltage is 13.6. The drain current changes very little with decreased V_{DS}, which impairs the efficiency significantly. It is not unusual to obtain efficiencies as great as 90% with a well-designed FET amplifier, whereas a comparable bipolar amplifier seldom has an efficiency greater than 50%. Class-C operation is the exception.

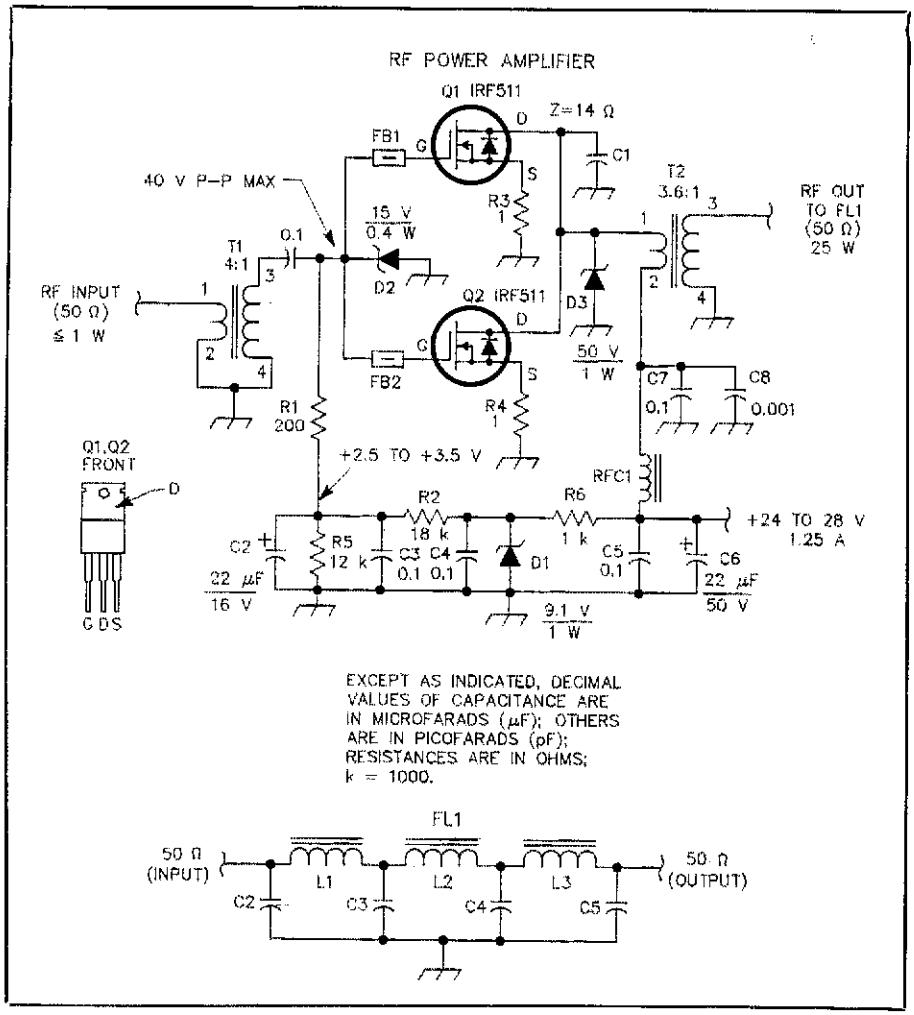


Fig 2—Schematic diagram of a 25-W power FET linear amplifier. Polarized capacitors are electrolytic or tantalum. Others are disc ceramic, 100 V or greater. Resistors are ½ W units, except for R6, which is a 1-W unit. Numbered parts not listed below are for text discussion or PC layout purposes.

C1—See text for X_C value.
D1—9.1-V, 1-W Zener.
D2—15-V, 400-mW Zener.
D3—50-V, 1-W Zener.
RFC1—8 turns of no. 22 enam wire on an Amidon FT-50-43 toroid.
T1—Broadband transformer, 4:1 Z ratio. Primary has 4 turns of no. 26 enam wire and secondary has 8 turns of no. 26 wire. Wind on Amidon Assoc BN-43-302 balun core.
T2—Broadband transformer, 3.6:1 Z ratio. Primary has two turns of no. 24 stranded hookup wire. Secondary has 4 turns of no. 24 enam wire. Use an Amidon Assoc BN-43-3312 balun core.
Z1, Z2—Mini ferrite bead on transistor lead. Amidon FB-43-101.

Power-FET Switches

A catalog ad caught my eye recently. The distributor was selling Motorola IRF511 power FETs for $1 each. I ordered six pieces for the purpose of experimentation. The data book shows this device to have a maximum V_{DS} of +60, a continuous drain current (I_D) of 4 A and a 20-W power dissipation (P_D). Input capacitance (C_{iss}) is 150 pF and output capacitance (C_{oss}) is 100 pF. These values are substantially lower than we find in RF bipolar transistors. The IRF511 is housed in a TO-220 case. My experience indicates that some TO-220 switching FETs work very well from 1.8 to 30 MHz, and sometimes even to 144 MHz. Upon reviewing the specifications I concluded that 12 W of RF output per device would be a safe level if good heat sinking were used. My tests verified this.

Experimental 12-W FET Amplifier

Fig 1 shows the circuit for my single IRF511 12-W amplifier. R1 sets the input impedance at 200 ohms. This makes it a simple matter to match a 50-ohm exciter to the amplifier input by way of a 4:1 transformer (T1). Forward gate bias (+V) is supplied from a 9.1-V Zener diode through a resistive divider (R2, R3). Power FETs are enhancement-mode devices, which means they require a positive gate voltage to turn them on. I use +2 V for CW operation (not critical). For linear operation, the gate voltage is set (via R2) for a value that produces an I_{dq} (resting drain

current) of 25 to 50 mA. D1 draws 18 mA, so this value must be deducted from the total current measured in the +24-V line. Optimum linearity can be determined only by examining the output of the amplifier with a spectrum analyzer. Some RF power FETs require as much as 250 mA of I_{dq} for proper linearity. I find the 25- to 50-mA value suitable for a single IRF511.

The amplifier in Fig 1 uses a feedback loop (T1 winding, R5, Z2 and Z3). R5 may be adjusted to obtain the amount of feedback desired. The amplifier gain is always less when feedback is used, so use no more than is necessary. I used feedback in this circuit to help ensure amplifier stability (reduced gain), although good performance resulted when I disconnected the loop. I included the network to illustrate how you may incorporate negative feedback, should you desire to have it. It does help prevent amplifier self-oscillation. Z1 is slipped over the gate lead of Q1 to suppress VHF parasitics. It serves as a Q killer. Professional engineers stress the importance of "de-Qing" the FET input circuit to obtain stability. Ferrite beads (850 μ_i) greatly reduce the Q of the stray inductance at the FET input.

T2, as in the case of T1, is a broadband transformer. It matches the Q1 drain to a 50-ohm harmonic filter (see FL1 of Fig 2). The T2 feedback winding consists of a single turn of wire through the T2 core.

My first filter was a 7-element T network. The amplifiers in Figs 1 and 2 self-oscillated with that filter, and this destroyed six IRF511s before I cured the problem. The inductive input element of the filter encouraged oscillations that exceeded the safe V_{DS} rating. I changed to a 7-element pi type of filter, and the problem vanished. D2 protects the drain-source junction from voltages over 50. These parts aren't necessary if you're certain that your amplifier is unconditionally stable. I prefer to use them as a safeguard! I installed a 15- and 36-V Zener diode in series at D3 because I did not have a 50-V device on hand.

Remember that the RF voltage swings to twice the supply voltage when the circuit is amplifying on CW and SSB. Therefore, the drain voltage peak is 48 when you use a 24 V dc supply. The Zener diode must be rated slightly higher than the maximum peak RF voltage. It should not conduct until excessive voltage occurs.

C6 is used to bypass VHF harmonic currents at the Q1 drain. It also aids stability. The X_C (capacitive reactance) should be at least four times the drain impedance, lest there be a power loss in the circuit. Thus, for a 29-ohm drain impedance (Fig 1) the X_C is 116 ohms. A 200-pF capacitor is the largest you should use at 7 MHz. I chose a 150-pF unit for the 7-MHz circuit in Fig 1 because I had that value available.

The required driving power for the Fig 1 amplifier is between 0.5 and 0.75 watt. The output power may increase to 15 W if greater input power is applied, but the FET runs quite warm at this power level. My heat sink measures 1-1/2 × 1-1/2 × 5/8 inches (Thermalloy 6111-B). A homemade sink can be fashioned from 1/16-inch aluminum stock (U shaped).

Parallel IRF511s

The manufacturers of power FETs caution against using these transistors in parallel. Paralleled FETs increase the chance for destructive self-oscillation by virtue of extra leads that introduce unwanted stray inductance. Also, current imbalance may exist if the transconductance of the devices is not matched. I decided to meet this challenge. The circuit in Fig 2 shows an amplifier that operates smoothly and without instability. The output power on 40 and 80 meters, depending upon the driving power, is from 20 to 25 W (after filtering) at 24 V. No feedback is used in this amplifier. D2 and D3 protect the devices from over-voltage damage. C1, Z1 and Z2 suppress VHF parasitics. The ferrite beads are slipped over the gate leads of Q1 and Q2 before they are installed on the PC board. R3 and R4 tend to equalize the currents of Q1 and Q2 when the transconductance is not the same for both FETs.

R2 may be changed to obtain the desired I_{dq}. In fact, a PC-mount potentiometer can be used in place of R5 to provide variable gate bias. I suggest a value of 25 kΩ. C1 follows the X_C rule given for the circuit in Fig 1. The large vertical heat sink for this amplifier is an AAVID 2049469-05-F that I bought as surplus. It measures (HWD) 2-3/8 × 1-1/2 × 1-5/8 inches. It is quite warm to the touch after a 3-minute key-down condition when the amplifier is delivering 25 watts. Silicone grease is used between the transistor bodies and the heat sink.

FL1 in the lower drawing of Fig 2 is a low-pass harmonic filter. Table 1 lists component values for the various HF bands. You may wish to build all of the filters and switch them for multiband operation.

Construction Data

Double-sided PC boards are used for these amplifiers.[2] No. 4 holes are drilled in the boards at various places to accommodate bus-wire connectors that join the ground planes on each side of the board. This equates to plated-through holes and allows the RF currents to flow unimpeded from one side of the board to the other. If no. 60 holes are drilled through the board, with bus wire passed through them and soldered on each side, the RF can't flow by way of skin effect through the board. Metal eyelets can be substituted if they are soldered in place. The double-sided board aids amplifier stability because the foils act as bypass capacitors to the ground-plane surface of the board.

The amplifier modules should be mounted on a metal chassis by means of metal spacers. This enhances stability by improving the grounding of the module.

Since the heat sinks for these amplifiers are common to the mounting tabs of the FETs (drain connection), they have +24 V on them. The sinks are isolated from the ground foil of the PC board by means of isolated copper islands. The drain leads for the amplifier in Fig 2 are clipped off near the transistor body.

The Zener diodes of both circuits are merely soldered to the appropriate PC-board foils rather than being mounted in holes. Keep the leads short.

Parts-placement guides for the two circuit boards are provided in Fig 3.

Wrap-Up

Dave Hollander, N7RK, a Motorola power-FET engineer, told me that the

Table 1
Component Values for FL1 of Fig 2

Band	C2, C5 (pF)	C3, C4 (pF)	L1, L3	L2
75/80 m	560	1200	2.46 μH. 21 turns no. 26 enam on T-50-2 toroid core.	2.89 μH. 23 turns no. 26 enam on T-50-2 toroid core.
40 m	470	820	1.4 μH. 17 turns no. 24 enam on T-50-2 toroid core.	1.56 μH. 18 turns no. 24 enam on T-50-2 toroid core.
30 m	220	470	0.96 μH. 15 turns no. 24 enam on T-50-6 toroid core.	1.13 μH. 17 turns no. 24 enam on T-50-6 toroid core.
20 m	110	300	0.6 μH. 11 turns no. 24 enam on T-50-6 toroid core.	0.65 μH. 14 turns no. 24 enam on T-50-6 toroid core.
17 m	100	250	0.52 μH. 11 turns no. 22 enam on T-50-6 toroid core	0.65 μH. 13 turns no. 22 enam on T-50-6 toroid core.
15 m	110	240	0.48 μH. 11 turns no. 22 enam on T-50-6 toroid core.	0.56 μH. 12 turns no. 22 enam on T-50-6 toroid core.
12 m	120	270	0.54 μH. 12 turns no. 22 enam on T-50-6 toroid core.	0.63 μH. 13 turns no. 22 enam on T-50-6 toroid core.
10 m	56	150	0.3 μH. 8 turns no. 22 enam on T-50-6 toroid core.	0.38 μH. 10 turns no. 22 enam on T-50-6 toroid core.

These constants are suitable for both amplifiers described in this article. Various cutoff frequencies and ripple factors are represented above in order to arrive at standard capacitor values. Coil turns may be spread or compressed with an insulated tool to peak output power of amplifier. Capacitors are silver mica or polystyrene, 100 V or greater.

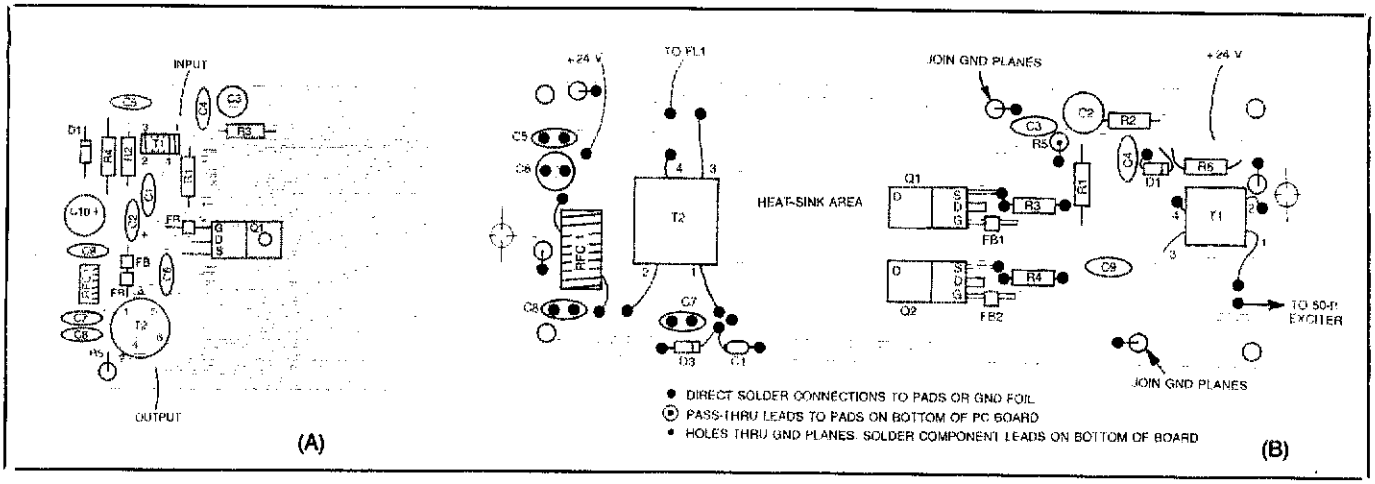


Fig 3—Parts-placement guides for the two amplifier boards. D2 and D3 of Fig 1 are soldered on the etched side of the smaller board. As shown at A, all other parts are on the ground-plane (top) side of the board. As shown at B, C1 and D3 are installed near the heat sink on the component side. The shaded area represents an X-ray view of the copper pattern. Component outlines are not necessarily representative of the shapes of the actual parts used.

IRF511[3] has the smallest internal geometry of the switching-FET line. This means that it is fairly fragile, but he considers it a good transistor for amateur HF applications. The two amplifiers I built using this device worked well on both the 40- and 80-meter bands. He mentioned the Motorola MTP3055E power FET as a low-cost substitute for the IRF511. He stated that the MTP3055E is more rugged and has a built-in drain-source protective Zener diode. The case (TO-220AB) is slightly larger than that of the IRF511 TO-220. The maximum ratings for the MTP3055E are V_{DS} 60, I_D 12 A and P_D 40 W. The $r_{DS(on)}$ is 0.15 ohm. This is the junction resistance when the transistor is switched on by a gate pulse or voltage. The lower the r_{DS}, the faster the switching time, and hence the better the HF performance. C_{iss} is 500 pF and C_{oss} is 300 pF—somewhat greater than the values for the IRF511. However, this capacitance is substantially lower than I experienced with power bipolars.

Power FETs in TO-3 cases are not as suitable for RF work as are those in smaller plastic cases. These larger FETs have very high input and output capacitance, owing to the large internal structure. The high capacitance is difficult to cancel (X_C) at the upper end of the HF spectrum. However, I had success when using a now-obsolete Siliconix VN84GA (TO-3) at 7 MHz in a class-C amplifier. It delivered 40 watts of RF power at 28 V. Efficiency was 80%.

My purpose in writing this article is to encourage you to experiment with power FETs. Switching FETs are inexpensive and offer good performance at HF and VHF. We need not have a hang-up about designing our gear for +12 V operation. A regulated +24 or +28 V power supply is no more difficult or costly to build than a 12-V one!

Notes

[1]VFO-controlled MOSFET CW transmitters are described in M. Masterson, "Three Fine Mice—MOuSeFET CW Transmitters," *QST*, Dec 1986, pp 19-24.

[2]Etching patterns for these amplifiers are available for a self-addressed, stamped envelope. Send your request to ARRL Power FET Patterns, 225 Main St, Newington, CT 06111. Drilled and plated boards for these amplifiers are available from FAR Circuits (N9ATW), 18N640 Field Ct, Dundee, IL 60118, tel 312-426-2431, evenings. The smaller board is $9.95, and the larger one is $12.25, postpaid.

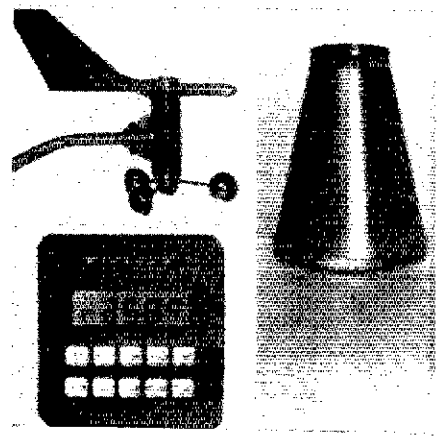
[3]IRF511 transistors were available in late 1988 from All Electronics Corp, PO Box 567, Van Nuys, CA 91408, tel 818-997-1806. Price: $1 each.

New Products

AZIMUTH WEATHER STATION

☐ Azimuth Communications Corp has introduced the TWR-3 WeatherStar computerized weather station. The TWR-3 allows you to monitor wind speed (in km/h or mi/h) wind direction (in 2° or 10° increments) and external temperature (Fahrenheit or Celsius), on a 5/8-inch liquid-crystal display. The TWR-3 also displays time, daily high and low temperatures, wind-gust speeds and wind-chill factor. An optional self-emptying rain collector allows you to monitor rainfall. A scan mode allows all displayed data to be viewed in any desired order. The TWR-3 runs on three AAA cells or an optional adaptor. A NiCd battery and a desk stand are also available.

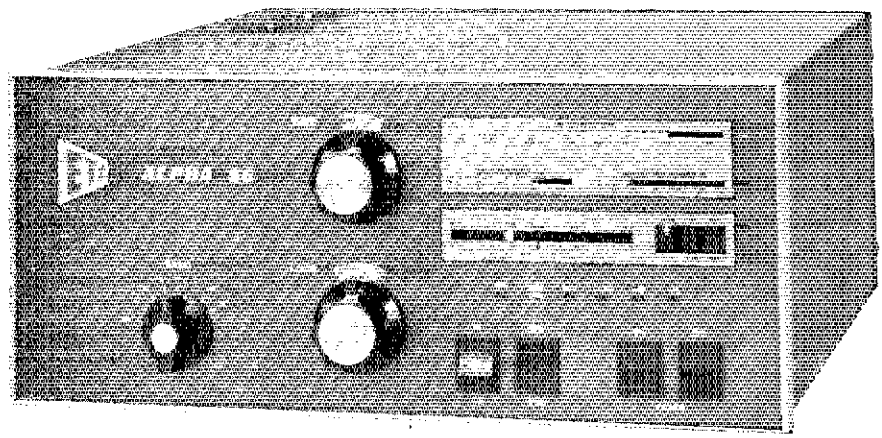
The weather station comes with the computer/display module, wind vane, anemometer and 40 feet of control cable (extendable to 200 feet). Price: $159.95 plus $4.95 shipping and handling to US addresses. Foreign-order shipping and handling charges are $17. For more information, contact Azimuth Communications Corp, Dept Q, 11845 W Olympia Blvd, Suite 1100, Los Angeles, CA 90064, tel 213-473-1332. For orders, call 800-882-7388.—*Rus Healy, NJ2L*



Conducted By James W. Healy, NJ2L
Assistant Technical Editor

ETO Alpha 86 Linear Amplifier

Reviewed by David Sumner, K1ZZ



A few years ago, the FCC changed the standards for measurement of transmitter power in the Amateur Radio service and created a legitimate market for a new generation of higher-power linear amplifiers. Most amplifiers then available did not deliver the new maximum legal limit of 1.5 kW output; they hadn't been designed to, because the old power limit, defined in terms of input power, equated to something more like 1.3 kW peak output on SSB and 650 W output on CW and RTTY.

In developing a legal-limit amplifier today, designers not only have to design amplifiers able to deliver the watts; they have to do it on eight bands between 1.8 and 29.7 MHz. This isn't as easy as it seems, because critical components (such as anode RF chokes) have resonances that have to be placed outside all of the bands of interest. Designers have to make amplifier operation "idiot proof," because a device capable of generating 1.5 kW can do a lot of damage—to itself and to other things—if it's misused. Finally, it's nice if the designers can do all this around tubes that won't cost more than the gross national product of a small country when, inevitably, the time comes to replace them.

The ETO Alpha 86 is not inexpensive. For most hams who buy one, this amplifier will be the single most expensive item in their stations. But the Alpha 86 meets all the above criteria, and then some—and it's a pretty safe bet that an Alpha built today will still be in regular use well into the next century.

ETO now sells factory direct, and supports its products from its plant in Colorado. When shipped from the factory, the Alpha 86 is in two boxes: one for the power transformer, and one for the amplifier itself. It's done this way because the power transformer by itself is heavy; the rigors of shipment are much greater than anything you'll subject the amplifier to once it's safely inside your shack, and shipping the amplifier with the transformer installed could cause severe damage. So, the first thing you do when the two boxes arrive is to install the transformer—a one-screwdriver operation. You then have a 66-lb cabinet with everything inside; the power supply is built in.

For a self-contained amplifier running this much power, it's not a big box. But it's not a small one, either; check out the dimensions when planning where you're going to put it, and remember that unless your ham experience includes rigs like the Heathkit® DX-100, you're going to think it's heavy.

Hooking up the Alpha 86 is a breeze. Plan on running it from a 240-V ac line; 120-V household wiring generally won't handle the load. If you're going to use the Alpha 86 with a non-QSK exciter, there are just four connections to be made: RF in, RF out, the relay keying line and ALC. *Don't neglect the ALC hookup!* It takes only about 50 watts of RF drive to tickle the amplifier to full legal output, so the typical 100-W exciter run wide open will seriously overdrive this amplifier. If you're going to operate QSK, there's an additional keying line to be used; you'll actually be keying the amplifier's relay line, which in turn will key the exciter. The instruction manual explains how to switch between this mode and conventional VOX or PTT operation.

On the front panel, there are three knobs, four large switches and three small ones, six small indicator lights and four multicolored LED bar indicators. There are no meters; the bar indicators take the place of meters, and function quite well, but they do take some getting used to. The three knobs are the band switch, tuning and loading controls. The four large switches are POWER ON, POWER OFF, OPERate/STANDBY and HIGH/LOW POWER. The three small switches set one of the four bar indicators to indicate anode voltage, anode current, or a special TUNE function (described later). The other three bar indicators show power output, reflected power and grid current. The six indicator lights show various faults and conditions.

Once all the connections have been made, it's time to hit the POWER ON switch. With the multifunction indicator on HV and the HIGH/LOW POWER switch on HIGH, you'll see the anode voltage rise to 1750 or so, and then jump up to 2500 a second or so later. The next thing you have to do is wait—for about three minutes (2 minutes, 55 seconds on the review unit); the control circuitry keeps the amplifier in standby until the tubes (a pair of Eimac® 3CX800A7s) are warmed up to Eimac's specifications. For those of us who are used to "instant" warm-up amplifiers, this 3-minute warm-up may dictate a significant change in operating habits. I usually keep my trusty 2 × 3-500Z amplifier turned off until I need it, but the first time I missed a DX contact while waiting for the WAIT light on the Alpha 86 to go out cured me of that! ETO recommends that you minimize the number of times you turn the amplifier on and off during a day's operation, because temperature cycling shortens tube life.

Tune-up of the Alpha 86 is straightforward. An initial tuning chart customized for each amplifier is included in the instruction manual to give you a starting point. The special TUNE function mentioned earlier helps you tune for maximum linearity at the 1.5-kW output level; if you've ever used a Collins 30L-1 or 30S-1, this should be a familiar concept. On the review unit, this function worked fine on all bands except 10 meters, where it wasn't possible to tune for an indicated balanced condition at 1.5 kW output. Because the amp tuned up properly in all other respects on 10 meters, this didn't seem to be anything to worry about.

The tuning and loading controls are each marked from 0 to 100, and once you've tuned up into each antenna on each of your favorite operating frequencies, you'll be able just to set and forget them when you QSY. Then, when you begin transmitting, a glance at the LED bar indicators will show you if anything's amiss. If anything is *seriously*

Table 1

ETO Alpha 86 MF/HF Linear Amplifier, Serial no. 88340043

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 1.8 to 22 MHz (can be modified by licensed amateurs for 12- and 10-meter operation).	As specified.
Power output: 1.5 kW continuous carrier, CCS.	As specified.
Driving power required: 60 to 70 W, nominal, for rated output	40 to 55 W, nominal, for 1.5 kW output.
Spurious signal and harmonic suppression: better than 50 dB.	See Fig 1.
IMD: −35 dBc at 1 kW output, typ.	See Fig 2.
Maximum load SWR: 2.5:1.	As specified.
SWR trip-circuit threshold: 250 W reflected power at 1.5 kW output.	As specified.
Primary power requirements: 220-240 V, fused at 20 A.	
ALC: negative-going, grid-current derived.	
Equipment protection features: primary and step-start fuses; primary ac interlock; high-voltage interlock; anode over-current relay; high-SWR cut-out.	
Color: Gray.	
Size (H × W × D): 7½ × 17 × 15 inches.	
Weight: 66 lb.	

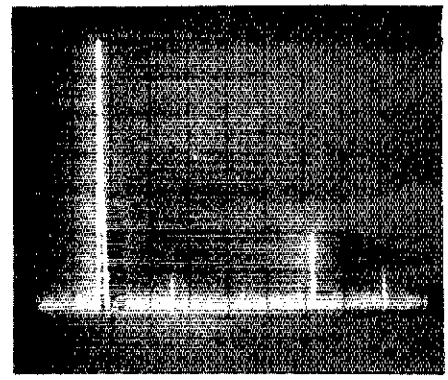


Fig 1—Worst-case spectral display of the ETO Alpha 86. Horizontal divisions are each 10 MHz; vertical divisions are each 10 dB. Output power is approximately 1.5 kW at 18.1 MHz. All harmonics and spurious emissions are at least 50 dB below peak fundamental output (−50 dBc). The Alpha 86 complies with current FCC specifications for spectral purity.

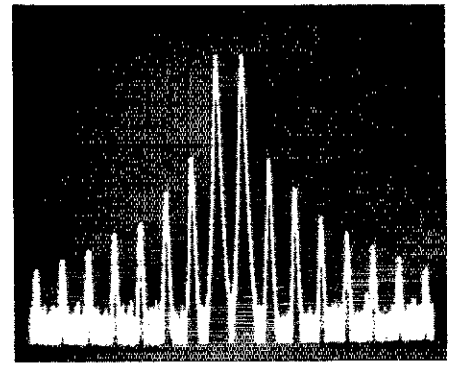


Fig 2—Spectral display of the ETO Alpha 86 during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 33 dB below PEP output, and fifth-order products are approximately 42 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The amplifier was being operated at 1.5 kW PEP output on 14.2 MHz.

amiss, such as your antenna having shorted out or fallen down, the control circuitry senses this when you apply RF drive and puts the amplifier into standby—and those indicator lights mentioned earlier tell you what's wrong. This is one of the most impressive features of the Alpha 86, and is a great comfort in the wee hours of a contest weekend if you forget to switch antennas when changing bands.

A two-speed blower is used to cool the tubes. Even at the higher speed, the blower is quieter than the fans used in most other amplifiers.

As required by the FCC, the Alpha 86 does not work on 12 or 10 meters as shipped by ETO. If you buy one, send ETO the completed warranty card for the amplifier, along with a copy of your license, and they'll provide you with the information required to make the appropriate modification, as well as tuning settings for the 10- and 12-meter bands. ETO provides a three-year limited warranty for use of the Alpha 86 in the amateur service, except for the tubes, which are warranted by their manufacturer.

Unless you're into microprocessor control of band switching and tune-up functions, it's difficult to think of anything you might want in an amplifier that isn't delivered by the Alpha 86. Price: $3395, shipping to US and Canadian addresses included. Manufacturer: Ehrhorn Technological Operations, Inc, 4975 North 30th Street, Colorado Springs, CO 80919.

RF CONCEPTS RFC 8-RC REPEATER CONTROLLER

Reviewed by Tom Francis, NM1Q

Thanks to Eric Wagner, KB1RI, Pete Simpson, KA1AXY, and Jim Podsiadlo, AE1C, for providing a repeater and their help with this review.

Under normal circumstances, the first thing a ham does when a new piece of equipment arrives is open the box, pull out the gear and get on with the show—reading the documentation is for times when you run into trouble or can't figure out what a particular gizmo does. The RFC 8-RC is different—we received a stuffed PC board and a descriptive 43-page manual complete with schematic, hook-up diagrams, repeater commands and modes of operation. Maybe reading the manual first isn't such a bad idea...

The RFC 8-RC can control up to three transmitters (repeater, link and remote base) and four receivers (repeater, link, remote base and control). There are also provisions for a continuous tone-coded squelch system (CTCSS) input and an alarm-input signal. The CTCSS input is a logic-level input—you have to use an external CTCSS decoder to decode the tone. The alarm input can be used for just about anything; for instance, to indicate an open door in the repeater room or cabinet, a fire in the repeater room, and so on. The controller also has eight auxiliary control outputs. Other options for the RFC 8-RC include interfaces for packet radio, link and remote-base receivers, and other auxiliary inputs. An autopatch controller is also available.[1]

Installation

After mounting the controller in a card cage and providing a source of 5 V dc, installation was straightforward. The only modification we had to make to the repeater itself was to the controller interface. The controller audio input and output levels were specified at 0.25 V RMS (−10 dBm). Two logic signals are also required: one to indicate the presence of a signal at the receiver (COR) and another to activate the transmitter (PTT). RFC provides an open-collector output for the PTT output and a CMOS-gate input for the COR signal. (RFC recommends using an open-collector driver at the receiver to generate the COR signal.) Both the COR and PTT signals are active-low.

Our repeater receiver does not provide a squelch-open signal, but instead, a signal based on receiver quieting. This signal varies continuously. To solve this problem, we built a simple comparator circuit to provide a squelch-open (COR) signal and to control an audio-muting switch.

It is easy to configure the RFC 8-RC—all you need is a transceiver with a dual-tone

[1]The optional autopatch controller, the RFC 8-AP, was bench tested as part of this review. All functions worked as specified. The autopatch PC board is well constructed, and the documentation is detailed and complete. Connecting the autopatch controller to the repeater controller is simple and straightforward.

multifrequency (DTMF) pad. (One minor problem was the layout of the command set—there doesn't appear to be any pattern to the commands, which caused us to spend a lot of time looking up the pertinent information in the manual.) We decided to lengthen the transmitter hang time to from 1 to 3 seconds[2] and to set the time-out timer to 1.5 minutes. All together, configuring the controller took less than ten minutes.

Up to ten sets of configuration parameters can be stored in nonvolatile memory. The command codes can be changed by "unlocking" the controller's command memory with a multi-digit DTMF code. This DTMF code is different for each controller. When you've finished configuring the command set, you lock it. If you forget to lock the command set, the controller will do it for you after a short delay. We elected to use the default command set. The command-set-lock feature was deemed a good thing by everyone involved in the review, and the automatic relock feature is a bonus.

As you program the controller, it acknowledges command entry in CW. This is another handy feature.

Repeater Operation

Once the configuration was done, we turned the repeater on, used the controller for six weeks and collected observations from users. We had installed the RFC 8-RC in place of a home-brew repeater controller that had been in operation for several years, so there were some differences to get used to. We've tried to ignore the subjective aspects of these differences in this review.

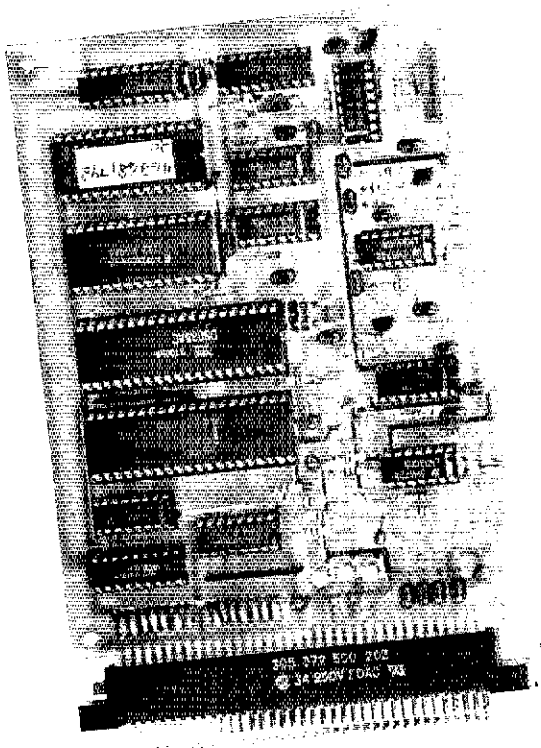
One glitch we noticed occurred—with somewhat unpredictable results—when the identification (ID) timer and time-out timer clashed. At one point, a user claimed that the repeater began to ID, then timed out during the transmission of the ID message. Another ID/timeout conflict occured when the machine sent an ID message, then timed out with no input carrier. This was the only bug that we found with the controller. [Ev Gracey, WA6CBA, of RF Concepts, says that this problem existed in preproduction units only, but that similar problems can be caused by improper repeater-controller-to-repeater connections. Anyone experiencing similar trouble can call or write RFC for assistance. If there is a problem with the controller itself, RFC will correct the problem.—*Ed.*]

The RFC 8-RC IDs the repeater at fixed (6-minute) intervals, and does not give a courtesy beep after the ID. This is a common feature among repeater controllers, but some feel that a courtesy beep after the ID is desirable. The RFC 8-RC turns on the repeater transmitter almost immediately when an input signal is present; a short delay is introduced to keep the transmitter from being keyed by noise transients. An anti-kerchunk feature takes over beyond this noise-protection delay: When someone kerchunks an RFC 8-RC-controlled repeater, a short transmission occurs, but neither a squelch tail nor a courtesy tone is generated. This feature can be defeated by transmitting beyond the anti-kerchunk time period, but it's a good idea nonetheless.

DTMF tones transmitted on the repeater-input frequency are muted and masked (the tones aren't retransmitted by the repeater) after the second tone is entered. This is done to keep unauthorized people from using the DTMF tones transmitted on the repeater for nefarious purposes (such as unauthorized changing of the repeater's control parameters). Unfortunately, this also inhibits the use of selective-calling systems using multi-digit DTMF addressing through the repeater. One solution to this problem might involve a program change in the controller that would mute only *commands*, perhaps by requiring that all commands be prefaced by a DTMF *. In the prevention of unauthorized command entry, however, the present system is almost airtight.

The RFC 8-RC performs well, and is a high-quality product. The PC board shows excellent workmanship and is built of good-quality components. If you're not into home-brewing repeater controllers, the RFC 8-RC is worth looking into. Manufacturer: RF Concepts, 1202 E 23rd St, Lawrence, KS 66046, tel 702-827-0133. Price class: RFC 8-RC repeater controller, $395; RFC 8-AP optional autopatch controller, $199.

[2]*Hang time* refers to the delay between cessation of the repeater RF-input signal and the termination of repeater-carrier transmission.



RF Concepts 8-RC Repeater Controller, Serial no. 0001

Manufacturer's Claimed Specifications

Audio input level: 0.25 V RMS.

Input impedance: at least 50 kΩ.

PTT output: open-collector, active low; maximum 24 V at 100 mA.

Hang-delay timer: programmable from 0.5 to 4 seconds.

Time-out timer: programmable from 30 seconds to 3 minutes.

Feedback-tone frequencies: programmable from 400 to 3000 Hz.

Identification timer interval: 6 minutes.

CW speed: programmable from 10 to 30 WPM.

Microprocessor: 8085A; 1.6-MHz clock.

Power requirements: 5 V dc (± 0.25 V) at less than 300 mA.

Size: 4½ × 6½ inches.

QEX

QEX: THE ARRL EXPERIMENTER'S EXCHANGE AND AMSAT SATELLITE JOURNAL

The March issue of *QEX* includes:

- "MMICs Mimic Mixer" by H. Paul Schuch, N6TX. Paul describes an active balanced mixer circuit that uses two inexpensive monolithic microwave integrated circuits (MMICs) to afford significant conversion gain and low noise figure, and requires extremely low LO drive levels.
- "The ACE Orbit: A New Communications Satellite Orbit," by Andrew E. Turner and Kent M. Price. Launch opportunities for geosynchronous-orbit spacecraft are becoming more expensive and less available. The newly developed ACE orbit is nongeosynchronous, but has many advantageous characteristics.
- In "Correspondence," Carl Gustaf Blom, SM6HYG, discusses tropospheric backscatter.
- ">50," by Bill Olson, W3HQT. This month, >50 wraps up a series on reflector antennas. The column concentrates on surface accuracy, surfacing materials and obtaining dishes and materials.
- "VHF+ Technology," by Geoff Krauss, WA2GFP. Reports have it that surplus 800-MHz cavities of potential use to hams are now scrapped by the cavity manufacturer(s) when decommissioned because of greed on the part of a few cavity-reselling "entrepreneurs." Can we mollify the cavity manufacturer(s) and redirect these cavities to honest hams?

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL/AMSAT members is $10 for 12 issues; for nonmembers, $20. There are additional postage surcharges for mailing outside the US; write to HQ for details.

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

LIGHT UP YOUR ID BADGE

☐ The circuit shown in Fig 1A lights 10 LEDs sequentially in marquee fashion, and can be used to accent an ID badge as shown at Fig 1B. Build the circuit on a piece of perfboard, using ribbon cable to connect the LEDs to the 4017. (At least 11 conductors are needed: one for each LED anode, and one for the common LED cathodes). Because the 4017 is static sensitive, don't solder it directly into the circuit; use an IC socket instead. Use a socket for the 555 timer, too.

To provide best background contrast for the LEDs, I suggest mounting the ID badge into a suitable plastic box. In lieu of this, black cardboard strips can be glued around the badge. (If you use a box, cut a slit in the box to pass the LED ribbon cable.) Drill and mark the badge to take the LEDs, mount the LEDs on the badge, and wire the LEDs to the board. (I drilled *two* holes for each LED, one for each lead, in my badge.) Tape the 9-V battery across the center of the circuit board as shown in Fig 1B. Tape a piece of cardboard across the back of the perfboard to protect the wiring.

A snap-on battery connector serves as the on/off switch. To wear the illuminated badge, insert the circuit board into your breast pocket, leaving only the badge visible, or attach the badge to your shirt with its clip or pin.—*Al Greenstein, W4NFJ, 4138 NW 88th #107, Coral Springs, FL 33065*

ANTENNA PRUNING BY NUMBERS

☐ Because they are approximations, the well-known formulas for antenna length in feet (1005/f for a full wavelength, 468/f for a half wavelength, 234/f for a quarter wavelength, and so on, where f = frequency in megahertz) don't always provide on-the-nose results: Often, the lengths they provide end up a little on the long side. (Irregularities in installation, proximity of nearby objects and other factors account for some of the difference.) A coax-fed, 7.2-MHz, half-wave dipole cut to length per 468/f may show minimum SWR at, say, 7.1 MHz instead of the design frequency. This is where "cut and try" comes in: To lower the SWR at 7.2 MHz, you cut a few inches off each leg of the dipole (the same amount off each leg!) and measure the SWR again. Usually, several tries are needed to shorten the antenna enough to minimize SWR at the design frequency.

Here's the technique I use to minimize cut-and-try antenna pruning in cases where the antenna is too long to start with:

1) Install the antenna per the appropriate formula and determine the frequency at which it exhibits an SWR dip. (If the antenna is indeed too long, the minimum-SWR frequency will be somewhat lower than the design frequency.)

2) Substitute the minimum-SWR frequency for the design frequency in the antenna-length formula you used, and solve the equation. The difference between the answer and your antenna's installed length equals how much wire you must remove from the antenna to move its minimum-SWR point to the design frequency.

Example: Based on the equation 1005/f, a full-wave loop for 1.9 MHz should be 528.9 ft long, but measurements show that a loop of this length exhibits an SWR dip at, say, 1815 kHz. Per step 2 above, substituting 1815 kHz for the design frequency in the full-wave length formula

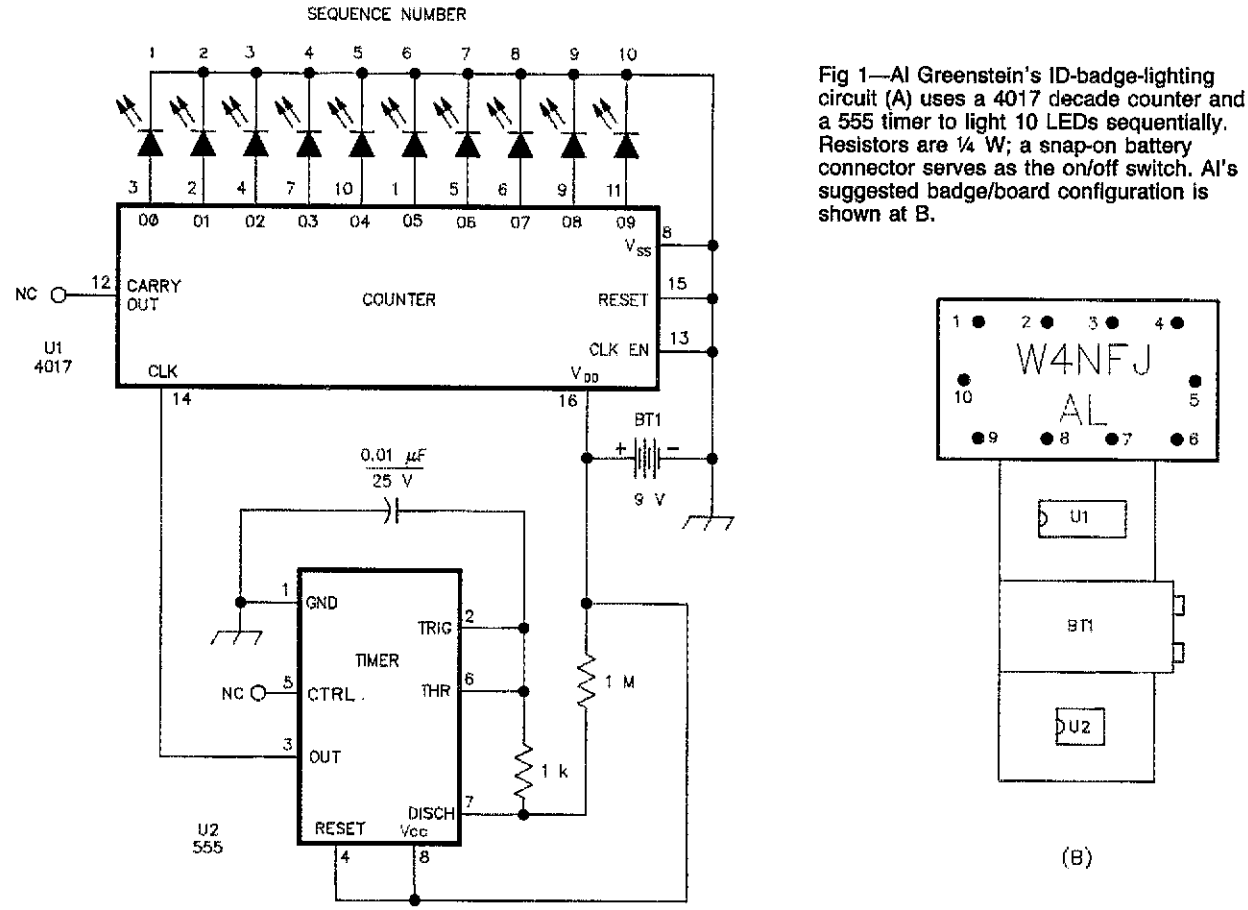


Fig 1—Al Greenstein's ID-badge-lighting circuit (A) uses a 4017 decade counter and a 555 timer to light 10 LEDs sequentially. Resistors are ¼ W; a snap-on battery connector serves as the on/off switch. Al's suggested badge/board configuration is shown at B.

(1005 ÷ 1.815) results in a length of 553.7 ft. Shortening the antenna by 24.8 ft (553.7 − 528.9) should move the SWR dip to 1.9 MHz.

Using this procedure to adjust several antennas, I have come very close, if not right on, to moving the SWR minimum to my design frequency with only one antenna-length adjustment.—*Wayne M. Sutherland, NQ7Q, PO Box 1721, Laramie, WY 82070*

HIGHER VISIBILITY FOR TS-440S KEYPAD NUMBERS

☐ The numbers on the keypad of the Kenwood TS-440S transceiver are difficult to read because of their small size, and because of the insufficient contrast between the dark gray keys and the light gray numbers. I solved this problem by applying white 3/16-inch dry-transfer numbers directly over the existing numbers. When carefully applied, they look absolutely factory installed, and are quite visible (to say the least!). The transfers are available at hobby shops.—*Ron Akre, NM4H, 27 Hillside Cir, Lexington, SC 29072*

This hint also applies to the Kenwood R-5000 receiver.—*AK7M*

RF/AUDIO FEEDBACK IN THE YAESU FT-101Z AND ZD TRANSCEIVERS

☐ In Oct 1986 *QST*, Bruce L. Mackey refers to RFI in the FT-101Z and ZD transceivers ("FT-101ZD Modifications," Hints and Kinks, p 49). Bruce suggests bypassing the mic input leads, and so on. In my experience, this modification only partly cures the '101Z/ZD RF problem and—if a phone patch is used—does little to clear up the audio distortion caused by the RFI.

I suggest checking the '101Z/ZD's rear-panel phone-patch jack ground terminal. Although this terminal may appear to be grounded directly to the chassis, it wasn't—at least on my transceiver. Connecting the phone-patch-jack ground terminal to chassis *at the jack* cleared up the RFI in my case.—*Peter Gamble, VE4TZ, 295 Harcourt St, Winnipeg, MB R3J 3H4*

MEASURING THE INDUCTANCE OF LOW-L INDUCTORS

☐ In "Calculating Power Dissipation in Parasitic-Suppressor Resistors" (*QST*, Mar 1989, pp 25-28), I stated that the amount of inductance used in a parasitic suppressor has a large effect on the HF power dissipated in the resistor. Because the suppressor-resistor power dissipation cannot be calculated without knowing the inductance of the suppressor inductor, a method of accurately measuring values of small inductance is useful. Here's how I do this without exotic test equipment.

The items required are a dip meter, a disc-ceramic fixed capacitor (with 1½- to 2-inch-long leads) of a known value between 30 and 62 pF, and two miniature copper test clips. Construct a test fixture by soldering the miniature test clips to the capacitor leads (don't cut the leads short).

The measurement procedure is as follows: Find the total inductance of the test clips, the capacitor leads and the capacitor itself. Do this by shorting the test clips together and measuring the text fixture's self-resonant frequency (always somewhere at VHF) with the dip meter. (Couple the dip meter to the loop comprising the capacitor, leads and test clips for this test.) Because you know the value of the capacitor, you can find the total L by using the formula

$$L = 1 \div 4\pi^2 f^2 C \qquad \text{(Eq 1)}$$

where

L = inductance in henrys
f = frequency in hertz
C = capacitance in farads

With the 47-pF capacitor I used in my test fixture, the total L worked out to be 0.086 μH. I wrote this inductance on a paper label and fastened it to the test fixture for future reference.

To measure the inductance of a low-L inductor, clip the test fixture across the ends of the inductor and measure the new, lower resonant frequency with a dip meter. Then, find the total inductance of the unknown inductor and the test fixture with Eq 1. Since you already know the inductance contributed by the test fixture (0.086 μH in my case), you can find the unknown L by subtraction.—*Richard L. Measures, AG6K, 6455 La Cumbre Rd, Somis, CA 93066*

A SHORT 7-MHz DIPOLE

☐ Here are dimensions and construction information for a short, inductively loaded dipole for 40 meters. If installed over 50 ft above ground—outdoors or even in an apartment—it can provide plenty of DX.

See Fig 2. The antenna and loading coils consist of a total of 60 ft of no. 14 plastic-covered wire. Wind the loading coils first: Each consists of 30 close-wound turns on a 1½-inch-diam plastic form [pill bottles are suitable—*AK7M*]. Use the rest of the wire as shown in Fig 2. (If space prohibits an overall antenna length of 32½ ft, you can let the 6¼-ft end sections dangle for a total length of just over 20 ft. Feed the antenna as close to its center as you can; 50- or 72-ohm coax is suitable. Preferably, the feed line should leave the antenna at a right angle.

This system can handle up to 120 W. Installed as shown in Fig 2, it should exhibit better than a 2:1 SWR from 7050 to 7160 kHz.—*Stan Grimes, W7CQB, 13300 NW 14th Ave #A, Vancouver, WA 98685-1652*

AN INEXPENSIVE CONCRETE CUTTER

☐ My problem wasn't a difficult one. All I needed was a 22-inch-square cut in concrete so my tower would fit along one side of my driveway. I checked into having someone cut the hole for me. Wow! Prices ranged from $80 to $105—so much for *that!* Renting a cutting machine looked a bit better: $55 plus the cost of the cutting blade. But jump up cow—that's more than half of what a rotator, or enough bags of concrete for the tower base, would cost!

The solution—simple *and* cheaper than the first two options—came to me one night as I lay in bed waiting for that sandman character. I realized that a concrete-cutting machine looks like a heavy-duty grass edger. Would a grass edger *work?* I tried it! I changed the oil on my edger (cost, $1.25) and installed a new belt ($4.17, and the edger needed it anyway). With the help of a 10-inch-diameter masonry-cutting blade ($3.88), water from the garden hose, two or three hours' worth of patience, sun, breaks and beer, the job was all but done. Then, with the help of a 16-pound sledge, I finally hit, er, pay dirt!—*Steve Grimminger, KG6KL, 6107 Whitewood, Lakewood, CA 90712*

ADJUSTING THE POWER OUTPUT OF JFET VFOS

☐ The output of a JFET VFO is determined largely by the device standing current—the JFET's drain current with dc bias applied and ac feedback removed. In many VFO designs, this is equivalent to I_{DSS}—the zero-gate-voltage drain current. Generally, the relationship between I_{DSS} and oscillator output is simple: The higher the device I_{DSS}, the greater the VFO output.

According to the *Motorola Small-Signal Transistor Data* book, I_{DSS} for the popular MPF102 can fall anywhere within the wide range of 2 to 20 mA. This wide I_{DSS} specification explains why some VFO builders have good luck with the MPF102 and others build MPF102 VFOs that deliver less output than that claimed for the circuit involved. The "premium" 2N4416 has an I_{DSS} range of 5 to 15 mA, making

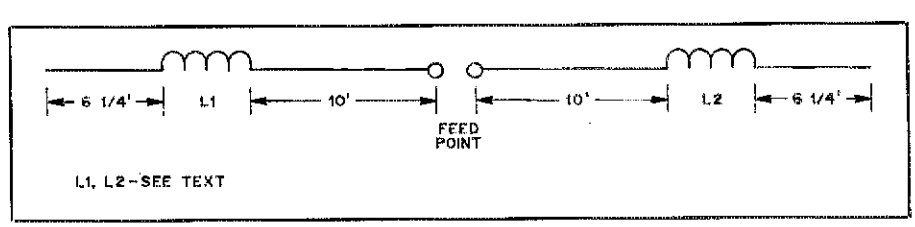


Fig 2—Stan Grimes suggests using this short, loaded 7-MHz half-way dipole where space is limited. The antenna and loading coils consist of no. 14 insulated wire; see text.

the '4416 generally better than the MPF102 if you want more power output. The best commonly available JFET for lots of VFO output is the 2N5486, which has an I_{DSS} range of 8 to 20 mA.

It's important to keep another rule of thumb in mind: Oscillator frequency stability generally *decreases* as power output increases. If you're willing to sacrifice VFO output for greater frequency stability, the 2N5484 (I_{DSS} of 1 to 5 mA) and 2N5485 (I_{DSS} of 4 to 10 mA) are good choices.

By the way, the resistance of the JFET channel is a good relative indicator of device I_{DSS}. With this in mind, you can grade your JFETs for VFO power output merely by measuring their channel resistance (source to drain) with a DMM. (Caution: The measuring instrument you use must not apply a destructively large current to the device under test.) Generally, the lower the channel resistance of a given device, the more power output it will furnish as a VFO.—*Zack Lau, KH6CP, ARRL Laboratory Engineer*

A SECOND VOX ON-OFF SWITCH FOR THE KENWOOD TS-830S TRANSCEIVER

☐ I always use my TS-830S in the VOX mode—which, as far as I am concerned, is the only way to go. Unfortunately, switching from VOX to MOX necessitates turning the transceiver's VOX GAIN control down or to OFF. I sought a means of modifying my '830 so that VOX could be turned off without disturbing the setting of the VOX GAIN control.

Investigation of the '830's schematic revealed that setting the VOX GAIN control to OFF merely grounds the input to the '830's VOX amplifier circuitry. I determined that the TS-830's DH (digital-display hold) switch could be rewired to do this. With the transceiver off and disconnected from the ac mains supply, locate the red wire that goes to the DH switch. Measuring from the DH switch, cut this wire long enough to reach the left-hand terminal of the switch on the VOX GAIN control. (Tape the free end of the DH wire and tuck it into its associated wiring bundle, out of harm's way.) Strip the DH-switch end of the wire, and solder the wire to this terminal (see Fig 3). This places the DH switch in parallel with the VOX on/off switch. When the DH button is locked in, the VOX is off; the VOX is on with the button out.—*Jack P. Golden, KK2W, 28 S Main St, Portville, NY 14770*

USING WATER-BASED MARKERS ON GLOSSY SURFACES

☐ Many glossy surfaces won't take ink from water-based markers. Typists' correction fluid is a solution to this problem: Just brush a patch of the white stuff on the surface to be marked. Once the fluid dries, it can easily be written on with water-based markers, such as Flair® pens and their equivalents.—*Scott Gray, K7WPC, PO Box 12, Toledo, OR 97420*

MAKING THE MFJ-484 GRANDMASTER KEYER A BIT GRANDER

☐ The MFJ-484 is a versatile memory keyer, but after using one of the original versions for several years, I found two features lacking: (1) It has no provision for using remotely mounted push buttons instead of its four panel-mounted memory buttons. Having to reach a distance to hit keyer-mounted memory buttons can be fatiguing during a contest, and the Grandmaster's size usually doesn't allow it to be placed close enough to the log or keyer-paddle to avoid the arm travel necessary to operate the memory switches. (2) The Grandmaster has no provision for a rechargeable memory backup battery. The stock keyer contains a holder for a 9-V alkaline battery, but such a battery lasts only a few hours if power fails. Replacement of this battery involves removing the keyer's top cover and two back-panel screws. This inconvenience, plus the cost of periodic replacement, makes a *rechargeable* backup battery desirable.

My Grandmaster owner's manual did not include a schematic. But examination of the keyer showed that one side of each memory push button is hot and the other side is connected to chassis. These switches can be "remoted" as follows; this modification preserves the function of the Grandmaster's front-panel buttons:

1) Drill a 3/8-inch-diameter hole on the back panel about 1/2 inch to the left of the dc-input jack. Insert a grommet in this hole.

2) Mount a six-lug, two-mounting-hole terminal strip on the inside of the Grandmaster's back panel. Position it so that its mounting holes are on either side of the MFJ label on the keyer's back panel.

3) Cut a 4-inch length of shielded, four-wire cable (four wires plus shield). Attach a suitable connector (five pins or more) to one end of the cable (I used a six-pin Cinch-Jones plug). This will be used to connect a cable to the remote switch box. Snake the connectorless end of the four-wire cable through the grommeted hole in the Grandmaster. Inside the keyer, connect the cable shield to ground, strip the ends of each of the four wires, and wrap each stripped wire around its own (ungrounded) lug of the terminal strip. Bypass each lead to ground with a 0.01-μF, 25-V disc-ceramic capacitor, using the grounded lugs for the bypass-capacitor ground connections Solder all connections.

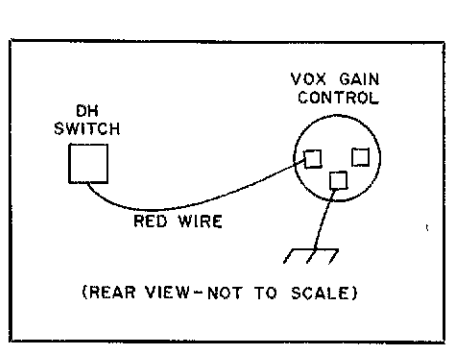


Fig 3—Jack Golden's TS-830S modification allows the transceiver's VOX to be switched on and off without disturbing the VOX GAIN control. See text.

4) Using a pencil or ¼-inch-diameter rod as a form, wind four RF chokes, each consisting of 24 close-wound turns of no. 20 enameled wire. Each coil should have pigtails long enough to allow it to be wired between the terminal strip and the back of the front-panel push-button switches.

5) Solder one coil between each ungrounded terminal-strip lug and the hot terminal of its corresponding memory push button. (The chokes and bypass capacitors are *necessary*, by the way; they prevent false triggering problems that can occur if RF rides into the keyer on the 4-wire cable.)

6) The balance of this modification consists of mounting four push buttons in a suitable enclosure that can be firmly mounted to the operating table, and wiring a suitable length of four-wire shielded cable to these switches. [Borrowing a computer term, some operators refer to such a keyer-remote-control box as a mouse; we'll continue with that term here.—*AK7MJ*] Mount the mate of the connector installed in step 3 at the end of this cable, taking care to preserve proper wiring of the remote push buttons. (Breaking the keyer/mouse cable with mating connectors allows the mouse to be used with other Morse keyers, or a digital voice keyer.)

As an alternative to this procedure, a socket for the mouse cable could be mounted directly on the back panel of the Grandmaster. (There is room for an octal socket to the right of the Grandmaster's KEY jack.) This would eliminate the need for the terminal strip, as the bypass capacitors and the chokes could be mounted directly to the socket terminals.

Those wishing a "no holes" modification—and who can afford to sacrifice one or the other of the Grandmaster's keying outputs (DIRECT or GRID BLOCK)—could remove the double phono jack used for the keying outputs and route the selected keying output via a single-hole-mount phono jack mounted in one of the double-jack holes. The unused hole, lined with a grommet, could be used to pass the mouse cable.

A Rechargeable Memory Back-Up Battery

The Grandmaster's existing 9-V battery connector is connected to the keyer's 12-V line via a diode for isolation. Diodes are also used in the lines from the Grandmaster's ac-adapter and dc-input connectors to the 12-V line. The addition of a 2.2-kΩ series resistor and a 1N4004 diode to this circuitry (see Fig 4) provides

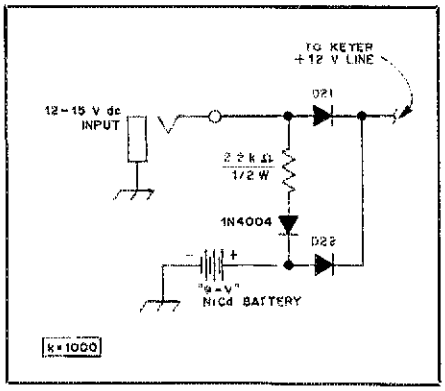


Fig 4—Jon Zaimes installed rechargeable memory back-up in his MFJ Grandmaster keyer by adding three parts: a 2.2-kΩ resistor, a 1N4004 diode and a "9-V" NiCd battery. D21 and D22 are MFJ parts. This drawing does not show the Grandmaster's ac-adapter input. See text.

a charging current of a few milliamperes and allows the use of a "9-V" (actually 7.2-V) NiCd battery (I used a Radio Shack® no. 23-126) when the Grandmaster is powered from an external dc supply. I soldered the new parts on top of the Grandmaster circuit board, just below the two rear-panel power connectors.

Now, I don't have to replace an alkaline 9-V battery every few months, and the keyer doesn't lose whatever is loaded into memory when the power goes off.—*Jon Zaimes, AA1K, 145 Farm House Ln, Bear, DE 19701-2015*

RESETTING THE CPU IN THE ICOM IC-02AT TRANSCEIVER

☐ On a frosty morning, you shuffle into your station and pick up your hand-held transceiver to call someone; you turn on the rig and hear the chatter, but the frequency display is blank! What has happened is that you've zapped the CPU's frequency-display memory. Don't worry—it's only temporary.

The IC-02AT's liquid-crystal display (LCD) panel is covered by a thin plastic membrane as it comes from the factory. More often than not, this covering is lost during normal use of the transceiver. If the plastic film is missing from your IC-02AT, do *not* touch the LCD panel if you can avoid it! Finger-delivered static electricity can erase the frequency-display memory. In seasons of dry air, the chances of this happening are particularly high.

If you have this problem with your IC-02AT, the following procedure may save you some money in getting the problem solved. [Read this hint in its entirety before working on your IC-02AT; if the reset procedure looks "a bit much" to you, *don't* try it—call ICOM instead. You may void your '02AT's warranty if you do this procedure yourself. If you decide to reset your IC-02AT, remember that the procedure wipes its memories clean, so be sure to record this information beforehand if you won't be able to retrieve it from *your* memory.—*AK7M*]

1) In a clean, clear work area, remove the IC-02AT's battery pack and place the transceiver face down on the work surface. With a "jeweler's" Phillips-head screwdriver, remove the four side screws (two on each side) and the screw near the top center of the transceiver back. The four side screws are longer than the fifth screw; keep this in mind so that you can reassemble the transceiver correctly.

2) With a slightly larger Phillips-head screwdriver, remove the screws that hold the battery-pack latch plate to the '02AT. Underneath this plate, you'll find the battery-pack latch spring and a plastic button; remove them also.

3) Carefully pry up the transceiver back; it serves as the transceiver's heat sink. Near the top of the exposed circuit board, you'll see a shiny plate covered with a greasy, white substance. *Do not* remove this material—it's thermally conductive grease.

4) Carefully *push* the chassis out of the plastic case from the bottom at the battery-contact point, or gently *pull* the chassis from the plastic case, being careful not to tear the PC-board foil connection between the two chassis halves. Open the sandwiched circuit board. In the half containing the IC-02AT's lithium cell (about the size of a nickel), you'll see, down and to the left, the CPU reset switch. (Note: Although this reset procedure isn't described in the IC-02AT user's manual, the illustration on p 42 of the manual shows the location of the reset switch.)

5) Attach a 12-V dc power source to the 12-V input port at the top of the '02AT and turn the transceiver on. Using a nonconductive wand, press the reset switch.

6) Turn off the IC-02AT, disconnect the 12-V dc power source and reassemble the transceiver. Now, the rig's CPU is reset to 144.00 MHz, its display will function normally, and its memories must be reprogrammed.—*Joseph J. Wavra, Jr, WQ5M, 7017 NW Taylor Ave, Lawton, OK 73505*

POWER-OUTAGE POWER-SUPPLY DISCONNECT FOR FLOAT-CHARGED SYSTEMS

☐ Here's a circuit (Fig 5) that's been most useful during power outages. With it (assuming that ac mains energy is present), closing S1 connects the battery to the load (via S1A) and routes ac mains energy (via S1B) to the power supply and K1A, actuating K1. Closed, the normally open contacts of K1 (K1B) connect the power supply to the load and battery. When ac mains energy fails, K1B opens, connecting the battery and load to an alarm or indicator. (I use a motorcycle lamp as an "alarm;" it provides emergency lighting as well!) When ac mains energy returns, the power supply is again connected to the battery and recharging begins.

I use an old car battery in my system, and it has been satisfactory for a couple of years' use with 25-W FM gear. For a really prolonged outage, the battery would have to be recharged by some other (perhaps automotive) means.—*Willard W. Waite, W8GDQ, 45310 Webster Rd, Wellington, OH 44090*

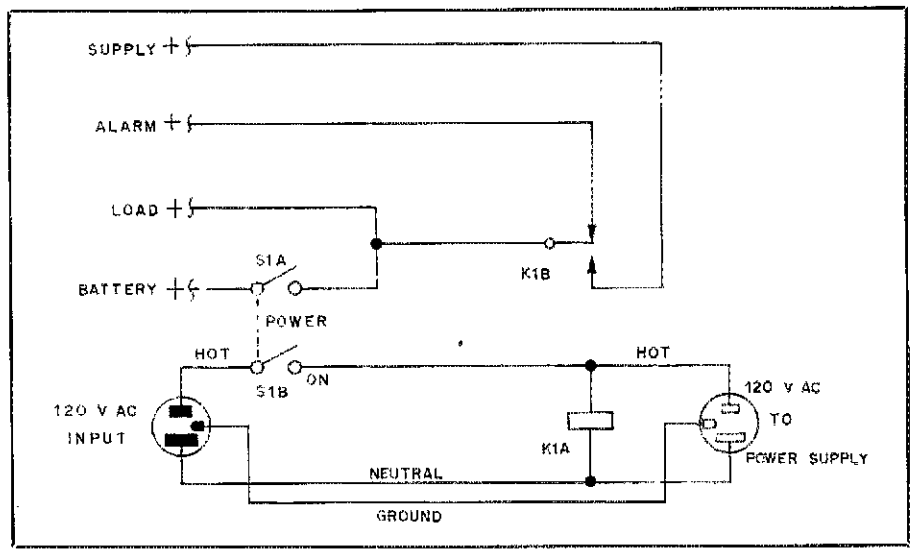


Fig 5—Willie Waite's circuit disconnects the power supply from his float-charged 12-V system when ac mains energy fails. S1 is a DPST switch rated for ac operation at 120 V, and K1 is a SPDT 120-V ac relay with contacts capable of handling the dc output of the power supply and the current drawn by the device(s) connected to the ALARM output. This drawing does not show the common negative of the 12-V system, nor does it show the precautions Willie takes—proper ventilation, and safety practices related to the presence of sulfuric acid and hydrogen near a potential source of sparks and high-current short circuits—when dealing with the lead-acid battery in his system. Safety *first!*

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Associate Technical Editor

PHASE MEASUREMENT IN PHASED ARRAYS

☐ I enjoyed the excellent presentation of phase measurement in phased arrays presented by Roy Lewallen, W7EL, in the 15th edition of the *ARRL Antenna Handbook*.[1] I'd like to add a couple of finer points that are somewhat important in the practical application of Roy's ideas.

If we consider Figs 29 and 30 on p 8-27 of *The ARRL Antenna Book*) (reproduced here with their original captions as Figs 1 and 2, respectively), and make the following assumptions, we can perform a simple analysis:

- Two identical verticals with a feedpoint impedance of 50 + *j*0 ohms
- 1.5 kW RMS into the array (resulting in 750 W per antenna)
- Z = 50 Ω
- R = 50 Ω
- Current probe as shown in Fig 2

Current probe and *current viewer* are terms commonly used to refer to what is more correctly called a current transformer. If we assume that the transformer is located at the feed point of the vertical, the current at that point will be

$$I = \sqrt{\frac{P}{R}} = \sqrt{\frac{750}{50}} = 3.87A \quad \text{(Eq 1)}$$

This means that the current in the 10-turn secondary of the transformer is 0.387 A RMS. As R is in series with the secondary, this current will pass through the resistor. That requires that the resistor dissipate

$$P_D = I^2R = (0.387)^2 \times 50 = 7.49\ W \quad \text{(Eq 2)}$$

Also, this resistor should be noninductive so as not to introduce any phase error into the measurement.

Great care should be taken to guarantee that this load does not become disconnected from the current transformer. If it does, a potential greater than 2.5 kV RMS will appear across the open secondary. In addition to the obvious safety hazards, this will usually result in a turn-to-turn voltage breakdown in the transformer. Also, the oscilloscope would probably be damaged because most oscilloscopes can safely accept input voltages of only 300 (RMS).

A common procedure in commercial systems is to use two resistors of identical value at each end of the line; the resistor values are chosen to be equal to the line impedance (see Fig 3). This method reduces certain other phase errors associated with impedance mismatches. As a benefit, the calculation presented in Fig 3 shows the reduction in load powers and associated lost power in the system when this method is employed. This approach still results in a secondary current of 0.387 A RMS, but it effectively flows through a resistance of 25, not 50, ohms.

When designing the transformer, ensure that the selected core will not be saturated.—*Domenic M. Mallozzi, N1DM, 26 Carey Ave, Apt 8, Watertown, MA 02172*

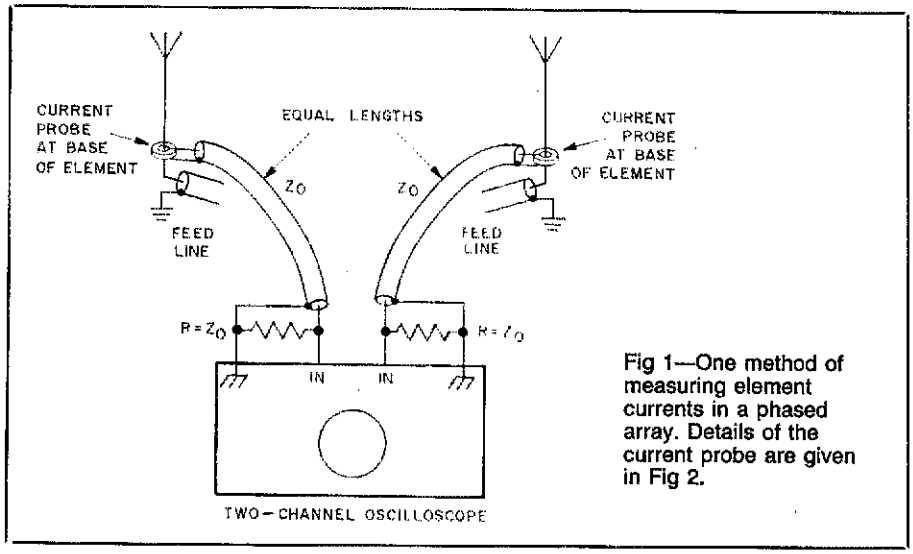


Fig 1—One method of measuring element currents in a phased array. Details of the current probe are given in Fig 2.

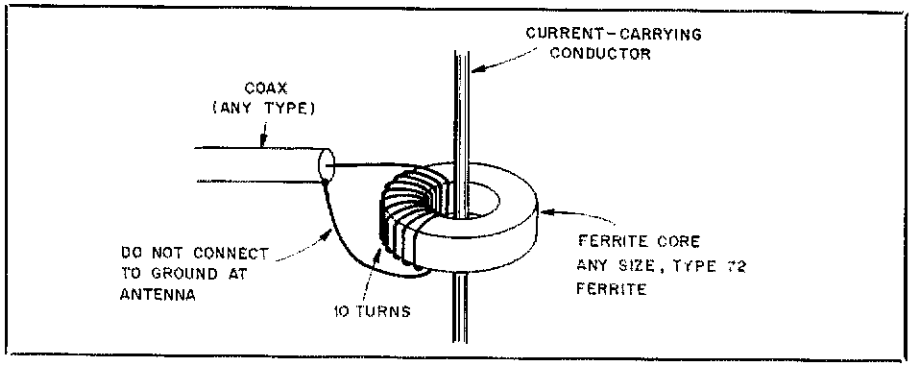


Fig 2—The current probe for use in the test setup of Fig 1. The ferrite core is of type 72 material, and may be any size. The coax line must be terminated at the oscilloscope end with a resistor equal to its characteristic impedance.

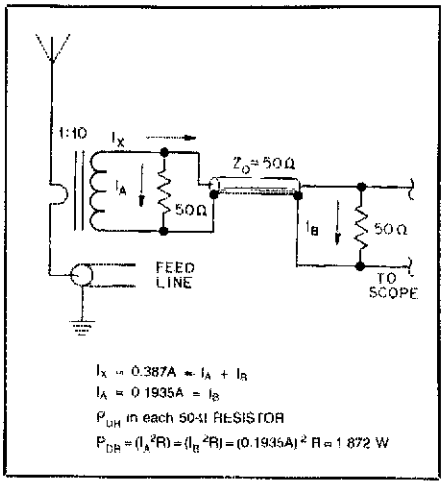


Fig 3—To reduce phase-induced errors associated with impedance mismatches, noninductive resistors are connected to each end of the probe transmission line. The value of each resistor is equal to the characteristic impedance of the line.

USE CAUTION WHEN BUYING NiCds

☐ If you're planning to purchase NiCd cells, watch out! Many of the D-size NiCds being sold in drug stores and supermarkets are *not* true D cells, but are C cells mounted

[1]J. Hall, ed., *The ARRL Antenna Book*, (Newington: ARRL, 1988).

in a larger case! There are two easy ways to determine which is the fake D cell and which is the real one:

• Check the charging-current instruction printed on the cell. If it calls for a charging current of 120 mA, it's a C cell in disguise. A true D cell requires a 400-mA charging current. The exact current may vary from one manufacturer's brand of cell to the next, but the charging-current difference will be obvious.

• Compare cell weights. The Eveready CH50, according to the Eveready Engineering Data Manual, weighs 2.19 oz. The Eveready CF4, a true D cell, weighs 5.01 oz. If you keep in mind that one real D cell weighs about the same as two of the "bargain" cells, you can easily tell the difference.

This situation involves more than just consumer awareness. If you charge one of the 120-mA cells in a D-cell charger, you could destroy both the cell and the charger. Conversely, trying to charge a 400-mA cell in one of those handy home chargers made to match these smaller cells will result in an undercharged D cell. Charging a mixed set in a series string, the common method, could also result in destruction of the cells. Double check, before you buy!—*Bill Parrott, W6VEH, 7662 Bellaire Ave, N Hollywood, CA 91605*

DID YOU MAKE THE SAME MISTAKE I DID?

☐ One of the more common amplifiers appearing in various Amateur Radio publications is the grounded-grid triode amplifier. (All the designs are basically identical, each containing an embellishment or two that the originator thought necessary.) A circuit common to most of these amplifiers is that shown in Fig 4—one that senses excessive grid current. Because I'd seen the circuit used so often, I assumed it to be fairly practical. So, I incorporated the circuit into one of my amplifiers. In doing so, I violated one of my philosophies: Don't assume!

As things happen, I fired up the amplifier and forgot to switch on the high voltage. When I applied drive, I had an abnormally high amount of grid current. I was at the point where I was about to set the grid-current trip point when I keyed the amplifier. The grid over-current circuit didn't do its job. Fortunately, I had been carefully monitoring the grid current and immediately removed the drive. The tube, a 3CX800A7, was not damaged.

What the circuit of Fig 4 does is simple. Grid current flowing through R1 produces a voltage that is sampled and applied to the base of Q1. When sufficient voltage is present (greater than 0.7 V dc and dependent on the setting of R2), Q1 conducts, closing relay K1. K1 is usually wired so it either removes drive power or biases the amplifier tube to cutoff. Sounds like a good idea, doesn't it? But here's why this circuit could cost you a tube.

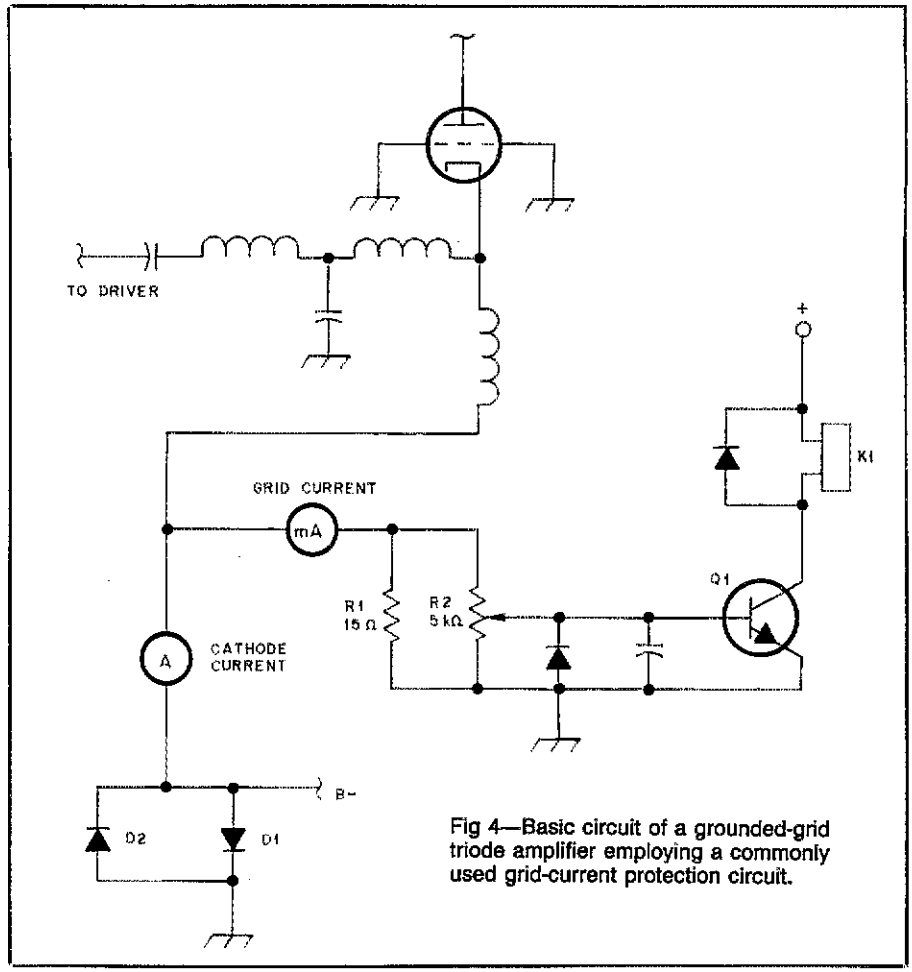


Fig 4—Basic circuit of a grounded-grid triode amplifier employing a commonly used grid-current protection circuit.

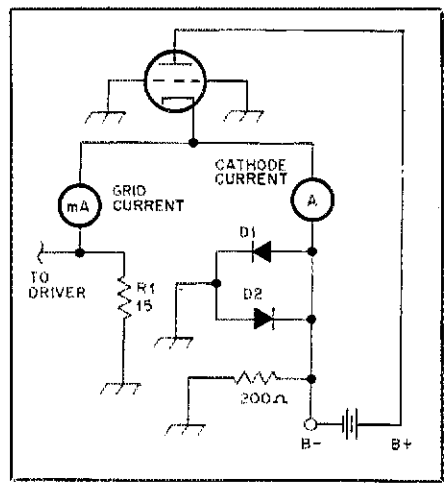


Fig 5—Fig 4 redrawn.

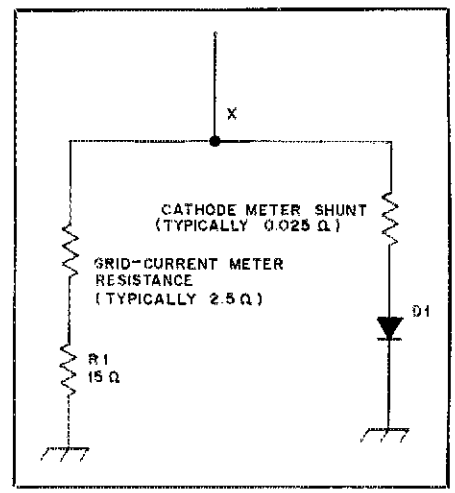


Fig 6—Fig 4 simplified to show the action of D1.

Take a look at two simplified versions of the circuit of Fig 4. Fig 5 shows another way to draw Fig 4. Fig 6 shows how the circuit operates electrically. Refer to Fig 6. With 50 mA of grid current, the potential from point X to ground is approximately 0.875 V dc. Guess what happens to D1? It conducts because it is forward biased! You can forget about the exceedingly low resistance of the cathode current meter shunt (0.025 Ω). So, D1 is shunted across the series combination of the grid-current meter and R1. This means that as the grid current increases, D1 conducts heavier. The result is that the grid-current meter reading doesn't change much (if at all) because of the shunt current path through D1. This is where damage can occur to your tubes. Once you observe between 45 to 60 mA,

depending on the meter internal resistances, your grid-current meter reading is going to be incorrect, and you could actually be running 100 mA or more—disastrous if your tube is rated for a maximum grid current of only 60 mA!

There is a cure. Look at D1 and D2 of Figs 4 and 5. In the original articles, the intent was to protect the meters from voltage transients, or in case the B+ line was shorted to ground. For example, if a feedthrough bypass capacitor fails, or if an arc-over occurs, the current flow would be through the chassis, through R1 and D2, because D2's anode is connected to ground. Because the impedance of D2 is much lower than the path through R1, D2 will protect the grid-current meter and return B+ directly to B−, hopefully causing the power-supply fuses or circuit breaker to open. D1 wouldn't conduct until the voltage reached the PIV rating of that diode, so it doesn't help us at all! The cure: Remove D1. This eliminates the shunt path across the grid-current meter, and the protection against a B+ short to ground is still ensured by D2.—*Russell L. Miller, N7ART, 27008 138th Ave SE, Kent, WA 98042*

17-METER TIPS

☐Here are some technical and operating notes I gleaned from recent experience on the new 18-MHz band.

An 80-meter dipole cut for 3.5 MHz acts as a 5/2-λ antenna at 17 meters. The antenna length (a little less than 134 feet) is within a few inches of what the formula calls for on 18.1 MHz. Having a current loop at the center, the antenna provides a good match to either coax line or tuned feeders. The radiation pattern is basically a cloverleaf with four major lobes, each one about 30 degrees on either side of each end of the antenna. The major lobes provide approximately 2 dB gain over a half-wave dipole.

I've been using an 80-meter dipole on 17 meters with excellent results. In casual operating since the band opened to US amateurs, my 80-meter antenna and the 150 watts put out by my transceiver have proved more than adequate; I've "worked the world" and have not had to call anyone twice!

I tested my Heathkit® SB-200 on 18 MHz and found that with the amplifier bandswitch in the 15-meter position, the SB-200 produces 700 W output with about 110 W of drive power. The output circuit tunes well, but the SB-200's fixed-tuned input circuits require somewhat more drive on 18 MHz than on 14 or 21 MHz. Watch the grid current—as the instruction manual tells you—to avoid overdriving the amplifier.

Propagation on the new band, as one might expect, is a cross between that observed on 15 and 20 meters, so far with less QRM than either 15 or 20 meters. Many countries allow only CW amateur operation on 17 meters, so don't neglect the low end of the band when hunting DX!—*Ray Soifer, W2RS, 60 Waldron Ave, Glen Rock, NJ 07452*

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary. QST

Feedback

☐ In the article, "Transistor AM Radios as Ham Receivers" (*QST*, Feb 1989, pp 33-36), pins 1 and 4 or pins 3 and 5 of T1, Fig 5, may need to be reversed. Also, the polarity (winding sense) of some 455-kHz IF transformers may differ from others; this may require checking the transformer pinout before soldering it into the circuit. Replacing C12 with a 25-pF capacitor increases the potential at gate 2 of Q1 from 2 V P-P to 4 V P-P. (The available P-P voltage depends on the gain of Q2 and the loaded Q of T1.) *Thanks W1FB and KE4VJ.*

☐ The correct telephone number for A & A Engineering is 714-952-2114. The number given in "A Low-Cost Frequency Counter," *QST*, Feb 1989, p 26, has been reassigned.

☐ Here are the prices for drilled and plated PC boards for two recent *QST* projects: "VFO with Bandspread and Bandset," (Jan 1989, pp 31-33), $4; "Transistor AM Radios as Ham Receivers," (Feb 1989, pp 35-36), $5, both postpaid to US addresses. These PC boards are available from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118, tel 312-426-2431, evenings. The ARRL and *QST* in no way warrant these offers. QST

New Products

ANTENNA WAX

☐ Dave Suggs, K4MJN, has introduced Macaroni Brand Antenna Wax™. Recently found parchments from the earliest days of ham radio have revealed the secret formula for Antenna Wax—this blend of exotic waxes is now available to hams! Used on any type of antenna, Antenna Wax reduces SWR and QSB and eliminates RFI, TVI and splattering. It also increases antenna bandwidth and gain, repels lightning strikes, improves low-angle radiation and keeps birds off your antennas!

Antenna Wax must be applied sparingly to antennas. It makes a great gift for your friends who can't hit the repeater!

Antenna Wax is available for $3.98 (postpaid in the US—for foreign air mail orders, add $3.) from Tung-N-Cheek Co, PO Box 11632, Columbia, SC 29211.—*Rus Healy, NJ2L*

Strays

I would like to get in touch with...

☐ active duty military amateur operators to serve as points of contact at forts, bases and posts. Please send a QSL card or letter with name, call, address and branch of service. Robert Godlewski, HHC 593rd ASG, Box 66, Ft Lewis, WA 98433-5410.

☐ hams who are rockhounds. Larry D. Stamm, WB3EVL, 2516 S Lumber St, Allentown, PA 18103.

☐ anyone that was in the 3186 Signal Battalion A company in WW II. Bill Jones, WB4PUD, Rte 6 Box 285, Springfield, TN 37172.

The Patron

Wherein a bad ham meets HPM in the hereafter and learns the evil of his ways.

By Bruce Vaughan, NR5Q
Box 203
Springdale, AR 72765

The acrid smell of diesel fuel mixed with the sweet fragrance of new-mown hay. Stopping his tractor, the farmer looked toward the busy interstate highway. He thought how peaceful it used to be working in this field. Now, noise and fuel odor covered the field like a heavy blanket.

"Must be a terrible accident," he thought. Even a half mile away, he could see a car burning. It looked as though the car had crossed the median, hitting a large 18-wheeler head-on. Traffic was backed up for a mile in each direction, and he could see the flashing lights of the emergency vehicles.

Restarting his tractor he said to himself, "St Peter, you better get ready, some more people are headed your way."

Joe looked around trying to remember exactly what happened. He was on his way home from the big hamfest where he had found the parts to build the 5-kW linear he had wanted so long. Becoming bored with the miles and miles of interstate, he had decided to work some 10-meter SSB. He could remember answering a CQ from some jerk who went back to a West Coast QRP station instead of him. "Well," he thought, "that will never happen again." The last thing he remembered was reaching for the switch to the kW amplifier. It was mounted under the instrument panel; an inconvenient position to reach while driving.

When he looked up the car was airborne, headed directly at the front end of a truck in the opposite lane. He could see the look of terror on the face of the driver.

Joe was surprised that he felt no pain—quite the opposite, he never felt better. The truck, the car, even the interstate were gone. The countryside was not unusual, yet there was something different about it. Rolling hills and green pastures stretched as far as he could see. Fluffy white clouds hung close to the ground. Joe, trying to get his bearings, thought, "This looks like Iowa at 30,000 feet." The sky was the deepest blue, the temperature perfect, but the silence was eerie.

Joe stood up, knocked some dust from his clothes, and started walking toward some trees in the distance. Entering the wooded area, he eyed a small stream of sparkling clear water. A distinguished-appearing gentleman, sitting on a boulder, was watching him with a look of amusement.

"Hey, Old Timer, which way back to the interstate?" asked Joe.

"Friend," said the gentleman, "there are no interstates here. Why don't you have a seat on this rock and enjoy the beauty and sound of this brook?"

"Sorry, I don't have the time," said Joe. "I have a lot to do when I get this accident thing cleared up."

"You have nothing but time, friend," said the OT, "you have crossed over."

"Crossed over, crossed over where?" asked Joe.

"I think it is time we introduced ourselves," said the gentleman. "Just call me Pete; I believe your name is Joe."

"That's right," replied Joe, "but how'd you know?"

"Oh, I have a way of knowing many things," answered Pete. "Now back to your problem. You have crossed over and are no longer mortal. You have left your world behind. Come look into this pool in the stream. It will explain many things."

Joe walked over to the stream and gazed into the crystal-clear water. He could see the interstate, his burning car and all the rescue activity. They were still trying to pull someone from the burning automobile. Suddenly Joe realized the truth—he was now a Silent Key!

"Well," said Pete, "I suppose we may as well get on with it. You will have to go through qualification and indoctrination. Let's walk over to Headquarters, and I will introduce you to your patron."

Walking out of the woods, Pete and Joe quickly came to a small brick building. Somehow Joe felt he had seen this building before. "This is the qualification office. All hams must pass through here before being assigned quarters," said Pete.

Inside, seated behind a well-worn oak desk, was a kind-looking man, dressed in a tweed suit, white shirt and conservative tie. His friendly face was vaguely familiar to Joe. His mustache was carefully groomed. His white hair was combed but in disarray. The aroma of good pipe tobacco filled the room.

"Hiram, this is Joe. He just joined us," said Pete. Then he left the room.

Hiram stood up, placed his pipe in the ashtray on the desk, and said, "Welcome Joe, I am your patron. Pete put me in charge of all hams. Please have a seat, and we will proceed with your processing. After that, I will show you to your living quarters and your shack."

Joe pulled up a chair and watched as Hiram went to the bookshelves behind his desk and removed a large, well-worn, leather-covered book. As Hiram placed the book on the desk, Joe was surprised to see his call on the cover.

"We keep a complete log up here of all ham operations on Earth," said Hiram. "Let's go through yours, and see if there are any points that need clarification."

"Hmmm...seems quite a few stations you worked never received a QSL in return from you Joe. Your address is 814 Spruce, is it not?" asked Hiram.

"Yeah," replied Joe, "QSLing is for Novices. I'd rather spend my money on equipment."

"But, you are the holder of several certificates, including WAS, WAC and DXCC with endorsements," replied Hiram. "All require that you submit QSLs. How do you explain that?"

"Well," replied Joe, "if those lids want

to waste their money on QSLs, I may as well use 'em. I'm not gonna waste my bucks that way."

"Okay," said Hiram, "what about those long CQs where you only sign your call a couple of times at the end? I am sure you have a good reason. Would you mind sharing it with me?"

"That's easy, why send your call till you finish your CQ? With a sig like mine, they'll stick around. No use sending your call every three or four CQs. Let 'em wait," replied Joe.

Hiram picked up his old pipe. Taking his time, he carefully refilled it with tobacco from the humidor on his desk. Hunting around in his pockets, he finally found a match and struck it on the underside of the desk drawer. Relighting his pipe, he looked at Joe through the blue smoke.

"Now," said Hiram, "are you really tuning up on top of rare DX stations, or is the QRM deliberate? We have monitored a strong signal coming from your shack on many occasions when you were zero beat with DX. I don't understand how it can take anyone 15 minutes to tune up—and what is the reason behind the book-on-the-dash-paddle bit?."

"Oh that," answered Joe. "I'm just teaching those lids and Novices a thing or two. If they would QRT for a few minutes, I would work the DX and move on. But no, they keep calling and calling. I'll teach 'em not to mess with us QRO boys."

"Speaking of power, are you familiar with rule 97.67 (a)?" asked Hiram.

"Nah, I haven't bought a *Rule Book* since I was studying for my General exam," replied Joe. "Nobody pays any attention to those stupid rules. The CBers run a kW and the FCC don't do anything. They are running 200 times more power than they are allowed. No one is going to complain about my 4- or 5-kW amplifier."

"I see," said Hiram. "That brings up another thing we need to discuss. I suppose you are doing something to bring CBers and young people into our ranks."

"Are you nuts?" replied Joe. "That's the trouble with ham radio now, too many on the air. Why would I want to add more lids to increase the QRM?"

"Then you are not an ARRL Volunteer Examiner?" asked Hiram.

"ARRL," shouted Joe, "After all they have done to us real hams. First, they kept on about creating a Novice class license, then for a while it was nothing but SSB in every issue of *QST*. Now, you seldom hear a good AM signal anymore. They really threw us a curve with the stupid incentive licensing thing. Now, all you hear is packet, packet, packet—no way I'll pay them for their stupid magazine—it's too technical."

"Well then, if you are not a member of the ARRL, what clubs and organizations do you belong to?" asked Hiram.

"I'm not a joiner," replied Joe. "Our local club is nothing but a bunch of young lids and some old coots who think they know everything. No way I'll waste my time and money on a bunch like that. I'd rather be working DX."

"I'm truly sorry," said Hiram. "Only members of clubs and organizations on Earth may join the ERRL."

"You mean ARRL, and I'm not interested," replied Joe.

"No," answered Hiram, "I mean the ERRL; the Eternal Rest Radio League. Only ERRL members may leave this area for trips back to Earth or to talk and visit with others here. However, since you are not a joiner, I suppose you will not miss the fellowship with other hams."

"Who cares?" replied Joe. "I can't see any big deal about your ERRL."

"Pity," said Hiram. "We have a lot of good times. We go to Dayton every year, plus a few other hamfests and conventions. We also go along on a lot of DXpeditions. The folks down there can't see us, but we're there just the same. A few years ago we went along with W5LFL on the Space Shuttle—even the Big Boss was along on that trip.

"I never needed all that stuff," said Joe.

"Perhaps we should return to the qualification questions," said Hiram. "From our conversation so far, I get the idea you are a *real* DXer."

"Nobody pays any attention to those stupid rules..."

"Yep, if it's there I work it," replied Joe. "Some of the real rare DXpeditions I work five or six times. Nothing to it—just crank up the old linear and keep calling."

"But after you work them once-per-band, why go back and work them again? Doesn't that knock some other ham out of a needed country?" asked Hiram. "Why do that?"

"For the sport of it," answered Joe. "I'll let them lids and QRP types see how a big gun operates."

"I see," said Hiram. "Don't you ever help out other DXers?"

"Sure," replied Joe. "When I get through working 'em, I get on frequency and make sure everyone else stays in line."

"And how, exactly, do you do that?" asked Hiram.

"Simple," said Joe. "Just keep sending UP LID, UP LID, and occasionally drop in NOVICE, STUPID, or some other clever remarks. Also, send UP 10 when you know the station is listening up two; this really gets 'em out of the way. The DXers really appreciate it."

"I'm sure they do," replied Hiram, as he shook his head in disbelief.

Hiram wrote in the book for some time, then closed it and replaced it among the other logs. He knocked his pipe out in the ashtray, refilled it, and lit it as he strolled over to the window. For some time he stood, looking at the scene outside, the smoke curling upward from the well-worn briar. Then, turning, he said, "It's time I showed you to your shack and quarters Joe; please follow me."

Together they left the small brick building. After a while they arrived at a modest, but attractive house.

"This is your living quarters and shack, Joe. I hope you like it. You are going to be here a long, long time," said Hiram. "Let's go inside, and I'll check you out on the equipment."

Joe knew he had impressed Hiram, but the shack inside the house was more than he ever dreamed. The room was large, and a thick carpet covered the floor. The walls were paneled in rich wood, and maps of every description were displayed under glass lighted with indirect lamps. A large operating desk was in the center of the room. Directly in front of the desk were eight, six-foot racks with many controls and meters.

Hiram walked over to the racks. "These eight racks are your amplifiers, Joe. There is a kilowatt on every band from 160 meters through 2 meters. The console has the latest transceivers. You will notice that there are a number of keyers, mikes and bugs on the desk. I trust your favorites are among them. Here is one piece of equipment you should find interesting," said Hiram. "It is a calendar-clock. Just by turning the dials you can set it for any time, any year. How would you like to hear a real spark-gap rig?"

Hiram flipped on a transceiver, turned the calendar-clock back to 1919 and started tuning the dial. Joe was amazed at the various notes from the rotary-spark sets. He was also surprised to hear how good some of the fists were compared to what he had recently been hearing on the air.

"You try it," said Hiram.

Joe pulled up the big leather office chair, turned the calendar clock to 1938, and started tuning the 20-meter band. "Hey!" yelled Joe, "I heard AC4YN! There he is again, AC4YN! Is it okay if I give him a call?"

"Sure," replied Hiram. "Go ahead."

Joe grabbed the paddle and gave him a long call. When he switched to receive, AC4YN was in QSO with a W9. Joe waited impatiently and tailended him. This time a W4 snagged the rare one. Disgusted and angry, Joe grabbed the calendar-clock and put in a different year. Again, he heard some rare ones but no QSOs resulted.

"Say Hiram," said Joe. "What kind of antennas do I have?"

"Come over here," replied Hiram, stepping to the large picture window. "You see that shack over there. You can guess who that is. He has forty acres of rhombics.

And look to your left, that fellow has a Big Bertha. Now, look at the horizon. There is a fellow running stacked monobanders. Up here, all shacks and equipment are the same. We try and match the antenna to the operator."

Relighting his pipe, Hiram started for the door, then turned. "Joe," he said, "your rigs are all working into the world's largest dummy load, that's the *hell* of it."

The ringing in Joe's ears was 20 dB over 9. Slowly the blinding white light dimmed, the ringing dropped to S5, and he could see figures emerging through the haze.

There was his XYL, Freda, and two attractive girls in nurses uniforms. A middle-aged man in a light-green surgical coat was taking his blood pressure. Joe, looking around, noticed his left leg was in a cast and tied to a "ginpole" attached to the foot of his bed.

"How is he, doctor?" asked Freda.

"Well, all vital signs are returning to normal," replied the doctor. "I would say he is a very lucky man to be alive. Other than the broken leg, the bad cut on his head and a few cuts and bruises he received when he was thrown from the car, he's in good condition. A few weeks off work, and he'll be as good as new."

Joe reached to feel his head. He had more cloth around his head than a Hindu prince. He was surprised to find that he could speak.

"Doctor, I have a lot of catching up to do. Is it okay for me to have a phone in my room, and may I write some cards and letters? Freda will help me of course."

"No problem," replied the doctor. "You have no concussion. Keeping your mind active will be good therapy. Nothing will speed your recovery more than your will to get well and active again. I am giving you a sedative now. You can start on your work tomorrow. You'll be feeling much better then."

After breakfast the following day, Freda came in the room carrying a note pad and pen. "Now, what is so important that it can't wait until you are out of the hospital?" asked Freda.

"First, call Ed. I think he is still president of the radio club. Ask him how much for a life membership, and send him a check. Also ask him to send you a League membership application. When you get it, fill it out and pay for three years," replied Joe.

"Anything else?" asked Freda.

"Plenty," said Joe. "On my desk is a large stack of QSL cards. I want them and a few rolls of stamps and my log book. Oh yes, get one of my old QSL cards and go by the print shop and order a thousand. Pay 'em extra for a rush order."

"I hope that's all for today," said Freda. "I don't want you to overdo it so soon after the accident."

"No," answered Joe. "There is more. I want you to drop by Radio Supply, out on Elm Street, and pick up a few things."

"I want an *FCC Rule Book*, an *Operating Manual*, *License Manual* and *Handbook*. It's time I upgraded. I'll have plenty of time for study before this leg heals. By the time this cast comes off, I'll be an Extra Class operator. I always wanted to work the low end of twenty.

"...I want to buy the best darn dummy load in the house."

"Anything more, Mr Extra Class Ham?" asked Freda, smiling.

"Yes, I saved the most important until last," answered Joe. "At Radio Supply, ask for Bill, tell him I want to buy the best darn dummy load in the house. I've never owned one, so I don't know much about them. Bill will know what I need."

"If you have never used one, why do you need it now?" asked Freda.

"Well, maybe if I start to use one now, I won't have to use one for eternity later on," answered Joe.

Walking down the corridor, Freda could hear Joe laughing.

"I've always known hams were crazy," thought Freda. "Give them ham radio to think and talk about, and they're in heaven."

Strays

STRANGE SOURCE OF TVI/RFI

☐ The following item is taken from October 1988 *Break-In*, published by the New Zealand Association of Radio Transmitters, and quotes an article from Zimbabwe's *Harrare Herald* newspaper. "A strange source of TV and FM radio reception interference was traced to the shoes worn by viewers and listeners!

"The problem is confined to some shoes made during the past two years using hides from cattle and elephant that came from drought-stricken areas. Because of the lack of grass, the animals were forced to eat a certain type of weed that contained a large concentration of aluminium salts. Acting as tiny transistors, the components of the contaminated hides interacted and set up static discharges on shoes that were worn in dry carpeted rooms. Viewers and listeners were forced to move their feet to stop the interference." And you thought we had problems!

QST congratulates...

☐ the following radio amateurs on 50 years as ARRL members:

- Arthur B. Johnson, K2POA, of Baldwin, New York
- Ralph P. Horian, N7BD, of Fountain Hill, Arizona
- Oscar L. Short, W4YJ, of Churchville, Virginia
- R. Lyle Surtees, WØUUS, of Wichita, Kansas
- Robert E. Leo, W7LR, of Bozeman, Montana
- Robert V. Blaney, W9FRU, of Decatur, Indiana
- Marvis M. Fickett, W1LAV, of Sudbury, Massachusetts
- John H. Pearson, KE4CR, of Melbourne, Florida
- Francis J. Kern, W3KJ, of Springfield, Pennsylvania
- Edward A. Goodbout, W9DWQ, of River Forest, Illinois
- Carl W. Luhn, K4CL, of St Petersburg Beach, Florida

I would like to get in touch with...

☐ hams who are involved in home schooling, and hams who are Seventh-Day Adventists. Diana L. Clark, KC4BWO, 3036 Hunting Creek, Bowling Green, KY 42101.

☐ hams who are alumni of Lyndon State College, Lyndonville, Vermont, for the purpose of on-air activities and dissemination of a newsletter. Sheldon Ball, KC1MP, 202 Queen St, Bristol, CT 06010.

☐ anyone who wants to swap ham radio club patches. Also, anyone who has ham radio programming on public-access cable television, possibly for tape exchange. Charles Martin, AB4Y, 1605 Singletree Ln, Bowling Green, KY 42103-1425.

The Runner and the Radio

Former contacts help Dad keep pace with his son's running career.

By Frederick H. Maas, KT5X
Rte 9 Box 86-H
Santa Fe, NM 87505

Communications. That's what ham radio is all about, and there is no doubt that Amateur Radio operators have a bit of a knack for it. One autumn day in 1975, I had the pleasure to QSO Kenji, JA1RZD, on 20-meter SSB. Kenji said that he hoped to come to the United States for his graduate studies, and asked if I would chat with him for awhile so that he could practice his English. Two hours later we lost propagation, but not before we had been able to come to know one another a little more. I had all but forgotten the QSO, when one day the following summer the telephone rang, and it was Kenji! He was in Boston taking an orientation course for foreign students and had earned an American license, WB1AAN. Could he come for a visit? A few days later, I was waiting for him at Albuquerque Airport. Kenji got off the plane and was holding up his QSL card to each stranger he met in his search for me. The idea that I would have difficulty spotting a Japanese tourist amid a crowd of southwestern folk in cowboy boots, hats and bolo ties tickled my funny bone so that I had to hide behind a pillar momentarily while I stopped laughing, before rescuing Kenji from his search. He seemed very brave to be wandering around by himself knowing so little English. It turned out that I was one of a half dozen radio operators across the country that Kenji would be visiting on his journey.

Kenji stayed with us for two delightful weeks. We hiked and explored the mountains and canyons of New Mexico, and we multi-operated a 40-meter All Asian contest together. When we worked one of his many friends in Tokyo, Kenji delighted in identifying himself to their mutual pleasure. One evening we were out to dinner. As usual, we were enjoying the search for means of communicating around Kenji's limited English. When the waitress asked Kenji, "How would you like your steak cooked, sir?" Kenji turned to me in dismay. "What she say?" he asked. I thought a moment and said, "Your steak, cook FKØ or JA1?" "Aha!" he laughed, "I like FKØ!"

Kenji never seemed to tire sharing time with my six-year-old son, Dan. One morning he arrived at the breakfast table with a fish kite which he had brought from home. He explained to Dan that in Japan such a kite would be flown over a home where a boy had recently been born. Another day, Kenji spent hours teaching Dan origami, the Japanese art of folding paper.

A few months after Kenji had returned home, I received in the mail a copy of a Japanese radio magazine with a photograph of Kenji and me at my rig! We had always hoped that I could one day return the visit. As yet it hasn't happened, but that six-year old-boy, my son Dan, who Kenji played with on his lap, recently did.

At 12 years of age, Dan passed his Novice ticket, and he is now N5HFZ. He is also a runner. During Dan's high school running career, he became a national class distance runner. He won four New Mexico state championships in track in the mile and two-mile events, all in state record times. He then went on to win the TAC age group national championship in the 1500 meters held in Philadelphia in July 1987.

N5HFZ doing some speed sharpening on the track in preparation for entering the international cross-country competition. *(photos courtesy KT5X)*

Dan is now a sophomore at Adams State College in Alamosa, Colorado, where he and I keep in touch on 2 meters through the San Antonio Mountain repeater. The repeater is located at 12,000 feet, and we cross the 175-mile path each running about 5 W. When the weather is good, Dan sometimes cooks dinner on his backpacker's stove in the park and meets the sked from there with his hand-held. I am restricted to the shack, however, because the repeater is out of sight for me and requires a fixed beam at 50 feet up the tower to knife across a nearby ridge. A snowstorm between either of us and the repeater is enough to destroy the path.

At Adams State where he is studying premed and sports medicine, Dan trains under the direction of Dr Joe Vigil, the United States Olympic distance coach for 1988. On November 28, 1987, Dan ran in the TAC juniors (under age 20) cross country national championships in Van Cortland Park, New York City and finished in second place. Because of his performance, Dan received an invitation from Japan to be their guest at the Japanese Cross Country National Championships in Chiba, Japan. A week before the Japanese trip, Dan traveled to Dallas to race in the United States cross country team trials. Cross country, for those not familiar, is run across hill and dale, frequently through mud or over obstacles. The course in Dallas was laced with logs, hay bales and barriers, as well as nasty hills and a big mud hole.

I flew to Dallas to see the race and was there met by my old friend from the Potomac Valley Radio Club, John Barber, N5JB. "Today, I am at your service," John said, "You just sit back and tell me where you want to go."

John and I had met for the first time a few years ago when he came to Santa Fe to go fly fishing, but actually our acquain-

tance goes back much farther. We were each first licensed as young teenagers in 1958. I was KN3EPQ. John? Well, John was every Novice's Delaware, KN3GEK. It was 25 years later before we met face-to-face, but I still remember the excitement of listening on my S-38D receiver to his J-38 straight key send Morse revealing his location to be Delaware, my 42nd state.

John and his whole family turned out to cheer for Dan. As we drove to the race site on the Trinity River, I tuned the 2-meter mobile radio to the local repeater, a busy machine, but the local operators used it with the highest level of skill and manners, leaving time between each transmission.

BREAK, THIS IS KT5X

KT5X, GO AHEAD

THANKS FELLAS; W5KH THIS IS KT5X

Thirty miles to the south, another old radio friend from 25 years back, Barry Newberger, responded, HEY FRED, WE ARE 15 MILES SOUTH OF THE RACE COURSE. HOW'S YOUR PROGRESS? KT5X THIS IS W5KH.

Radio—after 30 years, I never quite get used to it. Barry and I had known each other in the Washington, DC area in the early 1960s. We QSOed back then but never met. A chance meeting 20 years later while Barry was a laser physicist in Los Alamos, New Mexico had led to many adventures together fly fishing and camping in the Grand Canyon. One night on the Grand Canyon rim, we even used our handhelds to surround a two-hour successful search for a child camper missing in the dark.

Barry and his wife, Betsy, beat us by a few minutes and, on simplex, guided us to the parking place he reserved for us by standing in it.

And naturally, to complete the circle, the race was ably controlled by members of the Dallas Amateur Radio Club. Over the radio, I asked them to give a cheer of encouragement to the kid up front in green during the first race, maybe America's fastest ham.

Dan ran an outstanding race, finishing the rugged course in third position. This qualified him to be a member of the United States Cross Country Team which would travel to Auckland, New Zealand to compete in the World Cross Country Championships in March.

A few days later, Dan left on his odyssey for Japan leaving behind anxious and excited parents. All of Dan's previous racing did little to prepare him for what lay ahead.

"They told me that they would meet me, but I thought they meant in Tokyo," Dan said, "I was met in Los Angeles and escorted to Japan!" In Japan, he was taken to the Japanese Olympic facilities in Chiba where he was to stay. It was only then that he realized that a dozen national champions from countries all over the world had also been flown in for his race. There were

After the workout, Dan checks into the local repeater. Dan has been licensed since he was 12 and running competitively since he was eight.

another 20 international Olympic stars brought in to participate in the seniors race, and Dan was able to meet all of them. Those who follow the sport will recognize names such as Nick Rose, 10 km champion from England, Allison Roe, former world record holder in the marathon from New Zealand, and Suliman Nuyambui, Olympic medalist from Tanzania.

The Japanese are most gracious hosts. There was always someone asking to see if anything was needed. Dan said over the phone that he was so laden with gifts that he would need an extra suitcase to return home. Fortunately, thanks to Kenji, he was familiar with this Japanese custom and came armed with souvenirs of Santa Fe to give in return.

We had been told that the race was to be on Saturday. When Dan didn't phone, we became concerned. After pacing the halls for a few hours, I decided to take action. The KWM-380 blinked to life and the 170-foot open wire-fed double zepp sent RF into the ether. I found JA1JAN, Jan in Tokyo, on 21.258 MHz. "Could you telephone Kenji, JA1RZD, and see if he can come on frequency?" I asked. A few minutes later came the familiar voice of my old friend. The years and the miles melted away as we renewed acquaintance for the first time since 1976.

"I have located Dan in the Olympic Village," said Kenji, who now speaks near-perfect English. "He told me that the race is not Saturday as you thought, but on Sunday—today. He is well and will be racing in five hours. In fact, Tomoko, my wife, is talking with him on the telephone in his room right this very moment."

Dan's mother, whose excitement was nearly beyond her control, could barely catch her breath to speak as she listened to Kenji's words from so far away. She had been imagining all sorts of unfortunate scenarios to account for not hearing from her son. Kenji and I struggled to catch up on 10 years, and 15 meters held up to the job admirably. At last it was time for Kenji to meet other obligations, but he promised to find Dan after the race to exchange gifts.

The course was undulating, run around a golf course in Chiba adjacent to Tokyo Bay. The course was controlled by Japanese radio amateurs, but that is another story. It was sunny, clear and very windy. "It seemed like no matter what direction we ran, the wind was still in my face." Dan ran with the leaders for the first four miles of the race, before fading to 9th at the finish. Dan's time of 24:28 was, nonetheless, his best ever for five miles.

Kenji went to Tokyo International Airport to see Dan off on his return trip. There they exchanged the traditional gifts of Japan and Santa Fe. Kenji surprised Dan with a VHS tape of the race.

The next stop for Dan would be Auckland, New Zealand and the World Championships. Dan's mother promises to never again say a discouraging word about Amateur Radio! And I intend to hold her to it.

Strays

PROUD OF YOUR HOME-BREW RIG

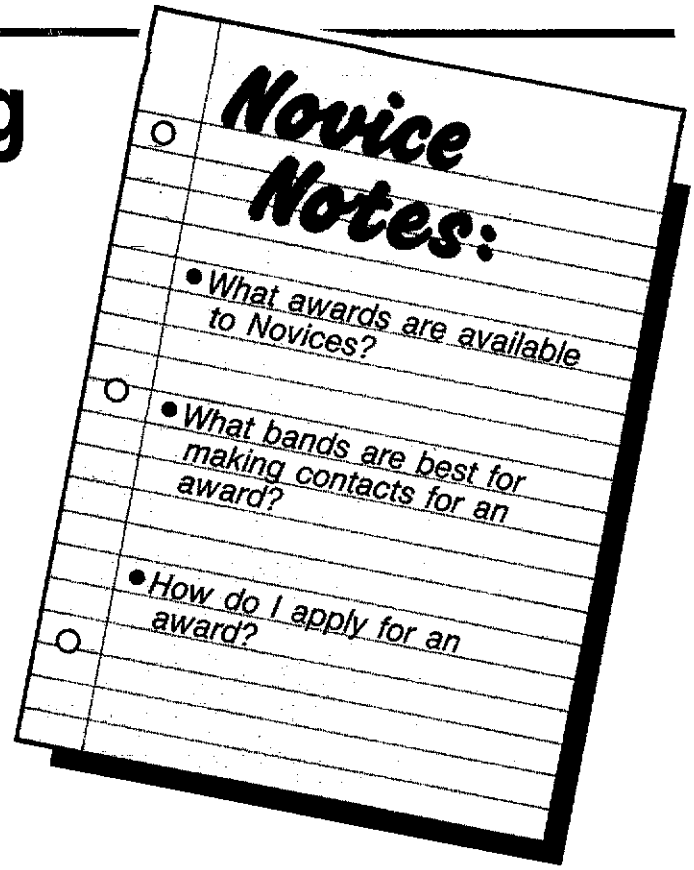
☐ You're proud of that piece of home-brewed gear, aren't you? Showed it to a friend, did you? Bet you felt a tingle of pride! You could magnify that feeling, and let a lot of other hams see and enjoy your handiwork. How? Write it up for *QST*! We'll compound your joy by paying you $50 per published page and tack on another $6 per page if you submit the manuscript electronically. If it's your first attempt at writing an article, and you're a bit squeamish about it, ask for our Author's Guide. It'll give you an idea of how to organize your material, put it on paper and/or disk and answer most—if not all—of the questions a first-time author has.

Send your manuscript or request for an Author's Guide to: Chuck Hutchinson, K8CH, Technical Editor, *QST*, 225 Main St, Newington, CT 06111. Or give us a call at 203-666-1541 between the hours of 8 AM and 4 PM Eastern.

Awards Chasing

Each radio contact you make today has the potential to culminate in an impressive "trophy" on your shack wall tomorrow.

By Robert J. Halprin, K1XA
ARRL Contributing Editor
PO Box 624
Newington, CT 06111



"Chasing awards is a robust facet of hamming that makes each and every QSO a key element in your present or future Amateur Radio success." Wow, the person that penned those words must have been quite a brilliant philosopher, eh? Well, not exactly, since *I* was the author—see page 8-1 of *The ARRL Operating Manual* under "Operating Awards." Now you're probably thinking, "what a bunch of hype!"

But wait a minute. Could I have stumbled into something? It is fair to say that the recognition factor, through awards, certificates and plaques, is what drives thousands upon thousands of radio amateurs to participate in on-the-air activities. It's a major motivating force of so many of the contacts that occur on the bands day after day. Why? Well, because you have a goal to shoot for and a tangible reward for achieving that goal. It's what K5RSG, in his book *DX POWER*, calls putting the "medals on the uniform." While you're doing this, you're expanding your Amateur Radio-related savvy (in terms of knowledge of propagation, operating skill and so on), and at the same time learning about the geography, history and/or political structure of other countries as well as our own. For general suggestions insofar as proper application procedures are concerned, see the accompanying sidebar, "Applying For Awards."

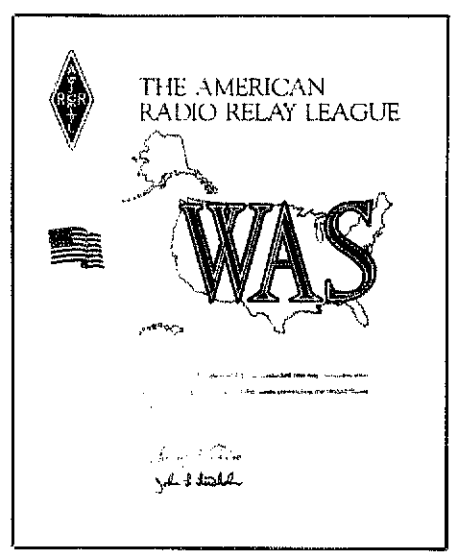
The fun of awards chasing (that is, setting out to make the appropriate radio contacts to qualify for a specific award) is something you can experience now, today, in the Novice bands, particularly at this point in the sunspot cycle. With a simple station that's operational on the Novice subbands, particularly 10 meters (see accompanying sidebar, "A Propagation Digest: Awards Chasing Within the Novice Subbands"), you can be logging those QSOs that will later transform your ham-shack wall into an *art nouveau* display of beautiful certificates and plaques.

Keep in mind that, in the main, you are going to need to obtain QSL cards to confirm these radio contacts for awards purposes; please see "Paper Tiger" by Rick Booth, KM1G, February 1989 *QST*, pp 58-60, for specific recommendations on QSLing techniques. For the most part, contacts may be made over any period of years, so working "Outer Baldonia" today as a Novice should count five years from now when you're applying for a big-time award as a hotshot Extra Class DXer (but please make a note of his QSL manager, okay?). As you spend more and more time on the air, you'll find that there are enough certificates available to wallpaper your entire shack! Decide which awards you want (and you can choose among them cafeteria-style), tune up your rig and go get 'em!

ARRL Awards

As a Novice, what kinds of awards should you be thinking in terms of? The ARRL awards program is the most prestigious to be sure, so it's a good place to start. Here the Amateur Radio literature usually discusses the Rag Chewers Club (RCC), considered the entry-level operating award. Frankly, I find the whole subject of RCC real boring, since it's not an award that gets the competitive juices flowing; suffice it to say that all you need do is keep a QSO going for 30 minutes and report the particulars to ARRL HQ, with an SASE (self-addressed, stamped envelope). A RCC certificate will be promptly forwarded to you in your SASE.

A more compelling distinction is achieving the Worked All States (WAS) award. To be eligible, you must establish a two-way Amateur Radio contact with a ham in each of the 50 US states, and then obtain the QSL cards for same. Your cards can be checked at ARRL HQ by the ARRL HQ Awards Manager or by a volunteer HF Awards Manager in your area (if one has been appointed). Numerous endorsements and specialized WAS certificates for modes and bands are available, including a special award for working all states as a Novice



The Worked All States award has numerous potential endorsements, including one for working all states as a Novice. Your QSL cards for this sharp award can be checked by ARRL HQ or by a local HF Awards Manager.

Applying for Awards

Properly filling out your awards application is not as serious as what you are facing on April 15 with respect to Uncle Sam, but here are some general recommendations and protocol to consider so that your application does not get "audited" by the awards manager.

1) All awards mentioned in this article are discussed in much more detail in Chapter 8 of the latest edition of *The ARRL Operating Manual*, available directly from ARRL HQ or from your local radio bookshop. For applicants in the US and Canada, League membership is a prerequisite for most ARRL awards.

2) Obtain the official rules and application forms from the award sponsor; always enclose an SASE (self-addressed, stamped envelope) with your request. For foreign awards, include a SAE (self-addressed envelope) and two International Reply Coupons (IRCs). Rules have a habit of changing, as Amateur Radio itself changes, so it's important that you keep up to date.

3) When you receive the application materials (and please be patient, as many awards managers are overworked and/or volunteers), carefully read the rules, so that your application complies fully.

4) Always use the official application. Homemade and/or tacky forms will not do anything to enhance your credibility with the awards manager and will probably result in delays in processing your award.

5) Make sure your application is neat and legible (please print or type), and that it clearly indicates what award and/or endorsement you are applying for, as well as your name, call sign, and complete mailing address. Don't forget to enclose the required fee, if any.

6) If you are required to submit QSL cards with your application, check them carefully at a time when you are most alert to see that they contain all the required info (your call correctly, the appropriate band, mode and so on). It's easy to miss something if you go through your cards when you're distracted or tired. Do not send any altered or marked-over cards; these cards are unacceptable for awards purposes, even if such mark-overs are made in good faith by the amateur originally filling out the card. If you feel a particularly card is a little shaky, don't submit it. Get a replacement.

7) When sending cards, make sure you've supplied adequate postage for their transit in both directions, including insurance if you so desire. The awards manager usually can provide you with details on this.

8) Make sure your application includes a signed statement that you have complied with the rules of the particular award as well as the regulations established for Amateur Radio in your country.

9) Application forms for WAS and WAC are reproduced for photocopying purposes in *The ARRL Operating Manual*. Application materials for other ARRL awards can be obtained by requesting them from ARRL HQ; please include an SASE.

licensee. Full information and the official application forms are available for an SASE to ARRL HQ.

As I discussed in my article in January 1989 *QST*, "Contests and You—Perfect Together" (pp 48-52), the dynamic contest atmosphere is ideal for getting the job done, insofar as WAS and DXCC (details follow) and other awards are concerned. As I pointed out, "In the fast-paced environment of a major contest, when all sorts of stations from rare states and countries show up and are workable with reasonable effort, you'll be surprised how quickly you can rack up the QSOs you need for awards, since these operators are placing their complete emphasis on working as many stations as possible in the shortest amount of time." So a good part of awards success is getting on at the right times in terms of activity levels and band conditions (the latter is also addressed in my January *QST* article, at least with respect to 10 meters).

As an aside, please don't badger me with letters about how it's impossible to get Hawaii or Alaska for WAS. During the 10-Meter Contest (which occurred only a few weeks ago, as this is being written), a loud KH6 and a loud KL7 were *both* calling CQ in the Novice CW subband around 2000 UTC on Sunday with few takers! Be there, or be square, okay?

The most prestigious award in Amateur Radio is the League's DX Century Club, DXCC, for contacting a minimum of 100 "countries." Since there are 321 of these entities listed as countries on the current DXCC Countries List, understand that the term country for DXCC purposes does not necessarily agree with the dictionary or conventional definition. Various bodies of land large and small and weird locations (not including the local golden arches!) qualify as DXCC countries under the somewhat legalistic DXCC criteria (the most recent version of which I helped draft). I recommend you obtain a copy of the *ARRL DXCC Countries List*, which contains all the rules and a complete listing of DXCC countries, as this is an essential reference and record-keeping tool for your DXCC progress. You'll quickly find that there is nothing quite like the thrill of working a new country.

With 10-meter SSB privileges, high solar activity and the 10-year renewable license, DXCC is well within reach of Novices. DXCC is a lifetime pursuit, however, so you just keep on going as you upgrade, incrementally qualifying for endorsement stickers as you increase your country tally. Remember that all contacts made as a Novice count towards your overall DXCC totals. The basic DXCC certificate is called a "mixed" (ie, mixed modes) award, but there are actually 12 DXCC awards available, including 10-meter single band, all phone, all CW and so on. You can shoot for just one, all or some. The choice is yours. See the DXCC rules for details.

As noted previously, 100 countries is the minimum to qualify; endorsements are available from that point onward (see the DXCC rules for details). The official application forms, along with the appropriate QSL cards, are required, and you must submit your cards to the DXCC Desk at HQ for verification. Send an SASE to HQ with your request for DXCC application materials.

A good day's work on 10 or 15, and you may be able to qualify for WAC, Worked All Continents. To qualify, you need to make contact with a station in North America, South America, Africa, Asia, Europe and Oceania (KH6, VK, ZL, among others, count as Oceania). QSL cards are required with your application, and various endorsements are available. Send an SASE to ARRL HQ for application materials.

Getting the cards for these awards adds an additional level of red tape, but it does serve the purpose of proving that you actually made the contacts. On the other hand, the honor system is alive and well in Amateur Radio. The last three awards that have been implemented by the League necessitate a self-certification *in lieu of* QSL cards: The Golden Jubilee of DXCC, the Constitution "We the People" Bicentennial WAS and the ARRL Diamond Jubilee (three of the most beautiful certificates ever offered for operating achievement) all simply require the applicant to affirm in writing that he/she has made the obligatory QSOs. No difficulties have been experienced with this approach thus far; perhaps this will be the streamlined trend of the future.

I should point out here that as a matter of personal values, applying for a certificate without actually making the required QSOs (or falsifying the required QSL cards for that matter) is senseless. Not only is it unethical, but you are denying yourself the thrill of the hunt and the ultimate achievement of your goal. The certificate, by itself, has no intrinsic value. The challenge and the satisfaction of making the required contacts that *later* culminate in the prize is the real reward.

CQ Awards

CQ Magazine, a popular Amateur Radio journal, sponsors three awards in particular that you might find of interest. As a Novice, you can qualify for the WPNX

Award, issued for working at least 100 different prefixes (ie, K1, AA2, KB4, PY2 and so on) used by amateurs throughout the world. Incidentally, *CQ* also sponsors a Worldwide Prefix Contest (phone in March and CW in May) during which all kinds of prefixes abound.

CQ's Worked All Zones (WAZ) Award is almost as popular and challenging as DXCC. *CQ* has carved up the world into 40 geographical "zones" numbered 1-40, and if you contact amateur stations in each of the 40 (and get their cards), you qualify. Like DXCC, there are various single-mode and single-band variations to apply for as well. Getting all 40 is no mean feat; you may have to wait until you upgrade to get the last couple of rare ones. The good news is that under the prevailing band conditions you should be able to work most of them on 10-meter SSB, nevertheless. Your *ARRL DXCC Countries List* contains a complete list of *CQ* zones by country, but you'll also note that DX stations sending you QSL cards generally will preprint their CQ zone on their card. A good place to collect zones is *CQ*'s Worldwide DX Contest (phone in October, CW in November).

Another essentially lifetime awards pursuit is *CQ*'s USA Counties Award Program, an ongoing process for working towards contacting all US counties (there are 3079 of them, for you trivia buffs). The basic award requires at least 500 counties, so please don't lose any sleep over this one. It's a long-term endeavor that may take on more significance as you get more and more QSOs under your belt.

While FCC rules have eliminated mandatory logging, thank goodness, the USA-CA program may be a good reason to do so; that is, to carefully enter the city and state along with the rest of the QSO details for each stateside amateur you talk to on the air. Once you've been active for a period of time, casually check your QSLs on hand (along with QSOs in the log for which you don't yet have cards) to see if you have the minimum 500 (the US Post Office publishes a directory by which you can determine the county by crosschecking with the city/town). The USA-CA certificate is one of the most attractive around, so when the time comes, you'll find the paper trail well worth it. More details on *CQ* awards can be found in *The ARRL Operating Manual*.

10-10 International

There are a variety of independent US organizations and clubs that sponsor awards, among them the 10-10 International Net, Inc. Since 10-meter SSB has become the hot band-segment of choice for Novices and Generals alike, you may be especially interested in pursuing the 10-10 Award. Yes, this is what they mean when they relentlessly hammer away at you for your 10-10 number! The 10-10 organization was originally established to promote interest and activity on 10 meters. The band is alive and well now, but this organized program keeps 10 functional even during the low points of the sunspot cycle. In any event, what you need to do is work 10 members of 10-10 (just work them anywhere on 10 meters—it need not be on any net frequency) making sure to log their 10-10 membership number, and send your log data to the appropriate 10-10 call area manager. Soon you'll be issued your own 10-10 number; not only will *you* then be able to bring new members in, but by working additional 10-10 members around the country, you'll be eligible for scores of 10-10 awards/endorsements issued by the national office and by numerous 10-10 local chapters from coast to coast. For details, send an SASE to W6YLJ, 18130 Bromley, Tarzana, California 91356.

International Awards

If you refer to the *ARRL Operating*

A Propagation Digest: Awards Chasing Within the Novice Subbands

An adventure awaits you each time you power up your Amateur Radio station. But what you might discover on the various bands is not totally unpredictable. Amateurs enjoy the privilege of using several different frequency bands scattered throughout the HF (high frequency) spectrum. Some of these frequencies work better during the day; some work better at night. Obviously, some frequencies are good for long-distance communications, while others provide good short-range communications.

As you acquire more and more on-the-air experience, you'll learn which frequency you want to be on, and when to be there, to work a certain part of the country or the world. Please don't feel *under*privileged with your Novice privileges; throughout the course of a good day, you can reach *any* part of the world using one of the Novice bands. Here's a summary of the type of *propagation* (ie, how radio waves travel from one point to another) that you will encounter on the Novice bands. You may wish to plan your awards-chasing strategy accordingly.

10 Meters: Since this band contains the highest frequencies in the amateur HF range, it is particularly sensitive to the whims of the sunspot cycle. During years of high sunspot activity, like we're enjoying today, 10 meters is magnificent, remaining open for most of the day with strong signals arriving from all over the world. In contrast, in periods of low solar activity, you many not hear signals, except local ones, for days at a time! So, during the next couple of years, with the sunspot cycle peaking, you want to hit 10 meters often and really hard.

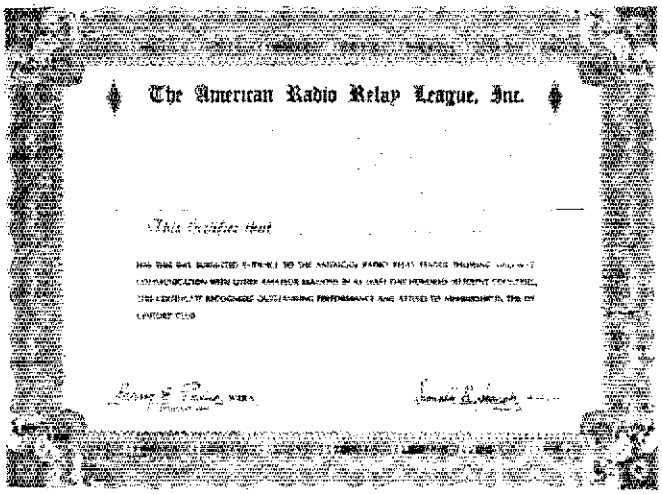
The Novice subband, particularly on phone, is alive with DX signals, workable with 100 watts and a comparatively simple antenna. And remember, you have a spacious allocation on that band; a full 200 kHz on CW and another 200 kHz on SSB. Depending on where you are, generally Europeans will be workable in the morning through early afternoon, Africans and Central/South Americans throughout the day, and Japan/Asia at sunset. All this, plus good communications to all areas of the United States during the daylight hours—10 meters, particularly the Novice SSB segment, is *the* DX crossroads of Amateur Radio.

15 Meters: This band is similar in range to 10 meters, although it tends to be open longer and more often than 10; 15 is also more stable during periods of low sunspot activity. Indeed DX is generally plentiful on 15, even in the lean years of the solar cycle, and you can anticipate similar kinds of DX as you might encounter on 10 meters (although Novices only have CW privileges on 15, of course). You might listen for DX stations calling CQ on SSB in the Novice subband; they often specifically look to work Novices. This is called "crossmode" operation (with the DX operator on SSB and you on CW).

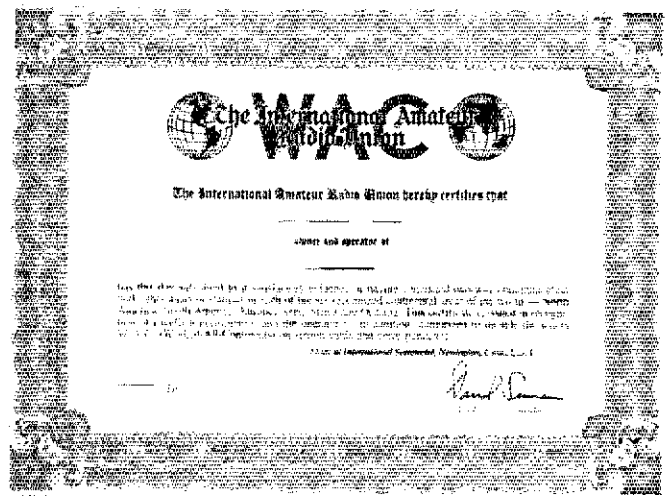
40 Meters: During the morning and early afternoon hours, 40 meters provides good stateside communications over a skip distance extending from about 400 miles to 1200 miles. Later in the afternoon, the skip distance increases to several thousand miles. 40 is a good WAS band, although the presence of foreign shortwave broadcasters makes it a bit of a challenge in the evening.

80 Meters: Like the 40-meter band, 80 meters is popular among Novices for stateside contacts. During the day, it's pretty empty (the range extends to about 350 miles). As 10 and 15 meters shut down for the night, and 40 opens up to foreign broadcasters, many Novices switch to 80, which provides strong and reliable "local" propagation with neither the uncertainty of 10/15 nor the foreign broadcasts of 40. During the summer months, nighttime communications may extend up to 1000 miles. During the winter season, however, when there is little, if any, static, cross-country contacts are normal occurrences.

Dipoles and inverted Vs are the typical antennas used on 80 and 40, while small beam antennas are generally preferred on 10 and 15 meters. However, wire antennas have also been quite effective on the latter two bands, so don't hesitate to give that a try. Even indoor antennas are known to have made the grade (see "Inside Antennas—Do They Really Work?," December 1988 *QST*, pp 55-57). For suggestions on what kind of antenna to use at your location, see the *Novice Antenna Notebook* and *The ARRL Antenna Book*.



The DX Century Club Award is still the Amateur Radio operating standard worldwide. Novices and Technicians now have a super crack at obtaining this highly-sought-after achievement with the present outstanding 10-meter conditions and the advent of the Novice Enhancement.



The International Amateur Radio Union sponsors the WAC award for international two-way contact with Amateur Radio stations in each of the six continental areas of the world. US hams and those in countries without IARU representation can apply directly to ARRL HQ.

Manual, you'll note a 44-page section on *international* Amateur Radio awards, these being certificates from foreign countries that you can earn through your skillful operating. The ARRL is a member of the International Amateur Radio Union (IARU), which is sort of like a United Nations of Amateur Radio national societies throughout the world. Many of these societies sponsor awards for various operating achievements through which you can earn gorgeous certificates.

A review of the material in the *Operating Manual* will show that the QSL cards that you have already gathered for DXCC, WAC and so on will qualify you for certain of these nice awards from our IARU counterparts. However, these societies also offer many unique awards through which you can learn about the structure and culture of these countries.

For example, if you set out to qualify for the WAJA Award, you'll quickly ascertain that there are 47 prefectures (administrative districts) in Japan. If you prefer the JCG Award, you'll realize that a "gun" in Japan is a regional congregation of towns and villages. Similarly, the Worked All Liberia Award reveals that Liberia is organized into nine counties, while the Worked All SM Award shows that Sweden is compartmentalized into 25 laens (the equivalent of counties) and the Helvetia Award will show you that Switzerland is arranged into 26 cantons.

The Sea of Peace pennant will adorn your wall if you work the required number of contacts with countries bordering the Baltic Sea. The Catch 22 Award will be yours if you work a certain number of stations located in the 22nd parallel of Latitude North, while you can get the Worked The Equator Award for working at least eight of the 19 DXCC countries along the equator. If you make the appropriate contacts in the Pacific, you can attain the Captain James Cook Award, sponsored by the New Zealand society to perpetuate the memory of the world-famous navigator. Did you know you could capture the Fairytale Award by contacting amateurs in Odense, Denmark, the birthplace of Hans Christian Anderson? How about getting a certificate (the Silver Award) personally signed by JY1, the King of Jordan, for working six JY stations, or one personally signed by the Major of Jerusalem for working four 4X stations (the Jerusalem Award)? The possibilities are endless—consult the *Operating Manual* for details.

In pursuing such awards, you can't help but get absorbed in the culture and geography of a given country. As such, having been directly responsible (as editor of the *Operating Manual*) for painstakingly gathering this information together and preparing it for publication, I'm extremely enthusiastic about being able to share it with the entire Amateur Radio community.

So as you start racking up those DX contacts, and those cards begin winding their way to you via the "buro," please keep in mind that there is a whole awards world out there that goes well beyond DXCC—many of which you may be eligible for primarily as a complementary activity to your day-to-day operating. That is, I don't mean to suggest, say, that you go "gunning" for the JCG Award, so to speak; those DX QSL cards that you will have stashed in a box in the basement (along with those unconfirmed contacts that are permanently recorded in your logbook), the result of QSOs made just for the fun of making contacts with distant lands, will become a treasure chest of awards potential, ready to be energized just as soon as you are.

Incidentally, the awards under the sponsorship of our friends in the IARU are only a portion of the international awards in the radio marketplace. If you contemplate getting really committed to certificate hunting (which may not be the case at this point in your Amateur Radio career) and you are interested in the many independent, ad hoc and less-publicized awards, the *K1BV DX Awards Directory* may be right up your alley. Send an SASE to K1BV (525 Foster Street, Suite 9, South Windsor, Connecticut 06074-2936) for pricing information.

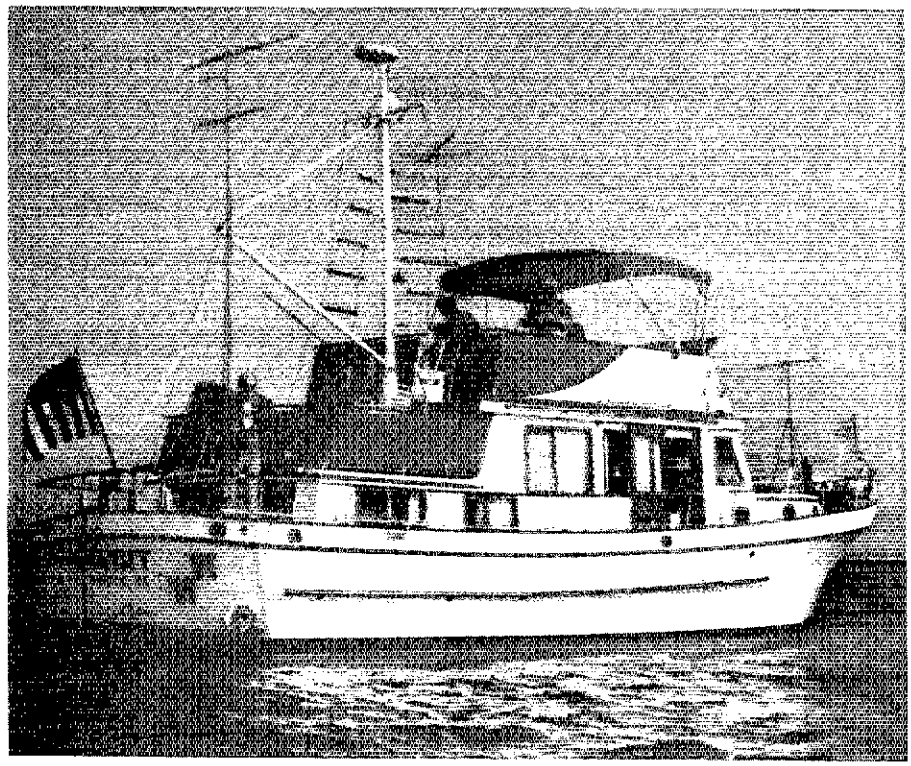
The Awards Chase is What You Make It

Please understand that you can by all means devote all your energies to purposely set out to snare particular QSOs for awards credit as an end unto itself—as many amateurs do. Or you can merely collect awards as a low-intensity by-product of your primary interest in talking with other hams. Right now perhaps a rag chew with a station in another state or another nation is rewarding in its own right. Maybe you're somewhere in between. The point is that QSOs made as a Novice and as a General-and-above, QSOs made while rag chewing or in the Novice Roundup, all accrue towards awards, if you desire. It's also perfectly acceptable to qualify for the initial level of a particular award as a Novice, then pursue subsequent specialized endorsements and the like when you upgrade and gain access to a few more bands. Regardless of where you place your operating emphasis, the radio contacts you make today will live on indefinitely and cumulatively through the many fascinating operating awards that are well within your reach—yet another lively aspect of this exciting art form we call Amateur Radio. QST

Casting Off With Ham Radio

Own a boat, or thinking of getting one? Don't forget to take Amateur Radio along when you hit the water!

By Rick Booth, KM1G
c/o Offshore Publications
PO Box 817
Needham Heights, MA 02194



Amateur Radio and boating are natural for each other, as exemplified by W1TUM's maritime mobile operation in the September VHF QSO Party. Give it a try! *(photo courtesy W1TUM)*

Americans have been turning to the water for recreation by the tens of thousands recently, and boat sales have soared in the past five years. If you're among the wave, do you take Amateur Radio along with you? If not, you may be catching one boat, but missing another.

Of course, boats and radio are old chums. Most boaters are familiar with marine VHF, the channelized FM service at 156 MHz. The solid-state revolution that has swept hamdom has also brought small, affordable, bulletproof VHF rigs to boaters, and it's easy to obtain a license, *if* you own a boat. That's the bright side.

Unfortunately, there is a darker side as well. Marine VHF is without Amateur Radio's rich tradition of good operating practice. A few hours spent listening to marine VHF can sour anyone. A lot of nonham boaters I know won't even turn their marine rigs on, its mindless anarchy unnerves them so. But at least they *know* about radio, what it is—and what its potential is.

Imagine their delight when I introduce them to 2 meters with my little hand-held. Repeaters are virtually unknown to them, and the distances I can reach blow them away, thanks to flat "terrain." Moreover, they're awed by the number of hams who can take part in the same roundtable—no confusion, no anarchy, no wasted time. That such courtesy and skill allow so many hams to use the same air at the same time is a revelation to boaters, a miracle on the order of water to wine.

Of course, I'm careful to choose repeaters which I know are frequented by good ops, and I'm careful to add the disclaimer that ham ranks have their share of bad apples—and usurpers.

From that casual 2-meter demo, I slide right into my pitch on high frequency and the incredible array of modes open to licensed amateurs. These demos do as much for me as they do for my subjects—having seen those wide eyes and heard those exclamations, I'm not likely to take this hobby's wonders lightly.

Of course, *you* don't need to be told about these wonders—you're already on the air. If you're a boater, whatever you do, don't leave ham radio at home when you get under way. Big mistake.

One of the best things about Amateur Radio is that it mixes so well with other hobbies. You've read of backpackers and campers, bicyclists, balloonists, fixed-wing and helicopter pilots who take ham radio along—boating hams do the same. Boating and Amateur Radio mix like peanut butter and jelly.

A Dream QTH

Think about it. Ever long for a wide-open QTH, a place with nothing to interfere with your signal—no buildings, trees, mountains, neighbors or power lines?

Put yourself on a boat, away from shore. Shazam! No obstructions, nothing but (we hope) calm water on every azimuth. There's great operating to be had, routine hamming for sure, and when you add the mariner's periodic need for emergency communications, you've got a powerful brew. There are those who say a boat is the perfect QTH.

Advances in Radio Equipment

It wasn't always so. Sure, the ocean's always been a perfect ground, and it's always been just as flat (*most* of the time). But the rigs, that was something different. Put yourself on a small boat with a National NC-303 receiver and a Hallicrafters HT-37 transmitter. Tubes need high dc voltage; the final plate supply in the HT-37 puts out 800 volts. Tube supplies have to step up the ac voltage and then rectify it. We're talking major power supply here—you might as well leave the YL or OM home. Fishing tackle too. There's no room. In fact, there might not

be room for *you*.

Tube rigs didn't (and still don't) like boats. They need lots of ac; boats normally have only dc from batteries. Tubes don't like vibration, and periodic pounding is part of nautical life. Finally, tube rigs were *big*. Ever heard old gear called a boat anchor? And you thought it was just an expression!

Enter the solid-state revolution. The same technology that swept the racks from your shack also wiped out the single biggest impediment to putting ham radio afloat. Today's HF briefcases thirst for 12-V dc—no tubes to flatten batteries or go south from wave action, and they leave space aboard for something besides radio, like people.

Come Aboard

If you're sold, let's get on with it. Let's get that solid-state, HF rig wired and ready to be fired. The sunspot cycle's about to peak!

Not so fast, mate. If solid-state electronics demolished the single biggest obstacle between hamming and boats, it didn't beat them all. Boats are a special environment. You'll need to do some planning.

Your two biggest decisions will be what kind of antenna, and how to prevent onboard RFI. In the first place, boats don't have the space of home, not even a mobile one on a handkerchief lot. Secondly, RFI at sea can have more dire consequences than it does ashore.

Antennas

Balanced HF antennas are rare on boats; the vast majority are fed against ground. Not only is ground so close and so superb, in the form of water—there isn't room for a dipole or beam. Most sailboat hams use their backstay for an antenna. The backstay is a wire running from the masthead to the boat's rear, or stern. Rare is the sailboat that doesn't have a backstay. Egg insulators electrically insulate it from the rest of the boat's rigging, and you affix the feed line at the bottom egg, creating an end-fed random wire.

You'll need a tuner, preferably at the feedpoint and not near the rig. An automatic tuner (external, not in the rig) is especially suited to the task. Most sailboats have a compartment near the stern called the lazarette; a tuner stashes there nicely.

Beware: If your rig has a built-in tuner, don't rely solely on it. Without a tuner at the feedpoint, you're engraving an invitation to stray onboard RF. More on that in a minute.

You can energize other parts of the boat's rigging, and some sailors like mobile whips. But the backstay is so convenient, and works so well, that most sailors go with it.

Hydrocarbon-powered hams have more leeway. I've seen cabin cruisers with towers and beams, believe it or not, but weight and windage aloft make that configuration a bad idea, even if your boat is big enough. If you're like the majority, you'll choose a mobile whip. As always, be sure it's fed against a good ground. Peek over the boat's side—you're looking at *the best* ground there is.

The Ground

Of course, you've got to harness it, which brings us back to stray onboard RF, which is likely if you're not mindful of ground. Nobody likes stray RF in the shack, but ashore you don't call on electronics to guide your home—satellite navigation (SatNav), top band's old nemesis LORAN, or radar. There's even a new electronic compass, the fluxgate. If you don't check before leaving port, RFI may do to your navigation instruments what the Greeks did to Troy, and a lot faster. Of course, you shouldn't be in a boat unless you can navigate without electronic aids, but if you've got them, why handicap yourself?

Getting to ground can be as simple as a length of conductive ribbon (copper or aluminum) thrown over the side, attached to the ground side of the feedpoint. Use the widest you can get—remember skin effect.

Maritime Mobile Rules and Regs

Situation: You and some friends are boating one mile off the coast of Mexico. You are a ham, but, for some reason, the leash of your FCC license doesn't seem as tight as it did just a few hundred miles ago when you were off the coast of California. "It sure would be nice," you think to yourself, "to operate a little on the ham bands." You know your commercial marine rig will operate in the ham bands. Can you legally do this? No! Not until you meet the special conditions as specified by the FCC and by the country in whose territorial waters you are boating.

"Why not?" Well, for one thing, consider Section 97.101 of the FCC rules. "In addition to complying with all other applicable rules, an amateur radio station operated aboard a ship [or aircraft] must comply with all of the following special conditions: (a) The installation and operation of an amateur mobile station shall be approved by the master of the ship . . .; (b) The amateur [maritime] mobile station shall be separate from and independent of all other radio equipment . . . installed on board . . .; (c) The electrical installation of the amateur [maritime] mobile station shall be in accordance with the rules applicable [to ships as directed by] the appropriate governmental agency; (d) The operation of the amateur [maritime] mobile station shall not interfere with the efficient operation of other radio equipment [on board] . . .; and (e) The amateur [maritime] mobile station . . . shall not constitute a hazard . . ."

Additionally, since you are in Mexican waters, you need to obtain a reciprocal operating permit for Mexico (or whatever country in whose territorial waters you are boating). Your FCC license applies when you are in the US, its territories or on the High Seas (ie, International Waters.) If you're a mile off the coast of Mexico, you're under that country's communications jurisdiction and you must apply to the government of that country in order to obtain a permit. Beware—certain countries have been known to seize gear operated without authorization.

Always check to see if the country in whose waters you are boating has a third-party agreement. In the case of Mexico, we do have a third-party agreement, so you can run third-party traffic while in that country's territorial waters. If the US does not hold such an agreement, you are prohibited from passing third-party traffic. Also, remember the prohibition on business communication in the Amateur Radio Service. You are "mobile" on water rather than land, but the same rules must be followed—except when you are in the territorial waters of another country, in which case you follow their rules. The Washington Mailbox column of October 1988 *QST*, "Amateur Operation On the High Seas," goes further into detail on the "dos and don'ts" of maritime mobile operation than we can here.

"But," you think to yourself, "it would be so 'convenient' to use the commercial marine rig to make that phone patch on the ham bands." It would be too convenient. The rules of the Amateur Radio Service are there to protect *us* and it is up to *us* to abide by them. If faced with a life-or-death emergency, almost "anything goes" since the providing of emergency communications is one of the basic purposes of the Amateur Radio Service. This privilege should not be abused. A boater should not possess an amateur rig to be used "only in emergencies" if he or she has no intention of obtaining an Amateur Radio license. Our spectrum is far too precious to be abused.

So, if you are operating your station maritime mobile and you decide to break a rule—"just once out of convenience"—remember that your fellow hams are counting on you and you on them to follow "the rules," to follow the Radio Amateur's Code and to uphold the tradition Amateur Radio offers.—*John C. Hennessee, KJ4KB*

Trailing ribbon is the quick and dirty way to find ground. It works, but it can have dire consequences if the engine is running. If you back the boat down, the ribbon can get caught in the propeller, and there's always the outside chance of the ribbon drifting forward. Best use another route.

A grounding method that doesn't actually use the water is to run conductive (read: copper) strips along the inside of the boat as a counterpoise. Shoreside hams do it with success. Trouble is, finding a convenient run that's a quarter wave on your favorite band might be a little tough in a boat's tight quarters, especially if your favorite band is 75 meters. The bright side is that a counterpoise can cut down onboard RF. It's especially useful in that capacity when used in conjunction with the third, last and best ground system.

A Serious Marine Ground

If the under-way ham bug really bites, you might as well get serious. Next time the boat's in dry dock, plan to have a ground plate installed on the underside of the hull. Naturally, ensure that it's installed in a seamanlike manner. It doesn't make much sense to use ham radio to call MAYDAY because you're sinking when the cause of your leak is poor through-hull fittings on your ham ground!

The plate's size can vary considerably. For plain copper, some sources recommend a pretty sizable slab; 12 square feet is mentioned often. That's hard to find on a 20-foot walkaround outboard boat.

Fortunately, many reputable marine electronics outlets offer specially fabricated plates made of porous copper to fool electrons into thinking the plate is much bigger. The hull-plate method offers not only the best ground method for your ham station, but you can also tie all the boat's electronics into it.

Give It a Try

Don't think that HF is the only game in town, or that you have to plan an ocean crossing before you can get on the air. You can have just as much fun sitting a mile off your favorite beach, working DX on 10 or 15 meters with simple monoband whips, as you can back home with your tribander-tipped tower. And you might be surprised at what you can do with VHF offshore. Even if you just take your outboard for a little fishing and throw a hand-held in your pocket, repeaters you usually don't hear can beckon. Park a 5/8-λ whip on there, or, better yet, a collinear array, and you're into some serious fun with only a hand-held.

Better still, take advantage of what your boat can do that the home QTH can't. It's *mobile*. It can move. Many's the ham who has found Amateur Radio handy in a strange land, even a county or two away. There's a never-ending supply of advice and directions, besides the usual rag-chewing fun. Take a run down the coast a few miles, cross the big lake and see what's on the other side. Ham radio will be there, and the hams waiting will greet you with open arms.

Just don't forget to take time demonstrating Amateur Radio to your nonham boating friends. I can use all the help I can get.

Strays

WHAT'S YOUR NAME?

☐ It was one of those dreary, but hamperfect, winter afternoons that I made a RTTY contact with KBØM (Duane) that triggered this incident.

After my initial greeting, I transmitted my RTTY brag tape which mentions that I was a high speed (Mil-Spec #777) fixed-station radio operator assigned to 8th Army Headquarters in the South Pacific during WW II.

Once the island of Leyte was secured, 8th Army management turned its attention to other nearby major islands. I was ordered to join the radio team assigned to the newly acquired communication ship *PCE 850*. This vessel was a floating command post with full communications and secret code facilities for use by the commanding general and staff if they needed it during invasion operations. The officer in charge of our communications team was Lt Daniel H. Mercer.

When Japan signaled its desire to surrender, our communications team was ordered to Tokyo Bay as initial occupation troops. We were anchored off the bow of the *Missouri* and were witness to the surrender ceremonies.

Shortly after our arrival in Tokyo Bay, we were ordered to disembark and take up duty in Yokohama at the Court House Army radio station, already in the process of being set up by the 8th Army. All during this time our radio team continued under the command of Lt Daniel H. Mercer.

In the months after the surrender, our wartime company started to disband as we were ordered home for discharge. January 1946 was the last time I saw my group as we scattered to the 48 states.

From 1946 to 1980 I had no contact with communications or electronics other than as a consumer. My time and efforts were directed to business except for time spent boating. During 1980, I began to think of retirement, and it occurred to me that I was in need of a full-time hobby. A local illegal (high-power) CBer was receiving negative publicity in the newspaper at that time. The article mentioned the merits of ham radio and triggered my curiosity. I made contact with the local ham club and attended the Novice and subsequent upgrade courses.

Upon completion of the Novice course, I became a member of the South Jersey Radio Association and began attending the club meetings. It was at one of the meetings that I asked several members about mini quad antennas, as I was interested in one for the station that I was installing.

I was advised to call a member named Howard and I did. We talked for over an hour, and he patiently answered all my questions. During the next five years of membership in the club, I never got to meet Howard or be in contact with him again.

Upon retiring from business on July 31, 1984, my wife and I moved to Punta Gorda, Florida. My station was set up immediately, and I became active in the local ham community. On January 9, 1986, almost 40 years after my discharge, I was in RTTY contact with KBØM when another station (W2FAZ) broke in with a message directed to me. WHAT'S YOUR NAME? K. I responded with my name, and he came back THIS IS EX-LIEUTENANT MERCER ALSO OF 8TH ARMY HDQTRS. RADIO.

He became so excited he asked for my phone number and called me long distance, not taking any chance of propagation dropping out. He discovered that I don't live far from his daughter, and right then he announced his plan for visiting me. He arrived several weeks later, and that's when we both learned how small the world really is.

When he arrived at my home, we began comparing a lot of cross information about the last 40 years. I learned that he lives in Cherry Hill, New Jersey, where I had lived for 10 years before moving to Florida. I learned that he lives no more than 10 minutes away from my former residence. I learned that he belongs to the South Jersey Radio Association but seldom attended meetings. He remembered my mini quad phone conversation with him in 1980, but it took a chance occurrence of his tuning his rig at the right time and the right mode to pick up my brag tape transmission! This is how I came to sort out that military Lt Daniel H. Mercer is really civilian Howard Mercer.

How small the world is, especially in ham radio! And WHAT IS YOUR NAME? K.—*Paul London, KI4XZ, Punta Gorda, Florida*

QST congratulates...

☐ Larnelle "Stu" Harris, WD4LZC, of Louisville, Kentucky on winning the Grammy for Best Male Gospel Vocalist. Stu is an active user of packet in the Louisville area. *Tnx to Paul Cook, KT7H*

I would like to get in touch with...

☐ anyone who has modified the Kenwood TS-520S to use the AUX frequency band for 30 meters or other bands. Anthony L. Kelly, W2HAH, 17 Country Ct, Hicksville, NY 11801.

☐ hams who are high school age and younger interested in daily net on 28.450 MHz at 0000 UTC. Presently the net is meeting on Sundays. Conway Springs Cardinals ARC, c/o Jan-Michael Steen, KAØZZU, Conway Springs High School, Conway Springs, KS 67031.

Like Flowers in Spring

What's sprouting in our garden? A favorite perennial promising new growth!

By Mary E. Schetgen, N7IAL
Secretary
The ARRL Foundation, Inc

Ah, spring! White, puffy clouds, blue sky, newborn flowers and grasses—our natural world in showy, youthful exuberance to delight the senses! Our spirits renewed, we turn with enthusiasm to begin projects we mulled over in a deep winter reverie. Up on the roof adjusting the antenna or tilling a small furrow to lay in a new radial, mapping out strategy for the upcoming hamfest season or trying out operations on a new band, we've come alive with new energy for our Amateur Radio pursuits.

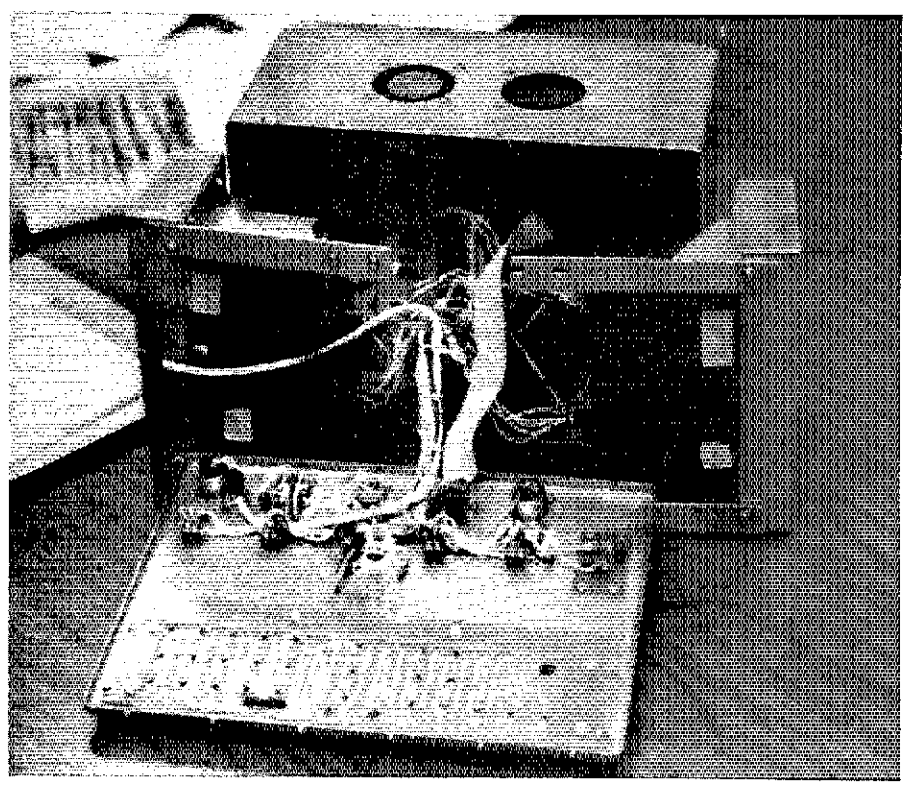
Yes, it happens every spring. Doesn't it remind you of when you first got hooked on hamming? Maybe you hounded a friendly Elmer to hurry and teach you everything you needed to know to get your ticket. Or maybe you ordered a *Tune in the World with Ham Radio* kit, quickly mastered the material and passed your Novice test at the local club's exam session. However you came to our wonderful hobby, you appreciate the joy of being a ham and the world of experiences open to you.

Thousands of people would like to experience hamming, and many of them are young. Right in your own community, local schools and youth groups are placing new emphasis on programs designed to encourage awareness of the sciences. Response to these programs is overwhelmingly positive. Kids want to know about astrophysics, geology, computer sciences and *electronics*. From Boy Scout troops to a small, newly formed club of just-licensed youngsters, we get letters attesting to the desire to experiment and participate in a wide range of Amateur Radio activities.

Application to the Victor C. Clark Youth Incentive Program has never been higher! We've received well-documented grant proposals from enough youth groups to know that Amateur Radio education is experiencing a boom in towns all over the country! Don't see it yet? Wait a minute. Combined with an overall emphasis on new ham recruitment for every age group, the ARRL, through local volunteers, is making sure that anyone wanting to get licensed knows how, when and where to go about it. But it's the teachers, students and Scouts who've sent the Foundation a clear message: *"Amateur Radio is helping kids learn, and we need a matching-fund grant to get our project off the ground."* See the words learn and matching-fund? Kids appreciate the cost of an education and are willing to work for it, but they need our help. You can help to strengthen the Youth Incentive Fund so we can make grants to as many worthy groups as possible. Your tax-deductible donation can be earmarked for this or any Foundation program you choose to support. Please help our young get the maximum benefit from Amateur Radio's unique educational opportunities. Send your contribution to VICYIP Fund, The ARRL Foundation, Inc, 225 Main Street, Newington, CT 06111.

IS IT BIGGER THAN A BREAD BOX?

So...you're pretty savvy with technical knowledge. Home brew is no hassle. You remember a decade's worth of *QST* bench articles. Relishing chances to one-up your buddies on the local repeater during the techno-roundtables, your looking for a new challenge. Here it is. Tell us what this box is and its function. Gloat to the boys that *you* know what it is...and tell us, too.



Do you know what this is? (*Photo courtesy of KE3Z.*)

Send a QSL with your answer. Sorry, we can't give you a prize, but we will name you as the definitive, once-and-for-all expert you've been telling folks you are. Earliest correct answer nets this distinction. PS: We just want to know what *it* is!

SCHOLARSHIPS, AND MORE SCHOLARSHIPS

We're often asked if other groups offer Amateur Radio scholarships. Happily, they do! Information and applications can be had by writing to the addresses listed.

The Foundation For Amateur Radio (FAR)
6903 Rhode Island Ave
College Park, MD 20740

Send a QSL before May 31, 1989 for full details. Offers 32 scholarships.

The Atlanta Radio Club
c/o Phil Latta, W4GTS
259 Weatherstone Pkwy
Marietta, GA 30068

Preference given to residents of Georgia and adjoining states.

Dayton Amateur Radio Association
Scholarship Committee
317 Ernest Avenue
Dayton, OH 45405

Quarter Century Wireless Association
1409 Cooper Dr
Irving, TX 75061

YOU OUGHTA BE IN PICTURES

We want to make you a star! Contributor's Corner, the listing thanking our supporters at the end of each monthly column wants to feature your smiling face in addition to the regular listing of your name and call. Your comments and QSLs are welcome, too. Don't be shy! Send a photo of yourself or club to The ARRL Foundation, 225 Main Street, Newington, CT 06111.

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Victor C. Clark Youth Incentive Program Fund

Thomas W. Frenaye, K1KI

The Goldwater Fund

Bryan Amateur Radio Club
in memory of Joe Bonifazzi

The General Fund

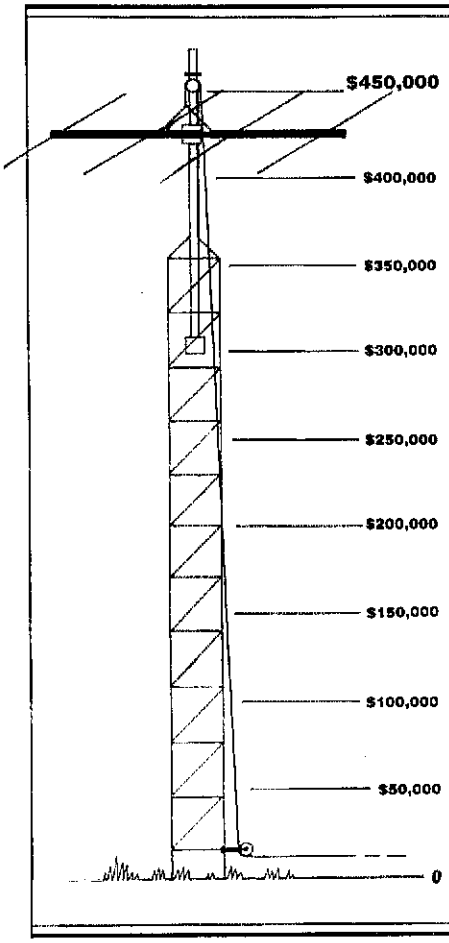
Forrest W. Hogue, KS6L
in memory of Phinon R. Lewis, KE6ZF
Douglas C. Lans, N6TBM
Wilton T. White, KL7BDK
Harry R. Collins, K6ANN
in memory of George Whitmore, WA6LCG
John F. Clarke, KA3JUO
Rita B. Speirs
in memory of Thomas Speirs, W1IOH
Don Cooper, KB6NMW
John F. Hallenback, Jr, W2GUL
Paul B. Ely, KB4VIT
Clarence E. Streck, Jr, W9QDM
George H. McBride, W4DGJ
Howie C. Howard, KB5EQY
Paul I. Hammer, Jr, KA6CHJ
Tom Lane, KA5BWW
Rudolph R. Rice, K1ROK
Harry M. Kalish, W2LRP
Krieger W. Henderson, Jr, N4HAM
Chuck Miller, WAØKUH
Harland A. Orego, WB4RUJ
Samuel E. Craig, W2ACM
Ralph J. Johnson, KA1LSL
Stephen Mendelsohn, WA2DHF
A. J. Mitchell, W1AZP
in memory of George Grosner, W1ASO
Clinton Amateur Radio Club (IA)
in memory of Chris Bahnsen, KAØYDJ
Paul H. Smith, Jr, KA1MTO
Clark O'Hagan, KA5VCT

Received and acknowledged during the month of **January.**

THE ARRL FOUNDATION, INC.

"for the advancement of amateur radio"

W1AW Renovation Update



How to Contribute to the W1AW Renovation Drive

- **By Mail:** Address all contributions to W1AW Fund Drive, 225 Main St, Newington CT 06111. Please make your check or money order payable to W1AW Renovation Fund.
- **By Phone:** For your convenience, credit-card contributions can be made by calling Jennifer at ARRL HQ, tel 203-666-1541, between 8 AM and 4 PM Eastern Time, weekdays.

All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Does your employer have a match-contribution program? Some major employers will match your contribution.

Recognition

Contributors to the W1AW Fund Drive will be recognized as follows:

- *W1AW Kilowatt Club:* Those contributing $1000 or more.
- *Hiram Percy Maxim Club:* Contributions of $500-$999
- *W1AW Century Club:* Contributions of $100-$499
- *W1AW Booster Club:* Contributions of up to $100

All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim and Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* will receive a specially inscribed personalized plaque, which you'll be proud to display in your ham shack. In addition, special recognition will be given to those who donate substantially more than $1000.

Happenings

Conducted By Phillip Sager, WB4FDT
Editorial Manager, Regulatory Information Department, ARRL

17-Meter Band Open!!

On the morning of January 30, the FCC issued a news release announcing the opening of the new amateur 17-meter band (18.068-18.168 MHz) that very evening at 0001Z (7:01 PM EST)! A copy of the news release was obtained by ARRL Counsel Chris Imlay, N3AKD, and FAXed to HQ.

A bulletin announcing the opening of the band was immediately sent over W1AW. Word spread quickly. At 0001Z it was wall-to-wall signals to usher in US entry to the band. W1AW worked almost 70 stations that evening before the band closed.

The 17-meter band is one of three new HF bands allocated to the amateur service by the 1979 World Administrative Radio Conference (WARC). The other two bands, 30 meters (10.1-10.150 MHz) and 12 meters (24.890-24.990 MHz), have already been implemented.

Early US amateur occupancy (it is to become exclusively amateur on July 1) was contingent upon the relocation of certain US government stations that had informed the FCC of their continued presence to that date. But the FCC said it would continue to monitor usage, looking for possible early entry for US amateurs.

On September 28, 1988, the ARRL filed a request for temporary use of the 17-meter band, pointing out that over 60 countries have already allowed their amateurs access to the band, and that the additional US amateur stations using the band would not cause any significant additional interference to the remaining government fixed stations. The request was renewed in our comments in PR Docket 88-467, filed on October 31.

In its news release, the FCC said that the Department of Defense (DOD) was still utilizing major portions of the 17-meter band and would continue to do so until July 1, 1989. However, DOD had agreed to allow secondary use of the band by US amateur stations, subject to immediate termination if interference is caused to Government operations. After July 1, the band will be exclusively amateur; until then, amateurs also are obligated to avoid interfering with stations in the fixed service operating in other countries.

The band is open to all General, Advanced and Extra Class licensees with a maximum output power of 1500 watts. As recommended by all IARU Regions, the telegraphy emission A1A is permitted in the entire band, with RTTY/packet recommended from 18.100-18.110 MHz and, an SSB/analog subband from 18.110-18.168 MHz.

Here are the new Part 97 rule changes, effective 0001 UTC July 1:

Section 97.7(c) is revised by adding the following line entry in the table between the last 20-meter band entry and the first 15-meter band entry, as follows:

(c) * * *

Meter Band	Terrestrial location of the amateur radio station			Limitations see para (g)
	ITU Region 1	ITU Region 2	ITU Region 3	
		kilohertz		
		* * * * *		
17	18068-18168	18068-18168	18068-18168	
		* * * * *		

Section 97.7(d) is revised by adding the following line entry in the table between the last 20-meter band entry and the first 15-meter band entry, as follows:

Section 97.7 Frequency Privileges

(d) * * *

Meter Band	Terrestrial location of the amateur radio station			Limitations see para (g)
	ITU Region 1	ITU Region 2	ITU Region 3	
		kilohertz		
		* * * * *		
17	18068-18168	18068-18168	18068-18168	
		* * * * *		

Section 97.7(e) is revised by adding the following line entry in the table between the 20-meter band entry and the 15-meter band entry as follows:

Section 97.7 Frequency Privileges

(e) * * *

Meter Band	Terrestrial location of the amateur radio station			Limitations see para (g)
	ITU Region 1	ITU Region 2	ITU Region 3	
		kilohertz		
		* * * * *		
17	18068-18168	18068-18168	18068-18168	
		* * * * *		

Section 97.61(a) is revised by adding two line entries to the table between the 14150-14350 kHz and 21000-21200 kHz entries, as follows:

Section 97.61 Authorized emissions

(a)* * * * *

Frequency Band (kHz)	Emissions	Limitations (see para. (d))
* * * *		
18068-18110	A1A, F1B	
18110-18168	A1A, A3E, F3E, G3E, A3C, F3C, A3F, F3F, H3E, J3E, R3E	
	* * * * * *	

Section 97.415(a) is revised by adding one line entry between the 14000-14250 and 21000-21450 entries in the kilohertz portion of the table, as follows:

Section 97.415 Frequencies available

(a)* * * *

Frequency Band kilohertz	(see para. (b))	Limitations
* * * *		
18068-18168		
* * * *		

* * * * * *

"THANKS FCC" FROM ARRL PRESIDENT PRICE

The following letter was written by ARRL President Larry Price, W4RA, to the FCC in response to their timely handling of the opening of the 17-meter band to amateur use prior to July 1, 1989.

Mr Ralph Haller
Chief, Private Radio Bureau
Federal Communications Commission
Washington, DC 20554

Dear Ralph:

On behalf of the US radio amateurs, I would like to thank you, and through you, everyone else who had a hand in it, for the Commission's prompt action on PR Docket 88-467. Even for a relatively non-controversial matter, 4½ months from NPRM to final action is very prompt work.

We deeply appreciate that you were able to arrange for the granting of immediate, temporary authority for amateur operation in the new 18-MHz band. If you've had a chance to listen, you'll have noticed that US amateurs are already putting the allocation to considerable use. Even I was able to get on at 0001 UTC and QSO a station in Nova Scotia!

Thanks again for your efforts on this matter.

Best personal regards.
Sincerely,
Larry E. Price, W4RA
President

FCC TERMINATES RECEIVER ADVISORY LABELING PROPOSAL

In May 1988, the FCC proposed amending Part 15 to require labeling radio receivers to advise users that it may be unlawful to intercept radio communications protected by the Electronic Communications Privacy Act (ECPA) of 1986.

The FCC said that although the ECPA prohibits interception of certain classes of communications, the frequencies on which these communications are transmitted can be used for unprotected communications as well. The FCC decided that, given the complexities of the ECPA, it was impractical for a label to provide sufficient information to properly advise users of the legal requirements.

The FCC also said that it agreed with some of the commenters that, in some instances, a warning label might encourage prohibited activity.

Lastly, some manufacturers are voluntarily informing users of ECPA provisions or by redesigning equipment to omit certain frequencies. Thus the FCC concluded that an advisory label on radio receivers was unnecessary and terminated the proceeding, Docket 88-281.

FCC MODIFIES ID RULES FOR RECIPROCALS

The FCC issued an Order which reversed the sequence in which the call sign is given for foreign amateur reciprocal operators on May 24, 1988. For example, instead of operating as 4X6LL/W3, the new ID would be W3/4X6LL. According to the new FCC rules, the verbalization of the slant mark (/) in the call would be limited to STROKE or SLASH. Dave Popkin, W2CC, requested partial reconsideration of the new rule. Popkin requested that the word SLANT be added as another option to the words STROKE or SLASH to describe the slant mark. He also requested that the rule specifically state that the identification be made in the English language.

The FCC agreed with Popkin that minor rewording of the alien station identification rule, 97.313, was needed. Rather than limiting the verbalization of the slant mark to STROKE or SLASH or adding SLANT as suggested by Popkin, the FCC said it would permit the use of any suitable word denoting the punctuation symbol during telephony transmissions.

In regard to identifying in English, the FCC noted that 97.84(g)(2) already requires an English language ID. To avoid any misunderstanding, the FCC also changed 97.313 to include a reference to 97.84(g)(2).

The following are the actual Part 97 rule changes:

97.313 Station identification.

When the station is operating under a reciprocal permit, the call sign transmitted in the identification procedure required by 97.84 must be that issued to the station by the licensing country, preceded by the appropriate United States letter-numeral amateur station call sign prefix designating the regional location of the station, separated by "/" (the slant mark) on other than telephony emission transmissions and by any suitable word that denotes the slant mark during telephony emission transmissions. At least once during each intercommunication, the identification announced must include the geographical location as nearly as possible by city and state, commonwealth or possession.

FCC REVOKES LICENSES

The FCC on February 3 issued an Order of Revocation and Affirmation in the case of a group of 11 amateurs from Puerto Rico who, according to the FCC, committed fraud in obtaining amateur licenses or upgrades, or who fraudulently certified that others had passed examinations for amateur licenses.

The Order says that the violations arose in connection with three W5YI VEC sessions held in Guaynabo, Puerto Rico on August 16, August 30 and October 4, 1986. The FCC found that the examiners for those sessions, NP4E, NP4H, WP4U, KP4FW, KP4KB and KP4IN, had assisted others in obtaining amateur licenses by fraudulent means and had misrepresented material facts to the FCC. The candidates, WP4FOG, WP4FOF, NP4ZN, WP4GAW and NP4ZM, were found to have obtained amateur licenses by fraudulent means.

Two of the 11 amateurs, NP4ZN and WP4GAW, had earlier surrendered their licenses for cancellation, rendering their cases moot. Three of the examiners, WP4U, KP4FW and KP4IN, due to what the Commission described as their exemplary cooperation, had their operator license suspended for six months and their station licenses were not revoked. The remaining six amateurs had their operator licenses suspended for the remainder of the license term and their station licenses revoked.

These investigations were carried out by the FCC Field Office in San Juan, Puerto Rico.

ARRL FILES REPLY COMMENTS IN *PROPOSED RULES REWRITE*

The ARRL has filed its Reply Comments

FCC-ISSUED CALL SIGNS UPDATE

The following is a list of the FCC's most recently issued call signs (February 1).

District	*Group "A" Extra*	*Group "B" Advanced*	*Group "C" Tech/Gen*	*Group "D" Novice*
Ø	WRØE	KFØAS	NØKDL	KBØDXQ
1	NV1L	KC1NN	N1GGY	KA1TFB
2	WN2I	KE2LI	N2IYQ	KB2HDR
3	NT3O	KD3LH	N3GVC	KA3UDC
4	AB4MU	KM4NM	N4UWY	KC4IUS
5	AA5JZ	KG5RI	N5NVT	KB5IKW
6	AA6MO	KJ6QQ	N6UHQ	KC6BTW
7	WX7A	KF7RD	N7MFY	KB7GTC
8	WO8H	KE8WL	N8KIA	KB8GKZ
9	WF9L	KE9OM	N9IDA	KB9CBH
Guam	KH2K	AH2CE	KH2DN	WH2ALX
Hawaii	**	AH6JO	NH6SL	WH6CBV
Alaska	**	AL7KT	NL7QK	WL7BTQ
Virgin Islands	NP2E	KP2BN	NP2CU	WP2AGN
Puerto Rico	**	KP4PV	WP4TO	WP4IHC

**indicates all 2 × 1 calls have been issued in these areas.

in FCC Docket 88-139, the FCC proposal to reorganize the Amateur Radio Service rules. Previously, the ARRL had filed its own rewrite, called "Part 96," in response to the FCC's original proposal.

The ARRL used its Reply Comments to again take aim at the FCC's proposed Section 97.221, entitled "Restricted Operation." This one-sentence Section, "The FCC may restrict operations as necessary to prevent harmful interference," would eliminate the procedural protection for amateurs contained in the present Section 97.131, which requires an investigation by the Commission.

Our Reply Comments state: "...the Amateur Radio Service will under no circumstances tolerate the proposed elimination of the procedural protection for amateurs contained in the present Section 97.131 of the rules. The comments validate that prediction. It is the League's intention to utilize all resources available to protect the Amateur Service from inappropriate Commission restrictions in RFI matters."

The ARRL's comments noted that the Field Operations Bureau of the FCC has commenced a program imposing arbitrary operating restrictions on amateurs who interfere with home electronic equipment. The program imposes the burden of the interference resolution on the amateur station, despite findings of no technical fault in some cases.

The ARRL's comments strongly attacked the program: "The Amateur Radio Service is unwilling to accept the burden of the continuation of these policies, much less the codification of Commission authority to impose them without any procedural protection at all. Such policies create an irrebuttable presumption of fault on the part of the amateur, and deprive the amateur of an unconditional operating privilege available to all other Amateur Radio licensees of the same license class without the hearings mandated by...the Communications Act..."

The most extensive comments filed, other than those of the League, were filed jointly by a number of broadcasting groups, including the National Association of Broadcasters, CBS, ABC, NBC, National Public Radio and Turner Broadcasting System. The broadcasters argued that present Commission policy concerning the use of Amateur Radio for news-gathering purposes was overly restrictive. Instead, the group suggests different wording which would broaden the categories of events in which amateur stations could be used in news-gathering situations. For example, the group suggests that amateur stations should convey news information for broadcast use where the information is "directly related to an important news event" and where other voice communications systems are unavailable.

The ARRL replied that this definition is too broad and includes events which have no relation to emergency, or even public-service, communications. For example, a football game can be considered an important news event. The ARRL noted that in the past amateurs have been exploited during certain emergency situations to transmit such nonemergency communications as personnel manifests and broadcast-equipment requisitions. The ARRL concluded that the rule changes proposed by the broadcast group are far too broad to prevent commercial exploitation of the Amateur Radio Service.

The ARRL filed its Reply Comments on January 31.

In a related story the FCC has denied a request for an extension of time in this docket, filed by David Popkin, W2CC. Popkin had asked that the time for filing comments be extended until July 17, 1989, reasoning that, since the League's comments were almost as extensive as the Commission's proposal, a similar amount of time should be allowed for study and reply. The Commission noted that Popkin's petition was procedurally defective, having been filed two days after the deadline for requests for extension of time. The Commission also said that 10 months had already passed since the proposal was issued and "in the interest of administrative efficiency, it is desirable that the proceeding be moved forward."

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Colorado, Georgia, Los Angeles, Sacramento Valley, San Francisco, South Texas, Eastern Washington, Western Washington, and West Virginia Sections: You are hereby solicited for nomination petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 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 forms (FSD-129) are available on request from ARRL Headquarters but are 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 4:00 PM Eastern Standard Time June 9, 1989. Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before July 1, 1989. Returns will be counted August 21, 1989. SMs elected as a result of the above procedure will take office October 1, 1989.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1989.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in October 1989 *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

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Wyoming Section Manager election by the deadline of December 9, 1988, nominating petitions are herewith resolicited. See the above notice for details on how to nominate.

WASHINGTON SECTION DIVIDED

The Washington Section has been divided into two ARRL Sections, Eastern Washington, and Western Washington, effective February 6, 1989. Tom Plaisance, KC7PH, has been appointed Section Manager of the new Eastern Washington Section. Ed Holladay, KA7INX, is the new Western Washington Section Manager. The Section Manager election notice for both sections appears above.

The new sections consist of the counties west and east of the Cascade Mountain range. The **Western Washington Section** comprises the counties of Whatcom, Skagit, San Juan, Island, Snohomish, King, Pierce, Thurston, Clallam, Jefferson, Mason, Kitsap, Grays Harbor, Pacific, Lewis, Wahkiakum, Cowlitz, Clark and Skamania. The **Eastern Washington Section** comprises the counties of Okanogan, Chelan, Douglas, Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Adams, Grant, Lincoln, Ferry, Stevens, Pend Oreille, Spokane, Whitman, Columbia, Garfield and Asotin.

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

37,000 QSOs Later

By Scotty Martin, W7SW

The opportunity for me to visit Cocos-Keeling (VK9Y) and Christmas (VK9X) Islands arose after working in Antarctica, where I also operated the club station KC4USV. I traded in my New Zealand-Hawaii-San Francisco airline tickets for ones that would take me from Auckland to Sydney, and from London back home to San Francisco. After traveling through ZL and across VK, I joined the Northern Corridor Radio Group in Perth for their "field day," operating the special call VI88WA. I worked George, VK6NKG, who suggested that we plan a DXpedition to the islands. It didn't take me long to find out that Cres, VK6YC, was the man to speak with regarding the Cocos-Keeling club station, VK9YY (this club station had been set up by VK6YC, VK9NS and W5KNE).

VK6NKG and I decided to "go for it," with George on 10/15 sideband while I concentrated on CW on the lower bands. Our game plan was for 3 weeks on Cocos and then 3-4 weeks on Christmas. When initially applying for a VK9 license I was told to use my VK6BYE call and sign portable, not an attractive situation for me. I finally was able to convince the DOC to trade my VK6BYE call for VK9XI. I would then need to sign portable only while operating from Cocos. VK6RU convinced me not to use the call though, since it belonged previously to the Christmas Island Radio Club. I went back to the DOC, traded my VK9XI for VK9XT, and convinced them that I really needed a separate call for Cocos! After paying the $28 licensing fee and completing the paperwork, I walked out with the VK9YT license as well! With licenses in hand and our equipment tested we now began to pack. Most of the gear was sent at the cargo rate, with us hand-carrying the transceiver, linear, etc.

The flight from Perth to Cocos stopped at Christmas Island for an hour (2300 km NNW of Perth, with Cocos-Keeling 900 km west of Christmas). As the flight continued towards Cocos-Keeling (a group of 27 coral islands), I saw the beauty and felt the excitement that Darwin wrote about when he visited the atoll in the *Beagle* in 1836. Darwin's observations on Cocos led to his theory of coral atoll formation, with the Cocos group a classic example of that configuration. Cocos lies about 12 degrees south of the equator and has consistent weather, daily average maximum 29 degrees C, the average minimum 24.5 degrees C. Only 2 of the 27 islands are inhabited. (Home Island has a population of about 400 and West Island about 200.)

> The operators we enjoyed working most were the JAs. They really do cooperate as a team and serve as a great example of operators who "listen more and transmit less." I also noted this practice among SM and LA operators.—*W7SW*

We landed at the airport on West Island and were warmly greeted by Vicky and John Clunies-Ross. After the baggage was unloaded (onto John's truck), we headed to the jetty where John's boat (the "Mardeka") waited to take us to Home Island. A beautiful 20-minute cruise across the 8-km lagoon brought us in sight of the 25-meter tower with 8-element log-periodic, and the 20-meter tower with a 6-element log-periodic array. We wasted no time after landing and got the gear up to two ham shacks, both on the second floor with windows overlooking the salt water lagoon. It took just a few minutes to get the VK9YY club station on the air. The 6-element log periodic had suffered some damage in a recent storm, but within 24 hours John had it down, repaired and back up with very low SWR. VK9NKG used this antenna with tremendous success (9,000 contacts—an excellent job for a Novice on his first DXpedition).

(L-R) VK6NKG and W7SW are ready for the attack on Christmas after 20,000 two-ways from Cocos-Keeling.

I operated VK9YT primarily on CW, using the 8-element log-periodic on 10, 12, 15, 20 and 30 meters. I also spent a few hours daily on 40, 80 and 160 CW. (I used a 2-element delta loop on 40, pointed north. For 80 I used a dipole and on top band I transmitted on a modified G5RV, using many different receiving antennas.) From Cocos we logged over 20,000 contacts, worked all 40 CQ zones on 15, and close to 200 countries.

We flew from Cocos happy with our VK9Y operation, and excited to tackle Christmas (which is significantly different from the Cocos-Keeling atoll). Christmas is a single island, about 22 km long, 16 km wide and reaching 380 meters above sea level. For decades it has been mined for phosphate (fertilizer), an operation now stopped because of economic and political pressures. The island may soon become an Australian military base.

George and I once again set up two stations, but this time they were well separated. George operated AX9NKG at the location we were staying at (AX for Australia's bicentennial), using dipoles on 10 and 15. I operated VK9XT on top of a phosphate "hill" about 300 meters above sea level, using the old commercial rhombic and supports for a G5RV and a 160-meter dipole.

Propagation during our month on Christmas wasn't as good as on Cocos. We took more time for meals and exploring, working over 17,000 during our stay. We missed having a beam, though. The rhombic I used was pointed south to Perth and became more bidirectional as we opened the terminating resistor. Many different propagation paths were noted between Christmas and the Americas, the most popular being over the South Pole. European stations were almost always louder and could have been worked 24 hours a day. The QRM level on 80 (and many times on 40 and 10) was S9 from what appeared to be illegal sideband operation in this part of the world, making for many frustrating QSOs.

Two very memorable contacts stand out. The first was with the guys on T32—Christmas Island in the Pacific Ocean. We had fun exchanging reports Christmas Island-Christmas Island. The other outstanding QSO was with my good friends down at Scott Base, Antarctica. I had left them when there was 24-hour sunshine, and now they were in 24-hour darkness.

Putting everything in perspective, the

DXpedition was a wonderful experience. If you get an opportunity to go "down under," I suggest you contact Chris, VK6YC, and arrange a visit to the Cocos club station, VK9YY. This would make an excellent contest location (it has 8 old school rooms which could be used for separate stations).

As I finish this report I'm sitting in Malaysia's "Taman Naguara" (National Park) in a "hide" looking for wild animals. I'm on camera safari looking for tigers, leopards, elephants, rhinos, etc (I spent the last 3 or 4 days in Kuala Lumpur unsuccessfully trying to get together a Spratly DXpedition. Those who know convinced me that I'd be safer with the tigers in the jungle than with the hundreds of pirates in the South China Sea).

And so I sit here dreaming of DXpeditions—37,000 QSOs later.

CRETE

WA7AQR/SVØCR has started his second operation from Crete. Note that cards sent to his Texas address (88-89 *Callbook*) will be forwarded only until May! His current address (for about the next 18 months): Bob Applonie, Box 899, APO New York 09291. Please note that an SASE (25 cents postage) from stateside, or SAE for DX (one or two reply coupons) is welcomed. He answers all cards via the same means that they reach him. Bob works mostly CW 80-10 meters, but occasionally gets on 10-meter FM and 10 sideband. He hopes to be on top band before spring.

SVØGE/N3FNE writes that he is an American currently living on the island of Crete. Pete notes that nonnationals are giving the numeral zero whether in Athens, or on Rhodes or Crete. (The bottom line is the location of the station, Pete. If you're licensed to operate from Crete and are signing an SVØ call, the recipient of your card will indeed get credit for Crete.) SVØGE seems to be having a lot of fun with a new 10-meter transceiver, in addition to CW activity on 10, 15, 40 and 80. You can contact him as follows: Pete Dillon, SVØGE, PSC Box 192, APO New York 09291.

UZ1AWA

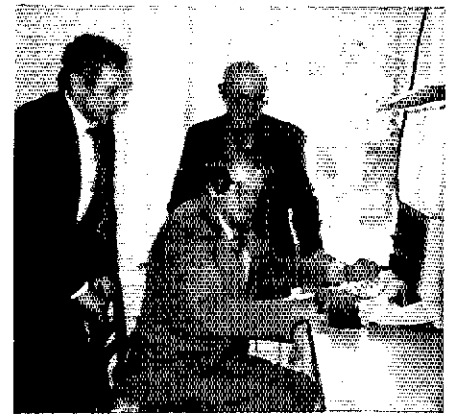
AWA is the station of the Leningrad Shortwave Club which boasts a membership of 900 and a weekly attendance of 200-250. G3FXB notes that plans are afoot for stations in Moscow and Leningrad to be specifically for the use of foreigners. Al indicates the possibility of an international DX convention in Leningrad in July involving the OH gang! (See photo.)

CIRCUIT

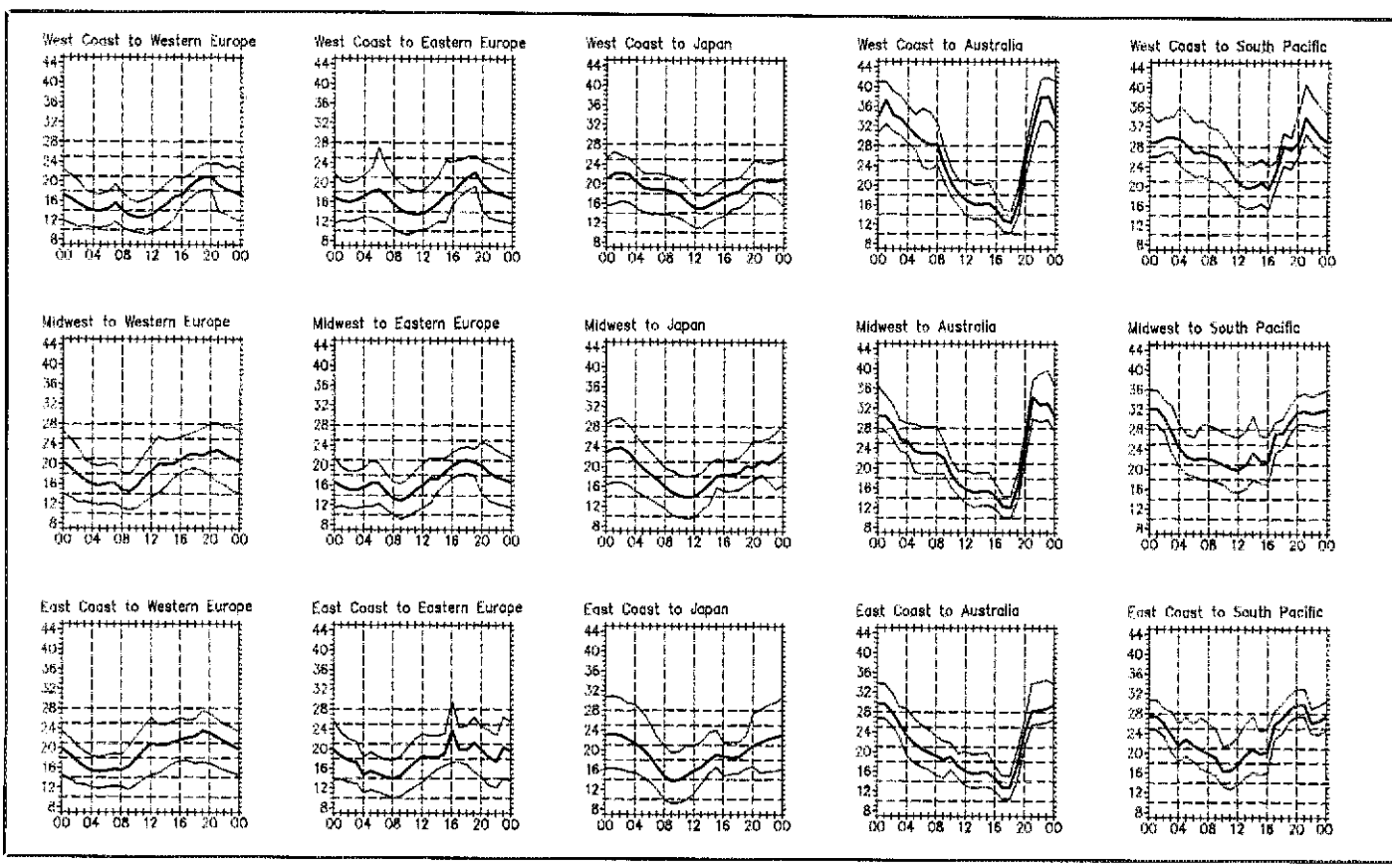
OZ8RO: Rag's thoughtful words are apropos to those situations where money is required before a card is rendered—"it doesn't serve the interest of the DX fraternity to have somebody make QSLing a 'business.' It is totally against the spirit of ham radio. It disqualifies the person as an amateur, and ultimately is harmful to the country and the reputation of its amateurs."

ZF: Ron, ZF8SB, is now sporting ZF8AA. Cards still go to Art, N8AG, 860 S Main, Milford, MI 48042.

FJL: UA9MA is managing the cards for UA1OIL, Franz Josef Land. SAE and 2 IRCs



(L-R) Vlad UA1CK, G3FXB, Alexey U1AM. See text. (*Thanks G3FXB*)



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

Whatever convention you go to (Visalia DX Convention, Dayton HamVention® etc). You're sure to meet top-of-the-Honor-Roll'er W6HX. Ted is shown here at Friedrichsafen '88. (*Thanks DK7PE*).

direct to Gennady Kolmakov, Box 341, Omsk 644099, USSR.

U3DR: Vlad (ex-UW3DR, a USSR Veteran of the Great Patriotic War eligible for a shortened call) can now QSL direct: V. V. Mitkevich, U3DR, Box 1833, Demodedovo, Moscow Oblast, 142040 USSR. (*Thanks W1RAN*)

Routings: J6LAH via K4PHE. ZF2MV via John Byne, KK9A, 635 Rosner Dr, Roselle, IL 60172. V31JZ via Art Phillips, NN7A, Box 201, Flagstaff, AZ 86002.

QSL Corner

Administered By Joanna Hushin, KA1IFO

ARRL OUTGOING SERVICE RATES INCREASED

Effective February 1, the rates for the ARRL outgoing QSL service increased to $2 per pound (approximately 150 cards). The $1 rate continues for packages of 10 cards or less. This is the first increase in rates for this important membership service since it began in 1976!

Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

A71BJ	(G4HOU)
CEØZIG	(NR8J)
CUØSM	(CU1EZ)
DK1CE	(DJ9ZB)
DL7AKV/W5	(W5PDY)
JY9SR	(W3FYT)
KC4AAC	(KE9AS)
P29CG	(WB9SVK) 89 CB

RH8AA Vitaly Kozin, PO Box 414, Ashkabad, 744008-USSR

RH8AX PO Box 414, Ashkabad, 744008-USSR

T77T	(IØERW)
VK8SR	(KR8V)
VK9ZM	(NM2L)
VP5U	(K3IPK)
ZF2MZ/ZF8	(K3IPK)

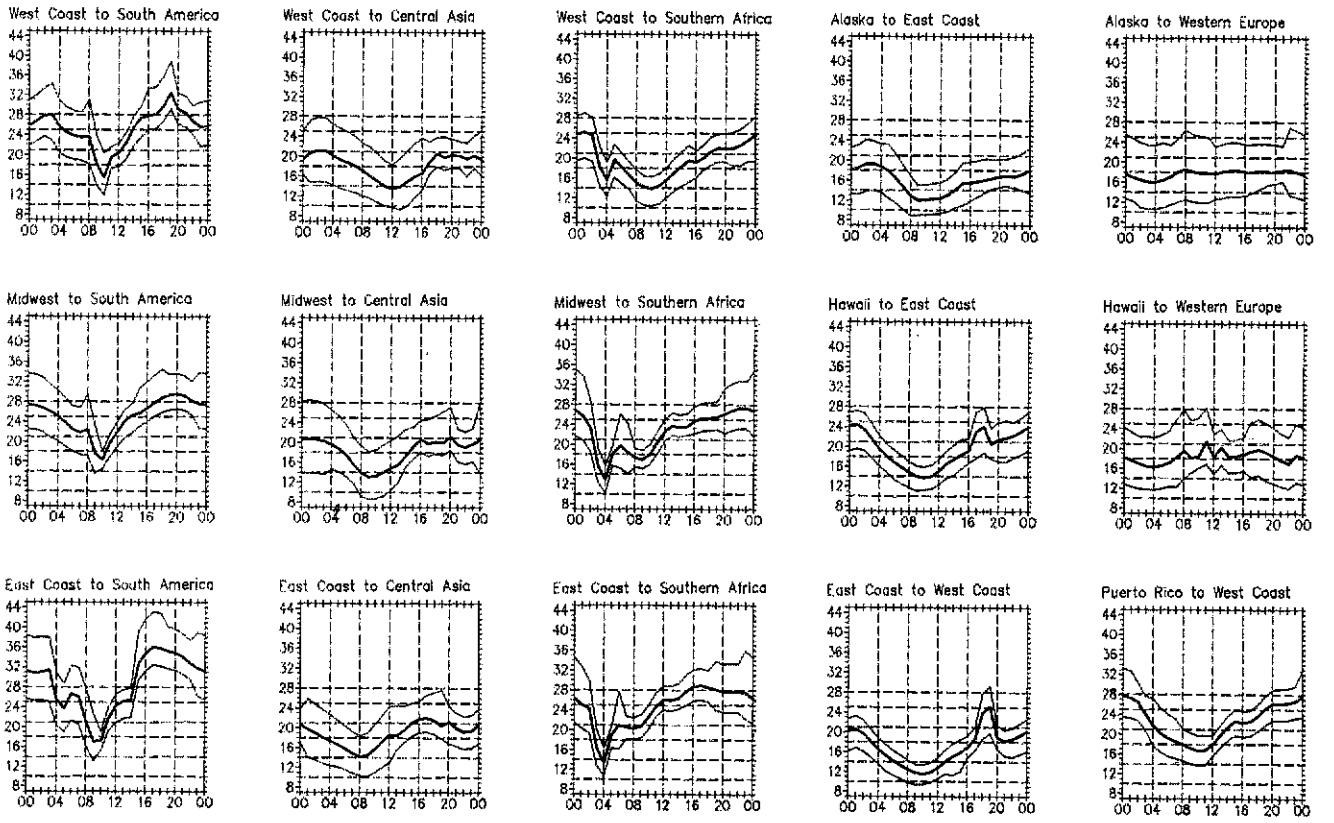
3W8CW Erica Brunntaler, PO Box 131, 1141 Vienna, Austria

5U7CW	(DJ6SI)
5U7YL	(DJ6SI)
5Z4SS	(JA1ODC)
8P6BBS	(KH6WZ) 1988 CQ WW PHONE
8P9FD	(KH6WZ)
9G1PP	(GØCAD)
9Q5DX	(KQ3S)

QSL MANAGER VOLUNTEERS

KA3SIO N0IWT XE2TCQ

☐ QSL Corner, Dec 1988, *QST* page 74, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, March 1989 *QST* page 68 contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



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. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for April 16 to May 15, 1989, assume a sunspot number of 173, which corresponds to a 2800-MHz solar flux of 216.

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 and 160 Meter DXCC awards are endorsable in 10-country increments through 200, and 5-country increments above 200. The totals shown below are exact credits given to DXCC members from December 6, 1988 to January 12, 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

AP2HA/105
DF2DV/100
DJ3IF/118
DL2EBX/103
DL9DAJ/154
F6EEM/137
F6HLE/107
FO5IW/136
FR4FA/J/111
HB9BXX/208
IK1FJI/118
IKØDMQ/105
JA1IT/169
JA1KXY/313
JA3DTM/110
JA4JDG/104
JA4RED/165
JA5AVL/250
JF7GTL/104
KP4P/313
LA9FFA/104
PA3CFL/141
PT2DMS/150
SKØHB/134
SM4JUW/102
SM6OOI/191
SP8UFO/216
SV9ABG/113
TA1AZ/101
TJ1CH/106
V85RM/110
VE1BLX/296
VE1HA/110
VE2ECN/103
VE3NLU/102
XE2GBI/108
YU3DEU/140
4X6MP/106
4X6UU/118
KB1A/120
KQ1N/107
ND1T/110
NO1Y/111
WA1HFF/104
W2KN/FG/103
WE2G/102
WK2F/103
N3CBH/286
NJ3H/142
NM3U/100
W3ZZX/108
WA3CDV/112
K5FQN/109
KE5AW/124
KE5BK/144
KI4QJ/109
N4EX/108
N4JQQ/101
WA4JJZ/104
WA4WZR/107
WD4REX/100
WU5X/106
AA6LS/110
KØQBE/110
KBØAUK/135
WAØK/106
KE5BR/138
KG5EG/112
N5ERH/101
N5FER/116
WA5LQN/120
WU5X/106
W6FDU/101
WA6CTA/101
N7JXN/108
KD8PF/110
KB9R/104
N9AHU/116
N9GCI/112
WB9RNL/226
KØQBE/110
KBØAUK/135
WAØK/106

Phone

CP6GB/152
DL8DH/108
EA5AL/110
FE1JLM/111
FR4FA/J/102
G4XGF/106
G4ZYB/110
HB9DCQ/116
HC2CG/106
IK8JWA/104
IØVKK/209
JA1IT/163
JA1KXY/313
JI1QGX/105
JI3FYI/108
JA4RED/142
KP4P/310
LA7SI/202
OZ1HPS/106
SKØHB/114
SM4JUW/102
SM6OOI/145
SV9ABG/113
TI2MCL/144
TJ1CH/106
V85RM/109
W1TSP/292
YV5JBI/137
5W1FT/108
K1DD/190
KA1CLV/141
KA1WZ/102
KB1A/100
W1TSP/292
KM2W/187
N2CJJ/102
WA2B/102
KA3ENQ/109
N3CBH/279
WA3JAT/100
NJ3H/142
N5MDR/104
WD5KBB/179
KJ4JM/121
N4REE/110
N4SQZ/103
KE5BK/110
KV5I/148
KE7KB/210
W9KTB/121
WB9RNL/226
KI6YE/106
KI6ZH/101
N6JQL/106
W6PLX/109
KE7KB/210
N7JXN/108
KA8URK/105
KB8APS/101
WD8ICX/110
K9GYW/107
W9KTB/121
WB9RNL/226
NØIGU/103

CW

EA8BCJ/145
G3JGB/111
HB9BTO/150
JA3DKB/102
JA5AVL/233
JH8CMZ/106
LZ2TU/110
OZ1IOG/112
PT2DMS/144
SM6OOI/135
SP8UFO/195
VE3JU/105
VK6ZH/110
7P8DX/102
K1DD/108
ND1T/110
KJ3Q/187
KW3U/104
N3CRN/102
KB4RMO/101
KB4RRS/100
N4MHQ/157
NX4Y/102
KA5YCM/105
KV5I/136
W6PLJ/103
KZ7V/105
N7JB/101
NU7V/109
WA8MOA/143
KR9Z/126
NV9B/103
KIØZ/114

RTTY

GM3WIL/104
LA9GV/112

10 Meters

DJ2PJ/182
I6DQE/117
JA4VUQ/174
PBØAED/115
SM4HEJ/104
SM6BGG/152
VK2ZR/100
ZP5CF/117
K2POF/124
WF2B/102
AJ3H/201
W3GG/236
KD4OM/100
N4HID/109
W4OUE/234
WA6DAW/109
K8TGC/110
KA8KDA/100
N8HUR/110
K9ZXG/100
W9RXJ/153
WA9CDY/152
KØCVD/125
WØPXM/100

5BDXCC

IK5DEY
NQ2O
NG8S
WBØV
KA9PJZ
OK1DBM
W6PGK
WA2UKA
SP6DVP
JH1XYR
KB2FS
K5CTG
W1CKA
I3VJW
KZ3H
OZ5PA
K5TA
WI8R
W7FJE
W3RAB

New Honor Roll Members

Mixed

312
HB9AQA/319

311
IV3TQE/315

JA2BAY/320
OH2BLD/315
SV1ADG/311
W3XX/329

310
JA5ELM/315
W1MM/344
W1XS/314
N6ST/318
K8MNG/315
W9FID/349

Phone

311
IV3TQE/315
JA2BAY/320
OH2BZ/328

310
I5FCK/320
W2IJB/315
W4ZCB/318

Endorsements

Mixed

AL7HX/132
DF3CB/296
DF6JC/262
DJ2BV/251
DJ3NW/324
DJ6BN/315
DJ9WB/181
DK2PR/275
DK3KD/321
DK5QK/318
DL1SV/279
DL7CW/337
EA6ET/286
F2GL/325
F6BKI/321
F6DHB/317
F6DYY/291
F6FFA/298
F6FNU/292
F9DK/154
G3IOR/351
G3SJH/326
G4IUF/305
GM3WIL/289
HA5AM/299
HB9DEU/178
HB9HT/320
HL9EP/156
I1BUP/308
IK1GPG/253
I2MOV/304
I2PNB/317
I2XIP/316
IN3XAI/306
I4UFH/295
I8WY/295
I8WYD/272
IØAMU/381
JA1GV/339
JA3THL/322
JA4VUQ/261
JA7IL/323
JA8AQ/338
JA9FPI/316
LA8XM/262
LZ1HA/295
OE8RT/337
OK3MB/301
ON4ACB/226
OY7ML/332
OZ1KFQ/160
OZ6MI/336
PA3BUD/210
PY3DF/255
SK7AX/282
SM5API/340
SM6CMU/322
SM6JAO/264
SM7HCW/308
SM7MPM/185
SMØMIW/16
VE3NSZ/275
VE6EJ/224
VE7EW/186
XE1CI/308
YU1EXY/333
YU1SZ/300
YU3NR/316
YU3VU/210
ZL1IB/221
5B4TI/286
AK1N/293
K1AA/255
K1DII/250
K1EFI/323
K1YR/315
KA1CLV/177
KA1UC/170
KB1CM/285
KB1HY/281
KB1JU/280
N1WR/186
NJ1T/201
W1ACB/319
W1CKA/354
W1HOF/282
W1OHA/344
W1UN/333
W1YY/326
WA1JHQ/232
WB1AJG/202
K2BS/345
K2MYR/125
K2OLG/301
K2VSP/204
KA2K/306
KB2RV/315
KW2P/321
N2BJ/307
NA2R/231
NI2C/293
W2KN/281
WA2BOT/295
WA2C/204
WA2HMM/197
WA2IKL/176
WA2TMP/291
WB2GFI/159
WB2TPS/171
WE2K/205
WE2P/196
WI2J/251
K3PA/242
K3YGU/251
K3YL/202
KC3EK/273
KD3IY/161
KJ3Q/300
KN3P/296
KZ3H/263
N3BNA/289
N3COB/208
NI3P/268
W3IVG/260
W3MP/366
WA3DVO/320
WB3AVN/282
WB3GRA/154
AA4CJ/329
AA4LI/122
AA4NJ/254
K4FW/270
KE4I/333
KF4YH/269
KK4BS/176
KV4B/283
KX4R/317
N4MIS/158
N4SR/326
W4NNH/354
W4UFH/232
W4UXI/294
WA4WPN/315
WB4ETD/286
WB4FOT/265
WB4KMH/150
WB4LFM/324
WD4KMW/150
WI4K/293
WN4KKN/274
AA5BK/224
K5PZ/202
KA5YCM/277
KB5NO/153
KC5P/273
KM5R/285
KV5I/204
N5AX/307
N5IIT/179
N5RR/335
NE5P/312
NY5E/152
W5DL/350
W5NF/300
WB5BIR/300
WB5FXT/180
WB5MTV/251
WB5NAA/219
WB5QBV/257
WD5AAM/293
WO5D/127
K6ETM/129
K6GWN/315
K6ICS/183
K6XJ/328
KB6LOO/150
KI6AN/200
NA6F/272
W6GG/270
W6KFV/330
W6MUR/355
W6NPY/316
W6NVN/224
W6UZ/290
W6WKE/180
WA6HAN/202
WK6E/320
K7FL/152
K7PM/278
NY7Z/290
W7FF/254
W7HX/262
W7KT/252
W7LYO/301
W7MCU/302
W7UZA/330
WG7A/327
K8CS/262
K8KJN/300
K8NWD/309
K8OM/203
KC8QT/300
N8CEO/256
W8DCH/340
W8DN/262
W8IO/327
W8WOJ/323
W8XD/225
WA8MOA/297
WA8SAE/302
WB8Y/199
AJ9C/210
K9DFK/131
KA9FCZ/125
KB9M/259
KD9KN/232
KD9M/298
N9RD/290
NC9T/233
NK9Y/176
NQ9E/226
W9IL/285
W9IU/352
W9JEK/176
W9JOO/159
W9JOP/227
WA9RCQ/300
WA9USE/315
WA9YTQ/307
WB9KOY/177
WB9V/302
KØBFR/268
KØCVD/309
KØRW/176
KAØAYN/266
KAØCDN/296
NØICI/126
WØIJR/296
WØJMZ/325
WØYVA/292

Phone

A92P/273 AL7HX/132 CO2HQ/271 CT1TM/280 DF3CB/262 DF5KX/276 DJ2BV/176 DK2PR/212 DK3HL/324 DK8DB/303 DL4FV/227 DL9ZAL/166 EA5FCO/253 EA6ET/266 EA7ABW/300 F6AOI/334 F6FFA/292 F6FNU/290 F6FWW/300 G3OPL/222 G3SJH/326 GM3WIL/169 HA5AM/254 IK1GPG/253 I2MOV/298 IN3XAI/305 I4UFH/295 I7ETU/284 I7IJU/166 I7UNX/300 IK7FPV/281 I8WYD/272 I8XIW/237 IK8BMW/249 IK8CNT/290 I0AMU/361 I0CEP/320 I0ER/318 I0ZYA/231 IK0EIM/230 JA1FO/150 JA1GV/320 JA4VUQ/256 JE5IVW/318 JA7IL/323 JE7JZT/184 JA9FPI/307 KH6OR/349 LU1JDL/240 LZ1HA/291 OE1PC/320 OE1WHC/150 OK3MB/208 ON4ACB/215 OY7ML/255 SM6CMU/300 SM6JAO/249 SM7HCW/300 SM7MPM/185 SM0MIW/164 TI2JJP/157 VE3CKP/300 VE3SST/322 VE6AGV/271 VE6EJ/177 VE7EW/184 XE1CI/307 YC0RX/127 YV2EMR/169 5B4TI/286 7P8DX/143 AK1N/289 K1EFI/312 N1EBT/247 W1CKA/345 W1DNZ/330 WA1SMI/270 K2BS/342 K2OLG/300 K2PWG/291 K2QFX/137 KB2MY/290 KC2Q/256 KD2NL/156 N2BJ/306 NA2R/220 NI2C/274 NN2Q/150 W2PBI/323 WA2BOT/294 WA2HZT/180 WA2MUA/200 WB2MNE/154 WE2K/204 K3YGU/206 KA3DLT/206 KC3EK/269 KJ3Q/281 KN3P/284 KZ3H/228 N3BNA/276 N3EHD/259 W3NB/249 W3SAI/130 WB3KBZ/229 AA4CJ/318 AA4NJ/218 AG4M/257 K4ODL/201 KE4I/331 KE4YD/288 KF4YH/268 KV4B/165 N4SR/322 W4FRU/312 W4UFH/229 WB4LFM/322 WC4B/271 WD4LJY/252 WI4K/292 WN4KKN/211 KA5YCM/266 KB5NI/125 KC5P/267 N5JPJ/154 NE5P/305 NZ5E/275 W5OHF/256 W5VHN/185 WB5RQM/257 WD5AAM/292 K6XJ/328 W6KBB/259 W6QON/225 WA6EED/127 WA6HAN/203 WB6OHH/146 WK6E/227 AI7M/223 K7CAJ/183 K7FE/312 K7PM/263 KB7SU/299 NY7Z/263 W7CNC/200 W7FF/252 W7HX/202 W7QN/253 W7UZA/304 K8IHX/151 K8MID/290 K8NWD/304 K8REG/291 K8YVI/250 KC8EU/305 KC8QT/294 W8JQR/201 W8PR/333 W8QNF/260 W8WOJ/312 WA8MOA/289 KD9KN/222 KD9M/295 KR9P/315 KS9R/305 N9ELY/180 W9CZI/308 W9DMH/319 W9IU/289 W9UPC/299 W9VSL/251 WB9V/296 K0BFR/260 K0PCK/201 KA0CDN/289 KA0KEL/151 KU0Y/280 N0ZA/291 NZ0R/179 W0IJR/288 W0IKD/210 W0JMZ/323

CW

DF3CB/271 DJ2BV/227 DK2PR/204 DL1SV/224 DL7CW/283 DL9LBR/131 HA5AM/124 HB9HT/301 I2MOV/220 I8WY/290 JA1GV/296 JA4VUQ/255 JA7ASD/162 JA7IL/288 JA9CWJ/225 JA9FPI/187 OH4OJ/254 OK3MB/273 OY7ML/268 PA3BUD/207 SM6CMU/281 SM7HCW/268 VE3ST/260 K1EFI/293 K1MEM/316 K1TG/202 KA1CLV/158 W1OGZ/203 W1YY/298 WE2P/189 KC3W/125 KN3P/228 KZ3H/215 N3BNA/235 W3BWU/124 W3GG/290 AA4LI/132 AA4NJ/174 KA4YAE/178 KE4I/309 NI4Y/250 WC4B/257 WD4AHZ/149 WD4JHY/155 WN4KKN/205 NE5P/276 NG5F/151 WQ5W/184 WK6E/256 K7SLI/203 KA7AUH/125 N7EPD/214 N8GG/154 W8PR/280 WA8SAE/296 KA9OTD/132 KD9M/185 W9IU/251 WB9V/172 K0CVD/302 K0VZR/205 KA0CDN/280 W0HBH/252 W0IJR/278 W0UY/138

RTTY

CT1AUR/132 W1EW/125 K6WZ/201

160 Meters

F6BKI/163 W1JR/159 NA2M/130 W3GG/140 WB3AVN/136 W8AH/194 WB9NSZ/153

10 Meters

K1EFI/272 N1CIX/126 W1JR/270 W1YY/254 K2OLG/301 WB5RQM/257 W8IQ/127 KA0CDN/169 W0HBH/164 W0IJR/165

DXCC Notes

Annual Listing Corrections

Mixed: JA1FHK/309;W1KGH/336;KT8P/303. Phone: FM5CL/277.

Strays

AMERICAN INDIAN AMATEUR RADIO ORGANIZATION

☐ Now forming is the Little Big Horn Amateur Radio Organization (LBH), a group of American Indian Amateur Radio operators and hams of other ethnic backgrounds who are banding together to build bridges of understanding, friendship and respect between all Native Americans and other people via Amateur Radio.

Membership in the LBH is not limited to American Indians. Currently, the LBH includes members from the Cherokee, Crow, Djibway, Oneida, Sioux and Tlingit tribes, plus a sizable number of non-Indian hams.

Code nets meet Sundays at 2200 UTC on 14.057 MHz (15 WPM) and 2230 UTC on 21.150 MHz (slow speed). Listen for CQ LBH followed by a general announcement. Net control stations are WB0L in Minneapolis, Minnesota and WA2DAC in Peru, New York. Visitors are encouraged to check into either net. For more information, contact M. McDaniel, W6FGE, 940 Temple St, San Diego, CA 92106, tel 619-222-3912.

CORRECTION

☐ In the photo caption in the Stray on page 57 of March *QST*, the date January 13 should read January 19.

I would like to get in touch with...

☐ anyone using the Henry Radio Tempo 1. Wayne Brandon, KC5ND, 4025 Morgan Dr, Mesquite, TX 75150.

☐ anyone with a schematic and/or manual for an Atlas RX-110 receiver. Ed Croney Sr, WA4NSM, 3205 Ballast Point Blvd, Tampa, FL 33611.

☐ owners of Kenwood TS-900 transceivers for the purpose of swapping info through a newsletter. Weston G. Strauch, W5VBX, 2238 Lake Oaks Pkwy, New Orleans, LA 70122.

☐ anyone with a manual for a Phillips PM-3226 oscilliscope. Roy R. Cone, W9YLU, 6731 N Hermitage, Chicago, IL 60626.

☐ anyone interested in starting a fire fighter's net on HF. Please send info on what type of net you would take part in (WAS, roundtable, etc). Ricky Martin, KA4TLC, Rte 1, Box 199-J, Hope Mills, NC 28438.

☐ anyone who was stationed aboard PT boats, for the purpose of organizing a net. George C. Ellsworth, K1SFC, 483 Col Ledyard Hwy, Ledyard, CT 06339.

☐ anyone wishing to participate in a Latvian-speaking roundtable with Latvian (UQ2-land) Amateur Radio operators. Check in on Saturdays and Sundays at 1400 UTC on 28.660 MHz and at 1500 UTC on 21.360 MHz, plus or minus QRM. George (Juris) Liepins, KE4HW, 2527 Torcross Dr, Fayetteville, NC 28304, tel (N) 919-484-9345 (D) 919-864-1976.

☐ hams who are over 80 years old to join an octogenarian CW net on Tuesdays at 11:00 AM EST on 14.045 MHz ±5 kHz. Lou Nees, NT3S, 45 Marian Terrace, Easton, MD 21601.

History Of The National Traffic System—*Part 2*

By Jean A. "Doc" Gmelin, W6ZRJ,
Honorary Vice President, ARRL

As discussed in Part 1 of this series, the ARRL National Traffic System was first implemented in the winter of 1949. The changeover to the new system was met with enthusiasm on the part of most of the traffic operators who had been working the ARRL Trunk Lines, but back in West Hartford, the real task that faced the ARRL Communications Department was to find qualified net managers for each of the new Regional and Area nets. In each case, fortunately, a manager was quickly found. The operators for the Regional and Area nets were gleaned from the representatives of the Section nets, who provided liaison stations to send and receive traffic at the Regional level.

The second task was to integrate the existing Section nets into the new system and to encourage those Sections without nets to organize. One problem that evolved early on was a lack of operators from the Section level in many of the ARRL Sections. There were Section nets in about 60% of the (then 73) ARRL Sections, with more in the east than in the west. Because of this fact, NTS organization in the west was a little slower.

Many of the traffic nets that were used for local distribution and delivery under the Trunk Lines System were on 75 phone. They were independent and not affiliated in any way with the League, and often covered areas of more than one ARRL Section. When the National Traffic Plan was proposed, the leaders of these nets were not overly thrilled. The main objection was that the independent nets would have to be split up along Section boundaries. Many of the independent phone nets chose not to join NTS for that reason. However, some phone nets did join because they covered an entire state, and the Section structure was such that the state made up an ARRL Section.

Recruiting efforts were started by traffic operators in those Sections without a Section net. Many of the efforts were successful; some were not. In some instances, there were few operators to begin with, but many of the Route Managers started recruiting and training net operators. The Sections within the Rocky Mountain Area had the most difficulty, in part because the sections in the Rocky Mountain Time Zone were more sparsely populated with radio amateurs. The original plan had called for a Mountain Area Net which was to include the 11th and 12th Region Nets, but even after some initial success, there were not enough operators to maintain the necessary level of operation to fully man the Area and Regional Nets.

It should be pointed out that the plan of the National Traffic System was indeed ambitious and required many more operators than the previous Trunk Line System. This was done intentionally, of course, to provide opportunities to utilize the services of more public-service-oriented operators and to cut down on the number of iron men whose hearts were in the right place, but who often would not let newcomers into the system.

Another problem that posed a threat to some traffic operators was the rather tight time schedules of the new system, which while making for an orderly and efficient flow of traffic, did in fact somewhat tie the hands of operators to a specific time schedule. As time passed, however, it was realized that no matter how tight the established time schedule, following it would certainly make for a more effective system, regardless of the imposed restrictions.

Another difficulty was that much of the NTS operation was on CW only—to the virtual exclusion of phone. This came

The Dedication/Burnout Balance

By Barbara Mattson, KA4UIV

Since I am active with formal message handling, this article reflects my experiences and observations regarding National Traffic System operation. Before you say, "Hey!, I'm not a traffic handler, so this doesn't apply to me!," READ ON. The point I make can also apply to other volunteer work.

How many times have you said yes to the following questions?

1. Are you willing to be a net control of your statewide HF traffic net?
2. Are you willing and capable of acting as a liaison station?
3. Can you take on the duties of Section Traffic Manager or Net Manager?
4. Can you supervise a Region or Area net?

Now, how many of these responsibilities have you had at one time? Are there days when you get tired of all the hassle, but hesitate to give up some of your obligations for fear that no one would replace you? Do you feel guilty when you say no, or ask to be relieved of a duty?

If so, your transmitter may suddenly "fail" or you might acquire antenna "problems" that keep you off the air indefinitely. By the time you return, someone may remind you of your obligations by asking if you are ready to resume them. Feeling too guilty to say no, do you say yes anyway? Any time from a few weeks to a few years later, you could come down with burnout again and your transmitter may break or your antennas might again collapse.

To prevent these off-the-air periods, be good to yourself and your radio! When both of you have taken on all you can manage, or if you want to swap some responsibilities with others, inform the necessary people so that they can make arrangements. Try not to take on obligations begrudgingly or simply disappear; how much you value message handling, and the amount of time you have to put into it, will determine how involved you really should be. Remember that the National Traffic System is strictly voluntary; it requires willing, dependable and capable people to keep it running efficiently.

Whenever I get to the point of thinking about discontinuing the South Carolina Noontime Net, I remember the 4-hour net sessions held three days in a row after a tornado ripped through parts of South Carolina in March of 1984. Amateurs (and the public) who counted on the Amateur Radio Service to get messages into and out of South Carolina quickly were well served because of the efforts of the many NTS people involved with keeping our net running efficiently. Indeed, the rewards inherent in being able to help out during such an emergency are what have kept me going, and I hope that you too will keep this in mind the next time that the dedication-versus-burnout problem strikes!

about because the original trunk lines and many of the delivery nets were on CW, making it both logical and simple for members of these nets to easily switch to NTS, even though the plan officially called for no particular mode of operation. It's interesting to note that not many of the phone operators could work CW at any speed (a condition that some claim remains true almost 40 years later!). The few operators who could copy CW provided the necessary liaison between the phone nets and the fledgling NTS.

During the winter of 1949-50, the system went through a series of growing pains. Indeed, during the next summer when conditions on the 80-and-40 meter bands declined, many of the nets became dormant. In September, the NTS started back in full operation. Even though there had been a major effort by a few individuals, the Region Nets of the Mountain Area, and even the Mountain Area Net itself, were not able to survive. There were just not enough operators necessary to maintain the full system in this sparsely populated area. Some changes were effected, with the 6th Region picking up the 12th Regional Net, and the 7th Region picking up the 11th Region.

In some parts of the country, Sections would not have enough operators to maintain a Section net, so sometimes the operators in a Section that lacked an NTS Section net would check into the net in an adjacent Section, and from this came combined-Section nets.

New National Traffic System Service Award

Per ARRL Board of Directors Annual Meeting Minute 99, a new NTS service award has been created. This award has been expressly designed to recognize the ongoing efforts of owners and trustees of FM repeaters, packet digipeaters, packet bulletin boards and similar services through which NTS traffic flows.

The service must have exhibited support for the ARRL National Traffic System, as determined by the ARRL Section Manager and/or Section Traffic Manager, for a period of at least one year.

The NTS service award in no way replaces the Brass Pounders League or Public Service Honor Roll awards but represents a completely new award for a larger group of possible recipients. Operators who make BPL or PSHR by virtue of operation on packet for instance, continue to submit their scores to their SM/STM as in the past.

The NTS service award is presented by ARRL Headquarters Field Services through the Section Manager or Section Traffic Manager to the trustee and/or support staff of the system to be recognized. To obtain the award, each SM or STM must send a notice of request to Field Services, ARRL HQ. HQ then sends the certificate to the SM/STM for presentation to the recipient. For further information on this new award, contact Luck Hurder, KY1T, at ARRL HQ.

By 1951, the National Traffic System was a functioning entity. By ARRL Board of Directors action that year, the Plan was adopted by the League as the National Traffic System, with the head of the system being National Emergency Coordinator George Hart, W1NJM.

Through the early and middle 1950s, the system functioned well, although there were hard times, some brought on by the sunspot minimum, with conditions on 80 and 40 meters being very difficult. Sometimes entire net schedules were missed when stations in a 500-mile radius could not hear each other! But the concept of a system proved to be a good one, and in the end it turned out that it was the individual amateurs and the leaders at all levels of the system who made it work. These individuals gave countless hours of their own personal time recruiting, organizing and making the necessary modifications that make the National Traffic System work so well.

No, it wasn't perfect, but it was certainly better than the previous system, and as Barry Goldwater once said, "Not bad for a bunch of volunteers."

January 1989 Field Organization Reports appear on next page.

Exam Info

ARRL/VEC
225 Main St, Newington, CT 06111

INSTRUCTIONS FOR FILLING OUT 610 FORMS

Please print all information, except on line 13 (signature).

SECTION I

LINE 1. Attach photocopy of license to the back of the 610.

2. Check the one(s) that apply.
   2C Examination for new license
   2D To upgrade operator class if you already hold a license.
   2E Check if you wish to have a new call sign

3. Fill in your call sign.

4. Operator class of license. (Novice, Technician, General, Advanced, Extra)

5. Print first name, middle initial, last name, suffix if any.

6. Your date of birth, all numerals (example 02/20/58)

7. Mailing address (street, PO Box, rural route, etc), city, state, ZIP code.

8. Station location: The exact location of your station. Do not use PO Box No. or RFD. If you don't have a street number, use mileage from a landmark.

9. Mark yes or no.

10. If you have an application pending with the FCC, check yes and give the information on lines 11 and 12.

11 and 12. Ignore, unless you checked yes on line 10.

13. Your signature, must match *exactly* as you printed on line 5 (first name, middle initial, last name, suffix), plus the date you signed the 610.

—Gerrie Wood, ARRL/VEC Assistant

Strays

I would like to get in touch with...

☐ anyone who is using or has used an Ameritron AL84 linear amplifier. Les Turner, W8BKQ, 2214 Sunland, Las Vegas, NV 89106

☐ anyone who has a manual or a schematic for a Drake RV4 remote VFO. Ron Rydzewski, SP8ARY, PO Box 79, 23-210 Krasnik, Poland.

☐ anyone who has a schematic for an SBE SB-144 2-meter FM transceiver. Bill Burke, WA2NCH, 11322 Woodchuck Ln, Boca Raton, FL 33428.

☐ anyone who has a manual or schematic for a Precision Apparatus Co tube tester, model 612. Carl H. Miller, NW2Z, 202 Holly Dr, Rio Grande, NJ 08242.

***QST* Congratulates...**

☐ Charles A. Lukas, Jr, W1DOH, of Acton, MA, on being elected to the office of Senior Grand Warden of the Grand Lodge of Masons in Massachusetts on December 14, 1988.

Field Organization Reports
January 1989

ARRL Section Emergency Coordinator Reports

Field Organization Reports Twenty-seven SEC reports were received, denoting a total ARES membership of 18,432. Sections reporting were: GA, IA, IN, KS, MI, MDC, MN, MT, NFL, NH, NLI, NM, NNJ, NV, OH, OK, ORG, SD, SDG, STX, UT, VA, WA, WNY, WPA, WTX, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	112	90.00	522	1089
TCC Central				
TCC Pacific	117	94.35	425	229
Summary	229	92.17	947	1318
Cycle Three				
TCC Eastern	62	100.00	27	54
Cycle Four				
TCC Eastern	109	87.90	612	1237
TCC Central	70	92.10	347	699
TCC Pacific	96	87.27	459	909
Summary	275	89.06	1418	1845

TCC Roster

Eastern Area, Cycle 2: KW1U, Director. W1CE K1EIC WA1FCD NK1O KT1Q W1QYY KW1U WA2FJJ W2FR NN2H WB2MNA W2MTA KA2UBD N2XJ N3AZW N3EMD NC3V WA3YLO AA4AT WD4FTK N4GHI WB4PNY N4SS W8PMJ WB8YDZ VE3ORN

Eastern Area, Cycle 3: KN1K, Director. KY1T WA2SPL N3EMD W3JKX W3OKN AA4AT K8TPF KA8WNO

Eastern Area, Cycle 4: KN1K, Director. KB1AF W1CE W1EFW KN1K KA1MDM W1NJM W1QYY KY1T KW1U W1WCG W2FR W2GKZ NQ2H W2LWB W2RQ WA2SPL N2XJ N3FM WB3GZU W3PQ KQ3T NC3V WD4FTK N4GHI N4SS W4UQ K4WJR K4ZK W8BO W8PMJ N8XX VE3FAS VE3GSQ

Central Area, Cycle 4: K5GM, Director. W4ZJY K5GM WB5J K5MXQ WZ5N WR5O N5TC K5TL W5TNT KB5W W9CBE WB9UYU AIØO KSØU

Pacific Area, Cycle 2: ND5T, Director. W5JOV KB5UL K6UYK WF6O VE6CHK W7AMM VE7EIL KF7R W7TGU W7IGC NØHFZ NØIA WAØOYI WAØYNP

Pacific Area, Cycle 4: KØDJ, Director. N2IC ND5T W5QVK K6LL W6EOT W6INH W6VZT K7GXZ W7EP W7GHT W7LG W7VSE KA7CPT KN7B NN7H NR7E KØEZ KØTER KCØD KJØG.

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	874	28.19	.744	97.3	
CAN						
PAN*	62	415	6.69	.519	98.9	
Region Nets						
1RN	62	368	5.93	.436	90.0	100.0
2RN	60	321	5.35	.239	91.0	100.0
3RN	31	147	4.74	.437	92.8	100.0
4RN	62	382	6.16	.320	77.0	
RN5	62	569	9.18	.516	87.6	
RN6	59	141	2.38	.268		98.3
RN7	62	352	5.69	.476	98.4	100.0
8RN	62	322	5.19	.317	99.4	100.0
9RN						
TEN	62	329	5.30	.233	78.0	
TWN	59	331	5.61	.428	87.5	98.3
ECN						83.9
Cycle Three						
Area Net						
EAN	31	247	7.97	.601	88.9	
Region Net						
1RN	31	136	4.38	.297	95.4	96.7
2RN	31	148	4.77	.357	96.1	87.0
3RN						93.5
4RN						87.0
8RN						96.7
ECN						83.8
Cycle Four						
Area Nets						
EAN	31	1205	38.87	1.436	98.1	
CAN	31	915	29.52	1.215	100.0	
PAN	31	706	22.77	.988	98.9	
Region Nets						
1RN	62	359	5.79	.385	94.7	100.0
2RN	46	156	3.40	.429	70.0	96.7
3RN						100.0
4RN	62	611	9.85	.408	97.4	100.0
RN5	62	531	8.56	.594	83.9	100.0
RN6	62	294	4.74	.564	92.7	98.3
RN7	62	324	5.22	.654	88.7	100.0
8RN	62	381	6.15	.431	94.0	96.7
9RN	62	338	5.45	.450	95.6	100.0
TEN	62	455	7.34	.688	83.1	100.0
TWN	60	288	4.80	.477	94.0	98.3
ECN	62	215	3.47	.445	60.0	96.7
ARN	31	112	3.61	.095	100.0	96.7

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, ENY, GA, IA, IL, IN, KS, ME, MI, MN, MO, NC, NFL, NLI, NNJ, NTX, OH, OK, OR, ORG, SB, SD, SDG, SC, SCV, SFL, STX, UT, VA, VT, WA, WMA, WNY, WPA, WI, WTX.

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 24-month period, upon sending written notification to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ. This certificate is a one-time award, ie, it is not issued more than once.

466
KC9CJ
193
KA1BBU
149
WD8V
141
W2MTA
135
WA2SPL
134
N4EXQ
131
W2QNL
127
N1CPX
125
WA9W
124
W7VSE
123
WX4H
WB2OWO
KA7AID
122
WA4QXT
KA8BBY
120
WA9VLC
119
WA9VND
WA1TBY
118
N4GHI
117
WB4DVZ
K5MXQ
116
N2EIA
KA3DLY
113
KB1AF
112
KAØPDM
111
KD7ME
110
WB2ZJF
W9YCV
WB2ZJF
109
WF6O
108
WD8KQC
K4ZK
NM1K
107
W2RRX
K4NLK
106
N9BDL
WB1GXZ
105
WB6DOB
AC5Z
KT1Q
WB7WOW
NG1A
KW1U
104
N3EMD
WDØGUF
WAØHTN
103
WA4JDH
K5UPN
102
KD8HB
W4PIM
WA4PFK
N4MEJ
KAØKPY
WG7H
101
K8TVG
W9CBE
WA2ERT
WB1HIH
100
AG9G
WB2EAG
KA1GWE
WB4KSG
99
W1PEX
W7LNE
98
W4CKS
N5MEA
WB2VUK
N2XJ
WB8SYA
KI4YV
KA2UBD
K4MTX
97
WA4EIC
K5CXP
KA1FVY
96
NØFOO
WD5GKH
W7GHT
N4MEJ
WØOYH
KØBXF
95
WE2G
94
K2ZVI
93
NØDPF
92
KF5BL
W4JLS
WBØZNY
WT7A
91
WB8VNV
AA4TE
90
AA4AT
WB4ZTR
89
K9CNP
KJ4VT
N4KSO
88
WB2UVB
W6VOM
KA2QOO
KA7EEE
87
KB9LT
W5CTZ
KJ4NK
K1GGS
86
KA1NXT
NØIYE
WA1JVV
N6DOJ
WA2FJJ
85
KF7KZ
K3JL
KA8WNO
84
W4ZJY
W9DM
83
K2YAI
N4SMB
W1KX
W1RWG
82
N8GPU
WD4KBW
KØERM
81
W7LBK
W5YQZ
N7BGW
KA7SYG
KA1IFC
80
ND2S
KB4WT
79
AA4HT
78
NO3M
KAØUEQ
77
WAØTFC
WA6WJZ
WA1FCD
KV7F
76
WB5J
N1CVE
KC5NG
AK1W
75
N2HIF
WB4WQL
W1KK
74
K2VX
NY8W
KC1KI
KA4HHE
N3AZW
73
KAØARP
WB4WII
WS7U
KI4ZH
72
KA9WDE
NØHWD
71
KA2INE
WC2R
KC4GRU
NR9K
KA2ZKM
NJ3V
70
WA4RUE
WA4LLE
WA4TXT
NDØN
69
KF8J
WA3UNX
WB1BTJ/T
KA4FZI
N5KCL
68
N8FWA
KA9RII
NW8M
KI4W
WJ7E
67
NOØA
WB8R
NZ5J
NC9T
N3COY
N3DRM
66
K1ABO
KJ9J
K4BGZ
65
WB3AVZ
K4IWW
KA9TVU/T
KA1JXH
KA1KML
64
N8FPN
N1DHT
W4RWB
KM4LS
KDØYL
KA9QXI
63
N8CEI
WB6QBZ
WA8DHB
WB8YPG
WB5YDD
KF7FF
WD4COL
KA1LIH
K9ZBM
WB2QIX
W4TZC
AIØO
62
KD8KU
WB2FTX
N2DXP
KA8CPS
WGØS
N7GGJ
W2FR
WØOUD
61
N8EFB
WB8KWC
NS9Q
N8HSC
KM4LP
N4ORZ
KDØNH
N1FLO
W9HBI
N2ABA/T
WB5CPY
60
K8JDI
WD8KBW
WBØWNJ
KA1MDM
W9UMH
KA2ZNZ
KC2HJ
KI4BR
WB4PNY
58
KA9CTW/T
KA1QFV/T
57
KB2EPU/T
53
KA1RVN/T
51
KB4CYC
KA1MOI/T
48
KA1HPO/T
N4LST
47
KA8HJK/T
46
KA2COX/T
43
N2IKR/T
N2EVG/T
40
N8IQS/T
KB5IFH/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 callsign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	790	684	1269	86	2829
N1BBT	703	496	703	408	2310
WB9YPY	0	1189	129	689	2007
NØBQP	29	1050	93	628	1800
WBØTAX	0	862	862	0	1724
W1PEX	1	323	1324	25	1673
KB4N	1	815	776	1	1593
WA2SPL	4	618	600	29	1251
WA1TBY	22	680	746	22	1470
W3VR	337	298	477	29	1141
KC9CJ	10	638	42	397	1087
WA9VND	11	493	449	25	978
WBØWNJ	245	110	605	1	961
WA4JDH	0	375	409	2	786
KA1BBU	217	162	224	151	754
K6UYK	35	340	361	3	739
WD4IIO	156	218	313	45	732
KA1IFC	8	375	323	12	718
W8FRC	40	321	299	22	682
NØFBW	---	---	---	---	678
WX4H	3	319	336	9	667
WA1FHB	1	316	317	0	634
W2MTA	5	371	247	5	628
N4GHI	56	276	284	12	628
WF6O	4	304	293	13	614
AL7IN	4	298	293	9	604
W4HAW	282	0	282	0	564
WØLVI	28	263	180	83	554
N4HOG	0	272	272	0	544
KB1AF	8	275	217	30	530
K5UPN	0	305	221	2	528
KI6ZH	14	227	254	17	512
K4DOR	21	235	251	5	512
NM1K	21	222	235	25	503

BPL for 100 originations plus deliveries:

N4UAV	141

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Transmitting Society	31	276	438
Central Gulf Coast Hurricane Net	31	135	3866
Clearing House Net	31	287	295
Empire Slow Speed Net	31	73	483
Golden Bear Amateur Radio Net	31	153	1628
Hit and Bounce Net	31	238	708
IMRA	26	882	1914
Mission Trail Net	31	142	890
Northern California Net	93	304	1089
NYSPTEN	31	84	526
West Coast Slow Speed Net	31	92	489
75 Meter Interstate SB Net	31	1246	397
7290 Traffic Net	48	366	3576

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.

Some Results from the Survey

Last August, the World Above 50 MHz included a survey of readers, one of a series to be conducted for the various *QST* columns. Most of the questions were constructed to facilitate numerical evaluation. Results on these have now been compiled and are reported here. However, in order to obtain a more complete picture of what readers think and desire, some questions had to be phrased to bring forth more complex responses not readily amenable to statistical analysis. These have not yet been fully evaluated, although they have been scanned. To the extent this has been accomplished and space permits, some of these comments are also summarized.

It's difficult to determine just how many readers The World Above 50 MHz has, but 241 people returned completed questionnaires. I would like to think that this is a small percentage of those who read the column. Question 1 concerned completeness of coverage of The World Above 50 MHz. Only seven respondents thought that it currently offers complete coverage of all aspects of VHF/UHF. A breakdown of additional coverage desired by the others is summarized as follows:

6-meter news and openings: 102
2-meter news and openings: 87
News and openings on the higher bands: 69
Moonbounce news and information: 48
News of local nets and regular activities: 44
News of FM operation: 26
News of ATV operation: 30
News of packet operation: 24
News of upcoming DXpeditions: 97

With the possible exception of the last item, I believe that the space given each of these in the column over the period of a year is about in proportion to the interest shown. However, it can be argued that the depth of coverage may be improved.

Question 2 dealt with the standings boxes. Of the 238 who responded to this one, 188 (79 percent) thought that the boxes serve a useful purpose and should continue as a regular feature of the column.

Question 3 continued the examination of the boxes by asking about their frequency of appearance and the current policy with respect to regular reporting. Of the 195 answering, 13 percent expressed the opinion that the boxes should be run less frequently, 25 percent more frequently and 63 percent agreed with the current schedule of appearance. Of the 149 who responded to the second part of the question concerning expanding the boxes to include newer stations just getting started, continuance of the listing of "oldtimers" whether or not they report regularly or requiring periodic (currently 2-year) reporting in order to stay listed, 25 percent were in favor of expanding the boxes to include more stations, 11 percent voted for keeping stations in the listings whether or not they report regularly, while 64 percent agreed with the current policy.

With regard to Question 4 addressing the lead material, by far most expressed the opinion that the subjects chosen are to the point and appropriately varied. Only a very small number thought they are too technical and 20 times that many expressed the opinion that they are not technical enough. In a related question, regarding features that readers would like to see included in the column, a large number wanted to see more designs for equipment. I agree that this would be a worthwhile feature and will henceforth endeavor to pass on schematics of simple gear such as preamps, antennas etc. Naturally, I can't check out such submissions, and thus can't stand behind any designs which may appear. About 10 percent of those responding to the question on lead material thought that my leads have been slanted too much toward a few subjects. Even though this is a small number, I will try to vary them more in the future. Suggestions please! A similar percentage thought that the leads are not long enough to properly present the subjects. That old problem of space raises its head again.

Question 7 addressed current operating modes and bands. Of the 241 responding, all but four said that they currently operate on the bands above 50 MHz. This is somewhat of a disappointment. I have always hoped that those not presently on the VHF bands might read the column, and through it become interested in becoming VHFers. Possibly, such readers did not return the questionnaire. The breakdown of the bands and modes reported goes as follows:

6-meter SSB: 174
6-meter CW: 105
6-meter FM: 47
6-meter AM: 18
2-meter SSB: 180
2-meter CW: 122
2-meter FM: 167
2-meter EME: 29
220-MHz SSB/CW: 51
220-MHz FM: 51
70-cm SSB/CW: 117
70-cm FM: 56
70-cm EME: 18
33-cm SSB/CW: 15
33-cm FM: 1
23-cm SSB/CW: 52
23-cm FM: 21
Higher bands using narrowband modes: 7
Satellite: 47
ATV: 17

Of course, this breakdown does not imply exclusivity. One individual may operate any number of the above modes and bands. Nor does it provide an indication of how much any of these modes or bands are used.

In addition to asking for the inclusion of designs for simple VHF/UHF gear, many asked for beacon lists, lists of nets, more on propagation and greater coverage of VHF conferences. A "station of the month" was another popular item. Okay fellows and gals, send in those photos and station descriptions. It would be a good idea to include a picture of the operator in the shack as well as one of the antenna system. Photos must be suitable for publication (clear and with good contrast). Black-and-white is preferable, but color is okay. But please, no slides.

Of the 237 responding to Question 10 addressing column length, 86 (36 percent) thought that it is about the right length. Many of these, however, asked for additional features. I do not know how to interpret this apparent inconsistency. One hundred fifty (63 percent) thought that The World Above 50 MHz should get more space in *QST*—with most opting for one additional page. A single respondent thought that the column currently takes up too much space.

It's been interesting reviewing the responses and I will certainly try to take them into consideration in preparing future columns. I wish to thank all of those who went to the trouble of completing and returning the questionnaires. Your efforts really help.

ON THE BANDS

6 Meters—While F2 propagation did not continue during January and early February at the torrid pace set in December, it did continue. Because it marked the beginning of significant east-west F2 openings for this solar cycle, I presented an essentially day-to-day summary of the period in last month's column. I won't attempt such a complete rundown this month, but will try to hit the high spots.

For the first three weeks of January, W3OTC, near Washington, reports only scattered, and quite weak, openings to Florida, the Caribbean and South America. Bob did exchange reports with GM8MBP on the 14th, with the Scottish station at 4×4. [There are

Microwave Standings

Listings are call, state, US states worked, call areas worked, grids worked and best terrestrial DX worked in miles. 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. To ensure that the stations listed posses a true capability to work meaningful distances, a minimum showing of 5 grids or the minimum DX listed for each band is required. In order to make the standings a true reflection of stations currently active on the bands above 902 MHz, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked additional states or grids in order to remain in the standings or be reinstated, merely an indication of continued activity and interest. Compiled February 10, 1989. Deadline for next update is August 5, 1989.

902 MHz (33 Cm)
Minimum best terrestrial DX
150 Miles

W1JR	MA	10	5	27	394
W1RIL	MA	9	4	19	230
AF1T	NH	9	3	—	320
W1EJ	NH	6	2	—	
WC2K	NJ	16	6	33	609
KD5RO/2*	NY	10	7	31	300
N2WK	NY	7	5	24	328
W2PGC	NY	6	6	12	478
KU2A	NY	3	3	5	200
N3CX	PA	13	6	26	405
WA3AXV	PA	9	6	18	326
N4MW	TN	4	4	15	460
WS4F	GA	3	1	3	165
WB5LUA	TX	10	4	22	627
WA5VJB	TX	4	3	10	462
K6LMN		1	2	—	599
W6CPL		1	1	13	513
N6XQ		1	1	1	185
WB8BKC	MI	8	5	35	550
NI8O	OH	6	5	8	293
KXØO	CO	3	2	3	615
VE3LNX		9	6	36	498

1240 MHz (23 Cm)
Minimum best terrestrial DX
150 Miles

W2SZ/1	MA	17	8	34	—
K1FO	CT	15	7	21	468
W1JR*	MA	13	10	35	655
K1PXE	CT	13	5	—	448
WA1OUB	NH	12	7	30	496
W1RIL	MA	12	6	23	450
AF1T	NH	10	4	—	350
K1LPS	VT	8	5	17	288
W1EJ	NH	8	4	—	—
W1QXX	MA	6	3	—	260
K2UYH*	NJ	25	32	—	770
WC2K	NJ	18	8	49	756
WA2LTM*	NJ	17	6	—	770
W2VC	NJ	16	6	37	537
KD5RO/2*	NY	15	13	42	360
W2PGC	NY	13	9	25	960
N2BJ	NY	13	5	22	—
K2YCO	NY	11	8	—	—
N2WK	NY	11	6	29	584
K2EVJ	NY	10	6	—	426
KU2A	NY	3	3	6	200
K2LME	NJ	3	—	4	—
WA3AXV	PA	16	7	33	698
WA3JUF	PA	14	5	20	300
W3IP	MD	13	7	22	369
K3HZO	MD	13	6	25	—
WA3NZL	MD	11	7	—	780
KB3QM	DE	7	—	7	—
W3RUE	PA	6	3	11	—
K4QIF*	VA	22	25	—	790
WB4NXY	KY	17	7	29	730
WB4SLM	TN	9	3	21	728

*Some stations worked via EME.
—Information not supplied.

WS4F	GA	9	3	13	625
N4MW	TN	8	5	15	460
W3IY/4	VA	7	5	—	481
WA4OFS	FL	7	2	17	1042
K4NTD	FL	4	2	—	847
WB5LUA*	TX	30	26	119	1280
WD5AGO*	OK	16	26	70	600
W5HN	TX	14	5	50	1155
W5RCI	MS	14	4	42	—
W5DFU	OK	13	6	38	1031
K5UR	AR	12	4	41	654
WB5AFY	TX	12	3	50	685
WA5ASH	TX	10	6	33	1425
K5SW	OK	10	5	30	984
WA5VJB	TX	10	5	—	1140
WA5TKU	TX	5	3	18	1112
WA5HNK	TX	5	2	15	740
WØRRY/5	OK	5	2	11	285
W5NZS	OK	5	—	20	—
W5HPT	TX	4	1	—	571
N5AMA	LA	3	2	11	675
WB5LBT	LA	3	2	—	—
W5UC	TX	3	1	12	163
N5BBO	OK	2	2	3	1042
WA5DBY	TX	2	1	—	—
K5PJR	OK	1	1	1	271
WA5TBE	TX	1	1	—	571
W5GVE	TX	1	1	—	366
N6CA*		8	10	43	2472
K6ZMW		4	3	—	402
W6CPL		3	4	22	2476
N6XQ		3	3	19	2519
W6KGS		3	2	—	362
NN6W		2	3	6	595
K6QXY		2	2	—	2358
K6LMN		1	2	—	599
WBØHLC/6		1	1	7	479
K6LMN/6		1	1	1	230
W7RV	AZ	6	3	19	405
N6NB/7	UT	4	2	—	295
WB5TCO/7	AZ	2	2	2	403
W7YOZ	WA	2	1	7	230
WB8BKC	MI	23	9	66	950
W8YIO	MI	20	12	45	950
WA8TXT	OH	18	9	25	820
NI8O	OH	18	8	48	982
K8WW	OH	16	7	32	448
WB8PAT	OH	10	5	16	836
W9ZIH	IL	24	9	—	790
WB9SNR	IL	14	8	27	760
WA9FWD	WI	8	3	8	—
W9UD	IL	5	4	—	760
WØUC/9	WI	5	3	12	520
K9VGE	WI	5	3	6	350
WBØDRL*	KS	27	18	115	1100
WØRAP	IA	14	5	52	678
WAØTKJ	KS	13	5	40	1100
WØOHU	MN	13	5	28	814
KØTLM	MO	12	4	28	—
KØIFL	MO	11	5	18	428
KCØQR	NE	10	3	38	430
KØRZ	CO	7	3	31	407
KXØO	CO	6	3	17	615
KØALL	ND	6	2	—	283
WØYZS	MO	4	2	—	425
WØZJY	KS	3	1	—	170
NOØY	KS	2	2	4	170
WØMDL	MN	2	2	—	340
WØVB	MN	2	2	—	340
KH6HME		2	2	—	2472
VE3LNX		12	7	39	498
VE4MA*		14	22	22	800

2300 MHz (13 Cm)
Minimum best terrestrial DX
100 Miles

W1JR	MA	9	4	11	257
W1RIL	MA	7	3	11	230
W2SZ/1	MA	6	3	10	—
WC2K	NJ	11	5	20	556
KD5RO/2	NY	6	7	22	250
N2WK	NY	4	5	10	584
W2PGC	NY	4	4	7	315
WA3AXV	PA	11	6	19	671
N3CX	PA	8	4	13	325
WA3JUF	PA	5	3	10	—
W4HHK*	TN	10	7	12	582
N4MW	TN	5	4	9	420
WB4NXY	KY	4	4	6	360
WS4F	GA	2	1	2	147
WB5LUA*	TX	12	5	36	933
WB5AFY*	TX	7	3	18	285
W5RCI	MS	5	3	7	—
W5DFU	OK	4	2	11	235
W5HN	TX	4	2	11	623
WA5VJB	TX	4	1	14	410
W5UC	TX	3	1	12	163
W5ASH	TX	2	1	11	225
K5PJR	OK	1	1	1	271
W6CPL		1	1	5	105
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	—	115
W8YIO	MI	10	8	22	940
WB8BKC	MI	5	4	14	275
WA8TXT	OH	4	4	5	291
WB8TGY/8	MI	2	3	11	152
NI8O	OH	2	1	3	127
W9ZIH	IL	9	4	—	470
WB9SNR	IL	6	4	7	—
KXØO	CO	3	2	10	454
KØRZ	CO	2	2	11	143
KØJJA	IA	1	1	2	208
VE3LNX		5	5	11	296
VE4MA*		2	8	—	150

3300 MHz (9 Cm)
Minimum best terrestrial
DX 100 Miles

W7CNK/5	OK	4	2	6	187
W5UGO	OK	3	2	3	215
WB5LUA	TX	3	1	11	165
WB5AFY	TX	3	1	10	28
WA5VJB	TX	3	1	9	180
WB5LUA/5	AR	3	1	6	288
W6OYJ		1	1	2	214
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	—	115
KXØO	CO	2	2	6	454
KØRZ	CO	2	2	5	70
WBØDRL	KS	1	1	1	215
KDØGT	KS	1	1	1	170

5600 MHz (5 Cm)
Minimum best terrestrial
DX 100 Miles

K5PJR	OK	7	2	35	332
WA5ICW/5	OK	6	2	29	287
W5UGO	OK	6	2	24	377
WD5AGO	OK	3	2	5	96
N5JJZ/5	OK	3	1	4	404
WB5LUA	TX	2	1	10	215
WD5AGO/5	TX	1	1	1	224
W6OYJ		1	1	2	214
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	—	115
KØRZ	CO	2	2	5	75

10 GHz (3 Cm)
Minimum best terrestrial
DX 100 Miles

W2VC	NJ	5	2	7	227
WA5VJB*	TX	2	2	33	—
WB5LUA	TX	2	1	8	208
WA6EXV		2	3	9	219
W6CPL		1	2	9	317
N6XQ		1	2	7	358
K6KKO		1	2	7	402
NN6W		1	2	6	595
WA6QYR		1	1	7	103
W6OYJ/6		1	1	5	404
K6HLH		1	1	5	125
W6SFH/6		1	1	4	414
WA6MHZ		1	1	4	104
WB6BKR		1	1	4	168
N6GN/6		1	1	3	414
WD6FWE		1	1	1	174
WBØHLC/6		1	1	1	479
WB7ABP/6		1	1	1	479
KB7CIA	AZ	1	1	12	147
K2DNR/7	AZ	1	1	12	147
WA3RMX/7	OR	1	1	6	115
WB7UNU/7	OR	1	1	—	115
KØRZ	CO	2	2	6	78
KXØO	CO	1	1	2	165

24 GHz (1.25 Cm)
Minimum best terrestrial
DX 50 Miles

W6CPL		1	1	4	68
N6XQ		1	1	4	68
WA3RMX/7	OR	1	1	5	115
WB7UNU/7	OR	1	1	—	115
KXØO	CO	1	1	1	74

48 GHz (6.6 Cm)
Minimum best terrestrial
DX 10 Miles

WA3RMX/7	OR	1	1	2	14
WB7UNU/7	OR	1	1	—	14

those of us who would have said that working a GM is something to write home about—Ed.] The 22nd was something else again—more reminiscent of the conditions which prevailed during December. At 1320Z, Bob worked FY5AU with 53 reports and heard the FY7THF beacon at S9 + 20 minutes later. Then PZ1AP was worked with 59 reports. HC5K was contacted at 1355 with 55 reports, although N4VA only a few miles to the south was hearing him at 59. At 1513Z W3OTC worked HC8GR, exchanging 59s. At 1545, the band took an unexpected swing toward Europe producing contacts with G4CCZ, G4UXC, G4TIF (answered a CQ at 50.2), GØIPU, GW3XYW, G4CVI, G4TRA, EI7EH, G3RSI and the last station worked EI5FK at 1658Z. This opening was not confined to the East Coast. K8UNV Patriot, OH reports working HC5K and HC8GR at 1404 and 1522Z respectively, followed by G4CVI, G3ZSS, GW3XYW, G6ION, G4IJE, G6ATW, G4GLT and G3OSS between 1600 and 1638. K8UNV also reports an earlier European opening which he classifies as the best F2 opening he has heard in 26 years. Between 1517 and 1625Z January 14th, Phil worked OZ7JV (crossband), GM8MBP, G3CCH, GI8YDH, PA3DYS and G4GIR. KE8FH Wyoming, MI had similar results that day. Dennis says that it was the first transatlantic F2 DX that he has heard this cycle. Between 1610 and 1714Z he hooked up with G4PBP, G3ENY, G6LUZ, G3XBY, G4JNL and GI8YDZ.

February 1 brought the first opening that this conductor has experienced since moving to Texas. Around 1500Z 6 meters and the communications frequencies below it were alive with signals from the south. Heard at this location were the DL3ZM/YV5 beacon (50.045) and the FY7THF beacon (weakly for a few minutes). At 1503, HK4EB was worked with 59 signals both ways. W3XO/5 was running 10 W to a temporary 3-element beam. The 8th brought the FY7 beacon to the East Coast and weak reception in eastern New York of J52US. The only propagation affecting this part of the country that day was a short E_s opening to southern California. W3XO/5 had the pleasure of working

K6ODV and W6UXN (50.130—above the DX Window, HI). That evening, beginning at 2330Z and running until 0230Z February 9, the West Coast was treated to a very good South Pacific opening with VK2s and 4s worked along with FKs.

According to an advance copy of the column "The VHF Scene" written by ZL1MQ for the New Zealand magazine *Break In*, the first 50-MHz contact in history between the UK and Australia took place January 15. The landmark QSO was between G3JVL and VK4TL and occurred at 0952Z, reportedly via long path.

An interesting report is sent from Mar del Plata, Argentina by LU4EJ. Mariano writes that on 27 November he worked VP8PTG for the first 6-meter contact between LU and VP8. On the same date, FM5WD and PZ1AP were also worked by him and LU4DBK.

A letter from FK1TS compares conditions between this year and last. Phil feels that E and TE are better this year, not to mention F2. He listens regularly on 28.885, so give him a shout if conditions look favorable.

K5ZMS passes along the information that French amateurs who have 6-meter operating permits are not allowed operation below 50.2 MHz. The band from 50.0 to 50.2 is assigned to links for French radio broadcast stations. Remember, when the band may be open to Europe, look above 50.2 for the French. There is a grave question as to the legality of contacts made with French stations below 50.2.

WA8LLY/6 notes an ever-increasing problem on 6 meters, but heretofore common more to HF operating. That is people calling DX stations without first hearing them. Often, when the DX station comes back, the caller does not respond. Steve complains that this process merely causes QRM and can result in those hearing the DX missing contacts.

2 Meters—Very little has been reported relative to 2-meter TEP, which often occurs during the fall and spring months of high solar-activity years. In this hemisphere it is quite common for Caribbean stations to be able to work into southern South America many evenings. Such propagation is reported by LU4EJ Mar del Plata, Argentina. Mariano says that around 2400Z on November 10, he worked KP4EOR and NP4X on 144.150 with 599 signals both ways. He adds that KP4EOR also worked stations in Brazil and Uruguay on the same occasion. LU4EJ runs 500 W from a pair of 4CX250Bs to an 8-element Yagi.

Think you need lots of mechanical planning and a big array to work moonbounce? According to a issue of the *2 Meter EME Bulletin*, WØKEA proved the contrary. By the light of the moon, Phil set up 2 13-element vertically polarized Yagis. Using only "armstrong" azimuth and elevation control and eyeball tracking, he managed to work W5UN, N5BLZ, W4ZD, VE7BQH, W7IUV, KB8RQ and K6MYC during the first weekend of last fall's EME Contest. The *Bulletin* also notes that W4ZD is compiling a new issue of the *2-meter EME Directory*. To be listed, please provide Bev with call sign, activity status, array, power, name, address, telephone number, grid coordinates, total EME stations, countries, fields and grids worked. Send to Box 88, Lake Placid, FL 33852.

WA4MMP in southeastern Virginia wants it known that the Tidewater 2-Meter Activity Net meets Mondays at 2100 Eastern Time on 144.230. Bill serves as net control. Also in the net department, KC5IJ reminds us that the Headquarters SWOT nets are still active. The Saturday morning net meets from 0700 to 0800 Central Time with KA5NGG as net control. The other meets Wednesday evenings at 2100 local time with N5CTE as net control. Both nets originate in the Dallas/Fort Worth area and are held on 144.250.

The Higher Bands—WB5LUA reports that he and KD5RO/2 have broken the North American meteor-scatter DX record for 70 cm with an SSB contact covering 1239 miles. The sked was run between 1100 and 1356Z December 13 during the Geminids shower. Ten-second sequencing was used. The two experienced bursts of up to 5 seconds in length with the bursts occurring about every 10 seconds. WB5LUA runs 800 W to 4 F9FTs at 85 feet and KD5RO runs 400 W to a single K1FO type Yagi. WB5LUA says that the previous record was between WØLER and W2AZL and was made during the Perseids in 1972.

VE4MA continues his 13-cm EME activity. Barry has recently added OK1KIR and W4HHK to his list of stations worked. On 23 cm, his 12-foot dish and 500 W has been instrumental in working KD7YZ (12-foot dish and 150 W) and KD5RO/2 (10-foot dish and 150 W). Barry says he intends to try 33 cm as well, but wants to get the 13-cm system fully developed first.

K6LMN requests that an error that got into the December column be corrected. It seems he was running 10 W on 33 cm, not 200 W as reported, when he worked XE2GBO at 599 miles.

OZ1FTU announces the 1989 Scandinavian VHF/UHF/SHF Conference. This year's meeting will be held June 9, 10 and 11 in the lake district of Silkeborg, Denmark. Soeren says that, in addition to the social activities, talks will be presented on microwave equipment, computer simulation of antenna performance and many other interesting topics. Measurements of antenna gains for 70 cm and above will be conducted as will preamp and converter noise figures. For further information, write to DAVUS, Soeren Pedersen, OZ1FTU, Krumstien 10 A DK-2730, Herlev, Denmark.

Speaking of conferences, the Midwest VHF Report says that plans call for a series of VHF events for the upcoming Dayton Hamvention®. Like last year, Friday-evening noise-figure measurements will be held at the Hamvention site, as well as an antenna-gain competition at a nearby schoolyard Sunday morning. Various informal VHF-related get-togethers are likely to be announced at the Friday evening affair.

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in *italics* for each band listing. Numbers listed after calls refer to endorsements. The totals shown are current as of February 16, 1989. An SASE will bring you the rules and application forms.

50 MHz

100

341	NJØX
342	WQ5S
343	WB4TWX
344	KB3PD
345	WA1NQV
346	WA8R
347	WA7OEU
WA1NQV	150
WA1OUB	450
N2BJ	175
W2CNS	175
N3BBI	300
K4CKS	350
N4MW	275
WB4SLM	200
WA5OLT	175
WA5S	200
WQ5S	150
N7DB	300
KC7IJ	225
W7KYT	175
K7NN	150
WB8BKC	375
KB8BSW	150
WA8R	125
WB8YFE	300
KB8ZW	125
W3EP/9	250
KY9P	250
KA9SOW	175
NØFFO	225
KØIFL	200
WØJRP	300
KAØKUY	125
WBØHYV	175
VE3LNX	175

144 MHz

100

269	K7ICW
270	KB8ZW
271	NØFFO
272	KØJJA
273	WA4VLQ
274	WBØWAO/8
275	G3JMB
276	WA8MZQ
277	K1FJM/4
KI3W	200
K4CKS	150
WA4VCC	200
W4ZD	300
W5FYZ	175
N5WS	200
KØIFL	150
G6IJM	125

220 MHz

50

38	W3ZZ
39	W2GU
40	WB4SLM
41	N3AHI
N2WK	60
WB8BKC	100

432 MHz

50

144	GW8TIX/P
145	WB5NAA
146	JHØYSI
147	N5JYX
W2GU	80
K4CKS	90
KX4R	60
WA8OXG	60
K8WW	180
WØRAP	200
GW8TIX/P	70

902 MHz

25

9	N2WK
KD5RO/2	30

1296 MHz

25

63	KØIFL
64	N2BJ
WD5AGO	55
KD5RO/2	35

10 GHz

5

32	G3JMB/P

FM/RPT

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

FM/RPT Column Survey—Part Two

The FM/RPT Column Survey was presented for your consideration in the November 1988 installment of this column. Last month, the results of that survey's questions dealing with the state of the FM and repeater mode and its users (questions 1 through 6 and 14) appeared here. This installment of FM/RPT concludes the presentation of the survey results with those questions dealing with the state of this column (questions 7 through 13).

Survey Results (Questions 7 through 13)

Question 7. *How do you rate FM/RPT's coverage of the FM and repeater world?*

Eighty-one percent of the respondents thought that the column provided very complete coverage of all facets of the FM and repeater world; however, almost everyone wanted greater coverage of one or more of the topics offered in part B of the question. A list of those topics and the percentage of respondents seeking expanded coverage of the topic follows in their order of popularity. New techniques 37%, emergency communications 35%, mobile communications 30%, new products 29%, 52-54 MHz 28%, experimentation 26%, packet radio 26%, simplex operation 26%, 29 MHz 25%, autopatching 23%, frequency coordination matters 23%, controversial matters 21%, FCC matters 21%, 144-148 MHz 20%, 220-225 MHz 19%, 902-928 MHz 18%, ATV 17%, DX information exchanging 17%, nets 17%, 440-450 MHz 16%, traffic handling 16%, VRAC matters 16%, 1240 MHz and above 14%, RTTY 9%, ragchewing 8%.

Question 8. *Briefly, what topic would you like to read about in this column that has not already been listed in Question 7?*

The answers to this question were varied. Some repeated the topics listed in question 7. Others were more original. The following is a sampling.

Stories of old-timers, fact or fiction, groups and members, CRRL and Canadian matters, information for owners, FM using Mode S on AO-13, antennas, repeater link systems, trusteeship, control, novel antennas, FM DXing, surplus, hand-helds, phone courtesy, networking, high elevation repeaters using alternate energy sources, expanding 10-meter repeater frequencies, VHF calling-only frequencies, remote bases, CB-to-10-meter FM conversions, European news, cross-banding, SSB repeaters, access tones, unusual repeater innovations, retransmitting Shuttle transmissions, rule violations, how to handle QRM on repeaters, product reviews, YLs on FM, 52.525-MHz conversions, repeaters linking with OSCARs, not ragchewing on 29.6 MHz, how a repeater system works, technical description of outstanding repeaters.

Thank you for the ideas. You have given me a lot of fodder. The response to questions 7 and 8 provides me with a guide for the direction of future columns.

Question 9. *Do you believe that the subjects chosen for the lead story of FM/RPT are:*

According to 65 percent of the respondents, FM/RPT is to the point and appropriately varied, but, on the other hand, 7 percent believed that it was slanted too much toward a few subjects. While 20 percent believed that the column is even-handed in treating controversial subjects, 2 percent believed that it is biased in treating controversial subjects. Seventeen percent believed that the column is not technical enough, but 1 percent believed that it was too technical. And, while 12 percent believed that it was not long enough to properly present the subject, 1 percent believed that it was too long.

Question 10. *How often do you read FM/RPT?*

Eighty-three percent of the respondents are "regulars" and read this column every month, while 8 percent read this column occasionally and 7 percent read it every other month. Not surprisingly, 0 percent admitted to never reading the column.

Question 11. *Do you believe that FM/RPT is:*

More than half of the respondents (58%) believed that the column is too short and should be lengthened by 8/10ths of a page. Less than half (42%) believed that the column is about the right length to cover the various aspects of the FM and repeater world, while the remaining 1 percent believed that the column takes up too much *QST* space.

Question 12. *If answer to Question 11 is C (the column takes up too much* QST *space), would you like to see an abbreviated or eliminated FM/RPT?*

The 1 percent in question 11 who believed that the column takes up too much *QST* space answered that they did not want to see the column abbreviated or eliminated. I guess that means that they like the column, but would rather see it in another publication!

Question 13. *Do you feel that the Repeater Log section is:*

Fifty-six percent of the respondents felt that the Repeater Log is very useful and interesting, while 41 percent felt that it is of little interest. The remaining 2 percent had no opinion.

I thank all of you who responded to the survey. I hope that future installments of FM/RPT will show my responsiveness to you.

NORTHERN CALIFORNIA FREQUENCIES CHANGE FOR ATV

The ATV frequencies for 420 and 430 MHz were changed from 426.25 MHz and 434.0 MHz to 427.25 MHz and 434.0 MHz by a majority vote of the membership attending a recent Northern Amateur Relay Council of California (NARCC) general meeting. The 427.25 MHz frequency is exactly on cable TV Channel 58. An advantage of this change is easier reception. Reception does not require special equipment; these frequencies can be received by a cable-ready VCR tuner or a cable-ready TV attached to an outside 440-MHz antenna. The new frequencies also conform to the national ARRL band plan. All new systems are encouraged to use these new frequencies.—*NARCC, Inc Newsletter*

FM QRM TO THE AMATEUR SATELLITE SUBBANDS

There is an ongoing problem of 2-meter and 10-meter FM stations operating in the satellite uplink and downlink subbands.

FM operation in the 2-meter satellite subbands (145.8 to 146.0 MHz) causes steady carriers to be retransmitted by RS-11 in Mode A (its uplink is 2 meters) resulting in an undue drain on the batteries of the satellite and the reception of many heterodynes and "splatter" in the downlink passband. Some of the signals are very strong, causing the satellite's receiver to overload. Also, operation on these same frequencies causes undue QRM to local stations when OSCAR 13 is in range (its downlink is 2 meters).

Ten-meter FM signals are heard worldwide, and some of them are very loud—much louder than the downlink signal from RS-11 in the 10-meter satellite subband (29.3 to 29.51 MHz). They are very broad and hard to work between. Today, one fellow, operating on 29.400-MHz FM, was loud and broad enough to cause serious QRM to the satellite beacon on 29.408 MHz.

According to the *Repeater Directory*, the ARRL band plan for the satellite subbands are, as follows:

29.3 to 29.51 MHz: Amateur Radio Satellites subband

144.3 to 144.5 MHz: "new" OSCAR subband

145.8 to 146.0 MHz: OSCAR subband

There are still a number of stations using Mode "A" on RS-11, and many of the new satellite experimenters are there getting their feet wet. Please avoid using the satellite subbands for FM communications. Hopefully, we can get the word around and bring this QRM problem under control.—*John Lee, K6YK*

On Line

Conducted By Stan Horzepa, WA1LOU
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CompuServe ID no. 70645,247

Stan's Spring Software Collection

Mud, birds singing, Dayton, baseball, antenna repairs, more mud...it must be time to do some spring cleaning, so I will start by clearing my desk of the new software that I've been collecting all winter long.

Apple Macintosh®

MacMorse, $29.95, David Kall, KAØQEI, #314, 700 Marine Pkwy, New Port Richey, FL 34652. This Macintosh code-practice program allows the student to select the characters he or she wishes to practice at seven selectable speeds (5, 8, 10, 13, 15, 20 or 22 WPM), four selectable durations (1, 2, 3 or 5 minutes), four selectable pitches (440, 880, 1800 or 3500 Hz) and three selectable volume levels. The user may also type and send any combination of characters or words from the keyboard. The "MacSay" option will voice-synthesize any letters or characters that are sent.

Commodore C-64® and C-128

Amateur Radio software catalog, free, Hardsoft Products, PO Box 90, Via Federico Salomone, 121, Chieti, 66100, Italy. Hardsoft Products has a variety of Amateur Radio software for the Commodore C-64 and C-128 computers including *Noapackterm* (a packet-radio terminal emulator), *DIGICOM>64* (a packet-radio TNC emulator), *RX-64* (for RTTY, CW, ASCII and AMTOR reception), *RX-TX SSTV*, *FAX Reception* and *FAX Transmission*.

Electro Math and *Morse 5-30 WPM*, $9.95 each, Harold Vitney, WØMSF, 1135 Grenshaw Dr, St Louis, MO 63137. *Electro Math* is an all-purpose C-64 "electronics" calculator that includes formulas for calculating ac, dc, inductance, capacitance, reactance, coils, transformers, tubes, transistors, frequency, wavelength, filters and other measurements. *Morse 5-30 WPM* is a CW training program for the C-64 that generates random groups of 1 to 5 characters for durations of 1 to 30 minutes and includes 47 text practice files.

PA QSO Party Comprehensive Contesting Program, $15, Harry Bump, KM3D, PO Box 392, Richland, PA 17087. This C-64 program is a logging-and-duping program for the Pennsylvania QSO Party that, according to its author, can dupe 600 entries in less than half a second. It provides a pull-down multipliers-needed screen on demand and permits duping to be overridden for mobile stations operating from different counties. At contest's end, log, dupe, score and summary sheets are printed. The maximum number of QSOs that the program can handle is approximately 650.

IBM® PC (and Compatible Computers)

Amateur Radio graphics, FBD & SASDM†, Bob Smith, W8DD, 47531 Tomahawk Dr, Negley, OH 44441. Bob has produced some Amateur Radio clip-art, including the ARRL diamond, antennas, microphones and CW keys, using Printshop and Printmaster.

CAT980, shareware/$5/FBD & SASDM†, Art Harding, K5YEF, PO Box 8617919, Plano, TX 75074. K5YEF's program allows the computer to control a Yaesu FT-980 transceiver while displaying the status of the transceiver's various functions including analog dials and plots of filter characteristics. The user can create and load files into the transceiver's memories and into 300 "memory slots" provided by the program. Three modes of scanning are selectable, including a special "band scan" which allows the user to scan a predefined section of radio spectrum. Included is information on how to build the simple interface that is necessary to use this program.

Logger—$35, *Logger and Contest*—$50, Alamo DX Amigos, 106 Tomahawk Trail, San Antonio, TX 78232. *Logger* is a general-purpose logging program that can be used to enter new contacts, change data in existing logged contacts, print lists of DXCC, WAS and WAZ award status, print QSL strips and view past contacts in several different formats. *Contest*, as its name implies, is a contest-logging program that includes a scoring module called Scorer.

Logwrite, $24.95, Aerospace Consulting, PO Box 156, Gwynedd, PA 19436. *Logwrite* is a data-base program that allows the user to store all of the information that he/she desires pertaining to on-the-air contacts. Automatic time-and-date stamping of contacts is provided and the user can find information about previous contacts easily and quickly. In addition, its split screen provides a "scratch pad" that can be used as a simple word-processor to allow the user to copy code or take notes while keeping a log at the same time. The scratch pad has a 5-line display and a scrollable 400-line buffer.

†FBD & SASDM—formatted blank disk and self-addressed, stamped, disk mailer

ON-THE-AIR COMPUTER NETS

Ad Astra, "The Official Journal of the Atari Microcomputer Network," (c/o Gil Frederick, VE4AG, 130 Maureen St, Winnipeg, MB, Canada R3K 1M2) notes that the Atari Computer Users' Group meets Sundays at 1600Z on 14.325 MHz.

Amigan Beacon, "The Newsletter for Amateurs with an Amiga!" (c/o Kathy Wehr, WB3KRN, RD #1, Box 193, Watsontown, PA 1777) lists the following schedule for the Amigan Amateur Radio Group's AmigaNet: Sundays at 2300Z on 14.345 MHz, Tuesdays at 0000Z on 3882 kHz and Saturdays at 1600Z on 7170 kHz. A European version of the net meets on Saturdays at 0800Z on 7095 kHz.

Insight, "MacNet's International Amateur Radio Newsletter," (c/o John Seney, KB1HE, 144 Pepperidge Dr, Manchester, NH 03103) describes how Macintosh computer "netletters" are distributed via packet radio to each net member's home PBBS on a regular basis, typically once per week. To become a MacNet member (and get on the netletter distribution list), send a packet-radio message to KB1HE @ WB1DSW.

According to CompuServe's HamNet, the Tandy Radio Amateur Club (TRAC) net meets on Sundays at 1500Z on 28.320 MHz and on Mondays at 0200Z on 7294 kHz.

ORPHAN ASSISTANCE

QZX is still published on a monthly basis covering Amateur Radio and the following Sinclair computers: ZX80, Micro-Ace, ZX81, QL, Z88 and their Timex cousins TS1000, 1500 and 2068. Recent issues have described how to get Sinclair computers on packet radio. For further information, send an SASE to Alex F. Burr, K5XY, 2025 O'Donnell Dr, Las Cruces, NM 88001.

Bob Bailey, NØJHR, says that PC Enterprises (PO Box 292, Belmar, NJ 07719) has purchased all of the IBM PCjr computer stock and has developed expansion gear for the orphaned PC including add-on RAM and hard disk drives. Bob adds, "There are hundreds of PCjrs in the newspaper classified ads for $400 and under...these are really workhorses if you expand the memory to 256k."

HELP WANTED...

☐ Interfacing a Kenwood TS-830S transceiver to a Timex-Sinclair 1500 computer system. Bill Hagen, K4BWW, 1313 Aldridge Dr, Huntsville, AL 35803.

☐ Interfacing a Rockwell/Collins KWM-380 to a Commodore 128 computer with a 1571 disk drive. Ciano R.E. Strachan, C6ANI, PO Box N4106, Nassau NP, Bahamas.

The New Frontier

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

Laser Communication Range

You can estimate the range of a laser communications system using Fig 1. The graph is based on:

$$\text{range} = \sqrt{\frac{(P_\ell \times A \times T_a \times T_o \times 4}{D_s \times \pi \times \Theta^2}}$$

(Eq 1)

where

range is in kilometers
P_ℓ = laser power
A = area of receiving optics (lens or mirror)
T_a = transmissivity of the atmosphere
T_o = transmissivity of the receiving optics
D_s = detector sensitivity (minimum detectable signal)
Θ = beam divergence (in radians)

The graph shows the theoretical maximum communications range for a 1-mW HeNe laser operating at 6328 angstroms (Å) with a 1-mR beam divergence (0.001 radians), assuming minimal atmospheric absorption and scattering (visual range = 100 km—a *very* clear day) and average optics (T_o = 0.85).

The value of T_a is determined by a number of factors. First is the absorbance of the atmosphere. For these calculations, T_a was assumed to be negligible at a wavelength of 6328 Å. Second is scattering loss from two sources: the molecules in the atmosphere (Rayleigh scattering) and dust and moisture droplets in the atmosphere (Mie scattering). Both of these forms of scattering are wavelength dependent. The third factor that determines T_a is the path length over which the light travels. The transmissivity due to scattering loss is given by:

$$T_a = e^{-sd} \qquad \text{(Eq 2)}$$

where

e = 2.71828 (the base of natural logarithms)
s = the combined Rayleigh and Mie scattering coefficients (calculated to be 0.0327 km^{-1} for the stated conditions)
d = distance

In order to determine the range the transmissivity of the atmosphere is needed, and in order to determine the transmissivity, the range is needed! This conflict can be dealt with by a mathematical method of successive approximations; this technique was used to obtain the values shown in Fig 1. The effects of atmospheric turbulence have been omitted from these calculations. When present, turbulence can cause a reduction in received signal through a number of mechanisms, including beam steering, spreading and scintillation. These effects all reduce the potential range, and are minimized by the use of large-area receiving optics. Other effects are present in coherent-detection systems (homodyne or heterodyne detectors), but they will not be dealt with here, as all amateur work to date has used direct detection.

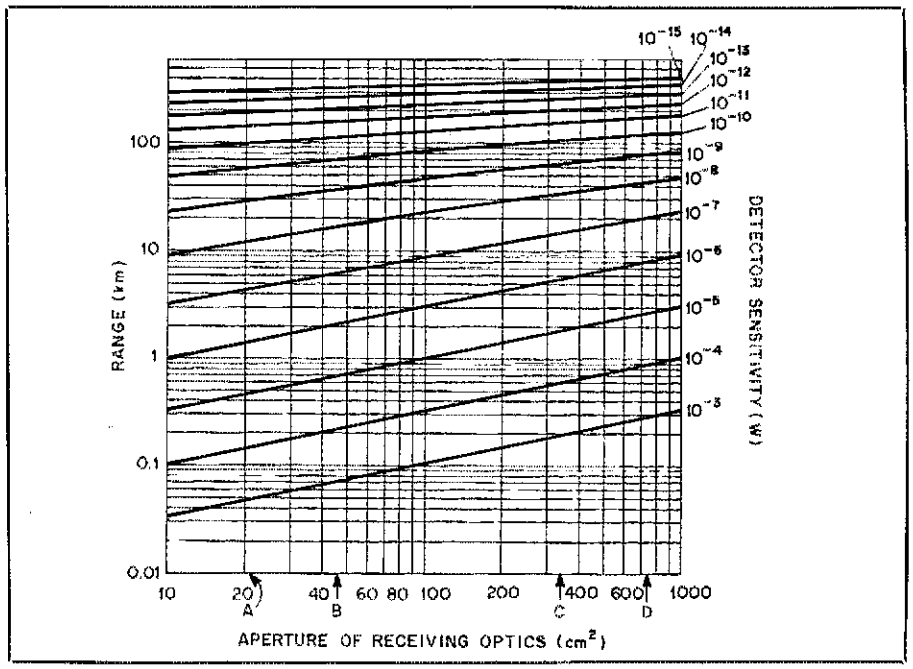


Fig 1—This graph can be used to calculate communications distances for HeNe lasers and combinations of optics and detector sensitivities. These range estimates are based on a 1-mH HeNe laser with a 1-milliradian beam divergence. Along the Aperture of Receiving Optics scale, A represents a 2-inch lens, B represents a 3-inch lens, C represents an 8-inch mirror and D represents a 12-inch mirror or a 10.5-inch-square Fresnel lens. See text.

Range is given for various detector sensitivities from 1 mW (10^{-3} W) to 10^{-15} W. To obtain the range for higher laser powers, read from a proportionally higher sensitivity curve, ie, for a 10-mW laser and a 10^{-6} W detector, use the range for a 10^{-7} W detector. For a different beam divergence, use the same technique. For example, for a system using a 10× beam expander, a 10× decrease in beam divergence is obtained. In this case read from a sensitivity curve which is the square of the relative beam divergence (10 × 10 = 100) times more sensitive (this comes from the Θ^2 term in Eq 1) than the actual detector sensitivity in use; ie, for a 1-mW laser with a 10× beam expander (and consequently 10× less beam divergence) used with a detector of 10^{-6} W sensitivity, read the range from the 10^{-8} W detector-sensitivity curve. For visible-light lasers other than HeNe (red), range will be less, because higher-frequency light (ie, more blue) will suffer more scattering loss.

The best detector systems (such as photomultipliers), operating under ideal conditions (no background light), can reach a detector sensitivity of 10^{-12} W. A typical photoDarlington transistor detector should be easily capable of a sensitivity of 10^{-7} W in an amateur system, and can probably do much better. The atmospheric transmissivity depends on atmospheric conditions and path length. For short (several-km) paths, T_a approximates to 1 under clear conditions. The transmissivity of the optical system depends on the quality of the optics. A typical value is around 0.85.

As you can see, using the very best detector, a 1-mW laser is capable of working the longest line-of-sight paths available. Even with a simple solid-state detector and small-aperture receiving optics (such as a 3-inch diameter lens, A = 43 cm^2) a range in the tens of kilometers is possible. It can also be seen from the graph that the best practical way to achieve maximum range is to develop the most sensitive detector system, because receiving-optics apertures of more than 1000 cm^2 are unwieldy (and expensive), and surplus lasers of more than 10 mW are hard to find, and potentially quite dangerous.

Anyone interested in the rather complex details involved in calculating scattering losses, please drop me a line at the address at the top of this column.

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

Amateur Radio on the Space Station: Whither Thee?

Since his days as a NASA astronaut, Dr Anthony (Tony) England, WØORE, has been one of the stronger proponents of building an Amateur Radio capability into the US space station's baseline design. Two recent events suggest we look again at the bold idea of integrating Amateur Radio with the US space station. These events are:

1. Amateur Radio activity from the *Mir* space station
2. Reactivation of the National Space Council by President Bush

Growing out of pioneering work done by Dr Owen Garriott, W5LFL, and later by Tony England, WØORE, aboard the shuttle *Columbia*, the idea of manned space operations from a long-duration platform such as the US space station seemed plausible to many. Although the shuttle missions of W5LFL and WØORE created great excitement and enthusiasm, and many hundreds of QSOs, they also generated a strong component of consternation and chagrin. The consternation resulted when thousands of would-be communicators cluttered every kilohertz of a segment of the 2-meter band hoping to be called by the astronaut. Chagrin was voiced by those who knew so much more could be done with this capability—not just short, excited QSOs. The project created a lot of heat, but somewhat less light. The shuttle was a start, but many reasoned that much more could be done.

Among those who first saw the US space station as the way to do it *right* were Tony England and former NBC science editor Roy Neal, K6DUE. Each was well situated to affect how NASA looked at incorporating Amateur Radio on the space station. Tony worked at the Johnson Space Center in Houston as Space Station Project Engineer, and could help from the inside to assure the idea got a thorough airing. Roy was well acquainted with working with the top NASA brass, having helped get the Garriott and England SAREX (Shuttle Amateur Radio Experiments) off the ground and into space.[1]

Although contacting an astronaut is truly an exciting, once-in-a-lifetime experience for many hams, the project planners and organizers wanted more to come from space-to-ground QSOs between astronauts and the populace. Tony, in particular, wanted to turn this excitement into lasting benefit. In the space station, he saw the potential to attract students and young folks and get them involved. Thus began the idea of using Amateur Radio on the space station to reach directly into the classroom, to use the prestige of the astronauts not only as a strong symbolic gesture, but to attract students to what could be a meaningful educational experience. It was thought that such meaningful experiences and powerful symbols could strongly and positively affect the career choices and dedication to studies of participating students, particularly in the fields of engineering, science and mathematics.

Almost as a backdrop to the continuing discussions on putting Amateur Radio on the US space station, the Soviets placed a 2-meter radio on their space station *Mir* late last year. Beginning in November, and for nearly a month, Musa Manarov could be contacted operating U1MIR[2] during crew recreation periods. Perhaps because the Soviet *Mir* activity was perceived to be open-ended, there was less urgency in getting a QSO *right then* and, by comparison to some earlier shuttle "radio riots," the *Mir* operation was a bit more subdued.

Although the *Mir* operation did improve

[1]Notes appear on page 76.

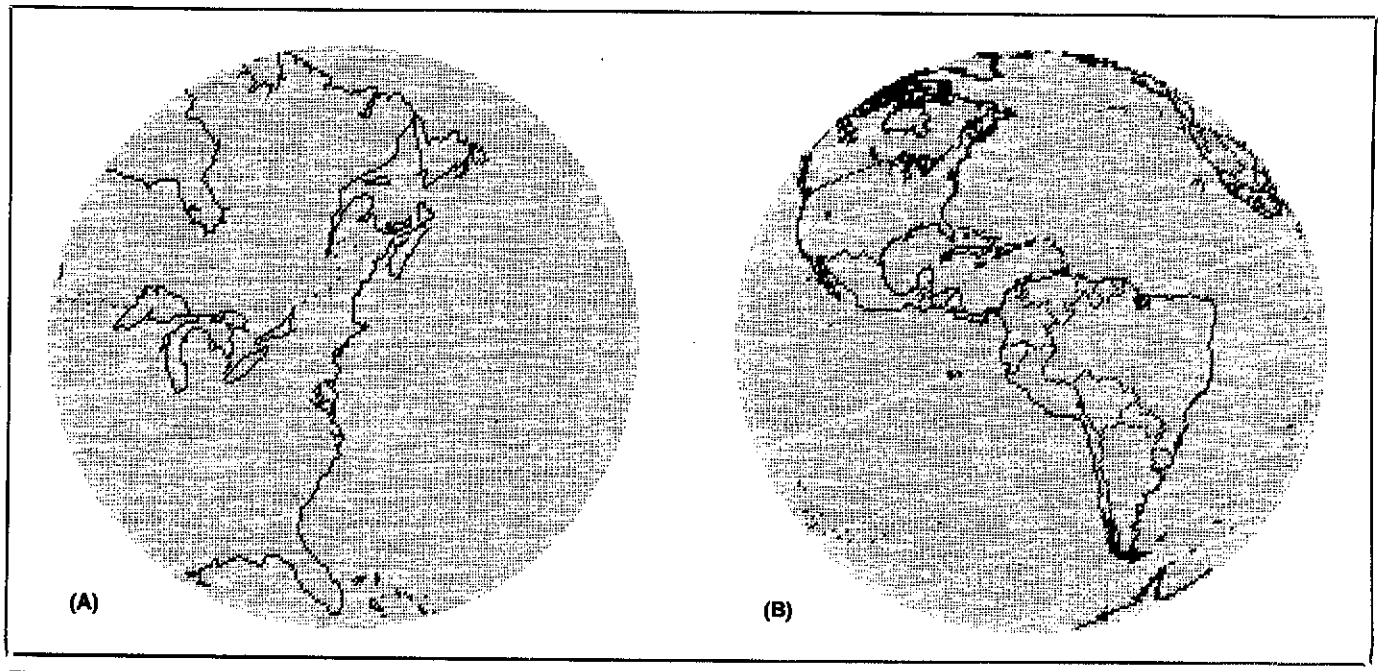


Fig 1—A comparison of the areas covered by a spacecraft—*Mir* on January 17, 1989—at shuttle altitude (A) with that of the area covered by geosynchronous satellites at a much higher altitude (B).

on SAREX in some ways, it did not begin to fulfill the mission envisioned by England and Neal for the US space station. *Mir*, in an orbit similar to the US shuttle,[3] passed overhead too quickly to allow meaningful exchanges between cosmonauts and students. Thus, it fell to the same people that make these events useful, if shallow, press opportunities.

The missing element, long-duration coverage, is waiting around the corner in a project called Phase 4. Phase 4 is an idea for an Amateur Radio geosynchronous satellite. It's a concept hatched by AMSAT a few years ago.[4] SAREX planners were quick to grasp Phase 4 as the answer to the coverage-time problem SAREX had, *Mir* has and the US space station would also have. The answer was simply to use Phase 4 as a relay platform between the space station and classrooms on the ground. Figs 1A and 1B contrast coverage areas between spacecraft at shuttle altitude and that of geosynchronous satellites.

The idea of a relay platform between the shuttle and the ground is not new. In fact, the Tracking and Data Relay Satellite System (TDRSS, often pronounced "teedriss") does exactly that for the shuttle and other low-orbiting spacecraft. From its geosynchronous vantage point, it relays signals between the low fliers and the earth. The problem is that the TDRSS requires very expensive equipment to use, and does not use Amateur Radio frequencies.

Using Phase 4, a dedicated Amateur Radio satellite, makes sense. Moreover, the advanced, high-speed, digital channel planned for Phase 4 would make it possible to include compressed video transmissions between the space station and the classroom. So, students could not only engage astronauts in conversation, but astronauts and students could *see* each other as well.

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.

How much of an effect this might have on their overall educational perspectives can only be surmised now. But as a father with school-aged kids, I have a feel for what will—and what will not—enthrall youngsters. The combination of Amateur Radio *and a chance to talk with astronauts aboard the US space station* is the right mix to work wonders in a classroom setting.

But, in order to be realized, the project must generate the required fiscal and political support within NASA and other government quarters. In particular, the project must be seen as supporting nationally recognized goals in several domains, including educational ones.

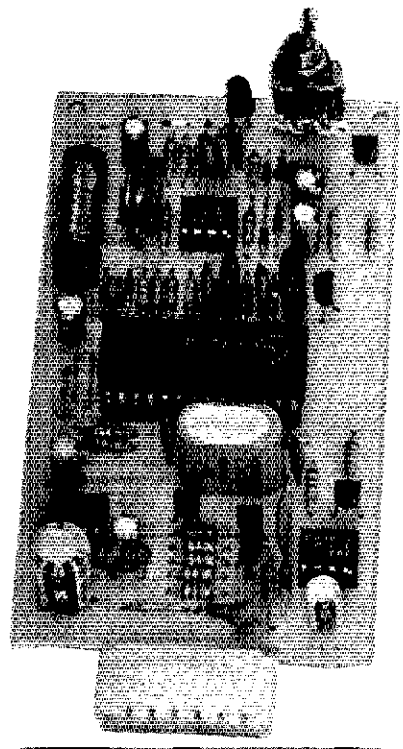
This is where the National Space Council may play a crucial role. Back in the early NASA days, the National Space Council coordinated US space policy under the leadership of the Vice President of the United States. It was, in fact, Vice President Lyndon Johnson, in his role as Chairman of the National Space Council, who helped convince President Kennedy to set the national goal of sending men to the moon in the 60s.[6] President Bush let it be known after his election that he intended to reactivate the council as a way of sorting out the complicated issues involved in prescribing a cohesive national space policy.

Every advocate of Amateur Radio on the space station should look at the reactivation of the National Space Council as an opportunity to present this exciting project to the leading policy makers in space matters. If astronauts reach out to students to inspire and motivate as WØORE and K6DUE envisioned, this nation will surely be the better for it.

Notes

[1]They worked with dozens of individuals to get the project onboard the shuttles.
[2]One of several call signs that were used from *Mir*.
[3]At about 220 miles, but having a higher inclination than most shuttles.
[4]King, Riportella and Wallio, "OSCAR at 25: Beginning of a New Era," *QST*, Jan 1987, pp 41-45.
[5]Geosynchronous altitude is 22,300 miles high.
[6]President Johnson (Vice President at the time) was also instrumental in getting a major NASA facility situated in Houston. Today, the famous Johnson Space Center (JSC), the lead NASA Center for manned space activities, bears the late President's name.

New Products



DIGICOM >64 AVAILABLE FROM *73* AUTHOR

☐ Barry Kutner, W2UP, produces a kit for the Digicom >64 TNC that he described in August 1988 *73 Magazine*. Kutner's units are based on the AM7910 modem IC and are designed for use with the Commodore 64™ and 128 computers. No alignment is necessary, and the units include a watchdog timer and reed-relay output. Digicom >64 units are available in two forms: PC board with kit of parts, program disk and documentation, $49.95; assembled and tested unit, including disk and documentation, $79.95. Add $2.50 for shipping and handling with each order. To order, or for more information, contact Barry Kutner, W2UP, 614-B Palmer Ln, Yardley, PA 19067.—*Rus Healy, NJ2L*

NEW HEATH CATALOG

☐ The ever-present Heath® Company has released a new catalog. In their Winter 1989 catalog, Heath gives descriptions and specifications for their line of audio, video, home-security, remote-control and Amateur Radio products. Heath's current Amateur Radio lineup includes HF transceivers (both kits and assembled versions), license-study courses, HF, VHF and UHF transceivers, an HF amplifier kit, QRP accessories, terminal-node controllers (two models), antennas and other accessories. For a copy of the Winter 1989 catalog, contact Heath Co, PO Box 8589, Benton Harbor, MI 49022-8589, tel 800-444-3284. —*Rus Healy, NJ2L*

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Department Assistant

A NO-CODE LICENSE: THE PRO...

☐ As those who know me will attest, there can be few amateurs more devoted to the love of and use of CW than myself. Yet, I feel that all amateurs would benefit from the creation of a code-free VHF license.

I have seen the experience of Amateur Radio in other countries, notably England, where the code-free license has greatly expanded the number of amateurs. A significant percentage of these license holders, having "tested the waters," go on to study the code and pass the exam for HF privileges.

In spite of initial reservations by many amateurs of the time, the creation of a Novice class license in the United States brought hundreds of thousands of new amateurs to our hobby over the years, including myself, injecting new life blood to a great hobby. A code-free VHF license could only duplicate the experience and would greatly benefit Amateur Radio.—*Bob Locher, W9KNI, Deerfield, Illinois*

☐ While at first blush, the idea of a no-code Amateur Radio license may not be very appealing to those of us who have had to pass a code test, the coming of such a license is probably inevitable. The world of communications no longer relies on CW as it once did.

WE5K, in December 1988 "Correspondence," makes a good point: if a VHF no-code license had been in place, by now there might have been enough operators on 220 MHz to have tipped the balance in favor of Amateur Radio.

Let's also look at the track record of other nations who have already adopted a no-code VHF license. Doing so will help us to take a less-emotional, better-informed approach toward whatever decision we finally reach.

If growth in Amateur Radio is what we want, a VHF no-code license may be the best way to achieve it.—*John Osborne, W1KFY, Winthrop, Maine*

☐ I belong to an Amateur Radio club that has about 70 members. Most all of the members are over 40; in fact, only two or three members are under 40 and the majority of the members are over 60. I don't know whether our club is representative of the Amateur Radio population in general, but if it is, it seems that we are in desperate need of young people... [As a matter of fact], I got my license when I was a teenager.

To attract a younger group of amateurs to our ranks, I think the no-code license is just the ticket. Now, don't get me wrong, I have nothing against CW, but let's leave CW to those who are interested in it!

Let's try to ensure that the parade of hams never ceases.—*Gerald E. Christen, W3EXD, Pittsburg, Pennsylvania*

☐ I wonder how many hams who are against a "no code" license ever operate on 220, 440, 902, 1296 MHz or up? Certainly political clout depends on numbers and saving our UHF bands will depend on using them. [The FCC claimed 220-222 MHz was underutilized.] A no-code, but not "no-exam," license for the UHF bands would make it easier to attract new hams.

At any rate, there will still be a big reserve of CW operators available for many years who can "get the message through when all else fails." I have been a ham since 1930 and have worked CW for many years. *It was great in 1930, but this is 1989.* If you like CW, fine, but let's face up to the changes that have taken place in communication. Put me down in favor of a no-code license.—*Hayes Steinhauser, W2DZ, Lincoln Park, New Jersey*

☐ I was pleased to read the large number of letters in January *QST* that support and applaud the continued use of CW... I was surprised that none of the correspondents addressed why code is required by all amateurs on all HF bands. I was expecting to see a well-thought-out discourse supporting its essential nature on 220 MHz or any frequency above the ITU regulatory 30 MHz cut off. I support its utility in certain cases regardless of band, but would prefer to see some license not requiring code proficiency with privileges starting somewhere above 30 MHz. It seems to me that a no-code license for some frequencies above 30 MHz does not have to detract from other licenses currently in existence.

Today, we seem to be attracting new hams primarily from the ranks of CBers. Wouldn't it be better to attract a potentially more technical group to Amateur Radio? The people that I would like to see targeted are the newly trained electronic engineers, communications majors, communications technicians or other technically oriented groups that already have an interest in communications. The self-directed diligent learner who finds fault with learning a language that is becoming archaic in the commercial world (ie CW) may associate code with Tesla coils and spark gaps. These people may not be interested in committing any time to learning code and they don't always appreciate it as an art form, but they would still be people who would benefit the amateur community through their involvement in Amateur Radio.

I enjoy code and, of all the ARRL's organized operating events, Straight Key Night is my favorite. I still have an old Lysco key just for that purpose!—*Terrence R. Redding, WB5LMJ, Lawton, Oklahoma*

☐ I have read with interest the editorial in the January 1989 issue of *QST*. Hams should always be free to operate CW in any part of any ham band because "we enjoy it." Should basic Morse code ability be a prerequisite for each and every radio amateur, irrespective of their interests? I would like to offer comments in answer to that question.

As a ham and a member of ARRL of long standing, I would recommend the following. We need to attract many, many, more qualified young people into the hobby in order to justify and defend our frequency allocations into the future. We should do whatever is necessary to attract some of the hoards of young electronics and computer scientists and engineers who are put off by the present code requirements.—*James E. Taylor, W2OZH, Webster, New York*

☐ The threats to our VHF/UHF range are not "potential" in any sense; they are real and here today. Consider, for example, High-Definition Television (HDTV). The FCC is currently considering different standards for HDTV, but all will need significantly more frequency bandwidth than current systems. The demands of public-service and business users will surely grow, and we're still in the infancy of cellular telephony. Commercial satellite bands are getting full, and there have been proposals for direct broadcasting from satellites and another radio broadcasting band in the VHF/UHF range.

It does no good to act as if our frequencies are our property; by law, the radio spectrum belongs to all the people and our allocations are "on loan." *If we don't use and occupy a band, we'll lose it to those who will.*

I'm proud of the CW skill that enabled me to get my Extra Class license, and I support licensing incentives, yet I don't think that CW is the most important skill for an amateur, or even a very significant one these days.

Yes, I've heard all those arguments about CW being able "to get through when all else fails." And please don't trot out that tired cliche about CW keeping out the riff-raff. Take a listen to 75 meters this evening or to some repeaters. Those amateurs who were deliberately QRMing the Hurricane Gilbert emergency nets had

all demonstrated at least 13-WPM ability!

The attachment many hams have for the code requirement even at VHF/UHF is more sentimental and emotional than rational. If we persist in keeping it as a requirement for any license, our numbers will continue to stagnate and age. Eventually, the FCC may do the same thing to much of our VHF/UHF frequencies that they did to 220-222 MHz.

I am only 36 and owe a lot to Amateur Radio. I want to still be enjoying it 30 years from now. If we once again reject no-code licensing, I'm afraid the Amateur Radio of the year 2020 will only be a skeleton of what it is today—and, for that matter, so will our League.—*Harry L. Helms, AA6FW, San Diego, California*

AND THE CON...

☐ I would like to say that I am against no-code for several reasons. Number one is the simple fact that all of us have worked hard for what we received. We didn't just go out there and get our tickets without a struggle. The way I see it, if I had to work for it, then so should anyone else that wants it. Number two is that if you make it so easy for someone to get his ticket, then what is going to stop these people from wanting to push for more privileges?

Remember what happened to CB? With steady deregulation, look at it now. CB used to stand for Citizen's Band, but now it stands for "Chicken Band." Let's leave Amateur Radio, Amateur Radio. We are a small elite group and we have a heritage to be proud of.—*Mike Kelly, N4RXC, Midway, Georgia*

☐ I find it annoying that the no-code issue has been resurrected again and that we are spending time listening to yet another replay of the same arguments that were presented in the past. Let me make it very clear that I like Amateur Radio pretty much the way it is. If anything, I'd like to see it get better, not necessarily bigger, and I strongly favor Morse Code as part of the licensing requirement.

I propose the following solution to end the latest no-code debate which seems to be so fervently pursued largely by those forces who would like to sell more products, more subscriptions and more services to the amateur community. Our neighbor, Canada, will adopt by the end of the year some form of no-code license for VHF/UHF operation. Canadian Amateur Radio is very similar to US Amateur Radio. I propose that we wait at least five years, or however long it might take, to draw some clear conclusions on the impact of no-code on the Canadian Amateur Radio Service.

At the end of that period we might find that the Canadian decision accomplishes all of the good things that our no-code proponents promise—more new hams, more trained operators with advanced skills and knowledge, a higher-quality hobby and service. If this should be true, we can proceed with a thorough study of how we might implement a similar plan.

Or, we might find that the Canadian decision simply lured some loonies into the Canadian amateur service and degenerated that service into the bedlam of CB. If this should be true, we can be grateful for not having made the same devastating mistake. Amateur Radio took nearly 100 years to evolve into what it is today. Watching the Canadian experiment for five years probably won't hurt anything but commercial interests.—*Richard Steck, W9RS, Lake Forest, Illinois*

☐ My feelings toward mandatory code are generated by my own experience. When I got my General, I had every intention of learning 13-WPM so I could pass and then forget the key forever. At the slow speed I could copy, I found CW painful at best. But I was forced to learn it—and I (reluctantly) tried using it. With a little use, the speed rapidly increased and I found that at decent speed, CW was a very pleasant mode.

I do not oppose no-code because I was forced to learn CW. I oppose it because the compulsion of learning CW at the start introduced me to a mode that I later found useful and enjoyable. There are those who learn the code, try it and find they do not like it. But at least they have been exposed and could make an informed choice. With no-code, there could be few informed choices.—*David L. Heller, K3TX, Morrisville, Pennsylvania*

☐ Considering the attitudes of present FCC personnel, it is probably inevitable that at some time in the future, we will have a no-code license forced upon us. If that be the case, then I suggest that an exam in digital communications techniques be required and that their operating privileges include all modes above 220 MHz.

On a related subject, to those who claim that some people cannot learn code, I say balderdash! I have been teaching code to Novice applicants for the past two years. Class size averages thirty. Ages run from 10 years old to 70 years old. In that time, there has only been one who failed to pass the code test and he admitted that he had failed to practice. We have found that if they have the motivation, they will master the code.

If you get the impression that I am opposed to no-code licenses, you are correct. I am. "Code will get through when other modes will not."—*Joe Phillips, W2DHV, Rochester, New York*

USA, USSR AND HAM RADIO

☐ We, the members of a newly formed informal club of Volgograd City, USSR, would like to suggest the following to your readers.

Our ham club would like to devise and implement an exchange of groups between the American and Soviet sides sometime in 1989 or 1990. We would welcome an American group here and would provide housing accommodations, travel arrangements and cover our guests' personal expenses. We are also ready to discuss any itinerary—be that a DXpedition anywhere in the USSR, joint Amateur Radio conference, enhancement of personal contacts or even a scientific research project. Another idea that we have would be to organize a summer camp for American children and make their stay interesting and rewarding, and ham radio would be included.

The year of 1989 marks the 400th anniversary of the city of Volgograd, so a visit by Americans, aside from being a part of festivities, would have a symbolic meaning as well. If our American guests can come and stay here in 1989, then Volgograd (formerly Stalingrad) amateurs can visit the United States the following year.

We welcome any ideas and hope that any prospective American counterpart can reciprocate in kind. Our address is: Radioclub "Peleng", PO Box 1601, 400002 Volgograd-2, USSR. With great respect and best wishes to you and your readers. —*Anatoly Tsilibin, Club Chairman, Volgograd, USSR*

PRESERVE AMATEUR RADIO

☐ Amateur Radio is of great service to the nation in so many ways—the enthusiasm it arouses in youths for electronics, the adherence of commercial people as to its standard, the geography lessons learned and much more—and amateurs have played an important part in the development of electronics in general such that we should support our spectrum by using it!—*Arpard A. Fazakas, W2FLT, Bridgewater, New York*

IS QRO ALWAYS BEST?

☐ I have been on the bands only a short time, but there is a common practice that is spoiling my fun. How many times have you been part of this conversation?

Bob says, "Well Jim, your signal is down tonight, you're only 20 over."

Jim says, "Yeah, this linear isn't working too well in this wet weather. You're still 40 over, Bob, but Jack's way down in the mud; he's only 5 dB over 9."

Jack says, "That's because this old linear only puts out 800 watts. Say, do you guys hear that lid up 5 kHz? He's splattering all over. It's a good thing we only live ten miles apart or we'd have to run some serious power to get through over that."

Sound familiar? People that live in the same town don't usually need to run a linear at full output. Please, cut back on power when you can; it will make the bands more of a pleasure for us all.

Of course the furnace is going to run a little more often with that linear off, but the light bulbs will probably burn brighter! —*Sheldon Erickson, NØJIU, St Paul, Minnesota*

YL News and Views

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

XE1CI: A Public-Service Story—*Part 2*

Nellie Saltiel de Lazard, XE1CI's commitment to serving children at Children's Hospital de Mexico was somewhat limited during the years she was raising her three daughters. Although she continued to make weekly visits to the hospital, her time nonetheless focused on her immediate family. More time at home also meant a proximity to the radio station, and Nellie discovered the rewards and enjoyments of continued public-service work through Amateur Radio.

XE1CI became the first YL to be elected National Director of the Mexican National Emergency Net, a chapter of Liga Mexicana de Radio Experimentadores, which is dedicated entirely to coordinating emergency communications when commercial communications fail and/or when human health or life are jeopardized.

"I became the National Director after a long period of being substitute regional director," said Nellie, "and during my administration I devised a filing system with cards, credentials and photographs of those who were active in the net. It was also at this time that we started the so-called 'Road Runner Operation.' Volunteers would cruise on the central turnpikes and main roads, using the newly born FM repeaters to help those in need of assistance, mechanical or otherwise."

During the period when Nellie was Assistant General Director of the Emergency Net, the Managua earthquake hit. XE1IJ was sent to Nicaragua by the Mexican President in 1971 to set up an emergency communications system. He was followed by other Mexican amateurs, as well as the IARU Region 2 President. "The plan was that these amateurs would help Nicaraguan amateurs resurrect their radio stations as well as set up equipment donated by the IARU. In Managua, the local broadcasting station, which miraculously survived the quake, announced that incoming and outgoing communications would be handled by a Mexican Amateur Radio team. We worked day and night to bring messages and help those affected by the catastrophe."

Three years later, XE1CI assisted the survivors of the Guatemalan earthquake. "After our success in Nicaragua and our common language, it was only natural that Mexican amateurs would be ready to help their neighbors. I was assisted by several Mexican amateurs. Together we located relatives, food, medical supplies and, of course, handled traffic for the Red Cross and government.

"It is impossible to remember all the hurricanes, floods, air and sea vessel locations and emergencies I have worked on over the years. There were so many procedures and protocols I had to become familiar with in order to direct the Emergency Net."

One of the worst earthquakes in world history struck Mexico City on September 19, 1985. "My first reaction was to respond outside Amateur Radio operation, so I purchased two large bags of bread and took them to the Mexican Red Cross headquarters. I stayed there for several hours working with the Cardinal and Archbishop of the Mexican Catholic Church as well as various Red Cross personnel. Long-distance telephone service broke down, and, as one might expect, Amateur Radio stepped in."

Today, in the Liga Headquarters, there is a document which reports over 300,000 QSOs logged during the disaster. Nellie and Amateur Radio colleagues were honored by the Mexican Congress, which gave the Aztec Eagle award, the country's most important civilian award, to Liga Mexicana de Radio Experimentadores.

XE1CI's world seemed to crumble when in the course of three years, her husband, father and brother died. "I had to take care of my brother's children, my mother and my three daughters. Suddenly, I found myself in charge of two textile mills, an office building and a curtain business. I was filled with fear and apprehension in having to assume such huge responsibilities. I had to manage all those businesses as well as be the head of the family. Luckily, the mill had wonderful employees. I went to school nights for two years to learn how to become a manager. The businesses already had a good system in place, so I used my common sense and established good human relations with my workers and customers. I made it! Now after 13 years, I am beginning to see the light again."

Due to family responsibilities and business commitments, XE1CI was not active for several years. "I did not have enough time to be on the air," recalls Nellie, "but when I did take a few moments to be in the shack, it gave me the breath to keep on living. Being an Amateur Radio operator all these years has given me the opportunity to have unique and really very special friends. Without their friendship, patience and support, I do not know what would have become of my life. Thanks to all of them, I am a better and more useful person."

DX YL TO NORTH AMERICAN YL CONTEST

Sponsored by YLRL

CW: Starts Apr 12, 1989 at 1400 UTC—Ends Apr 14, 1989 at 0200 UTC.

Phone: Starts Apr 19, 1989 at 1400 UTC—Ends Apr 21, 1989 at 0200 UTC.

Eligibility: All licensed women operators throughout the world are invited to participate.

Procedure: DX YLs call CQ NORTH AMERICAN YL and NA YLs call CQ DX YL.

Operation: All bands may be used. No cross-band operation. Net contact, repeater contacts and contacts with OMs do not count. Stations may be worked and counted once on each band and mode. Participants may work only 24 hours of the 36 hours in each contest. Operating breaks must be indicated in the log.

Exchange: Station worked, QSO number, RS(T), state/province/country. Entries in log must also show time, band, date and transmitter power.

Score: Phone and CW will be scored as separate contests. Submit separate logs for each contest. DX YLs, including Hawaii and Alaska, may contact all the North American continent which includes the 48 contiguous states and Canadian provinces. Contestants on the North American continent (including the 48 contiguous states and Canadian provinces) may contact DX YL stations including Hawaii and Alaska. A station may be counted once on each band for credit and one (1) point is earned for each station worked once on each band. Multiply the number of QSOs by the number of different states/provinces/countries worked. A multiplier is counted only once in the contest; it is not counted on each band. Contestants running 150 W or less on CW and 300 W PEP or less on SSB at all times may multiply the results by 1.25 (low-power multiplier).

Logs: All logs must show your state/province/country to qualify for awards. For each QSO, logs must show the station worked, QSO number given and received, RS(T) given and received, country/state/province of station worked, time, band and date. Logs must also state the power output used and the operating breaks taken. If you have 200 or more QSOs, submit a separate log for each band and a dupe sheet. Do not send carbon copies of logs. Please print or type. Logs must be signed by the operator and no logs will be returned. Remember to file separate logs for each contest. Logs must show claimed score and be postmarked by May 2, 1989 and received no later than May 25, 1989, or they will be disqualified. Awards will be issued. Mail logs to Vice President YLRL, Carol Shrader, 4744 Thoroughgood Dr, Virginia Beach, VA 23455 USA.

Duplicates: For each duplicate contact that is removed from the log by the Vice President, a penalty of three (3) additional and equal contacts will be exacted.

Suggested Frequencies: CW: 80 meters—3.540-3.570; 40 meters—7.040-7.070; 20 meters—14.040-14.070; 15 meters—21.180-21.200; 10 meters—28.180-28.200. SSB: 80 meters—3.940-3.970; 40 meters—7.240-7.270; 20 meters—14.280-14.310; 15 meters—21.380-21.410; 10 meters—28.580-28.610.

Note: Since band allocations in other countries are often different than the US, North American YLs should look for DX YLs in other parts of the bands, especially on 80 and 40 meters.

Coming Conventions

ARKANSAS STATE CONVENTION

April 8, North Little Rock

The Arkansas State Convention will be sponsored by the Central Arkansas Radio Emergency Net Inc. It will be held at the Community Center at the corner of Pershing Blvd and Willow St. Doors will be open from 8 AM-8 PM. Admission is $3. Features will include forums, Boat Anchor Inn buffet. Talk-in will be on 146.34/94. For more information contact Dale Temple, W5RXU, 1620 Tarrytown, Little Rock, AR 72207, Tel (N) 501-225-5868

ALABAMA STATE CONVENTION

May 6-7, Birmingham

The Alabama State Convention will be sponsored by the Birmingham ARC. It will be held at the Birmingham-Jefferson Civic Center. Doors will be open Saturday 9 AM-5 PM and Sunday 9 AM-3 PM. Admission is $5. Features will include forums, dealers, flea market, refreshments, VE exams 8 AM Saturday, banquet Saturday night. Talk-in will be on 146.28/88. For more information contact Frank Blanchard, Jr, AA4LB, 3450 Kildare Dr, Birmingham, AL 35226, tel (D) 205-945-0901 (N) 205-979-4678.

March 31-April 2
Midwest Division, Kansas City, MO

April 7-9
North Florida Section, Orlando, FL

April 8
Arkansas State, Little Rock

May 6-7
Alabama State, Birmingham

May 19-21
Atlantic Division/New York State, Rochester, NY

May 20
Tennessee State, Knoxville

ARRL NATIONAL CONVENTIONS
June 2-4, 1989—Dallas/Fort Worth Texas
June 8-10, 1990—Kansas City, Missouri

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.

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.

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.

Arizona (Sierra Vista)—May 6-7. *Sponsor:* Cochise ARA. *Time*: 8 AM-6 PM both days. *Place*: CARA facility, 5 miles east of town on State Rte 90 and then 2 miles south on Moson Rd. *Features*: VE exams, free tailgating, refreshments, handicap facilities available. *Talk-in*: 146.52, 146.16/76. *Admission* free. *Contact*: Robert L. Hollister, N7INK, tel 602-378-3155 after 6 PM, or write CARA, PO Box 1855, Sierra Vista, AZ 85636.

Arizona (Tucson)—April 8. *Sponsor:* University of Arizona ARC. *Time*: 7 AM-12 PM. *Place*: parking lot at 6th St and Fremont Ave, take St Mary's Rd, exit off I-10, head east until 2 blocks past Euclid Ave. *Features*: refreshments, free parking. *Talk-in*: 146.22/82, 146.52. *Admission*: $3 vendors, browsers free. *Contact*: Lance Deaver, KAØYAC, 2801 N Oracle Rd, #523, Tucson, AZ 85705, tel 602-622-1660.

California (Fresno)—May 5-7. *Sponsor*: Fresno ARC. *Place*: Airport Holiday Inn. *Features*: Gordon West, WB6NOA, swap meet, tech talks, left foot CW contest, VE exams, luncheon ($8), exhibits. *Talk-in*: 146.34/94, 222.34/223.94. *Admission*: $5, students 18 and younger free, advance full registration $23. *Tables*: swap tables $10, free with full registration, exhibit tables $25 or free to clubs. *Contact*: reservations payable with check to FARC, PO Box 783, Fresno, CA 93712 postmarked by April 29; for information, John Morrice, WB6ITM, 209-226-7593.

†ARRL Hamfest

†**Colorado (Longmont)—April 2.** *Sponsor*: Longmont ARC. *Time*: 8 AM-3 PM. *Place*: Boulder Co Fairgrounds. *Contact*: Bob Dornan, WA2EKU, 1106 Fordham St, Longmont, CO 80501, tel 303-651-3613 or Ken Parker, WØONF, 1221 Aspen St, Longmont, CO 80501, tel 303-772-4719.

†**Connecticut (Southington)—April 16.** *Sponsor*: Southington ARA. *Time*: 9 AM-1 PM. *Place*: Southington National Guard Armory, exit 32 off I-84 in Southington, south on Rte 10, follow signs. *Features*: flea market, VE exams, refreshments. *Talk-in*: 146.28/88, 144.57/145.17, 222.68/224.28, 449.25/444.25. *Admission*: $2. *Tables*: advance $8, door $10, two persons admitted with each table purchased. *Contact*: Harold (Chet) Bacon, KA1ILH, 138½ Summit St, Plantsville, CT 06479, tel (D) 203-232-4561, (N) 203-628-9346.

Florida (Newberry)—April 22. *Event:* Second Annual Poor Man's Hamfest. *Time*: 7 AM-6 PM. *Place*: 1 mile west of red light in Newberry (State Rd 26) I-75 (15 miles from I-75). *Features*: free parking, tailgating, RV parking free (no hookups). *Talk-in*: 146.22/82. *Admission*: no advance, door $2. *Tables*: swap tables $2. *Contact*: Bob Hawkins, W4UZB, PO Box 399, Newberry, FL 32669, tel (D) 904-472-3590.

†**Georgia (Augusta)—April 22-23.** *Sponsor*: ARC of Augusta, GA. *Time*: Saturday 9 AM-5 PM, Sunday 8 AM-3 PM. *Place*: Hippodrome, 2 miles north of downtown Augusta on US 1. *Features*: in-park tailgating at no extra charge, on-site camper hookups, VE exams. *Talk-in*: 144.77/145.37. *Admission*: advance $3, door $4. *Contact*: Jim Abercrombie, N4JA, PO Box 5943, Augusta, GA 30906, tel 404-790-7802.

†**Georgia (Marietta)—April 8.** *Sponsor*: Kennehoochee ARC. *Time*: 9 AM-6 PM. *Place*: Cobb Co Central Park, 3 miles south of Marietta, 1 mile east of Powder Springs Rd, on Callaway Rd. *Features*: VE exams, forums, RTTY/packet station, R/C aircraft demo, dealers, flea market, refreshments. *Talk-in*: 146.28/88. *Admission*: advance $3, door $4. *Contact*: Charles Gibson, AA4VE, tel 404-943-1015.

Illinois (Sandwich)—May 7. *Sponsor*: Kishwaukee ARC. *Time*: 8 AM. *Place*: Sandwich Fairgrounds. *Features*: overnight camping without hookups. *Talk-in*: 146.13/73. *Admission*: advance $3, door $4. *Tables*: reserved tables are $5 in advance. *Contact*: Howard Newquist, PO Box 264, Sycamore, IL 60178.

†**Illinois (Sullivan)—April 16.** *Sponsor*: Moultrie ARK. *Time*: 7 AM. *Place*: Moultrie Co 4-H Grounds located 4 miles east of Sullivan, IL on the Cadwell Rd. *Features*: refreshments, VE exams will be given from 9 AM-noon (walk-ins welcome), bring copy of your license and one other form of identification, 610s should be completed in advance. *Talk-in*: 146.055/655, 444.275/449.275. *Admission*: $3 or 2 for $5. *Contact*: Ralph Zancha, WC9V, tel 217-873-5287, or write Moultrie ARK, PO Box 79, Sullivan, IL 61911.

Maryland (Baltimore)—April 1-2. *Sponsor*: Baltimore ARC. *Time*: 8 AM both days. *Place*: Maryland State Fairgrounds Exhibition Complex at Timonium, MD, located at I-83 exit 17, two miles north of I-695, just north of Baltimore. *Features*: large dealer display, indoor flea market in three exhibit halls, computer dealers, large outdoor flea market, refreshments, free parking (available before 8 AM), overnight accomodations are available through our accomodation center. *Admission*: $5 for both days, children under 12 free. *Contact*: GBH & C, PO Box 95, Timonium, MD 21093-0095, tel 301-HAM-FEST (24 hours a day).

Maryland (Westminster)—April 23. *Sponsor*: Summit ARA, Inc *Time*: dealer setup on Saturday. *Place*: Carroll Co Agricultural Ctr, located at the end of Smith Ave, off of Rte 32. The Ctr is located just south of Westminster, MD, 25 minutes from Baltimore. *Features*: free parking, large inside space, tailgating $5. *Admission*: no advance, at door $4, kids and XYLs free. *Tables*: $8. *Contact*: Tim, N3DRB, tel 301-992-7745, or write SARA, 5384

Harvest Moon Ln, Columbia, MD 21044.

Massachusetts (Braintree)—April 9. *Sponsor*: South Shore ARC. *Time*: vendors 9 AM, public 11 AM-4 PM. *Place*: Viking Club, 410 Quincy Ave. *Features*: free parking, refreshments. *Admission*: $1. *Tables*: 8 ft $10 each which includes 1 free admission per table only if paid for in advance before April 7 by sending appropriate amount to Hal Jones, WB1ABM, 48 Saning Rd, N Weymouth, MA 02191. Tables will cost $12 on the day of the sale. No guarantee of table space unless paid for in advance. Checks should be made payable to the South Shore ARC, confirmation of check receipt will be sent, no cancellation refund after April 7, tel Hal 617-335-5777.

Massachusetts (Cambridge)—April 16. *Sponsor*: MIT Radio Society and MIT Electronics Research Society. *Time*: setup 7 AM, public 9 AM-4 PM. *Place*: Albany and Main St. *Features*: computer and Amateur Radio flea market, free parking. *Talk-in*: 146.52, 444.725/449.725, PL 2A, W1XM/R. *Admission*: $1.50, sellers $6 per space at the gate, $5 in advance includes one admission. *Contact*: for space reservations tel 617-253-3776, or mail advance reservations before April 1st to Steve Finberg, W1GSL, PO Box 82 MIT Br, Cambridge, MA 02139.

Massachusetts (Wellesley)—April 30. *Sponsor*: Wellesley ARS. *Time*: 9 AM-2 PM. *Place*: Wellesley Senior High School parking lot at 50 State St, from Rte 9 or Rte 128 take Rte 16 (Washington St) west and turn left onto either State St or Rice St, and you are there. *Features*: refreshments, handicap accessible. *Talk-in*: 147.03/63 (Wellesley Repeater). *Admission*: $2. Contact: David Kent, N2AWG, 508-875-2126.

Michigan (Grandville)—April 1. *Sponsor*: STARS ARA. *Time*: 8 AM-2 PM. *Place*: Grandville High School Gymnasium, 3535 Wilson Ave SW. *Features*: refreshments, free parking. *Talk-in*: 144.67/145.27. *Admission*: advance $3, door $3.50. *Tables*: 1st table free, 2nd table $3. *Contact*: STARS, 1714 Havana SW, Wyoming, MI 49509, tel 616-243-1730.

Minnesota (Bemidji)—May 6. *Sponsor*: Paul Bunyan Radio Club. *Time*: 8 AM-4 PM. *Place*: VFW Club. *Features*: dealers, VE exams, flea market. *Talk-in*: 146.13/73. *Contact*: Robert W. Bitz, KAØKTB, 401 Roosevelt Manor, Bemidji, MN 56601, tel 218-751-8748.

†**Minnesota (Fergus Falls)—April 15.** *Sponsor*: Lake Region ARC. *Time*: setup will be on Friday at 4 PM, security will be provided for Friday night, there will be camping spots for Friday night only, Saturday 8 AM-2 PM. *Place*: Otter Tail Co Fair grounds-Hockey Arena, Hwy 59 SO. *Features*: packet meeting, Army MARS State Meeting, satellite meeting and demo, commercial dealers, flea market, refreshments, VE exams starting at 9 AM, send form 610, copy of original license or current information and check for $4.75 payable to ARRL/VEC to Tom Shubitz, Box 157, Fergus Falls, MN 56537. *Admission*: advance $3, door $4. *Tables*: 6 ft $4. *Contact*: Keith McKay, NØFKF, Rte 1, Box 46, Battle Lake, MN 56515, tel 218-826-6274.

†**Nebraska (So Sioux City)—May 5-6.** *Sponsor*: 3900 Club Inc and Sooland ARA. *Time*: all day Friday and Saturday. *Features*: Get-acquainted dinner Friday night, banquet Saturday night, QCWA luncheon, several forums. *Talk-in*: 146.37/97. *Admission*: $6. *Contact*: Dick Pitner, WØFZO, 2931 Pierce, Sioux City, IA 51104, tel 712-258-1520.

New Hampshire (Contoocook)—April 30. *Sponsor*: Contoocook Valley RC. *Time*: 6 AM-3 PM. *Place*: 10 miles northeast of Concord, NH off Rte 89, travel 1 mile east from exit 7. *Features*: tailgating, flea market. *Talk-in*: 146.295/895. *Admission*: public $1, sellers $6. *Contact*: Dave Perrin, K1OPQ, 603-746-5090.

New Hampshire (Hudson)—April 15. *Sponsor*: Interstate Repeater Society. *Time*: setup 7 AM, public 9 AM. *Place*: Lions Club Hall. *Features*: flea market. *Talk-in*: 146.25/85, 222.86/224.46. *Admission*: no advance, $2 at door. *Tables*: $10 each. *Contact*: Wayne, KA1MKH, tel 603-895-9033 or Chan, KA1OU, tel 603-497-4333.

†**New Jersey (Flemington)—April 15.** *Sponsor*: Cherryville Repeater Assn II Inc. *Time*: 8 AM-5 PM. *Place*: 1 mile north of 202/31 Circle, Rte 523 at Hunterdon Central High School Field House. *Features*: VE exams, refreshments. *Talk-in*: 146.52, 147.975/375. *Admission*: advance $4, door $5. Contact: Marty Grozinski, NS2K, 6 Kirkbridge Rd, Flemington, NJ 08822, tel 201-788-4080.

New Mexico (Las Cruces)—April 29-30. *Sponsor*: Mesilla Valley RC. Time: 9 AM-4 PM both days. *Place*: Dona Ana Co Fairgrounds. *Features*: refreshments, forums, VE exams, RV parking, dealers, flea market. *Admission*: $5. *Tables*: inside $6. *Contact*: Joe Herring, WI5E, PO Box 234, Organ, NM 88052, tel 505-382-5629.

New York (Auburn)—April 22. *Sponsor*: Auburn ARA. *Time*: 8 AM-4 PM. Place: Aurelius Fire Dept on Webster Rd, 1 mile west of the Finger-Lakes Mall off Rtes 5 and 20. *Contact*: Auburn ARA, c/o James P. Nash, N2DTG, 114 Dunning Ave, Auburn, NY 13021.

New York (Owego)—May 6. *Sponsor*: Southern Tier ARC. *Place*: Tioga Co Fairgrounds (Marvin Gardens), Rte 17C at exit 64. *Features*: VE exams, vendors, flea market. *Talk-in*: 146.16/76, 146.52. *Admission*: $4, under 14 free. *Contact*: send SASE to STARC, PO Box 7082, Endicott, NY 13760.

†**North Carolina (Raleigh)—April 16.** *Sponsor*: Raleigh ARS. Time: 8 AM-4 PM. Place: Jim Graham Building, NC State Fairgrounds, Hillsborough St. *Features*: refreshments, forums. *Talk-in*: 146.04/64, 146.28/88. *Admission*: advance $4, door $5. Contact: Rollin Ransom, NF4P, Rte 5, Box 267, Zebulon, NC 27597, tel 919-269-4406.

Ohio (Dayton)—April 28-30. *Sponsor*: Dayton HamVention.® *Time*: starts noon Friday, and continues all day Saturday and Sunday. *Place*: HARA Arena and Exhibition Ctr. *Features*: giant 3-day flea market, technical, ARRL and FCC forums, new products, special group meetings and much more. Admission: advance $10, door $12. *Banquet*: advance $20, door $22. *Flea market*: (max 3 spaces), $25/1 space, $50/2 adjacent, $150/3 adjacent, (valid for all three days). *Contact*: send checks for advanced registration to Dayton HamVention, Box 2205, Dayton, OH 45401; for general information tel 513-433-7720.

Ohio (Dayton)—April 29. *Sponsor*: Miami Valley FM Assn. *Time*: 7 PM. *Place*: Conference Center (Madison Room) of the Hara Arena and Conference Center (same location as the HamVention). *Features*: refreshments. *Admission*: free. *Contact*: Miami Valley FM Assn, PO Box 263, Dayton, OH 45401.

†**Ohio (Madison)—April 2.** *Sponsor*: Lake County ARA. *Time*: setup 5:30 AM, public 8 AM-3 PM. *Place*: Madison High School, Burns and Middle Ridge Rds, exit 212 off I-90 and follow signs. *Features*: flea market, commercial vendors, refreshments, VE exams. *Talk-in*: 147.81/21, 222.90/224.50. *Admission*: advance $3, door $4. *Contact*: Roxanne, 7803 Skylineview Dr, Mentor, OH 44060, tel 216-953-9784.

Ohio (North Olmsted)—April 23. *Sponsor*: North Coast ARC. *Time*: 10 AM-2 PM. *Place*: North Olmsted Community Cabin, 28114 Lorain Rd the cabin is between West Park and East Park Dr, south of Lorain. *Features*: refreshments, Findley State Park on State Rte 58 south of Wellington has a campground (no hookups). *Talk-in*: 144.69/145.29, 223.24/224.84. *Admission*: $2, no advance tickets. *Tables*: 8 ft table is $5, 6 ft table is $3, dealers should reserve tables before April 13th. *Contact*: Dan Sarama, KB8A, 15591 Rademaker Blvd, Brookpark, OH 44142, tel 216-267-5083 or Pauline Wells, KA8FOE, 5755 Burns Rd, North Olmsted, OH 44070, tel 216-779-8999.

Oklahoma (Lawton)—April 15. *Sponsor*: Lawton-Fort Sill ARC. *Time*: 8 AM-5 PM. *Place*: County Fairgrounds. *Talk-in*: 147.39/99. *Admission*: no preregistration necessary except for table space. *Contact*: Claude R. Matchette, 3411 NW Atlanta Ave, Lawton, OK 73505, tel 405-357-5870.

Oklahoma (Mooreland)—April 1-2. *Sponsor*: Great Plains ARC. *Time*: Saturday 1 PM, Sunday 9 AM. *Place*: North on Main or Elm St, across tracks and West. *Features*: basket dinner at 1 PM Sunday, VE exams at 2 PM Saturday, local campsites. *Talk-in*: 147.72/12 and 146.52. *Admission*: $3 for both days. *Tables*: dealer and swap tables available at no charge. *Contact*: Gerald Bowman, WG5Z, Box 356, Mooreland, OK 73852.

†**Pennsylvania (Lebanon)—April 16.** *Sponsor*: Appalachian Amateur Repeater Group. *Time*: set up 6 AM, public 8 AM. *Place*: Lebanon Co Fair Exhibit Building, south of Lebanon, *5 miles off Rt* 72, 1 mile from tpk exit 20. *Features*: new and used equipment, refreshments, VE exams (10 AM, preregistration only), plenty of parking, handicapped accessible. *Talk-in*: 146.04/64, 146.52. *Admission*: $3. *Tables*: w/electricity $5, w/o electricity $3. *Contact*: Homer Luckenbill, WA3YMU, 105 Walnut Pine, Grove, PA, 17963, tel 717-345-3780.

†**South Carolina (Greenville)—May 6-7.** *Sponsor*: Blue Ridge ARS. *Time*: Saturday 8 AM-5 PM, Sunday 8 AM-3 PM, (early setups with advance registration). *Place*: American Legion Fairgrounds on White House Rd. *Features*: refreshments, VE exams (walk-ins), flea market, camping, free parking. *Talk-in*: 146.01/61. *Admission*: advance $4, door $5. *Contact*: send SASE to Blue Ridge ARS, PO Box 6751, Greenville, SC 29606, tel (D) 803-255-7316, (N) 803-243-4213.

Tennessee (Clarksville)—April 8. *Sponsor*: Clarksville Amateur Transmitting Society. *Time*: setup 6-8 AM, public 8 AM. *Place*: National Guard Armory, Hwy 41A North. *Features*: VE exams. *Talk-in*: 147.39/99, 146.805/205. *Admission*: no advance, $2 at door. *Tables*: $8. *Contact*: Lucky, KF4L, tel 615-647-7804.

Tennessee (Clinton)—April 15. *Sponsor*: Oak Ridge ARC. *Time*: 8 AM-5 PM. *Place*: National Guard Armory. *Features*: flea market, outside tailgating $3 per setup, refreshments, new and used equipment dealers, VE exams (10 AM, you must preregister before April 15, you will need a check for $4.75 made payable to WCARS/VEC, a copy of your license along with a completed form 610; mail it to Ray Adams, N4BAQ, 4325 Felty Dr, Knoxville, TN 37918). *Talk-in*: 146.28/88, 146.37/97. *Admission*: $3. *Tables*: inside $6 per 8 ft table. *Contact*: Gene Muncy, KB4UMM, Rte 8, Box 539, Powell, TN 37849, tel 615-945-5349.

Tennessee (Columbia)—April 16. *Sponsor*: Maury ARC. *Time*: 8 AM-4 PM. *Features*: refreshments. *Talk-in*: 147.72/12. *Admission*: no advance, at door $2. *Tables*: $8 (8 ft each). *Contact*: Steven C. Foster-chairman, WB4IPG, (D) 615-380-0105, (N) 615-380-2950.

Texas (Angleton)—April 8. *Sponsor*: Brazosport ARC. *Time*: 8 AM-4 PM. *Place*: Brazoria Co Fairgrounds Auditorium, south of SH35 on FM521. *Features*: swapfest, refreshments. *Talk-in*: 147.98/38. *Admission*: no advance, door $1. *Contact*: Brazosport ARC, PO Box 291, Lake Jackson, TX 77566, tel 409-265-6439.

†**Washington (Spokane)—April 15-16.** *Sponsor*: Spokane Radio Amateurs, Inland Empire VHF Radio Amateurs, Lillac City 10-X, NW Tristate Amateurs. *Time*: Saturday 9 AM-5 PM, Sunday 9 AM-3 PM. *Place*: take any Altamont exit from I-90 to E 2200 Sprague Ave. *Features*: VE exams, commercial exhibits, dinner dance Saturday night, forums, swap tables, ample parking. *Talk-in*: 146.28/88, 144.83/145.43, 146.52. *Admission*: advance $5 both days, door $3 each day. *Contact*: Ivan Brown, KF7PU, W 728 Spofford, Spokane, WA 99205, tel 509-328-7961.

†**West Virginia (Charleston)—April 15.** *Sponsor*: Tri-Counties Ham Club and Kanawha ARC. *Time*: 9 AM-4 PM. *Place*: Charleston Civic Center. *Features*: walk-in VE exams, flea market. *Admission*: $5. *Tables*: $6 each and ac power is $12. *Contact*: for dealer and flea market information write PO Box 1694, Charleston, WV 25326 or tel Bill Hunter, K8BS, at 304-744-2650 or Lovell Webb at 304-342-7247. For other information write PO Box 9076, So Charleston, WV 25309, or tel Doug Sweeney at 304-766-6655.

†**Wisconsin (Cedarburg)—May 6.** *Sponsor*: Ozaukee RC. Time: sellers setup at 7 AM, public 8 AM-1 PM. *Place*: Circle B Recreation Ctr, Hwy 60, (located 20 miles north of Milwaukee). *Features*: refreshments, free parking, VE exams will be given between 8 AM-10:30 AM; to preregister, send a postcard with your name, call, address, telephone number and license exam elements desired to Badger Examiners, c/o Gary Sharbuno, WA9UJK, 5119 W Willow Rd, Brown Deer, WI 53223, tel 414-466-5379 (bring an original plus a copy of your current ham license and another form of ID). *Talk-in*: 146.37/97 and 146.52. *Admission*: advance $2, door $3. *Tables*: 4 ft, $2 each in advance only. *Contact*: send business-size SASE to ORC SWAP-FEST, N5415 Crystal Springs Ct, Fredonia, WI 53021.

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

W1APM, George M. Woodman, Jr, North Haven, ME
W1ASO, George Grosner, Stratford, CT
KA1CPU, Robert P. Burns, Ridgefield, CT
W1CVD, Arthur G. Raymond, Albuquerque, NM
W1DNO, Noel Dale, Lexington, MA
K1HYQ, Richard A. Darling, New London, CT
K1JLW, Thomas J. Griffin, Jr, Ipswich, MA
W1LPF, Carroll M. Collamore, Clinton, MA
W1MYD, Elwood N. Danforth, North Haverhill, NH
W1UM, Thomas C. Bracken, Carlisle, MA
K1VPK, Salvatore H. Impellitteri, Middletown, RI
K1ZTO, Arvey H. Linda, West Roxbury, MA
W2DAN, George F. Wessell, Buffalo, NY
WB2GCE, Fred C. Grafing, Bellmore, NY
N2HHH, Bernard D. Loughlin, Trotters Ridge, NC
K2OXJ, Edward A. Smith, Penn Yan, NY
KA2WXF, William Bernroth, Honesdale, PA
WB3BBW, Mary G. Thome, Horsham, PA
W3CMA, Anthony J. Sarli, Tamaqua, PA
K3SVU, Robert C. Swengel, Sr, York, PA
K3VPE, Vernon Baum, Shohola, PA
WA4CRG, George B. Earl, Holiday, FL
KC4DUJ, Robert J. Russell, Wilmington, NC
W4JOZ, Chad H. Richards, Valparaiso, FL
WB4LKL, Bennie E. Durham, Sr, Madison, AL
WA4MYP, Joseph S. Burk, Doraville, GA
WB4NJM, David M. Weeks, Ocala, FL
W4NKG, Robert H. Levine, Mc Lean, VA
W4NXV, James R. Gordon, Wenatchee, WA
KB4OPK, Otto A. Krantz, Jr, Seminole, FL
KB4OZI, Hans E. Hunziker, Springfield, VA
KB4SJM, Don W. Maurer, Jacksonville, FL
N4TYG, Margaret Epperson, La Follette, TN
WA4UCD, Sam W. Wright, Calhoun, GA
KA4YKQ, Arthur E. Gravenhorst, Gainesville, GA
WB4ZJY, John N. Behrens, Dabneys, VA
W5AM, James D. Durkee, Mc Lean, VA
W5AOA, James E. Brannon, Sulphur, LA
W5ATO, J. Raymond Willis, Granite, OK
N5DHE, Lewis D. Brown, Dallas, TX
WA5ECK, Sidney O. Wright, Animas, NM
KA5EWZ, Wylie L. Reed, El Paso, TX
KB5FGJ, June Grant, Waveland, MS
N5FOE, William L. Jones, Fredericksberg, TX
WD5GAY, Ernest C. Watkins, Bogalusa, LA
WA5JCX, Raymond E. Shields, Mtn Home, AR
KA5KML, Elmo M. Combs, Marlow, OK
K5KWU, Felix Martinez, Albuquerque, NM
K5MKR, Joel E. Brakefield, Pineville, LA
W5OB, John L. Robertson, New Orleans, LA
W5OWP, J. M. Mc Millin, Jr, Dallas, TX
K5PRJ, Robert C. Byers, Elizabeth, AR
W6BKI, Harold Schmidt, San Francisco, CA
WB6DUF, John D. Byrne, Santa Cruz, CA
WD6FTF, Keith C. Scott, Project City, CA
W6HFL, Donald G. Cummings, Tustin, CA
W6IHR, Jack R. Lewis, Hadlock, WA
KG6IO, Verl R. Neal, Gardena, CA
W6IPQ, Herbert E. Chase, Chula Vista, CA
K6JHA, Mae E. Raymer, Clovis, CA
WA6LIJ, Gerald E. Starkey, Los Altos, CA
WA6OQF, Raymond M. Olive, Ceres, CA
W6OSD, W. Paul Morrison, Chula Vista, CA
K6PPI, Ray Esheim, Fresno, CA
KF6QI, Justin E. Morrison, Bakersfield, CA
W6SAM, Alvin W. J. Wessel, Sun City, AZ
WA6SWK, Arthur H. Nelson, Burlingame, CA
K7AIM, John R. Mac Neill, Ocean Park, WA
KB7AKD, Clark W. Cox, Salem, OR
K7BLU, George W. Long, Tempe, AZ
KA7CJX, Helen Ott, Overton, NV
W7CK, Marion E. George, Roscoe, MT
KX7C, Gerald A. Byerly, Idaho Falls, ID
K7CO, William M. Smith, Tucson, AZ
W7FKW, Harry R. Ellis, Billings, MT
N7GEB, David E. Coffey, Vancouver, WA
WA7JTW, Warren E. Baker, Elkton, OR
WI7L, Randall C. Craig, Bend, OR
W7LZS, Raymond T. Dickerson, Grants Pass, OR
K7OMI, Henry F. Harding, Mesa, AZ
W7RIR, Gordon I. Henry, Richmond, TX
W7WDM, E. Holmes Hyland, Winslow, WA
W8AVH, John A. Kiener, Cleveland, OH
WB8CMT, Frederick Randles, Jr, Cuyahoga Falls, OH
N8GFU, Charles F. Myers, Toledo, OH
W8LV, Weldon B. Sanger, Norwalk, OH
WA8TMO, Fred G. Durling, Bancroft, MI
WB8TQB, Patrick Truax, Shadyside, OH
W9DBJ, Albert H. Jackson, Lombard, IL
KA9EMV, Gerald J. Margis, Green Bay, WI
KA9H, Louise C. Clark, Speedway, IN
W9HQH, Frank H. Mills, Chicago, IL
WD9HTX, James E. Kraus, Muncie, IN
KA9KFN, William L. Holmquist, Chicago, IL
W9KO, Ken M. Hedrick, Palatine, IL
KA9LER, Donovan J. Allen, Rhinelander, WI
W9MPK, Frank H. Neal, Belleville, IL
W9MVG, Donald E. Shafer, Geneseo, IL
W9QLR, Howard B. Ferguson, Carrollton, IL
WA9TCZ, Alfred M. Davidson, New Castle, IN
W9VX, W. J. Burke, Arlington Heights, IL
KØAGE, Kenneth Posey, Sioux City, IA
KAØCCW, Jim Baker, St Louis, MO
WØ0CLK, Wayne L. Shirk, Shawnee, KS
WDØCNE, Ronald E. Howard, Hutchinson, KS
WAØFWK, Charles M. Hall, Sterling, KS
NØGNP, John Parmenter, Scottsbluff, NE
NØHPO, Bertha E. Seier, Grand Island, NE
WØJAQ, Eugene R. Iliff, West Union, IA
WØTJ, William M. Atkins, Kansas City, MO
WØWPH, Hugh J. Rogers, Sikeston, MO
KAØZKJ, Virgil W. Spaulding, Meriden, KS
WBØZYS, Wayne E. Holsti, Kansas City, KS
VK8MQ, Alex Smith, Alice Springs, NT

*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

April, 1939

☐ A powerful broadcast station, "Paris Mondial," has appeared on 7280 kc., jumping the gun on the Cairo agreement that such activity above 7200 outside this hemisphere would not commence until September at the earliest. The League has appealed to the Department of State to make a formal protest to France.

☐ And Cuban amateur phone stations are causing havoc in the low end of 7 Mc., but there is no basis for formal complaint because Cuba has not yet signed the Inter-American agreement.

☐ Publication errors, usually in diagrams, are reported in later issues, but helter-skelter. *QST* adopts W6QQE's suggestion that all such be included under one heading, "Feedback."

☐ Several articles about receivers are food for thought—and maybe construction. W9ADG has a deluxe job tailored for DX work, with separate tuning controls for the h.f. oscillator and signal-frequency circuits. W2AOE has a complicated but intriguing system in his superhet for using broadcast stations as standards to generate his transmitter frequency, as well as for frequency checking of others. Using mostly junk box components, W4PBP has a 3-tube battery-operated set ready for any hurricane.

☐ W9HLF finally worked the well-known, but elusive, AC4YN in Tibet, giving the latter his WAC.

☐ For our antenna buffs, W6JYH shows us how to use link coupling to simplify matching problems in the close-spaced antenna-director system. W5FDQ claims the very efficient flat (untuned) line can indeed be used for more than one band, with proper stub design.

☐ S-meters in receivers of different manufacture are, unfortunately, not calibrated to a common standard. W2JCR provides a chart of calibrations in popular receivers, with dope on how to correlate signal reports of others to obtain a true picture of beam antenna performance.

☐ After erroneously grinding his crystal past the desired spot, W9KNZ found that a coat of common iodine reduced the frequency adequately without losing oscillation activity.

☐ W8QBW has modernized his famous "QSL Forty" to provide those 40 watts on three bands for less than $15.

25 Years Ago

April, 1964

☐ The Editor advises us not to get upset over erroneous information in other ham publications about a forthcoming radio conference in Geneva. It is a "plenipotentiary" (high-level diplomatic) affair and will not deal with the international regulations which cover our activity.

☐ W1ICP again tears an old TV receiver apart to obtain some parts for his "Novice Gallon" modernization. It covers 160 through 10 meters, basically with 75 watts for the Novice maximum, but with provisions for 250 watts when the builder obtains his General Class ticket.

☐ The American Red Cross and the League have had a cooperative understanding since 1940. With changes over the years in both organizations, the agreement has been revised to bring it up to date. Herbert Hoover, Jr., W6ZH, and Gen. Alfred Grunther, respective presidents, signed the new document in the Washington office of the Red Cross.

☐ Using "Boulter's Principle" that compression and acceleration of electrons takes place when r.f. moves from a larger to a smaller conductor, WA2FQZ has developed a formula for the exact length and diameter of wire to be added to the antenna side of our tuners—with a tremendous increase in radiated power! (Darn—if only this weren't the April issue.)

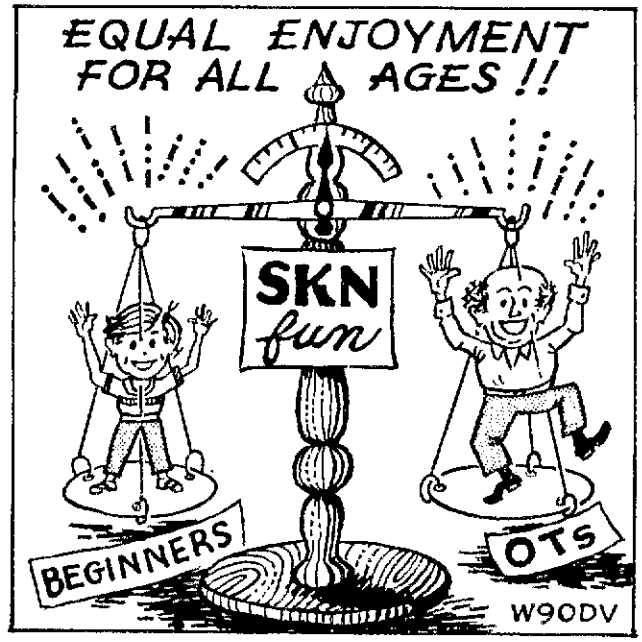
☐ W1DF's continuing treatise on the cathode-ray tube is almost a text in itself, replete with illustrations of changing pattern shapes when using an a.c. sweep.

☐ K2US, licensed to and supervised by the Hudson Area Amateur Radio Council, is located in the Coca-Cola building and will be amateur radio's voice at the New York World's Fair.

☐ "The Exciting Years" titles this month's installment of the 50-year ARRL history series, and describes the Transatlantics which culminated in the first two-way work across the Atlantic on about 100 meters—an event which "broke open" the short waves.—*W1RW*

Straight Key Night 1988

By Billy Lunt, KR1R
Contest Manager



DX will call from distant hills
and offer thrills and speed and power.
But give me respite once a year;
just a quiet hour,
to sweep the band more leisurely,
to tap the key real slow
and try to turn a QSØ into a QSO.
—Hunt Turner, KØHT

Straight Key Night gives us that solitude we thirst for—that comforting retreat that closes the curtain on the hustle and bustle of this high-pressure world and temporarily moves us back in time to when simple things were in demand, and our own arms generated the rhythm and music of that "sweet CW." These sentiments are echoed by Dick, N5AE: "What a pleasant, laid-back activity to start the New Year! A handful of interesting contacts and the music of old 'pump handles' on the bands. I spent as much time just reading the mail as I did making contacts."

SKN reminds us of how things were before the electronic blitz when people were recognized by their CW "swing." It didn't take Kurt, N2HTC, long to grasp the feeling. He remarked, "I found myself developing my own 'style' or 'personality' using the old key. I am sure this will not be my last SKN."

QSOs were in demand with a wide range of topics to exchange. That is what makes SKN such a joy. Ken, W6FU, commented, "This was another great SKN! The bands cooperated well, and there was a wealth of operators involved. A wide range of ages of operators and diversity of subject material made the QSOs fun and meaningful."

This year's SKN brought forth a diversity of participants and activity. Is there a growing interest in the way things were? This year's 95 entrants pounded out a reported 966 straight-key QSOs. These figures show an increase of 10 entries and 172 contacts over last year's SKN. If this trend continues, next New Year's Eve may very well host record-breaking amounts of activity in a sport enjoyed since the beginning of Amateur Radio—also known as brass pounding or CW. The bands will sing out with remembrances of the past with each and every straight-key QSO.

Each year, we ask the participants to cast a vote for "best fist" and "most-interesting QSO." This year was no exception and when all the votes were tallied, Bob, N2CPL, was again renamed "best fist" by accumulating six votes. In second place, was Bob, W2LYH, who also earned the distinctive title of "most-interesting QSO." Bob "talked" out a field of second-place finishers by gathering three votes. In second place for "most-interesting QSO" were AJ1G, W9IG, WØAP and WØGRW each with two.

If you have never participated in an SKN activity, then dust off your straight key and practice your CW for next New Year's Eve's event. SKN is a lot of fun as expressed by John, K8CQA who states, "It was a real joy to be able to listen and converse with so many others who share the feelings that the sound of a good straight key is among the finer things of life." See you next New Year's Eve.

Key Klicks

After 10 years absence from SKN, I had an enjoyable time this year. I am going to throw away my old plastic key and get down to "brass tacks" next SKN (W8GMH). Just wanted to let you know that I had a blast on SKN, as usual (N5NT). My participation in this year's SKN was very enjoyable. This was another fine SKN and the J-38s were in full song (WD4DSS). Lots of fun! I had some good visits. We hams are surely lucky people because we've got a world full of friends right at our fingertips. We need to stop and visit more often on the bands (W7SK). Had a great time using my vintage gear (WØRT). This was my first year in SKN. I really enjoyed the change of pace, using my old straight key (N2HTC). I must be getting older because my arm was killing me after just 3 QSOs using my old straight key! (VE3CUI). This was my first SKN and it was fun and rewarding (KA3THS). I had an absolutely great 24 hours of fun during this year's SKN (KØCDJ). If I had not lost my ability to pound brass with the old straight key, I may have been able to make a few more QSOs. I had to rest the "old glass arm" (W4ZCT). Every day is Straight Key Night and SKN is the brass pounder's night to shine (AA5FJ). The four hours of pounding brass were most enjoyable (W5KL). I only worked 3 stations during SKN but they were long, chatty QSOs (W2QUV). Heard a lot of exotic-antique keys. How do I explain to my XYL that I need a new key for next year? (NZ9C). Once again, I found a little time to participate in SKN. The usual New Year's Eve activities and football games on Jan 1 caused considerable interference (W6IFC). Good band conditions and very good operators (WA5ANF). Once again, it was a wonderful event! Wish I had heard more activity on 80, but 40 meters was full of professional sounding fists (W1DV/4). This was a very humble experience for those of us who operate 100% time on CW (KA1S). SKN was fun! I will be back next year (K7TFW). I must say that SKN was really great. I met a lot of interesting hams (W5ETK). I had very nice QSOs in the midst of fierce QRM from other SKN QSOs (KB8DOV). Lots of SKN activity! There was more than I could work, since each QSO was so long and enjoyable (WA9PWP). I thoroughly enjoyed SKN! It is a fun and safe way to spend New Year's Eve and a great way to bring in the New Year (W9IG). SKN was great fun in spite of my glass arm (W1PN). There sure was a lot of FB fists out there. It seemed like they got better as the day wore on (WB9LTN).

Results, 19th ARRL 160-Meter Contest

"I didn't have an antenna, so I loaded up the rain gutter and had a nice time anyway."—WB9PXR

By Billy Lunt, KR1R
Contest Manager

Band conditions can either make or break a single-band contest. There is no other band to QSY to. You must brave the conditions, whether good or bad, and cherish any new multipliers you may gather. On the weekend of Dec 2-4, 1988, we were blessed with better-than-average propagation during the 19th annual ARRL 160-Meter Contest. The first night of the contest was reported to be the better of the two. Oliver, K4ON, contended, "There was no noise, for a change. Propagation was good and the operators were all first-class gentlemen." John, WF2W, reported, "Conditions were relatively good in my area. I heard some DX in the 1830-1850 segment but most DX was smothered by US stations working each other." The crew at W9AZ didn't have any trouble getting through to the DX. They annotated, "We had some great European runs right through the East Coast QRM."

It is hard to remember, especially in the heat of battle that the band segment 1.830 to 1.850 should be used for intercontinental QSOs only, in conformance with the ARRL band plan. We urge everyone not to forget. If we leave this small portion of the band open, many more DX QSOs may get through and help make the contest more fun for all.

Saturday night things were a bit different as expressed by Moe, KA1S. "This was a great contest with good ops. The going was slow the second night with 'just so-so' conditions." John, K3TUP, summed it up a little stronger with, "Second night was S-L-O-W!" Mitch, WB2JSJ, stated, "Where was the DX? I had a quick run of some strong Europeans at local sunset on the second night and that was it!"

Overall, everyone had a great time in the contest and many participants accomplished their personal goals. "I beat my old high score by over 12k. I think I may even have the NLI record by 10k," claimed Arthur, N2KA. Bill, K5KLA, borrowed an amplifier to try this year and "almost doubled my previous high score."

For some, it's not whether you win or lose. Fun is the name of the game. Richard, N1BVY, asks, "I wonder how old we have to be to get over the excitement of the 160-meter test? Carl, WB1DEZ, and I are both retired and have a ball with this contest. No mosquitoes in the shack and all we need is a coffee pot nearby. We have to improve my antenna for next year. The 80-meter dipole just didn't do the trick. An amp might just help, too. We just couldn't make it to Texas or the West Coast, but look out for us in '89." Gary, WM5K, couldn't walk away from the contest and explained, "A fun contest! Got on just to pass out a few points and wound up only needing KL7 for 160-m WAS in one weekend using only 100 watts."

Running up large QSO totals and finding those rare multipliers on 160 meters takes a special skill—lots of patience and good ears to pull the weak ones out of the noise. K2EK proved his ability to do this by scoring 216,815 points and topping all others for an impressive first-place single-op finish. Bill worked 970 QSOs and 103 multipliers. Steven, WB2Q, piloted his Dad's station (K5NA) to the second-place spot, scoring 203,424 points. Don, WA8MAZ, guest oping at W3LPL, scored

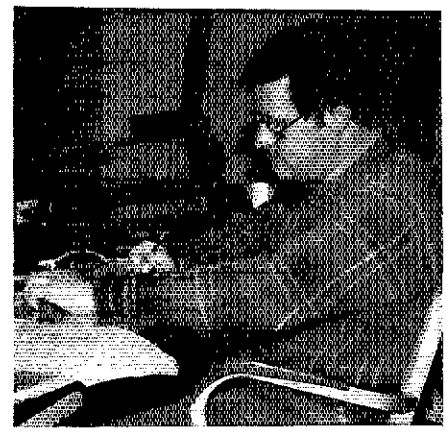
Top Ten

Single Operator

Call	Score
K2EK	216,815
WB2Q	203,424
W3LPL (WA8MAZ,op)	192,570
WØEJ	166,474
K3ZO	159,236
K1ZM	155,424
AA4NC	148,720
KC5DX	141,432
KF9D	132,804
NØTT	132,640

Multioperator

Call	Score
W9AZ	194,139
W8LT	187,598
KØDD	179,869
AA1K	169,116
K3TUP	160,706
W2GD	142,470
N4XM	124,872
NØSM	124,260
ADØO	113,256
WM4T	112,590



K8ND takes his turn at the controls at the Ohio State University club station, W8LT, during their 2nd-place multiop finish.

Division Leaders

Single Operator

Call	Score	Division
W3LPL (WA8MAZ,op)	192,570	Atlantic
KF9D	132,804	Central
WØUC	97,416	Dakota
N4ZZ	87,673	Delta
N8EA	132,048	Great Lakes
K2EK	216,815	Hudson
WØEJ	166,474	Midwestern
N1ACH	127,952	New England
N6TR/7	85,337	NorthWestern
W7XZ*	84,975	Pacific
WC7S	75,600	Rocky Mountain
AA4NC*	148,720	Roanoke
N4IN	64,528	Southeastern
N6ND*	108,264	Southwestern
KC5DX	141,432	West Gulf
VE3KP	105,108	Canada
YV1OB	28,438	DX

Multioperator

Call	Score
AA1K	169,116
W9AZ	194,139
KØDD*	179,869
—	—
W8LT	187,598
W2GD*	142,470
NØSM	124,260
W1OP	67,551
N7AGP	39,552
WB6EGE	17,875
ADØ*	113,256
—	—
WB4NMA*	87,438
K6LL*	101,232
W5NTJ	76,608
VE2OJ	27,030
JA7YAA	1,848

* Denotes a new division record.

QSO Leaders

Single Operator		*Multioperator*	
K2EK	970	KØDD	979
W3LPL (WA8MAZ,op)	909	W8LT	922
WB2Q	864	W9AZ	916
WØEJ	848	K3TUP	844
KC5DX	831	NØSM	807
NØTT	814	AA1K	760
AA4NC	809	W2GD	745
K3ZO	793	ADØO	705
KF9D	771	N4XM	693
N8EA	765	WM4T	683

Multiplier Leaders

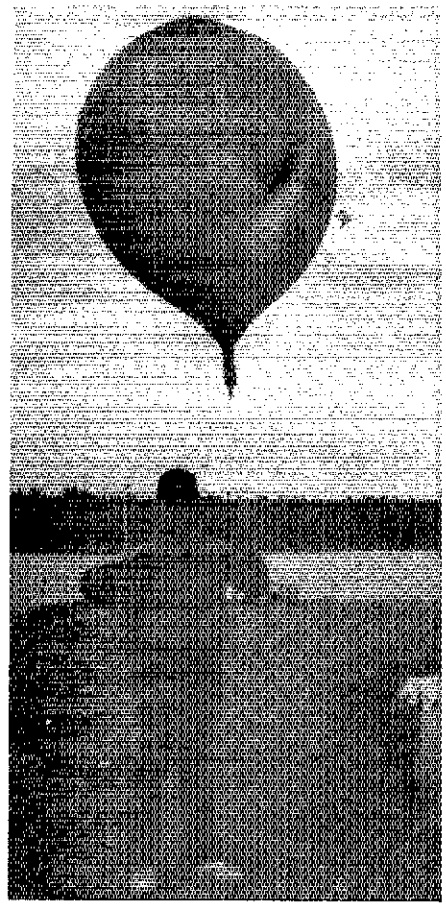
Single Operator		Multioperator	
WB2Q	104	AA1K	102
K2EK	103	W9AZ	99
W3LPL (WA8MAZ,op)	98	W8LT	97
K1ZM	96	K3TUP	91
K3ZO	94	W2GD	90
WØEJ	94	KØDD	89
W8FN	92	N4XM	86
N1ACH	88	WM4T	81
AA4NC	88	WB4NMA	78
KG4W	88	ADØO	78

192,570 points for third place.

The crew at W9AZ top the field of multioperators scoring 194,139 points for a first-place victory. Ohio State University club station W8LT edged out KØDD and group by 8k for the second-place finish. W8LT scored 187,598 points and KØDD scored 179,869 points.

For 1988, League Headquarters received 18 DX logs from around the world. YV1OB was the top-scoring single-operator DX entrant. Charles worked 241 QSOs and 59 multipliers for his first-place win. Jim, K1TN, operated VP2MDC and made 137 QSOs and 41 multipliers for second-place DX. JA7YAA, operated by JJ3CNL, using a spotting net, finished first-place multi-operator among the DX stations. Ted worked 44 QSOs and 21 multipliers.

For those who have not tried 160 meters, especially in a contest, this is the contest to try. It is a lot of fun and almost any antenna will produce QSOs and excitement. See you Dec 1-3, 1989 for the 20th ARRL 160-Meter Contest.



One of the ops at K6LL, multiop station, getting ready to launch the helium-supported vertical.

When the dust settled, Bill, K2EK, was the top-scoring single operator in the contest.

Soapbox

I had a limited operation. I was only on Sunday night but I enjoyed it (JA9BOH). Many asked for my section, thanks to the FCC! Shouldn't even bother mentioning the "DX window;" better to test the US stations' receiving ability, not just transmit! (KX6DC). I came across 4U1UN calling CQ with no takers—easy 5 points! (KQ1V). I used a G5RV fed as a "T" against four ¼-wave elevated radials. The elevated radials really made a difference. It brought my state total to 36 at 4-W output (KN1H). This is my favorite contest. As usual, there is always a monkey-wrench thrown in somewhere. This year, it seemed that whenever I got a run going, my 10-month old daughter would wake up! (N2KA). I operated from Radio Free Southhampton—vertical busted; Zepp busted; German quad (546-ft horizonal loop) played good enough to stay in the running (NR2L). I heard only one other station from my section the whole time. I hope that is a good sign! (WA2YEI). I had lots of fun! I had baby duty starting at 6 AM Saturday. I was too tired to do anything on the second night, except sleep. Great fun anyway! (KR2Q). This was my first year in the 160-Meter Contest. I thoroughly enjoyed the experience (WF2W). VS6DO started calling CQ right under me at sunrise on Saturday. Got him! Took 6 hours off Saturday night for an office Christmas party (AA1K). PLL hash kept the DX portion pretty messy (K3ZO). Great conditions! I'm not sure, but I think that I heard some DX in the DX window! There was so much activity in the contest, I guess we really needed that extra 20-kHz segment! (N3EQF). A new computer logging/duping program got us off to a walking start due to our inexperience on the keyboard (K3TUP). Greatly enjoyed by this 72-year-old-op that can copy CW! (W4GTS). I found the contest very enjoyable and plan to operate again next year. I got sleepy at 5 AM and quit. Probably lost a few multipliers. I will have to put in a serious effort next time. Lots of QRM. It was hard to hear the DX in all the mess. We need more room to spread out (WB4NMA). This was my first contest (AA4NJ). Good contest! Lots of fun! (WB4M). It was my first time on 160 meters. I got an antenna going one half hour before the start. I am hooked! See you next year (WD4AHZ). First time ever on 160 meters! I didn't have a tuner for 160 and could only get about 5-W output. Conditions were excellent (K6ETM). I got my very first 160-M antenna up. Now, I need an amp! Barefoot is murder on 160! (NE6I). This was not a contest—it was an experience! I ran 100 W to a 35-ft vertical. Maybe next year there will be a low-and high-power category (KD6PY). A late start yielded my best-ever score (N6TR/7). I was flabbergasted! My first time on the "top band" and I picked up 43 states during the contest. I never knew what I was missing on 160-m! (N8AGU). Great event! Only wished that I could have stayed up after midnight to work some of the CA sections. I was just too tired. Heard my first DX on 160 m (YV1OB) with a good S-7 signal. Unfortunately, he could not hear me. Every so often, I would find a clear frequency and was surprised at the success of a CQ—a pleasure I seldom experience. Amazing how many get on 160 m for this contest. Thanks for your help in keeping it going (W9HE). QSOs were easier after noise level dropped from S9 to S3 when the TV was turned off! (WAØOUI). My favorite contest! Thanks very much! (KØMZV). Last year I saw "where were the VE2s?" This year, I am here—not a "big gun," but "big fun" (VE2OPB).

Scores

Scores list call sign, final score, total QSOs, Total multipliers and hours operated (if given). (Example: DJ6RX scored 2400 points, with 48 QSOs and 25 multipliers).

DX

Federal Republic of Germany
DJ6RX 2,400- 48- 25-

Canary Islands
EA8BTO 7,790- 95- 41-

Ireland
EI9J 140- 10- 7- 2

Panama
HP1AC 40- 5- 4- 4

Italy
I3VHO 270- 15- 9-

Guinea-Bissau
J52US (K8MN,op) 360- 15- 12-

Japan
JA8RWU 1,932- 46- 21-
JA9BOH 132- 11- 6-
JA2FSM 32- 4- 4- 1
JA7YAA (+JJ3CNL) 1,848- 44- 21-
JA9YBA (JA9s VDA,-16148,ops) 1,722- 41- 21- 8

Marshall Islands
KX6DC (NZ8B,op) 4,690- 67- 35- 6

Peru
OA4ZV 2,378- 41- 29- 3

Czechoslovakia
OL1BRA 768- 24- 16-
OK1JDX 176- 11- 8-

Denmark
OZ1FTE 468- 16- 13-

Montserrat
VP2MDC (K1TN,op) 11,234- 137- 41- 5

Venezuela
YV1OB 26,438- 241- 59-

W

1

Connecticut
K1DH 36,598- 314- 58-10
N4XR 26,676- 202- 67- 6
W1WEF 26,671- 250- 57- 4
K1VKO 14,038- 158- 44- 7
N1JW 11,780- 155- 38- 4
WA1FCN 2,950- 59- 25-
N1ABY 2,784- 58- 24- 5

Eastern Massachusetts
W1TR 34,987- 292- 59-12
KZ1L 30,561- 243- 61-
W1FJ 28,790- 232- 57- 4
KA1CLV 25,821- 225- 57-27
KA1DWX 16,775- 130- 61- 5

KQ1V 9,036- 124- 36- 8
W1HN 3,720- 82- 30- 2
W1ND (K1s JKS,KQI,KA1RQX,N1s DS,FNI,NA1A,NJ1P,NS1G, WB9UDQ,ops) 58,962- 471- 62-

New Hampshire

N1ACH 127,952- 691- 88-19
WA3ECT 44,682- 325- 66-
AE9B/1 16,950- 168- 50-12
W1FZ 10,920- 135- 40-
KN1H 10,320- 120- 43- 8
AC1J 4,228- 74- 28- 3
AK1L (+KA1X) 43,624- 382- 56-18
NE1I (+KA1NNI) 28,900- 266- 50-35

Rhode Island

WA1HYN 63,717- 471- 87-14
K2MN 18,600- 200- 47-
N1DM 9,108- 138- 33-13
K6IM/1 7,735- 109- 35- 6
W1OP (W1GS,N1AKO,WA1s JHV, NZR,ops) 67,561- 476- 69-
N1BVY (+WB1DEZ) 17,200- 200- 43-19

Vermont

WB1GQR (WB2JSJ,op) 111,000- 722- 75-26
K1IK 100,700- 652- 76-26
W3LPR 4,554- 66- 33- 7

Western Massachusetts

KZ1M 23,136- 238- 48- 6
KB1W 22,654- 223- 47- 4
KY1H 4,712- 76- 31- 6

2

Eastern New York

K2EK 216,815- 970-103-31
WB2Q 203,424- 864-104-32
K1ZM 155,424- 748- 96-25
N1CC 48,384- 442- 54-17
NA2M 26,196- 219- 59-10
WB2PUH 1,540- 35- 22- 2
K5NA 2- 1- 1- 1

NYC—Long Island

N2KA 44,800- 308- 70-12
NR2L 18,240- 197- 40-
W2JGQ 13,524- 161- 42-10
W2KTF 8,470- 121- 35- 4
WB2DLA 6,840- 114- 30-12
WA2YEI 5,280- 88- 30- 8
W2GKZ 3,392- 53- 32-

Northern New Jersey

WA2SRQ 131,292- 744- 84-
WB2ULI 75,897- 452- 81-
KR2Q 67,067- 498- 87-11
K2STO 21,930- 212- 51-
KA2BZS 21,730- 196- 53-15
NW2D 16,830- 153- 55- 4
W2GD(+NET) 142,470- 745- 90-18

Southern New Jersey

N2GZL 36,270- 270- 65- 8
W2BN 28,956- 254- 57-
AB2E 10,908- 133- 41-
W2PAU 8,931- 113- 39- 4
WA2VYA 8,132- 107- 38-
K2TD 7,800- 100- 39- 4

Western New York

KM2P 94,754- 643- 73-27
WF2W 41,085- 372- 55-
WA2QKF 36,875- 311- 59-
KU2A 29,264- 245- 59-15
N2WK 18,414- 169- 54-10
W2TZ 16,838- 183- 46- 5
NA2Q 15,228- 162- 47- 8
KB2NU 12,599- 145- 43- 6
WJ2O 8,464- 101- 32- 7
W2FR 3,584- 64- 28- 4
W2GJ 528- 22- 12-

3

Delaware

K3WUW 10,000- 122- 40-
AA1K (+NET) 169,116- 760-102-20

Eastern Pennsylvania

W3TS 113,820- 652- 84-20
K3UEI 88,165- 553- 77-29
W3UM 85,701- 540- 77-14
W3GU 78,432- 498- 76-
K3ONW 53,976- 340- 78-
WB3FAA 20,700- 230- 45-12
KI3S 18,700- 187- 50- 9
W3EHZ 15,369- 162- 47-
K3VW 13,940- 170- 41- 4
W3AP 11,088- 129- 42-
W3CNS 10,298- 117- 44- 5
W3GBG 9,750- 125- 39-18
NK3U 7,770- 111- 35- 8
N3BNA (+NET) 57,526- 389- 72-
K3WW (+NET) 45,780- 377- 60-10

Maryland—DC

W3LPL (WA8MAZ,op) 192,570- 909- 98-33
K3ZO 159,236- 793- 94-
W3GN 67,480- 470- 70-
K3YGU 50,020- 404- 61-19
WB1DTJ 38,250- 375- 51-
N3EBR 21,242- 247- 43-
N3AM 20,844- 190- 54- 5
W3HVN 4,495- 76- 29- 6
K3SA 2,700- 50- 27- 1
K3DI 1,326- 39- 17- 1
W3GG(+KD3JH) 52,975- 400- 65-

Western Pennsylvania

W3KWH (N3EQF,op) 79,662- 558- 71-30
W3QM 76,384- 560- 68-20
K3BSY 48,860- 340- 70-
K3ZD/3 32,256- 250- 63- 5
KA3MMM 16,800- 200- 42-18
K3LVO 5,460- 70- 39- 6
KC3LV 4,536- 81- 28-
K3RYA 100- 10- 5- 1
K3TUP (+N3BJ) 160,706- 844- 91-
K3UA (+W3FSB) 29,865- 229- 65- 4

4

Alabama

N4JF 51,788- 405- 63- 9
WZ4F 25,520- 217- 58- 4

Georgia

KN4B 37,989- 294- 63-18
N4UZ 35,380- 305- 58-
W4DXI 34,748- 226- 73-16
W4GTS 20,574- 189- 54-
W4CEB 6,435- 70- 45-
AA4VD 6,240- 104- 30-
N4JVP 1,560- 39- 20- 5
WB4NMA (+N3AHI) 87,438- 532- 78-25
W4FGH (+WI4F) 57,850- 442- 65-31

Kentucky

K4FU 96,408- 606- 78-28
AA4NJ 82,214- 548- 74-32
KK4Q 48,120- 398- 60- 7
WA4EBN 34,884- 306- 57-21
N4XM (+KD4U,NO4R) 124,872- 693- 86-24
WM4T (+N4DBR,NV4H,KU8E) 112,590- 683- 81-

North Carolina

AA4NC 148,720- 809- 88-25
K4PB 57,152- 445- 64-14
W4UW 9,635- 101- 47-13
WB4M 5,921- 94- 31- 9

Northern Florida

K4ZRA 30,744- 249- 61-
WC4E 21,359- 200- 53- 7
W1XO 14,758- 157- 47- 7
KD1U 9,430- 115- 41-10
NC1R (+KB4LTQ,WS4Y) 65,240- 463- 70-24

South Carolina

AA4V 36,649- 266- 67- 8
AA4ZW 29,768- 238- 61-24
W4UKU 25,592- 227- 59-19

Southern Florida

N4IN 64,928- 424- 74-20
WD4AHZ 23,298- 221- 52-12
KR4U 3,300- 55- 30-10

Tennessee

N4ZZ 87,673- 596- 73- 9
KV4B 21,167- 169- 61-11
K4ON 19,200- 192- 50-
AK0M 16,873- 178- 47- 6
K4AMC 16,200- 162- 50-
N4TG 13,254- 141- 47-

Virginia

KG4W 93,016- 494- 88-
W4XD 70,299- 468- 73-14
W4WIN 69,069- 475- 69-
W4JVN 29,574- 231- 62-20
K4BAM 29,232- 258- 58-
K4VHH 28,392- 249- 56-
K4QD 25,137- 219- 57-10
K4FPF 19,380- 190- 51-10
W4YE 19,200- 200- 48- 5
K2UOP/4 14,238- 162- 42-
W4KMS 12,784- 136- 47-13
AA4UJ 7,527- 95- 39- 3
WU4G 5,544- 77- 36- 3
K8ETM 3,472- 62- 28- 6
N4MM 832- 26- 16- 2

5

Arkansas

K5ASB 10,332- 123- 42-
WA5VBE 6,512- 88- 37- 4

Louisiana

K5KLA 80,104- 518- 76-16
K5KV 38,820- 322- 60-15
N5WA 27,105- 204- 65-
W5WMU 19,392- 202- 48-
NO5H 714- 21- 17-

Mississippi

WB5ZKR 65,959- 460- 71-14
N9KS/5 25,806- 253- 51- 9
WQ5L 19,240- 185- 52-
W5GWD 1,240- 31- 20-15

New Mexico

W7LHO 29,760- 240- 62-
KN5S 28,730- 221- 65- 5
WD5T 27,714- 207- 62-
KI3L 14,522- 137- 53-
KA1NXT 9,730- 139- 35-18

North Texas

KC5DX 141,432- 831- 83-21
K5WXZ 69,450- 451- 75-25
W5FIX 60,168- 415- 69-25
WM5K 44,446- 310- 71-14
W5ONL 26,901- 219- 61- 4
W4YOK 16,280- 148- 55- 8
W5IWE 13,281- 115- 57-13
KF5UN 1,920- 40- 24-

Oklahoma

KO5D 30,550- 232- 65-12
KM5H 7,800- 100- 39- 1

South Texas

W5XD (W2IE,op) 70,858- 493- 71-20
K5TSQ 45,406- 278- 73- 7
KB5OG 33,116- 233- 66-23
W5PWG 22,940- 185- 62-13
WN5TEN 18,550- 175- 53-20
NR5M (WN4KKN,op) 12,768- 111- 58- 2
AK5E 7,740- 86- 45- 6
N1EE/5 364- 14- 13- 1
W5NTJ (+KC5ZT,WA5IEX,WR5O) 76,608- 474- 76-

West Texas

WF5E 44,287- 317- 87-25
W5AWT 3,712- 58- 32-

6

East Bay

W6FSJ 33,358- 248- 62-12
K6HIH 26,140- 227- 60-
K6XV 24,012- 204- 58-
N6EK 18,630- 171- 54-12
K6TS 5,760- 72- 40- 4

Los Angeles

N6LL (WA6CDR,op) 55,440- 351- 70-
K6EID 20,736- 156- 64-16
KV6I 20,709- 171- 59-12
NE6I 12,558- 148- 42-12
AD8C (+AE6E) 91,960- 538- 76-34

Orange

N6PE 40,298- 286- 69-11
N4ARO/6 26,901- 212- 63-16
NI6W 9,576- 114- 42- 8
WD6L 1,932- 42- 23- 4
W6SX 918- 27- 17-
W6AT (N6RUB,WA6BCN,WY6Z, WB9ZDI,ops) 38,012- 275- 69-24

Pacific

WA3KOG/KH6 2,106- 39- 27-

Santa Barbara

N6VR 6,216- 74- 42- 2
K6MXO 4,898- 79- 31-18
WA6FGV 4,616- 66- 28-10
W6JEO 4,620- 70- 33- 7
AA6EQ 1,080- 30- 18- 4
W6HDO (+AA6DT,KI6QE,W6JU) 32,319- 255- 83-15

Santa Clara Valley

KV6H 29,868- 229- 64-
KD6PY 22,120- 193- 56-
NS6V 19,344- 186- 52- 9
N6NF 7,714- 100- 38- 5
KB6FPW 3,780- 63- 30- 7
KG6AO 2,800- 50- 29- 3
W6PRI 2,440- 61- 20- 8
W6FDU 1,974- 47- 21- 5
W6BKY 1,148- 41- 14- 8

San Diego

N6ND 108,264- 640- 78-24
KI6MS 76,041- 480- 71-
W6JVA 7,392- 84- 44-
AA6EE 608- 19- 16- 1

San Francisco

W6BIP 16,524- 159- 51-15
W6JTI 14,850- 132- 55-12
AL7JC/6 4,224- 81- 33-
WB6EGE (N6s MQ,QC,WB6WPO,ops) 17,875- 161- 55-13

San Joaquin Valley

K6MO 41,875- 284- 67-17
K6XK 3,144- 46- 24- 3
WB6ITM 2,580- 43- 30- 3

Sacramento Valley

N6JV 54,244- 364- 71-19
KI6O 34,713- 274- 63-12
N6LU 20,130- 159- 55- 9
N6JM 10,272- 107- 48-

7

Arizona

K7OX 76,368- 504- 74-
AC7A 8,536- 97- 44- 8
K6LL (KB7H,NY7V,WE7G,ops) 101,232- 663- 74-20

Idaho

KA7T 52,564- 361- 68-15
WS7U 37,332- 306- 61-21
K6RN 16,060- 140- 55-10
W7IWU 1,716- 39- 22-

Montana

KS7T 48,048- 364- 66-
N7AGP (+KC7OD) 39,552- 297- 64-

Nevada

W7XZ 84,975- 526- 75-28
W7TVF 47,056- 322- 68-

Oregon

N6TR/7 65,337- 508- 73-25
K5MM/7 70,992- 454- 72-12
AD7T 12,650- 115- 55-
W7IMP 10,800- 105- 48-13

Utah

W7HS 22,382- 179- 62-12
K7RJ 12,544- 128- 49-12
K7CU 9,384- 92- 51- 4
K7OA 5,994- 81- 37-
W7MR (+WE7B,WK7V) 64,890- 426- 70-19

Washington

K7QQ 62,568- 424- 72-
KR7G 32,370- 246- 65-
W7BYK 24,282- 201- 57-15
NK7V 9,660- 105- 46-
KT7G 6,600- 100- 34-
K7UU 4,736- 64- 37- 7
K7XX 2,444- 47- 26- 3
W7KJ 572- 26- 11- 1

Wyoming

WC7S 75,600- 525- 70-
K7MM 1,120- 28- 20- 1

8

Michigan

N8EA 132,048- 765- 84-30
W8UVZ 72,792- 498- 72-
K8NWD 39,236- 281- 68-11
K8CV 31,696- 283- 56-12
WB8DIT 9,800- 98- 50-15
W8ROS 5,478- 83- 33-
W8QOA 3,120- 65- 24- 4

Ohio

W8FN 119,876- 614- 92-18
NZ8O 101,724- 580- 84-23
WB8PHI 74,130- 525- 70-24
K9ALP 70,449- 509- 69-27
W8XM 53,060- 370- 70-15
K8KEM 49,320- 411- 60-
NG8D 41,104- 367- 56-18
N8AA 38,335- 275- 65-11
K8SVT 27,492- 237- 58-22
KA1S 22,660- 208- 55-12
KC8JH 21,762- 200- 54- 8
N8AGU 18,256- 160- 58- 8
W8IDM 10,660- 130- 41- 6
K8MR 3,024- 54- 28-
W8ILC 2,349- 39- 29- 1
AF8C 2,116- 48- 23- 4
K8KSN 1,610- 38- 23- 2
W8LT (K1LT,K8ND,KD8NS,KU8E, NZ8R,ops) 187,596- 922- 97-39

West Virginia

K8OQL 85,068- 443- 72-20
KV8S 26,277- 229- 57- 6
KB8FJ 7,200- 100- 36- 2
W4PSJ 3,200- 50- 32-

9

Illinois

KF9D 132,804- 771- 84-
NA9J 93,456- 649- 72-
K9HDE 82,308- 534- 78-18
K9AB 51,730- 365- 70-13
W9EVI 31,010- 211- 70-26
N9JF 27,660- 229- 60- 9
K9MDO 20,000- 200- 50-10
NC9F 13,800- 150- 48-
K9PPW 11,000- 110- 50- 6
W9EBY 10,668- 127- 42-
WB9GOJ 8,820- 105- 42- 7
WD9DCW 5,880- 84- 35-25
WD9IWP 4,900- 70- 35- 7
ND9X 2,378- 41- 29- 2
W9TAL 198- 11- 9-
W9AZ (KJ6R,AK9F,K9s IFO,NR, KC9B,KE9MG,WB9Z,KA8WTR,ops) 194,139- 916- 99-

Indiana

KE9I 122,320- 751- 80-32
W9RE 100,035- 586- 81-10
KG9D 47,144- 328- 71-
WA8MBP 36,084- 291- 62-19
WB9CIF 31,136- 278- 58-16
AJ9C 27,610- 251- 55-12
W9JOO 26,264- 268- 49-13
K9HCX 16,005- 144- 55-
WB9PXR 14,592- 152- 48-10
WA4VWV 13,500- 150- 45-
W9JVF 10,980- 122- 45- 3
N9ACD 9,272- 122- 38- 4
KB8AC (+K9KLR,KD9CC,NJ9C, NS8A,W8SC,WA9s ECX,VMW, WB9s O,YRX) 82,868- 599- 69-36

Wisconsin

WA1UJU 84,663- 612- 69-21
K9CAN 84,075- 553- 75-
W9HE 33,770- 307- 55-11
K9OSH 22,504- 194- 58- 8
W9KHH 15,402- 151- 51- 9
W9MQZ 12,939- 112- 57-
WD9IAB 420- 21- 10-

0

Colorado

N0ZA 60,384- 444- 68-18
W9CP 46,152- 307- 72-13
K0FRP 31,842- 261- 61- 7
KJ0G 24,862- 199- 62- 4
W0GOR 20,648- 179- 58-12
K0OST 17,812- 148- 61-15
NQ0I 7,614- 81- 47- 3
AD0O (+KN5H,WD9T) 113,258- 785- 78-30

Iowa

W9EJ 166,474- 848- 94-
N0BB 36,048- 289- 67-16
K9SRL 21,164- 202- 52- 7
KD9CA 4,080- 60- 34- 4
N0SM (+K9s JGH,RW,N9JL,NR9E, WD9AOB, WE9U) 124,260- 807- 76-33
W0BXR (N2AWE,WA3TIH,K9AYK, KB9BNR,N9s HKL,OK,WC9M, KA9OVA, N9EL,NU9G, W9OJD, WD9s AZW,DUK,WM9D,ops) 76,680- 534- 71-34

Kansas

W0UY 42,305- 316- 66-28
W9AWP 18,054- 153- 59-12
W9RT 9,200- 100- 46- 3
WA9YXK 4,900- 70- 35-12

Minnesota

W0JC 97,416- 675- 72-18
W0HW 65,274- 473- 69-11
W1GV 60,237- 435- 69-12
KJ9B 47,235- 351- 67-18
WK0S 27,378- 232- 59- 9
W9FXL 18,592- 113- 68-11
W0HBE 10,212- 111- 46- 5
K0AD 9,840- 123- 40-
W0NGB 8,910- 99- 45- 5
N0AT 7,400- 100- 37- 2
KB0JX 6,355- 76- 41- 8

Missouri

N9TT 132,640- 814- 80-30
NX0I 52,920- 375- 70-10
KM0L 21,308- 198- 53- 4
WA0OUI 16,600- 158- 50-13
W0AV 9,202- 107- 43-
WB0EJN 6,510- 93- 35- 6
NS0B 4,824- 67- 36- 1
N0JGU 4,212- 78- 27- 7

North Dakota

WB0O 61,557- 432- 71- 6
NT0V 26,035- 218- 63-

Nebraska

KV0I 43,520- 340- 64-10
K0MZV 19,152- 171- 56- 6

South Dakota

KD0EE 16,846- 142- 56- 5
K0DD (+K0s,KX,SF,NS0N,WB0ADO) 179,869- 979- 89-

VE

Quebec

VE2CPB 1,558- 41- 19-
VE2OJ (VE2s FLD,SD,VE3s GNW, NJ,ops) 27,030- 262- 51-12

Ontario

VE3KP 105,108- 681- 76-
VE3CUI 59,772- 435- 68-18
VE3NBE 10,864- 124- 43- 9
VE3JKZ 9,245- 106- 43-
VE3DO 3,184- 78- 36- 8

British Columbia

VE7FPT 29,510- 224- 65-
VE7CKF 624- 24- 13-

Checklogs

AE7K, LA5SAA, N6VI, OK1DWJ, PA3AAV, VE4AAU

Rules, 4th IARU HF World Championship

1) **Eligibility:** All licensed amateurs worldwide.

2) **Object:** To contact as many other amateurs, especially IARU member-society HQ stations, around the world as possible using 1.8 through 30 MHz. (The 10, 18, and 24-MHz bands may not be used for contest QSOs.)

3) **Date:** Second full weekend of July (July 8-9, 1989).

4) **Contest Period:** 1200 UTC Sat until 1200 UTC Sun. Both single and multioperator stations may operate for the entire 24-hour period.

5) **Categories**

A) *Single operator*—phone-only, CW-only and mixed-mode. One person performs all operating and logging functions. Use of spotting nets is not permitted. All entrants must observe the limits of their operators' licenses at all times. Single-operator stations are allowed only one transmitted signal at any given time.

B) *Multioperator*—single transmitter, mixed-mode only. Must remain on a band for at least 10 minutes at a time. Only one transmitted signal allowed at any given time. (Exception: Only IARU member-society HQ stations may operate simultaneously on more than one band, with one transmitter on each band/mode. Only one HQ station call sign per member-society per frequency band is permitted.) All operators must observe the limits of their operators' licenses at all times.

6) **Contest Exchange:** IARU member-society HQ stations send signal report and official IARU member society abbreviation. All others send signal report and ITU zone. A complete exchange must be logged for each valid QSO.

7) **Valid Contact**

A) The same station may be worked once per band/mode. Mixed-mode entries may work a station once per mode (but only in the generally accepted portions of that band for that mode. Note: Reworking a station in the phone portion of the band on CW is not permitted). Example: On any band, a station may be worked once on phone and once on CW (in the CW segment) for additional QSO credit. However, this counts as only one multiplier. Crossmode, crossband and repeater QSOs do not count. Where contest-preferred segments are incorporated in regional band plans, participants are requested to observe them.

B) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

8) **QSO Points**

A) Contacts within your ITU zone, as well as QSOs with **all IARU HQ member-society stations, count one point.**

B) Contacts within your continent (but different ITU zone) count three points.

C) Contacts with a different continent count five points.

9) **Multipliers:** Total number of ITU zones plus IARU member-society HQ stations worked on each frequency band. **(Note: HQ stations do not count for zone multipliers.)**

10) **Scoring:** Multipliers times the total number of QSO points.

11) **Reporting**

A) All entrants are encouraged to use forms available from the ARRL/IARU Secretariat for an SASE (with 2 units of first-class postage) or 2 IRCs.

B) Logs must indicate times in UTC, bands, modes, calls and complete exchange. Multipliers should be marked clearly in the log. Cross check sheets (dupe sheets) are required if more than 500 total QSOs are made.

C) Entries *must* be postmarked within 30 days after the contest (by Aug 9, 1989). Any entry received after mid-Oct 1989 may not be received in time to be included in the printed results.

D) Contest summary, logs, and cross check sheet (if required) should be sent to IARU HQ, Box AAA, Newington, CT 06111, USA.

12) **Awards:** A certificate will be awarded to the high-scoring CW-only, phone-only, mixed-mode and multioperator entrant in each state, each ITU Zone and each DXCC Country. In addition, achievement-level awards will be issued to those making at least 250 QSOs or having a multiplier total of 50 or more. Additional awards may be made at the discretion of each county's IARU member-society.

13) Conditions of Entry

A) Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his/her licensing authority and by the decisions of the ARRL Awards Committee, acting for the IARU International Secretariat.

B) Disqualifications: An entry may be disqualified if the overall score is reduced by more than 2%. Score reduction does not include correction of arithmetic errors. An entry may be disqualified if more than 2% of duplicates are left in the log. A three-QSO reduction will be assessed for each duplicate QSO found during log checking or for each miscopied call sign. See Jan 1989 *QST*, page 104, for complete details.

Prefix, Continent and ITU Zone

A2	AF 57	FY	SA 12	OY	EU 18	UM	AS 31	ZP	SA 14
A3	OC 62	G-GW	EU 27	OZ	EU 18	UO	EU 29	ZS	AF 57
A4	AS 39	H4	OC 51	P2	OC 51	UP	EU 29	1A0	EU 28
A5	AS 41	HA,HG	EU 28	P4	SA 11	UQ	EU 29	1S	AS 50
A6	AS 39	HB	EU 26	PA	EU 27	UR	EU 29	3A	EU 27
A7	AS 39	HC	SA 12	PJ2,4,9	SA 11	V2-4	NA 11	3B6-9	AF 53
A9	AS 39	HH	NA 11	PJ5,6,7,8	NA 11	V6	OC 54	3C	AF 47
AP	AS 41	HI	NA 11	PY	SA 12,13,15	V8	OC 54	3C0	AF 52
BV	AS 44	HK	SA 12	PY0	SA 13	VE,VY	NA 2,3,4,9, 75	3D2	OC 56
BY	AS 33,42, 43,44	HK0(M)	NA 12	PY0(T)	SA 15	VK	OC 55,58,59	3D6	AF 57
		HK0	NA 11	PZ	SA 12	VK(LHI)	OC 60	3V	AF 37
C2	OC 65	HL	AS 44	S2	AS 41	VK9(W)	OC 60	3W	AS 49
C3	EU 27	HP	NA 11	S7	AF 53	VK9(X)	OC 54	3X	AF 46
C5	AF 46	HR	NA 11	S9	AF 47	VK9(C,K)	OC 54	3Y	AF 67
C6	NA 11	HS	AS 49	SJ-SM	EU 18	VK9(M)	OC 58	4S	AS 41
C9	AF 53	HV	EU 28	SP	EU 28	VK9(N)	OC 60	4U(ITU)	EU 28
CE	SA 14,16	HZ	AS 39	ST	AF 48	VK0(H)	AF 68	4U(UN)	NA 08
CE0A	SA 63	I,IS0	EU 28	SU	AF 38	VK0(M)	OC 60	4W	AS 39
CE0X	SA 14	J2	AF 46	SV	EU 28	VP2	NA 11	4X	AS 39
CE0Z	SA 14	J3	NA 11	T2	OC 65	VP5	NA 11	5A	AF 38
CM, CO	NA 11	J5	AF 46	T30	OC 65	VP6(F)	SA 16	5B	AS 39
CN	AF 37	J6-8	NA 11	T31	OC 62	VP8	SA 73	5H	AF 53
CP	SA 12,14	JA	AS 45	T32	OC 61,63	VP9	NA 11	5N	AF 46
CT	EU 37	JD (Minami)	OC 90	T5	AF 48	VQ9	AF 41	5R	AF 53
CT3	AF 36	JD (Ogasawara)	AS 45	T7	EU 28	VR6	OC 63	5T	AF 46
CU	EU 36	JT	AS 32,33	TA	EU 39	VS6	AS 44	5U	AF 46
CX	SA 14	JW	EU 18	TF	AS	VU	AS 41,49	5V	AF 46
D2,3	AF 52	JX	EU 18	TG	EU 17	XE	NA 10	5W	OC 62
D4	AF 46	JY	AS 39	TI	NA 11	XF4	NA 10	5X	AF 48
D6	AF 53	KC4	NA 6,7,8	TJ	NA 11	XT	AF 48	5Z	AF 48
DA-DL	EU 28	KC6	OC 64,65	TK	AF 47	XU	AS 49	6W	AF 46
DU	OC 50	KG4	NA 11	TL	EU 28	XW	AS 49	6Y	NA 11
EA	EU 37	KH1	OC 61,62	TN	AF 47	XX9	AS 44	7O	AS 39
EA6	EU 37	KH2	OC 64	TR	AF 52	XZ	AS 49	7P	AF 57
EA8	AF 36	KH3-7	OC 61	TT	AF 52	Y2-9	EU 28	7Q	AF 53
EA9	AF 37	KH8	OC 62	TU	AF 47	YA	AS 40	7X	AF 37
EI	EU 27	KH9	OC 65	TY	AF 46	YB	OC 51,54	8P	NA 11
EL	AF 46	KH0	OC 64	TZ	AF 46	YI	AS 39	8Q	AS, 41 AF
EP	AS 40	KL7	NA 1,2	UA1,3,4,6	EU 19,20, 29,30	YJ	OC 56		
ET	AF 48	KP1-5	NA 11			YK	AS 39	8R	SA 12
F	EU 27	KX6	OC 65	UA1(FJL)	EU 75	YN	NA 11	9G	AF 46
FT8W	AF 68	LA	EU 18	UA-UZ2	EU 29	YO	EU 28	9H	EU 28
FT8X	AF 68	LU	SA 14,16	UA9-UZ0	AS 20-26,30, 35,75	YS	NA 11	9J	AF 53
FT8Z	AF 68	LX	EU 27			YT,YU,YZ	EU 28	9K	AS 39
FG	NA 11	LZ	EU 28	UB	EU 29	YV	SA 12	9L	AF 46
FG,FS	NA 11	OA	SA 12	UC	EU 29	YV0	NA 11	9M2	AS 54
FH	AF 53	OD	AS 39	UD	AS 29	Z2	AF 53	9M6,8	OC 54
FK	OC 56	OE	EU 28	UF	AS 29	ZA	EU 28	9N	AS 42
FM	NA 11	OF-OH	EU 8	UG	AS 29	ZB	EU 37	9Q	AF 52
FO (Clip)	NA 10	OJ0	EU 18	UH	AS 30	ZD7-9	AF 66	9U	AF 52
FO	OC 63	OK	EU 28	UI	AS 30	ZF	NA 11	9V	AS 54
FP	NA 09	ON	EU 27	UJ	AS 30	ZK1-3	OC 62	9X	AF 52
FR	AF 53	OX	NA 5,75	UL	AS 30	ZL	OC 60	9Y	SA 11
FW	OC 62							4J2,A	AS 39

Contest Corral

Conducted By Billy Lunt, KR1R
Contest Manager

APRIL

1-2

SP-DX Contest, CW, sponsored by the Polski Zwiazek Krotkofalowcow, from 1500 Apr 1 until 2300Z Apr 2. Suggested frequencies are 160, 80, 40, 20, 15 and 10 meters. Categories: single op, multiband; single op, single band; multiop, single transmitter (all bands); SWL. Non-Polish stations transmit a 6-digit number consisting of RST plus QSO number. Polish stations send a signal report plus 2 letters denoting the province. Count 3 points for each SP-station QSO. Each different province counts as a multiplier (49 max). Multiply sum of QSO points by total number of providences for final score. Include complete logs, summary sheet and multiplier check list. Certificates. Mail entries by Apr 30 to Polski Zwiazek Krotkofalowcow, SP-DX Contest Committee, PO Box 320, 00-950 Warsaw, Poland.

Massachusetts QSO Party, Mar *QST*, p 89.

4

West Coast Qualifying Run, 10-35 WPM, at 0400Z Apr 5 (9 PM PDT Apr 4). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the 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.

8-9

North American QSO Party, CW, Mar *QST*, p 89.

QRP ARCI Spring QSO Party, CW, Mar *QST*, p 89.

MARAC County Hunters SSB Contest, Mar *QST*, p 89.

Soviet-American Goodwill Contest, sponsored by *Radio* magazine in cooperation with ARRL and the Radio Sport Federation of the USSR, 0000Z-2400Z Apr 9. Stations in 50 US states work USSR, and vice versa, on 10, 15 and 20 meters. Entry categories: single operator—all bands, multioperator—one transmitter. Modes: CW, SSB, mixed. Work stations once per band. US stations send serial number and state; USSR stations send serial number and oblast. US stations call CQ U; USSR stations call CQ USA. Each QSO equals one point. Score equals points earned in best five hours of operation, taken in no more than five operating periods. Send logs by May 9 to UW3AX, PO Box 679, Moscow 107 207 USSR.

10

ARRL VHF/UHF Spring Sprints, 144 MHz, from 7 PM until 11 PM local time on Mon, Apr 10. (Note: Other Spring Sprint dates are: 220 MHz on Tues, Apr 18; 432 MHz on Wed, Apr 26; 902 MHz on Fri, May 5; 1296 MHz on Thur, May 11; 2304 MHz on Thur, May 18; and 50 MHz on Sat-Sun, 2300Z May 27 until 0300Z May 28.) Usual VHF/UHF rules apply. Exchange grid-square locators (see Jan 1983 *QST*, page 49). Signal reports are optional. Count one point per valid QSO. Multiply QSO points by number of different grid squares worked for final score. Contests are separate; there is no accumulation of scores. The official entry forms, available from ARRL HQ for an SASE, are recommended. Logs must indicate time, call sign and complete exchange for each valid QSO. Multipliers must be clearly marked in the log. Submit separate log and summary sheets for each contest entered and mail contest entries in separate envelopes. Entries for each contest must be postmarked by June 28. The results will be listed in the *National Contest Journal*.

W1AW Qualifying Run, 10-35 WPM at 0200Z Apr 11 (10 PM EDT Apr 10). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Apr 4 listing for more details.

15

Holiday in Dixie QSO Party, sponsored by WA5ARJ Apr 15, from 1700Z until 2200Z. Suggested frequencies: SSB—7.235 14.245 21.385 28.400. Exchange name, QTH and RS(T). Send SASE and QSL for certificate to WA5ARJ, PO Box 4842, Shreveport, LA 71134.

15-16

North American QSO Party, SSB, Mar *QST*, p 89.

QST QSO Award Party, phone, sponsored by the Canadian Radio Relay League, Apr 15-16, 1500Z-2200Z each day (CW—Apr 22-23). The award is available to any amateur who makes phone, CW or mixed contacts with 8 of the 11 QST stations in Canada. To receive the award send SASE or IRC to Garry Hammond, VE3XN, 3 McLaren Ave, ON N4W 3K1, Canada.

18

ARRL Spring Sprints, 220 MHz, see Apr 10 listing.

22-24

Connecticut QSO Party, Mar *QST*, p 90.

QST QSO Award Party, CW, see Apr 15-16 listing for more details.

23

W1AW Qualifying Run, 10-35 WPM, at 2300Z (7 PM EDT) Apr 23. See Apr 10 listing for more details.

26

ARRL Spring Sprints, 432 MHz, see Apr 10 listing.

29-30

Helvetia Contest, sponsored by the USKA (Switzerland), from 1300Z Apr 29 until 1300Z Apr 30. CW and phone (mixed mode only). Categories: single op, multiop, SWL. Suggested bands: CW—160, 80, 40, 20, 15, 10 meters; phone—80, 40, 20, 15, 10 meters. Work stations once per band, regardless of mode. Exchange RS(T) and 3-digit serial number. Swiss stations will also send one of the following abbreviations to indicate their canton: AG AI AR BE BL BS FR GE GL GR JU LU NE NW OW SG SH SO SZ TG TI UR VD VS ZG ZH. Count 3 points per QSO. Multiply total points by the number of Swiss cantons worked. Awards. Separate logs per band. Mail entry by May 31 to Walter Schmutz, HB9AGA, Gantrischweg 1, CH-3114 Oberwichtrach, Switzerland.

MAY

3

West Coast Qualifying Run, 10-35 WPM at 0400Z May 4 (9 PM PDT May 3). See Apr 4 listing for more details.

5

ARRL Spring Sprints, 902 MHz, see Apr 10 listing.

6-7

Ten-Ten International Net Spring CW QSO Party, sponsored by the Ten-Ten International Net, from 0000Z May 6 until 2400Z May 7. Open to all amateurs, but only paid-up 10-10 members are eligible for awards. Single operator only. CW and RTTY. Work stations once on 10 meters only. Contacts must be in the CW 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 postmarked before Jun 1 to Boomtown Chapter, c/o Ed Neal, N5EBA, 1414 Hiawatha, Burkburnett, TX 76354.

MARAC County Hunters CW Contest, sponsored by the Mobile Amateur Radio Awards Club, from 0000Z May 6 until 2400 May 7. Work stations once per band. Work portables/mobiles again as they change county. Stations on county lines count as one QSO, but multiple multipliers. Exchange serial number, category (P for portables, M for mobiles, F for fixed), signal report, county and state (for US stations), province or country. Suggested frequencies: 3.575 7.055 14.060 21.060 28.060 MHz. Portables and mobiles call CQ below suggested frequencies, others spread out above those frequencies. Count 1 point for QSOs with fixed stations, 3 points for portables or mobiles, 3 points for W/VE QSOs with DX stations. QSOs with stations operating under "net control" are invalid. Multiply QSO points by total US counties worked for final score. Mobiles and portables calculate their scores both on a state-by-state basis and overall for awards. Mail logs by Jun 5 (include a large SASE for results) to Jerry Burkhead, N6QA, 7525 Baltic St, San Diego, CA 92111.

Danish SSTV Contest, sponsored by the Danish SSTV Group from 0000Z May 6 until 2400Z May 7. SSTV only. Use SSTV frequencies recommended by Region 1 on 80, 40, 20, 15, 10 and 2 meters. Work stations once per band. Count 2 points for 1st QSO with any DXCC country, count 1 point for additional QSOs. Count 1 bonus point for each Danish QSO. Final score is sum of points. Certificates. Send logs before Jun 3 to Carl Emkjer, Soborghus Park 8, DK 2860 Soborg, Denmark.

9

W1AW Qualifying Run, 10-35 WPM, at 0200Z May 10 (10 PM EDT May 9). See Apr 10 listing for more details.

11

ARRL Spring Sprints, 1296 MHz, see Apr 10 listing.

13

Ten-Meter Dash, sponsored by the Western Washington DX Club, 1700Z-1900Z May 13. Single operator, SSB (no crossmode), low power (100 W or less) category only. QSOs must be made between 28.300 and 28.500. Exchange signal report and state. Novice and Tech stations also indicate their license class. Count 1 point for US contacts, 2 points for DX contacts and 3 points for US Novice and Tech contacts. Multiply total QSO points by total number of states/provinces/DXCC countries worked for final score. Awards. Send logs and SASE (if results wanted) by June 13 to Andrew Isar, NN7L, PO Box 554, Gig Harbor, WA 98335.

13-14

Nevada QSO Party, sponsored by the Frontier ARS, 0000Z May 13 until 0600Z May 14. 160-6 meters, CW/SSB/FM/RTTY/SSTV. No crossmode or repeater QSOs. Suggested frequencies: CW—15 kHz up from bottom of General bands; phone—25 kHz up from bottom of General bands; Novice and Tech portion of bands. Exchange: NV—RS(T) and county; others—RS(T) and state/province/DXCC country. Count one point for each contact per mode. Multiply points by number of NV counties worked. Certificates awarded. Mail logs by Jun 1

to Jim Frye, NW7O, 4120 Oakhill Ave, Las Vegas, NV 89121.

CQ-M Contest (Peace to the World), sponsored by the Krenkel Central Radio Club of the USSR, from 2100Z May 13 until 2100Z May 14. CW and phone, 3.5 through 28 MHz. Amateur satellites count as a separate band if a 144- to 28-MHz mode is used. Work stations once per band, regardless of mode. No crossmode QSOs. Categories: single op, single band; single op, all band; multioperator, single transmitter (all bands); SWL. Exchange signal report and serial number. Avoid lower 5 kHz of 80/40 meters and lower 10 kHz of 20/15 meters. Count one point per QSO within your continent, 3 points for other continents. QSOs with your own country count for multiplier credit but have no point value. Multiply total QSO points by the sum of different countries (R-150-S country list) worked per band. The R-150 list is basically the same as the ARRL countries list except for USSR countries. Serious competitors should review the R-150 list. Awards. Mail logs by July 1 to CQ-M Contest Committee, PO Box 88, Moscow, USSR.

18

ARRL Spring Sprints, 2304 MHz, see Apr 10 listing.

20

Armed Forces Day

20-21

OMARC Midnight Special, sponsored by the Overlook Mountain ARC from 0300Z until 0500Z May 21. First hour, 40 CW. Second hour, 75 phone. Work stations once per mode. Exchange name/first call sign held. For example, K5NA would send Richard/KN5PFL. Final score equals the total number of QSOs. No multipliers. The results will be listed in the *National Contest Journal*. Mail entries to OMARC, W2XL, 133 Clifton Ave, Kingston, NY 15238.

26

W1AW Qualifying Run

27-28

ARRL Spring Sprints, 50 MHz, see Apr 10 listing.

CQ WW WPX Contest, CW, Mar *QST*, p 89.

28

QRP ARCI Hoot-Owl Sprint, CW

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 **May** 1 to make the **July** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted By Billy Lunt, KR1R
Contest Manager

Conyers, Georgia: The Conyers ARG will operate AA4SW 1500Z-2200Z **Apr** 1 at the 8th annual Cherry Blossom Festival. Suggested frequencies: 3.850-3.890, 7.225-7.275, 14.225-14.275, 21.300-21.350 and 28.300-28.700. For QSL, send an SASE to Conyers ARG, PO Box 80721, Conyers, GA 30208.

Washington, DC: In celebration of the 50th anniversary of the establishment of Naval Communication Unit Washington, K4NAA will be operated from 1300Z-2100Z **Apr** 1. Suggested frequencies: 7.230 14.280, 21.370 28.350. No SASE required. Stations not in the *Callbook* should QSL to Military Club Station K4NAA, Naval Communication Unit Bldg 13, Washington, DC 20397-5160.

Tucson, Arizona: The University of Arizona ARC will operate WA7IYG from 1900Z **Apr** 1 until 0100Z **Apr** 2 celebrating the 14th annual UA Spring Fling. Suggested frequencies: SSB—14.250, 21.360, 28.405; CW—7.140. For special certificate, send a no. 10 SASE to WA7IYG, Nuclear Engineering Bldg, University of Arizona, Tucson, AZ 85721.

Benton, Kentucky: The Marshall Co ARA will operate KM4GS from 1700Z **Apr** 2 until 2400Z **Apr** 3 in conjunction with the 146th annual Tater Day. Operation will be in the lower 25 kHz of the General 80-10 meter bands and the 10-meter Novice band. For QSL, send QSL and SASE to KM4GS, PO Box 917, Calvert City, KY 42029.

Cordele, Georgia: KA4WUJ will operate 1200Z-2000Z **Apr** 8 to commemorate the 100th anniversary of the city of Cordele. Operation will be on 7.250 and 28.400. For certificate, send QSL and 9- × 12-in SASE to KA4WUJ via *Callbook* address.

Marathon, New York: The Skyline ARC will operate NW2X **Apr 8-9,** 1300Z-2300Z each day, at the 19th annual Marathon Maple Festival. Operation will be in the lower 30 kHz of the General 75-, 40- and 20-meter phone and CW bands. For certificate, send a 9- × 12-in SASE to Skyline ARC, PO Box 5421, Cortland, NY 13045.

Asotin County, Washington: The Washington ARES will operate special-event stations from 0000Z **Apr** 8 until 2400Z **Apr** 9 commemorating the Washington State Bicentennial, Lewis and Clark Trail and the Lewis and Clark Trail Run. The Trail Run will retrace Lewis and Clark's 573-mile route. Work any Asotin Co station calling CQ I.C. Suggested frequencies: phone—middle of the General bands; CW—50 kHz from band edges; Novice—middle of the bands. For certificate and QSL, send SASE to the station worked.

Philadelphia, Pennsylvania: The Olympia ARC will operate WA3BAT from 1300Z **Apr** 8 until 2000Z **Apr** 9 to celebrate the anniversary of the US Submarine Service on board the *USS Becuna* and the *USS Olympia*. Suggested frequencies: CW—7.133 and 14.050; phone—3.895, 7.245, 14.245, 21.365, 28.305 and 144.200; FM 145.270; RTTY—10 meters. For certificate, send large SASE and QSL to Olympia RAC, PO Box 928, Philadelphia, PA 19105.

Delaware: The Warminster ARC will operate WA3FDU **Apr** 9 to celebrate their 25th anniversary. Operation will be on 7.275 and 28.375. Send QSL and SASE to Warminster ARC, Box 113, Warminster, PA 18974.

Palestine, Texas: The Palestine and Anderson Co ARC will operate W5ORW **Apr 10** from the Palestine Public Library to commemorate the beginning of National Library Week. Operation will be on 28.350 and in the General 15-meter band. For certificate, send QSL and 9- × 12-in SASE to Jeff Montgomery, WB4WXD, 104 Rosewood, Palestine, TX 75801.

Pensacola, Florida: Commemorating the 40th anniversary of Pensacola Junior College, K4SVX will operate **Apr 10-14,** 1400Z-2200Z each day. Operation will be SSB in the 40, 20, 15 and 10-meter bands. For certificate, send SASE to Ken Dunn, Dept of Advanced Technology, PJC, 1000 College Blvd, Pensacola, FL 32504.

Casper, Wyoming: The Morgan Jr High RC will operate KB7WH 1300Z-2100Z **Apr 14** to commemorate the 100th birthday of Casper. Operation will be on 21.305 and 14.235. For certificate and QSL, send QSL and SASE to Morgan Jr High, 1440 South Elm, Casper, WY 82601.

Berkshire, England: GB2TVC will operate **Apr 14-28** to celebrate the college launch into the new polytechnics and college funding council sector. Operation will be SSB, CW, RTTY and AMTOR on all HF bands and 2 meters. A special QSL will be forwarded to all contacts.

Wilmington, North Carolina: The Azalea Coast ARC will operate KB4IL 1400Z-2200Z **Apr 15** aboard the battleship *USS North Carolina* in conjunction with the Azalea Festival. Suggested frequencies are 7.235 and 28.465. For QSL, send large SASE to Azalea Coast ARC, PO Box 4044, Wilmington, NC 28406.

Tucson, Arizona: The Old Pueblo RC will operate W7GV from 1500Z **Apr 15** until 2400Z **Apr 16** to commemorate 60 years of worldwide Amateur Radio operation on the 10-meter band. Operation will be phone, CW, FM and packet in the 10-meter band. For QSL, send QSL and SASE to W7GV, Box 42601, Tucson, AZ 85733.

Green Valley, Arizona: The Green Valley ARC will operate KX7J **Apr 15-16** 1600Z-2300Z each day, from the world's only missile-silo museum. Suggested frequencies: SSB-7.230, 14.250, 21.350, 28.360 and 28.560. For QSL, send QSL and SASE to Green Valley ARC, 601 N La Canada, Green Valley, AZ 85614.

Virginia Beach, Virginia: The Virginia Beach ARC will operate WA4TGF from 0500Z **Apr 15** until 2200Z **Apr 16** to commemorate the 25th anniversary of the opening of the Chesapeake Bay Bridge Tunnel. Suggested frequencies: CW—3.540, 7.040, 14.040, 21.040, 28.140; phone—3.890, 7.240, 14.250, 21.340, 28.365; FM—146.49. For certificate, send QSL and 9- × 12-in SASE to Virginia Beach ARC, PO Box 62003, Virginia Beach, VA 23462.

San Francisco, California: The George S. Ladd Telephone Pioneer RC will operate WB6FDT 1700Z-2300Z **Apr 18** in conjunction with the Red Cross earthquake drill. The club will commemorate the 83rd anniversary of the 1906 San Francisco earthquake. Suggested frequencies: SSB—7.240, 14.240, 21.340, 28.340; CW—7.030, 14.030, 21.030, 28.030; FM—146.19/79. For certificate, send QSL and SASE to Carl Antone, W6OZA, 4540 Lawrence Dr, Castro Valley, CA 94546.

Lake Jackson, Texas: The Brazosport ARC will operate NV5L **Apr 21-22** to celebrate the 153rd anniversary of the Battle of San Jacinto. Suggested frequencies: CW—7.135, 14.035, 21.035; SSB—14.235, 21.335, 28.335. For QSL, send SASE to BARC, PO Box 291, Lake Jackson, TX 77566.

International Marconi Day: The Cornish RAC of England is sponsoring International Marconi Day in celebration of Marconi's birthday. The following stations will be operating from their respective countries: GB4IMD, GBØIMD, EI2IMD, K1VV/IMD, VO1IMD, VE1IMD, and IY4FGM. Operation will be 0000Z-2400Z **Apr 22** in the General bands. For award, work six of the stations and send to CRAC, PO Box 100, Truro, TX1 1RX, Cornwall, United Kingdom.

Alcatraz Island, California: The Sacramento ARC will operate W6AK 1700Z-2230Z **Apr 22** from Alcatraz Isand. Suggested frequencies: SSB—7.270, 14.300, 21.400, 28.450; CW—7.125, 14.050, 21.085, 28.150; FM—146.52; packet. For QSL, send SASE to Sacramento ARC, PO Box 161903, Sacramento, CA 95816.

Gold Hill, North Carolina: The North Carolina Chapter of the Triple States AC will operate N4KVF 1400Z-2200Z **Apr 22** at the site of Reed's Gold Mine in commemoration of the 12th anniversary of this historic site. Suggested frequencies: CW—7.050, 14.050, 28.050; SSB—lower 25 kHz of the General 40- and 20-meter bands and 28.480. For certificate, send no. 10 SASE to Walter Bastow, 484 High Rock Rd, Gold Hill, NC 28071.

Springfield, California: The Porterville ARA will operate WA6CYN 1600Z-2400Z **Apr 22** to commemorate the 28th annual Jackass Mail Run. Suggested frequencies: SSB—7.292, 14.265, 28.355. For QSL, send no. 10 SASE to WA6CYN, PO Box 1000, Springville, CA 93265.

Stockton, California: The Stockton-Delta ARC will operate W6SF **Apr 22-23,** 1900Z-0200Z each day, in conjunction with the Stockton Asparagus Festival. Operation will be SSB on 14.250 and

28.450. For certificate, send SASE and QSL to W6SF, PO Box 245, Stockton, CA 95201.

Ontario, California: The Inland Empire ARC, Inc. will operate WA6ZEF 1400Z **Apr 24** until 0600Z **Apr 30** from the Guasti Winery during the 1989 World Fest. Suggested frequencies are 7.200, 21.300, 14.250, 28.400. For certificate, send no. 10 SASE to IEARC, PO Box 1433, Ontario, CA 91762.

Rocky Point, New York: The Rocky Point Schools ARC will operate N2FCZ 1400Z-2100Z **Apr 25** from Marconi's shack to commemorate his birthday. Operation will be CW on 3.705 and 21.105. For QSL, send QSL and SASE to RPS ARC, Rocky Point Jr/Sr HS, 82 Rocky Point Rd, Rocky Point, NY 11778.

Nebraska City, Nebraska: The Nebraska City ARC will operate KØTIK from 1400Z **Apr 27** until 0000Z **Apr 30** from Arbor Lodge, the home of J. Sterling Lodge, the founder of Arbor Day. Operation will be in the upper portion of the General 80-15 meter bands and the upper portion of the 10-meter Novice phone band. For certificate, send SASE to Barbara Nihart, WDØGKA, Nebraska City ARC, 7731 Holdrege St, Lincoln, NE 68505.

Pitcairn Island: The Radio Amateurs of Pitcairn Island will operate VR6ID, VR6KB, VR6KY, VR6MW, VR6TC and VR6YL 0000Z-2400Z **Apr 28** celebrating the 200th anniversary of the Mutiny on the Bounty. Operation will be on 20, 15 and 10 meters. For QSL, send QSL, contact number and SASE to Bounty Mutiny Day, 7462 W Lawler Ave, Niles, IL 60648.

Seaford, Delaware: The Nanticoke ARC will operate KD3AL from 0000Z **Apr 29** until 2300Z **Apr 30** to celebrate 50 years of nylon. Seaford is the nylon capital of the world. Operation will be CW and SSB on all bands. For certificate, send a large SASE to Paul Bishop, 1806 Concord Rd, Seaford, DE 19973.

Portsmouth Island, North Carolina: The Portsmouth Island DX Assn will operate WA4DAN from 0000Z **Apr 29** until 1500Z **Apr 30** to commemorate the 236th year of Portsmouth Village's founding and the 10th anniversary of its inclusion on the National Register of Historic Places. Suggested frequencies: phone—3.907, 14.260, 21.360, 28.360; CW—14.060, 21.060, 28.060; FM—224.840. For QSL, send SASE to WA4DAN, 403 E 14th St, Greenville, NC 27858.

New Lanark, Lanarkshire, Scotland: The Scottish tourist board will operate GB2STB **Mar 25-27** from the World Heritage Site of New Lanark. Suggested frequencies: phone—14.240 21.250 28.400; CW—10 kHz from band edges; RTTY—14.080 21.090. A special QSL will be sent out for each QSO.

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 **May** 1 to make the **Jul** 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-in 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. QST

W1AW Schedule

April 2-October 29, 1989 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300, 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000; TTh: 0200, 1300; TThSSn: 2300; S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	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: 9:30 PM, 12:30 AM
CDT	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: 8:30 PM, 11:30 PM
MDT	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: 7:30 PM, 10:30 PM
PDT	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: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 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.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

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 January 1989 *QST*, pages 9 and 100" 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 100.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2230 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. Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EDT and on Saturday and Sunday from 3:30 PM to 1 AM EDT. 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 May 29, July 4 and September 4.

Major reconstruction at W1AW is expected to begin soon. Some or all of the scheduled transmissions and visitor operating periods *may* be preempted at times. Check W1AW bulletins for up-to-date information.

Strays

Eight-year-old Adam Jenkins, KB7GLP, was the youngest member of a Novice code and theory class sponsored by the Community Schools program in the Mukilteo (WA) School District No. 6 Sno-Isle Skills Center last fall. Here, he is pictured with instructor Larry Luchi, W7KZE, who mentioned that Adam's sister is in the school's present ham radio class.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—ASM: Walt Dabell, KD3GS. A lot of happenings in emergency communications in Delaware. The EOC in Delaware City has agreed to fund an HF station to add to existing VHF equipment. The Georgetown EOC should have two VHF antennas in place by now, one for digital and the other for voice. An HF station is in the planning. The Kent EOC has had an HF and VHF station for some time. Recent renovations and an outdoor VHF antenna should put the icing on the cake for them. These stations and equipment are useless without trained traffic handlers. You can easily get checked out on traffic by checking into the Delaware Traffic Net. The Delaware Traffic Net meets Monday thru Friday on 3905 kHz at 630PM local and the Delaware Emergency Phone Net meets on 3905 kHz at 6PM local on Saturday. January net rpt: DTN stns 320 tfc 37 in 22 sessns, DEPN stns 51 tfc 11 in 4 sessns, SEN stns 107 tfc 7 in 5 sessns. Traffic: W3QQ 76, KA3GRQ 27, K3JL 22, W3FEG 21, WA3WIY 21, WB3DUG 19, K3YBW 18, KD3GS 7.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Put the Appalachian Amateur Repeater Group's new April 16 hamfest at the fairgrounds in Lebanon on your sked. Some Field Organization appointments earlier this year include WC8R as OO, also N3FGC and W3KOD as ORS. If you pound the brass during "happy hour," are you operating incoherent CW? The Atlantic Division hamfest bulletins on packet radio, begun earlier this year, are very useful in planning your spending sprees. Sponsors, please send info about your hamfest for future bulletins to W3ABC @ WA3ZNW or to his CBA. The Foundation for Amateur Radio administers a number of scholarships for Amateurs' education at college or post-secondary technical school. Write to FAR Scholarships, 6903 Rhode Island Ave., College Park, MD 20740. ARES/Skywarn will participate in a statewide drill this month; Districts 1 and 2 have an NDMS exercise. Gettysburg vets N3ECL and group consulted with MD and VA hams planning safety comm for the reenactment of the Civil War Battle of Newmarket. With the clubs, WA3ADI, WA3IAO, KA3MER and WD9EQD are now officers of Suburban ARC. Mid-Atlantic's '89 officers are W3DZI, KC3BP, KC3ZG, and WA3PZO. Susquehanna Co. has elected WA3SDQ, N3EVI, K3EEL, and KA4JZF as officers; about half their members are chasing the Diamond Jubilee Awards. York ARC officers are N3GIB, K3KZD, WB3BZA, and WA3SRE. KC3LM will attend the ARRL Atlantic Division Cabinet meeting this month. The attractive flyer soliciting 1989 nominations for Atlantic Division Convention awards was designed by OES WA3RPG. You still have time before the April 22 deadline to nominate someone who makes you proud to be a ham for the Atlantic Division "Amateur of the Year" award. Write to Richard Goslee, K2VCZ, 24 Elaine Drive, Rochester, NY 14623-5306, for the form. Eastern PA NTS Section Nets:

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 participation is encouraged. Correction: PSHR November N3DRM 81, traffic 202. Owing to the need for me to be in Virginia with KD3AO during his father's last illness and funeral, I had to leave before the traffic and net statistics were ready for inclusion in this column. Ham radio is very important in my life, as it is to our traffic handlers, but you wouldn't have any respect for a Section Manager who put ham radio ahead of family. Thank you for your understanding and, of course, for your service to the public through NTS.

MARYLAND-DC: SM, Philip Battey, W3FZV—Many thanks to Ned Murray, retired Director of the MD Emergency Mgt and CD Agency. New EC in Anne Arundle Co. KD3KJ, Nancy, who, with OM, NS3V, is a member of the AARC. WA1QAA again ran a RACES exercise in Howard Co. and also received the "Outstanding Service" award from CARA. ARRL has issued an "ARRL Emergency Coordinator's Training and Certification Course." If interested, please contact the SEC, Al Taylor. The League has reissued "Operating an Amateur Radio Station," a $1 intro to "The Operating Manual." KX3U completed the preparation of a card file of data about MDC appointees. He received a Certificate of Merit for his several efforts ot aid to the SM. W3IWI received a Certificate of Merit for his continuing work with packet radio. Please packet oprs: download traffic from local bulletin boards and deliver it or put in on local nets! MDC Public Service Honor Roll for Dec: WA3YLO, W3YVQ, N3EGF, W3FA, K3RXK, KC3Y, K3GHH, and NC3V. MDD has several new checkers-in, including N3DEU, KA3PMK,KD3ID, and WA2WDT. New members of MSN are WB2NSV, N3QBI, WD2K, and N3GIA. Packet traffic in MDC will double this year, according to ASM, Al, KJ3E. WA2SCW uses packet to qualify hams for RCC! He also does a good job as PIA. Mel, N3EKZ, is active in emerg works and is on several nets. Liz, W3CDQ, has passed her 90th birthday! AJ3J, N3GDF, and KA3SKO are now ARRL Life Members. New officers of SMARC are WA3TAI, KA2FWJ, N3GLB, and W1ZX. The club had a fine Christmas dinner. The Amer. Heart Assn. will be aided by MMARC in their Annapolis Walkathon on May 6. K2EB, WA3SCW, AB3F, W3IKO, N3EYU, KC3GY, and KC3YY, all of MMARC, have new gear. New officers of the Antietam Radio Assn. are KA3SDJ, NF3X, and KA3IQX. Al Smith, N4AFJ, well known member of SMARC, is now a Silent Key. The Bay Area ARS helped 400 Boy Scouts in a big competition of outdoor activity. KJ3E is working with WB4ZTR and WB0TAX for the betterment of packet radio in VA and MDC. Contact Al for info. See Auto Call mag for upcoming ham exams. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 31/43/425, PON/WB3BFK 26/24/290, MDD/W3FA 62/284/611 (MDD TOP BRASS W3QQ/99 K3GHH/88 W3FA/87), MEPN/K3RXK 31/223/979, HOCARES/WA1QAA 2/6/23, MAVEN/W3YVQ 1/0/2. Traffic: W3IWI 410, KN1K 304, NC3V 250, K3GHH 234, KC3Y 170, K3RXK 150, NB3P 144, W3FA 139, KJ3E 120, WA3YLO 97, K3NNI 95, KA3T 92, N3EGF 75, NC3Z 63, W3YVQ 52, KK3F 37, KA3ENQ 34, WB3BFK 34, W3FZV 33, KA3DXX 30, K1BGT 25, W3LDD 20, WB3BJM 19, WA3ZNW 16, N1FJW 13, KX3U 12, W3DQI 12, KD3JK 12, WA3GYW 9, K3ORW 7, W3ZNW 3, WA2WDT 3, AG3L 2, WA3SCW 2, KC3DW 2. PSHR: W3FA 99, N3EGF 89, W3YVQ 82, WA3YLO 80, K3RXK 76, KJ3E 74, KC3Y 71, NC3V 70, K3GHH 66.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: KA2RAF. SGL: VACANT. BM: WB2UVB. OOC: WA2HEB. ATCs: K2JF, KA2RJA and WB2MNF. VE testing by the Jersey Shore ARS on April 15. Testing will also be given in Bellmawr on Apr. 20. For information on both these sessions, see January, 1989 QST column. The Mercer County Net is once again meeting daily on the 147.075 (+600 kHz) MHz Robbinsville repeater at 10:30 PM local time. NM is KA2PFM. As of this writing, net controls are needed. If interested, contact KA2PFM. Congratulations to KB2GLO on becoming NM of the JSARS Traffic Net. The Old Barney ARC is offering its members a number of different operating awards for the duration of this year. This sounds like a great way to spark some interest in a club. Sincere thanks to our STM for getting our section's traffic handlers to submit their monthly traffic totals. The following list is the highest I've seen for a long time. Keep up the great work, gang. Until next month, very 73. Traffic (January): WB2ZJF 176, WB2UVB 153, NG2R 42, K4FFM 37, KA2CQX 35, WA2CUW 31, W2FFE 28, WA4JRP 16, WA2HEB 8, KF2U 5, KE2EH 3. PSHR: WB2ZJF 110, WB2UVB 88, KA2CQX 46.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—Great things a-brewing with many of the WNY affiliated clubs—a new year and an ambitious slate of officers head into a sparking new year. The discoveries and re-discoveries are astounding! The 1989 Annual Report forms should now be in the hands of the club officers—if not, request another copy from Vicky Armentano at ARRL Headquarters. (Your copy must have gotten lost in someone's dusty mailbox!) New club officers: Black River Valley ARC NQ2W K2MQX WA2EOP; Champlain Valley ARC KB2DVM (now WN2FI) KA2KUI WA2DAC KC2JO KA2MOO; Fulton ARC W2TQF KE2HD WB2LBI KA2RRY; Jefferson County RAC WA2TYO KA2GCP WB2ACO WB2HBU; Oneida/Madison ARC WF2V WF2L W2GHH WB2DLP; Oneonta ARC K2TNN WA2UXE KE2GH KA2HYY; The Oneonta Club put on an excellent display at the South Side Mall with lots of radio action. Congrats! Liverpool ARC gave a special recognition to members KA2TPI KA2VEE KA1TY W2VUH KA2DQP KB2DIO KB2ECK, in memory of Silent Key John Bonar, NA2C, who was a super spark to Amateur Radio. Congratulations to the sharp eyes at KC2HJ and N2EIA for spotting the SHADOW in the last WNY column! Appointments: (NM) W2YGW NYS/L at 10 PM, (ORS) N2DLN KC2HJ WB2IJH WA2JPB KA2QOO W2UYE. N5MEA in ENY is new Net Manager for NYS/E at 7 PM. Again, many thanks to KU2N for his service as NYS/E&L manager during these past three years. Oh by the way, the Amateur Radio Emergency Service of the ARRL has an acronym "ARES," some folk are saying "ARIES," which of course is a male goat or sheep, a ram! And RACES is another acronym you will find in Part 97 of the FCC Rules which we must all be familiar with as we operate our Hamatuer Stations. Special Service Clubs in WNY are listed in the Repeater Directory on page 415 to 417 of the 1988-89 copy, they are: CVARC, CCAFMA, Fulton, RAGS, RAWNY, RARA, SIARC. Is your club interested in broadening the Amateur Radio experience and capabilities of its members, and in receiving additional support and information for club success in the community? If so, contact Affiliated Club Coordinator N2EH for more info.

NYSEMO	SSB	120/010/05	NYSR	CW	016/004/05
NYS/M*	CW	334/257/31	NYSE/E*	CW	336/150/31
WDN/M*	FM	427/148/31	WDN/E*	FM	515/175/31
NYP*	SSB	250/160/31	TIGARDS	FM	044/008/05
NYPON*	SSB	654/372/31	BlueLine	FM	153/013/30
ESS	CW	483/078/31	VHFTHIN	FM	052/000/04
NYSPTEN	SSB	526/084/31	VHFTHIN	FM	052/000/04
LCARES	FM	044/000/05	CNYTN*	FM	
OCTEN/E/	FM	717/101/31	OCTEN/L*	FM	285/074/31
Q NET	FM	383/001/31	WDN/L*	FM	506/114/31
STAR*	FM	333/061/31	NYS/L	CW	352/252/31
Pathfinder	FM	314/003/31	ORTN	SSB	025/000/04
JCRACN	FM	236/003/29	*NTS net		

SPNS Report: WB2ACV KT25 ST45. PBBS Report: KA2JXI KT00 ST05. Madison Co. ARES Net meets Sundays at 2000 on 147.105 MHz. PSHR: N2ABA N2EIA N2EVG WA2FJJ W2FR N2IKR W2MTA WB2OWO WB2QIX KA2QOO ND2S NJ3V KA2UBD K2YAI KA2ZKM KA2ZNZ. HAMFESTS: Drumlins Mar 25, Dayton Apr. 29, Owego May 6, Rochester May 19-21, Rome June 4, Cortland June 17, Batavia July 9, Traffic Handlers Picnic Aug.12, Elmira Sep 23, Syracuse Oct. 14. Traffic (Jan.) W2MTA 628, N2EIA 467, NJ3V 385, WB2OWO 367, WA2FJJ 289, K2YAI 233, KC2HJ 230, KA2UBD 225, KA2ZNZ 127, KA2ZKM 124, ND2S 122, N2ABA 121, WB2QIX 119, KA2QOO 111, WB2IJH 106, WB2OEV 80, KA2DBD 76, W2UYE 72, NN2H 36, KG2D 33, N2IYA 31, N2EVG 27, K2QR 27, N2IKR 23, KA2TWY 22, KC2JW 21, AF2K 21, KE2EA 10, WA2OEP 2. (Dec.) NN2H 100, K2QR 49.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN, OOC: KX3V. ACC: AK3J. SGL: KA3OEM. PIO & ASM: N3DOK.

NET	QNI	QTC	Sess	kHz	T/D	NM
WPACW	285	114	31	3585	7:00P/D	WA3UNX
WPAPTN	585	103	31	3983	6:00P/D	WB3HLN
KFN						
PFN	224	174	31	3958	5:00P/D	WA3THT
WPA2MTN	309	12	31	.28/88	8:00P/D	KA3BGC
NWPA2MTN	658	49	28	44.53/45.13	9:00P/D	KC3NY

To all clubs, please send in your 1989 annual club report as required by the ACC Stew Saylor. If you have any questions, please contact Stew. Our Technical Coordinator is requesting each club appoint an assistant TC to work with him. Our OO Coordinator needs more OOs to cover the bands. John Coulter, KX3V, will welcome your application. Bulletin Manager Charles Gessner, KC3ET, wants more bulletin stations both CW, SSB and Packet. Our SEC Bryan Simanic, WA3UFN, can use ECs in some counties. Does your county have an EC? If not, why not apply for it. Butler County ARA mall show was a success according to reports. Sorry that I could not attend. Now we must plan for a program that will take place in August, about the 25 or 26th. It is the NDMS (i.e. National Disaster Medical System). This is a comprehensive system to provide acute care for mass casualties. The July 1988 QST describes the event that was held in Eastern PA and NJ. As info is passed to me, I will pass it on. We will need amateurs at the hospitals here. This is to be determined as plans are made. More later by the powers that be. January traffic: N3EMD 389, KQ3T 326, N3FM 111, NO3M 94, N3AES 90, WA3UNX 76, W3NGO 76, K3SMB 53, KA3OEM 38, WA3DBW 35, KC3HR 34, W3RUL 34, KC3GO 28, WA3HJC 24, W3KUN 14, KA3EGE 14, KD3AC 13, KC3YE 11, N3GTO 9, NR3T 8, W2AHH 6, N3SN 5.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. DEC: WD9EBQ

Illinois Section Nets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 & 220 DAILY
ITN	3705	1900 DAILY
CTN	149.69/09	2100 DAILY
ILARES	3905	1630 1ST & 3RD SUNDAYS

Illinois Independent Nets

IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F; 0830 SUNDAY
NCPN	3915	0700 MONDAY-SATURDAY
NCPN	7270	1215 MONDAY-SATURDAY

This was the month for elections at many clubs. The new officers at the Fox River Radio League are: Pres. KD9RU; N9BTF; Sec. KE9JN; Treas., N9FWM. For A.C.L.R., Pres., N9EEV; V.P., KA9SVN; Sec., KA9VPK; Treas., KA9VRU. At the North Shore Radio Club, Pres., WBØLEY; VP K9TOL; Sec N9CHQ; Treas., W9RS. From the Egyptian Radio Club, Pres. KA9HDZ; VP, WØUH, Sec. KA9YIG; Treas, KBØALS. A big THANKS to all those who served as club officers throughout the section in 1988. And of course, congratulations and good luck to those newly elected! The Bolinbrook Amateur Radio Society sponsors a hot line with a recorded message about club activities. The number is 312-759-7005. Remember that as of Nov. 11, 1989 all of area code 312 outside Chicago will change to area code 708. Several clubs have responded to my plea for input on section activities by sending their newsletters. I have also received some input via packet @ N9GTM. Thanks to all, and keep it coming! Traffic: WA9VLC 179, W9HLX 126, NN9M 114, K9QEW 81, WB9TVD 65, K9CNP 60, W9HOT 59, W9LWH 46, WD9HQW 40, KA9QXI 39, NC9T 36, W9HBI 33, WD9CIR 29, KA9CTW/T 27, W9OBU 26, KA9BBV 20, W9KR 19, WA9SLT 18, KA9JNE 17, KA9TVU/T 16, WD9EBQ 11, W9VEY/M 9, W9JUM 8, W9LNQ 8.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: NX9I. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: KA9WXT. OOC: KJ9G. Net Managers: ITN KA9EIV. QIN KJ9J. ICN: KD9ER, VHF W9PMT. IWN KA9ERC. January Net reports:

Net	Freq	Time/Daily/UTC	QNI	QTC	QTR	Ses
ITN	3910	1300/2130/2300	3215	359	2026	77
QIN	3656	1430/0000/0300	516	165	1134	62
ICN	3705	2315	101	20	417	20
IWN	3910	1310	1269		278	31
IWN VHF	Bloomington		787		217	31
IWN VHF	Kokomo		812		204	31
IWN VHF	Ligonier		702		220	31
Hoosier VHF Nets (17)			5212	179	4569	203

D9RN for January 231 QTC 62 ses. IN 100% by N9DWU, K9ZLS, K9GBR, NX9I, WA9OHX, K9CGS, N9GRZ. CAND 510 OTC in 31 Ses. D9RN 100 by N9DWU, K9ZLS 9RN Cycle 4 for Jan. QTC 338, QTR 746 in 62 ses. In 98% N9HZ, KJ9J, W9JUJ, NR9K, WA9QCF, WB9UYU, K9WWJ. WA9OKK Early Bird Wet Net Report for January 263 QTC in 1980 minutes and 31 ses. Silent Keys: Delbert Maynard, W9MTV, Anderson, Indiana. Tom Nisbet. W9GGK of Rome City died of a heart attack on Feb. 5th. He will be missed by the 21 repeater club. Appointments: PIA Jim Walker, N9GCP, Laporte, In. and John Shean, N9TV, Jeffersonville, In. ATC David R. Kunzman, WB9NQQ. ORS Clark Co. ARC, W9WWI. OES Clark Co. ARC, W9JBQ. OBS Terry Lamb, NX9A. Although all activities in February and March are geared toward the tornado season beginning in April, on January 7, the Tri-State ARS activated their SKYWARN network in support of the Evansville, In. NWS.

(continued on page 98)

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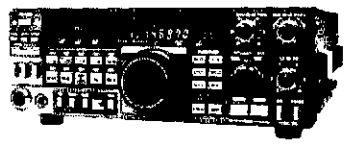

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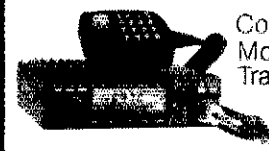

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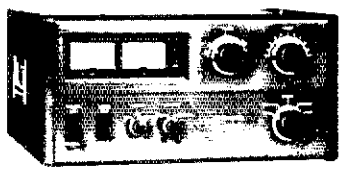

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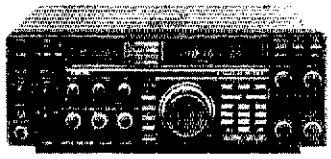

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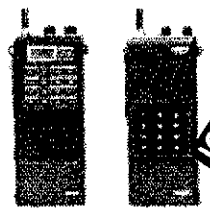

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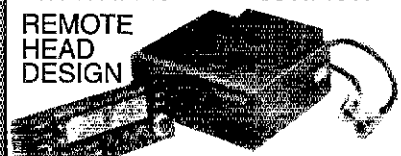

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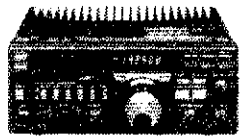

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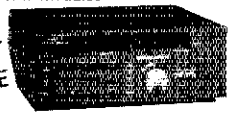

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Gain, dB	excellent	excellent	excellent
Power Rating, Watts FM	1000	500	500
Radiation Angle, Deg.	7	7	7
Horizontal Radiation Pattern, Deg.	360	360	360
Height, ft. (m)	14 (4.3)	9.3 (2.8)	4.9 (1.5)
Weight, lbs. (kg)	6 (2.7)	5 (2.3)	1 (.45)

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Available through dealers worldwide.

They were active for over 3 hours. Tornadoes touched down at Mills Shack, Il, Allendale, Il and at St. Thomas, In. 30 amateurs assisted, outstanding were WA9IVG, W9MR, KA9PCT, AI9N, and KA9EIV. Congratulations to the Northeastern Indiana ARC and the Huntington County ARC on their being officially renewed as an SSC. It is great to hear of so many new Novice classes underway with a good number of young people involved. EC reports for January: WD9BKA, W9BTZ, N9BHA, W9CTC, N9DFU, KA9DZM, WA9DOL, N9DUZ, KB9DE, N9DTG, N9ENC, W9EPT, K9ET, K9EFY, N9FMO, K9FEI, NO9G, N9GYO, KD9HB, WA9HEE, WD9HII, NX9I, WD9IZA, W9KGE, WB9LRR, K9LMJ, KA9MNR, W9NPA, WB9NCE, KA9SHM, W9SIO, WB9UNL, KC9W, WD9X, W9YDP, KC9YC. Packet BBS reports: KD9QB 2086, N5AAA 590, WB9SYK 192, N8GTC 79, and WA9IVB 79. Traffic: KJ9J 284, NR9K 245, W9UMH 145, N9DWU 124, N9BS 62, N9HZ 55, WA9OHX 52, W9ZGC 48, K9SBW 39, N9ENC 36, WB9IHR 34, WA9QCF 32, K9FEI 28, NX9I 28, WB9QPA 26, K9ZLS 26, W9OCL 24, K9ZBM 21, WD9HII 20, W9PPO 19, KA9KME 19, WB9OZZ 16, WB9TFD 16, W9PMT 14, KD9DU 13, N9DOP 12, W9BTZ 12, KA9QMI 11, WA9OKK 10, K9OUP 9, WD9DWD 8, K9GBR 8, AB9A 7, KB9GK 7, WD9CIV 7, WA9QVH 6, K9DIY 5, NZ9S 5, KB9HH 4, N9FMO 4, KB9SU 3, WA9JNC 2, K9EBK 2, W9POF 2, WB9AJY 1, W9KMY 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: K9EP. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. Congratulations to new Badger Emergency Net Manager Greg, WA9W, of Harshaw. Special thanks to Lisa, KA9RII, for three years of outstanding volunteer work as previous Net Manager. Welcome to new ARRL affiliated club Namekagon Valley Wireless Association in Hayward area, meets 2nd Thursday of month around 7 PM at home of President, KD9FC. N9ETE Sec/Treas. Riverland ARC new officers: Pres. KØJYB, V. Pres. KA9HOP, Sec./Treas. WB9VYI. KA9FOZ gave Amateur Radio demonstration to Girl Sout Troop and included good media publicity. Two ARRL Volunteer Examiner Teams in Wisconsin ranked high enough to become local custodians of test and application forms: Fox Cities ARC VEC and Tomahawk ARC VEC. W9YCV and W9CBE enjoy their new AMTOR capabilities. Sorry to report W9UCI, George Winkler of Stevens Point, became a Silent Key; he was Milwaukee's Pulaski High School radio class and club instructor for many amateurs in the sixties. New Emergency Coordinators: KA9PSL of Tomah for Monroe County and WD9FLJ of Appleton for Outagamie County; contact them for a description of communication plans in their areas. Central Wisconsin RA have received donated ham equipment and are vastly improving their club station. CWRA doubled their newsletter mailing list to 200 but by using bulk mailing rate they save money even with the extra printing costs. Helpful Racine Megacycle Clubers say, "We give rides to members who have difficulty getting out during winter months. They really appreciate the service." Bob, N9GMT, gave interesting program about remote receiver testing for the 91-Friendly repeater in Milwaukee; their new officers are Pres. K9IZV, V. Pres. WB9LZN, Treas. WD9EUF, and Sec. N9GMT. Ozaukee RC considers upgrading their 220 MHz repeater and hopes it will encourage more Novice use. Three out of the 36 US clubs having one hundred percent ARRL membership are in Wisconsin, they are: South Milwaukee ARC, Madison DX Club and the W/K ARC of Greater Milwaukee. Amateur exams on April 1st, Racine; April 5th, Milwaukee; and April 15th, Eau Claire. Traffic: WB9YPY 2007, KC9CJ 1087, WA9W 490, W9CBE 265, KA9WDE 227, W9YCV 202, W9KLN 201, WA9WYS 183, K9GDF 145, N9BDL 145, N9BCX 88, KA9RII 86, KA9BHL 84, K9UTQ 83, KA9KLZ 70, AG9G 65, K9AKG 61, K9EP 61, WB9ICH 55, W9UCL 48, W9NGP 47, K9JPS 45, KG9B 34, NS9Q 34, KA9VIA 32, W9UW 31, K9FHI 31, W9ODV 23, KA9TTM 22, K9ANV 16, NZ9Z 13, W9PVD 2.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—1988 is now history, and we have just completed January with a total traffic count of 3,166. If you are interested in comparisons with 1988, here are the figures by month for last year; Jan 3531, Feb 3349, Mar 3813, Apr 2423, May 5225, Jun 2965, Jul 2954, Aug 2902, Sep 3146, Oct 2923, Nov 3198, Dec 10,775. We have seven nets in operation and as you can see at the end of this summary, they are doing a great job. But, let's not get set in our ways. Too often traffic is listed in a net that doesn't move. The rule is, the station NEAREST the destination takes the traffic. If you are located geographically nearer the destination than the station listing the traffic, take the traffic. Then go from there. With all our regular nets, plus our 2-meter links and packet, we should be able to improve our efficiency easily. So let's not take so many slap shots, but let's work in closer to the "net." Congratulations to Jay Bellows, KØQBE, St. Paul as the Amateur of the Month for January. Thanks Jay for your efforts and thanks to all MSN participants for their work too. Jim Stodolka, WØTIV, says that the January meeting of the Upper Midwest Chapter QCWA met at the Ft. Snelling Officer's Club with 75 persons present. WØRHT showed a video tape of the Farnborough, England Airshow. Also, our best wishes to Art Putt, KDØCL for a speedy recovery and hopefully home from the hospital soon. In conclusion, take a look at MSSN activity for the month! It's the leading CW net for QNI and don't overlook that net if you need an outlet for your traffic. Thanks gang— see you next time. 73 es GL. Jim Swisher, KAØEPY, STM.

NET	FREQ	TIME	QNI/QTC/SESS	NET MGR.
MSN/1	3685	6:30P	408/125/31	NRØS
MSN/2	3685	10:00P	327/125/31	KDØNH
MSPN/N	3860	12:05P	390/175/31	WBØWNJ
MSPN/E	3860	5:30P	946/232/31	KCØT
MSSN	3710	6:00P	473/42/31**	KAØSBY
MAWN	3860	6:00P	363/235/21	KDØCI
PAW	3925	9:00A	3304/362/121	WDØBAC

**MSSN additionally 95 training messages. Traffic: WBØWNJ 951, WAØTFC 372, KAØEPY 292, WØGRW 247, KAØSBY 156, KT9I 122, KAØPDM 121, KDØCI 91, NØFOO 91, KAØARP 87, NRØS 87, KØOGI 76, WDØGUF 71, W9DM 60, KDØNH 55, NØHWD 53, KCØT 49, KØCSE 41, NØJP 39, WGØS 35, WØTIV 30, WMØW 18, WØKYG 12. Total Traffic: 3,166.

SOUTH DAKOTA: SM, R.L. Cory, WØYMB—Asst SM: NØABE, WAØFPR. SEC: KAØKPY. STM: KDØYL. The SD Centennial Wagon Trail will cover the State between May 10 and Sept. 4. Volunteer to be a radio operator on the Ham Radio Station on board the wagon train as it passes thru your

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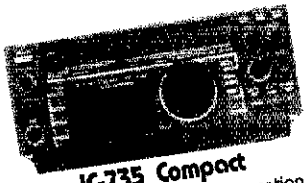

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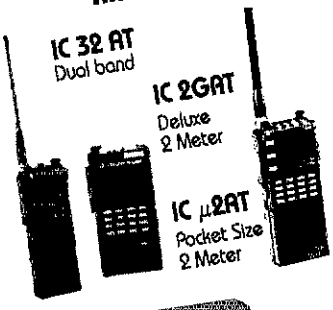

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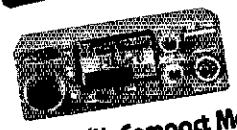

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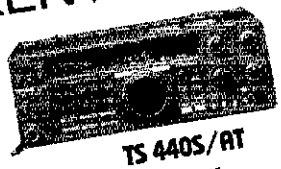

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area. For more info, contact your club secretary or the Sioux Falls Radio Club or your SM. It has been reported that there is a new repeater on the Air at Milbank on 146.97. Check-ins have been up on the S. Dak. CW net on 3650 at 7 PM CST, 6 PM MST Mon-Fri. Also on the QCWA net on 3885 SSB, Sun. morning, 8 AM CST, 7 AM MST. New packet stations please report to NØABE at Sioux Falls. An SASE to him will bring you a new up-to-date map of S. Dak packet stations. Total traffic handled for January was 1069. Traffic: NØDOF 563, KØERM 195, KØAIE 115, KAØUEQ 66, KAØYPY 66, WBØOMF 28, KDØYL 24, WØYMB 12.

DELTA DIVISION

ARKANSAS: SM, Bob Harmon, W5SEP—The new EC for Baxter County, Bob Walker, N5HZM, reports 28 active ARES members. Dick Hoyt, W5RIT, reports that CW operators are needed to operate OZK (Arkansas) Traffic Net which meets at 1900 CST on 3592 kHz. Net speed is 15-20 wpm or slower if required. Hognet, the Packet organization for Northwest Arkansas and Eastern Oklahoma elected new officers: President—Stan, K5VR, VP Doug, WB5HLR, Sec/Treas-Chuck, KA5BML. New officers for the Ft. Smith ARC are President Chuck, N5JUD, VP-Jack, W5PEW, Sec/Treas-Chuck, N5MQK, Activities Director-Charles, W5JE. New Officers, Russellville ARC are: President-Charles, KF5JH, VP-John, WB5BHS, Sec/Treas-Mary, WB8QJT. MARC officers for the ensuing year are President Paul, AF5M, VP- Paul, WD5BIV, Sec.- Dora Anna, NI5D, Treas.- Jan, N5IQL. 1988 MARC Amateur of the Year went to Paul Wynne, AF5M; Operator of the Year to Jan Thomas, N5IQL, and Ron Boynton received the Novice/Technician award. Congratulations to all. As we mentioned in the Section Managers Newletter, we are actively seeking ARES members as well as ECs for the counties that are not now represented.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: WB4ICV. Packet: NE5S. The new officers of the Twin City Ham Club in West Monroe are: Pres: Jim Ramsey, N5DMX. VP: Henry Little, WB5SOT. Sec/Treas: Joe Hatten, KB5EIL. Welcome aboard to Jerry Wilkinson, WB4ICV, from Kenner, recently appointed as the ARRL Official Coordinator for Louisiana. The La Section Official Observers are: Jimmy Bonnough, WB5TPG Shreveport. Robert Foster, NØEBH, Fort Polk. Wiltz Hanks, K5ABD Lafayette. Ralph Morel, WY5Q, Slidell. George Morvant, NZ5O, Broussard. Benson Owens, K5KV, Baton Rouge. George Perry, W5LVX, Greenwell Springs. Many thanks from all of us for your volunteer efforts. The new officers of the Springhill ARC are: Pres: James Cheatham, N5NLX. VP: Loyd Lytle, KB5BUS. Tres: Harold Stevens, K5ELJ. Tres: Val Marshall, K5WOD. The 1989 Hamfest Schedule: May 20-21 Baton Rouge. June 3-4 ARRL National Dallas (Arlington) TX. June 17-18 New Orleans (Metairie). July 1 Alexandria. August 12-13 Shreveport. November 4 West Monroe. I will be at the ARRL Forum at all of the hamfests. The monthly newsletter called QRM published by the Ozone ARC in Slidell is much appreciated. The Ozone ARC 1989 officers are: Pres: Dave Hartley, K5OZ; VP: Tom Nicolaides, WA5ZCC. Sec: Judy Guthans, KB5ENV. Treas: Ed Farley, KA5HAG. No traffic reports received. 73 de "Wondy" K5KR.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRX. PIO: WN5M. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: KK5K and ACC: NC5Y. Please consider a nominee for the Hiram P. Maxim Award for our young hams under age 21. Some deserving ham, somewhere in our state is certainly deserving of consideration. DRN5 (WB5YDD) Sess 62; QTC 569, Rep 97% by KB5W, KT5Z, NS5M and W5HKW. CAND (K5UPN) Sess 31; QTC 510, represented 100% by NS5M. Miss Sec Net (formerly MSBN) (KF5DE) sess 31: QNI 2170, QTC 52. Magnolia Sec Net (W5YRX) Sess 31, QNI 639, QTC 8. Miss Slow Net (W5YRX) Sess 21, QNI 79, QTC 2. ARRL Numbered Bulletins, 8; propo f'casts bulletins 5 (W5EPW Miss BM ARRL).

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: N4PQY. 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. At 6 PM CST on January 30, as is my usual custom, I copied ARRL bulletin 7, concerning the opening of 18 MHz an hour later. By the time I got back to the printer to edit the bulletin, it was almost time for the band to open. Quickly, I tried my 20, 40, 80 dipoles, and found that they loaded well (I wonder what the pattern looked like.) I moved a couple of kHz and worked Dave Sumner, K1ZZ, the Executive VP for ARRL, for my first contact! Next was W1YL/4, and other ARRL officials followed quickly. I ended up the hour with about 20 contacts. I think the band is going to be good for us. Thanks to ARRL for getting it opened six months early. DRN5 Net Manager WB5YDD reports 569 messages handled during 62 sessions, with TN covered by K4WWQ, NG4J, WD4GYT and WB4LAL during 77% of the sessions. We don't have such excellent RN5 coverage, but we are working on it. Let's make this the year to improve our traffic-handling ability, to apply for that ARRL appointment, to further amateur radio with efforts to the limit of our time and ability. After more than a year as your Section Manager, I continue to be impressed by the activity on our Section Nets. I don't recall a single session being cancelled for lack of an NCS. My sincere thanks to John, W4PFP, and Wilodean, WA4HKU, for their splendid efforts, and to each of you who are so dedicated in your acting as NCS, handling traffic, or just plain checking into the nets. I can't begin to mention the 300 members who make the phone nets possible, but the CW net is, er, quite a bit smaller, and I can thank our regulars in just a couple of lines: WB4LAL K4CXY W4DDK K4WOP K4HVA K4KP W4MRD W4TYU WA4JDY WA4YEM. There are several others, but these stations check in several times per week. Traffic: WA4FMR 113, W4DDK 95, W4TYV 37, WA4GZZ 34, W4MI 30, WB4LAL 23, KA5KDB 21, WA4HKU 18, K4WOP 14, K4CXY 12, W4EWR 5, W4PSN 4.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—Asst. SM: KC4WN. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (January) I am sorry to report that Willard Zahalka, K4HOE, is a Silent Key. Willard was a true ham in every sense of the word and his friendship will be missed by all. Want to know what your League is up to? Take the time to read the minutes of the board meetings which are published in QST. The section can always use more people interested in emergency work. If interested, see your DEC or EC, or become one yourself. I am still receiving many club newsletters and wish to congratulate the all-YL group of officers at MCARC

Net	QNI	QTC	Sess	Mgr
MKPN	1607	160	31	WD4RWU
KTN	1080	83	31	WD4RWU
KYN(both)	332	170	60	K4AVX/KZ8Q
TSTMN	402	29	31	KZ8Q
KNTN	247	71	40	WA4EBN

SAR (Jan.): K4VHF 168, WD4RWU 142, KI4QH 59, KB4UJA 54, WA4EBN 53, K4AVX 37, KA4MTX 36, WA4HLW 33, KC4WN 31, K4MHL 26, WB4AUN 18, N4PEK 16, WD4CQF 9, W4TPB 3. PSHR: KI4QH 100, KA4MTX 91.

MICHIGAN: SM, George E. Race, WB8BGY (@N8FTY)—ASM: WA1LRL (@WA1LRL). STM: WD8KOC (@NT8R). SEC: N8AYQ (@TVC). SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. ACC: N8JVA. PIO: N8KBA. BM: W1BW. Silent Key, with deep regret, WA8QNC. New Officers for the Montcalm Area ARC are; Pres. N8JIQ-Robert, VP Ray Larabee, Sec. N8HDH-Ann, Treas. N8HOK-Darlene. New Officers for the Southern Michigan ARC are; Pres KB8EJD-Carol, VP WA8MFL-Marion, Sec. N8FBV-Ivan, Treas. WB8FBJ-Jerry. Cascades ARC new Officers are; Pres. KB8DKZ-Bill, VP KA7UIU-Al, Sec. KB8DLC-Rick, Treas. KA8VMJ-Lee. As we prepare for our yearly Tornado season, reports are that most counties have been through their yearly SKYWARN Spotter training. Each EC should be prepared to work with the NWS and their local EOC Director during this critical time of year. Good liaison with adjacent counties is very important for early warning of impending severe weather systems. Providing liaison stations to the many wide area VHF Nets is also important. This is the time of year to update your local calling tree, or other alerting systems. Emergency operation supplies, equipment, and generators should also be in readiness. During any major disaster, the 3.932 MHz State Emergency Frequency will be used for inter-county communications and general information. The SEOC and many County EOC's are equipped to operate on this fre- quency as well. WD8KQC-Skip, our STM, reports that 89 stations handled 24,945 pieces of traffic in 1988. This is a 20% increase over 1987. My thanks to all for your support of the MI Traffic Nets. The top 5 traffic handlers for 1988 were; KA8CPS-4707, WD8KQC-2400, N8HHH-1699, WB8R-944, NW8M-892. On a recent visit to the Milford ARC, I had the honor of presenting, on behalf of the Club, a plaque to Harry, W8SWD, for his 35 years of service and dedication to the Milford ARC. Also recognized at the meeting were the following new Novices; KB8GBQ-Keith,KB8GBR-Tom, KB8GBS-Ernest, KB8GBT-Joey, KB8GBU-Tim, KB8GBV-Pierce, KB8GBW-Bob, KB8GBX-Jane, and KB8GBY-Carol. Incidentally, KB8GBT, Joey, at 10 years old, is the youngest person to earn a license from the Milford ARC. Congratulations to all, and welcome to Amateur Radio. Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
UPN*	3921	5:00PM Dy	1243	72	36	WA8DHB
MACS*	3953	11:00AM M-Sa	334	44	31	K8OCP
MITN	3953	7:00PM Dy	645	184	31	WD8EIB
QMN*	3663	5:00PM Dy	820	171	92	WB8R
MNN*	3722	5:30PM Dy	248	54	62	KA8BBY
SEMTN	145.33	10:15PM Dy	347	85	30	N8HSC
GLETN	3932	8:00PM Dy	1298	48	31	NW8M
WSSBN	3935	7:00PM Dy	No report received			W8NDI

VHF Net Activity 462 6 27 NO8Q *QMN Fast-6:30PM Dy; QMN Late-10PM Dy.; MNN Late-8:00PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. Traffic for January: KA8CPS 300, WD8KQC 140, WB8YDZ 99, WB8SYA 96, N8FTY/BBS 92, W8RNO 75, K8GXV 74, WA8OOH/BBS 71, N8FPN 70, KA8BBY 67, WA8DHB 66, NW8M 65, NY8W 60, WD8EIB 54, WB8R 52, N8HSC 47, W8EOI 43, N8CNY 42, K6HAP 40, WB8YPG 37, WA1LRL/BBS 35, K8UPE 34, WB8BGY 34, WB8Q 34, W8YIQ 33, K3UWO 32, N8IIC 33, W8BEZ 27, KD8LZ 24, K8OCP 22, W8IHX 22, K8EQO 17, K8VA 17, K8ZJU 15, WD8MJB 14, KI8Q 13, WN8H 11, K8CQF 10, W8VIZ 9, WA8MVH 8, N8JAT/BBS 8, KA8LAR 8, KA8BYK 6, NX8S 6, N8EXS 4, W8URM 3, KN8JDN 3, W8CUP 1. (Nov. W8IHX 6, K8ZJU 9, Dec. WA1LRL/BBS 59.)

OHIO: SM, John Haungs, WA8STX Phone: (513) 563-7373—ASM: David Kersten, N8AUH. SEC: WD8MPV. STM: KF8J. ACC: KJ3O. BM: W8ZM. TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK. PIO: K8QOE.

NET	QNI	QTC	SESS	Time	FREQ	MGR
BN(E)	266	125	31	1845	3.577	WD8C
BN(L)	101	198	31	2200	3.577	K8TVG
BNR	295	108	31	1800	3.605	W8EK
BSSN	305	80	38	1900	3.873	K8OZ
OSN	—	—	—	1810	3.708	WD8KBW
OSSBN	2223	860	93	1030 1615 1830	3.9725	KA8CGF
OSSN	192	68	31	0645 M-F	3.577	KD8HB
OSSN	—	—	—	0800 S-SN	3.708	KD8HB
OHIO SECTION AREA NET				1700 SU	3.875	WD8MPV

A note from K1CE indicates that the Ohio Section has the largest number of League members in the country, 6,808, as of the end of December. It is encouraging to see the number of new clubs being formed and the clubs which are active and are keeping their members informed with a newsletter. We hope we can keep these clubs active so they will grow and show an increase in their annual club report to ARRL. It is time to remind club Secretaries to send in the club annual report, so they are not dropped from the affiliated club list. There has also been an increase in request for applications for Field Organization Station Appointments. DARA had a large number of applications submitted for those interested in being OES, OBS, ORS, PIA, and OO. Contact your local club Secretary, The Ohio SM or ARRL for an application (form FSD-187). The ARRL night at Dayton Amateur Radio Assn. was a very informative session with League and Section Officials present. Items from the January ARRL Board meeting were some of the main topics of discussion including the no-code study. Hamilton County Civil Defense Director had his first quarterly meeting with the ARPSC group to discuss the role of RACES with Civil Defense. The role of Civil Defense is more important now that they are responsible for the monitoring of hazardous materials and the clean up of a hazardous site. EC, WD8QDQ has been actively training

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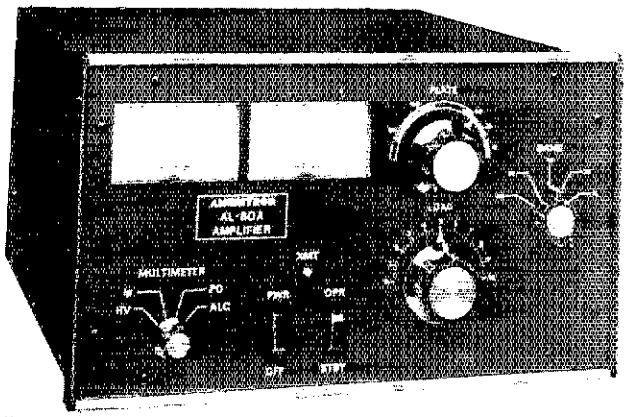

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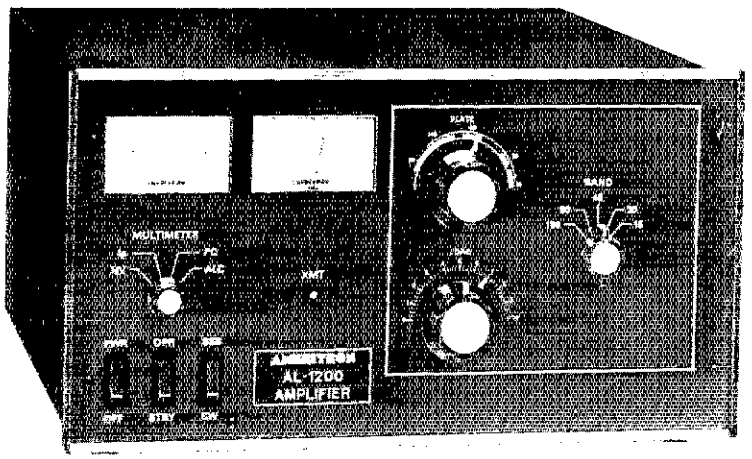

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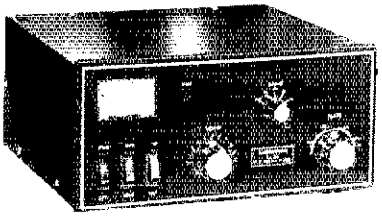
8877 TUBE

Full legal output with 65 watts drive.

The cooling system in both amplifiers keeps the tube safely below the manufacturers ratings even when operating at 1500 watts output with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

Size: 18½"D. x 17"W. x 10"H. Wgt. 77 lbs

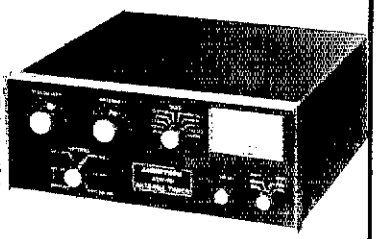


AL-84 LINEAR AMPLIFIER

The **Ameritron AL-84** is an economical amplifier using four 6MJ6 tubes to develop 400 watts output on CW and 600 watts PEP on SSB from 160 through 15 meters. Drive required is 70 w typical, 100 w max. The passive input network presents a low SWR input to the exciter. Power input is 900 watts. The AL-84 is an excellent back-up, portable or beginner's amplifier.

Size: 11½"W. x 6"H. x 12½"D. Wgt. 24 lbs

ATR-15 TUNER



The **Ameritron ATR-15** is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

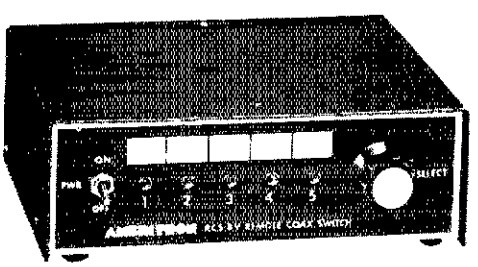
A peak reading wattmeter and SWR bridge is standard in the ATR-15. It accurately reads envelope powers up to 2KW.

Size: 6"H. x 13¼"W. x 16"D. Wgt. 14 lbs

Remote COAX Switches

RCS-4 FOR CONVENIENT INSTALLATION

No control cable required.
Selects one of four antennas.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms.
Power capability: 1500 watts average, 2500 watts PEP maximum



RCS-8V FOR SPECIAL APPLICATIONS

Selects up to five antennas.
Loss at 150 MHz: less than .1 dB.
VSWR: under 1.2 to 1 DC to 250 MHz.
Impedance: 50 ohms.
Power capability: 5 kW below 30 MHz, 1 kW at 150 MHz.

Available at your dealer. Send for a catalog of the complete AMERITRON line.

AMERITRON

9805 Walford Avenue • Cleveland, Ohio 44102

For more information: (601) 323-9715 • **Technical inquiries:** (216) 651-1740

members to be prepared for this added responsibility. License exams at Dayton HamVention: Novice through Extra are scheduled Sat. & Sun. April 29 and 30 by appointment only. The Parma Radio Club is planning to charter a bus to the Dayton HamVention. What a great idea to beat the parking situation. Contact KA8IMU. There is a Midwest Amateur Radio News service available to everyone within range of the 145.11 Dayton-Columbus repeater system. Phil, KA8KEJ, who now lives in Lima, is continuing his production of "Amateur Week," a weekly report of Amateur Radio activities around Ohio, Northern Kentucky and Indiana. "Amateur Week" is aired several times a week. Anyone in the Columbus area who has any kind of information about Amateur Radio activities of any sort is invited to contact the Columbus reporter, Ron, WA8BUW. The information can be club activities, individual achievements, technical news, or anything at all related to Amateur Radio. Congratulations to Joe, W2TSI of the Lake County Amateur Radio Assoc. for receiving the "Good Ducky" award. LCARA reported a total of 11 community Radio Communication events during 1988 for a total of nearly 400 man hours of volunteer service. Have you sent the Eighth Call Area QSL Bureau your self-addressed, stamped envelopes to receive your DX QSL cards? Send several 5 X 7½ SAS envelopes with your call sign in the upper left-hand corner of the envelope with at least one unit of postage to Box 182165, Columbus, OH 43218. Traffic: W8PMJ 350, KC8TW/BBS 264, KD8KU 257, W8BO 227, K8JDI 199, WD8KFN 195, KD8HB 177, W8ZOL 171, KF8J 168, N8IIP 153, WA8SSI 143, WD8QXT 138, KA8CGF 136, WA8STX 136, W8QZK 129, W8SKP 122, N8FWA 117, WB8RIB 113, W8JLW 110, WA8HED 105, W8EK 100, K8IOW 90, WB8JGW 84, W8CXM 79, KA8HBN 75, KA8LVN 74, N8GPU 74, K8CMR 70, N8GEC 59, WB8IKO 54, N8XX 52, N8AUG 52, WD8KBW 50, KA8GJV 50. NS8C 44, KE8CV 44, KC8YVZ 44, K8DHD 41, KA8SON 40, NE8X 38, WB8VNV 38, KC8JV 38, W8LDU 37, WD8JYE 36, WB8KWC 36, K8LQM 36, K8ES 35, N8CW 32, KA8DRR 31, WB8HHZ 31, K8WZX 30, WB8FSV 29, KB8ABO 28, KA8SOM 27, WA8EYQ 25, N8CEI 23, N8EFB 20, KA8BNQ 20, N2NS 19, NC8Q 19, KA8YIT 18, KB8EIW 17, N8HJB 16, KB8SFR 15, N8FPH 15, N8AJU 15, KA1S 14, N8GOB 14, WD8PWG 14, W8ZM 13, KD8XL 13, KA8OQF 13, W8BI/BBS 12, K8CKY 12, KB8EMD 11, N8CJS 11, N8JZV 11, N8CDN 10, N8JDH 9, K8EF 9, W8RG 8, N8JYV 8, NW8E 7, K8DXZ 6, KE8DQ 6, WB8AJC 6, WA8RLB 6, KA8RIX 5, KA8ZYT 4, WA8NZE 4, KD8IC 3, N8GIO 3, W8GDQ 3, NC8Q 2, W8FPA 2, WB8GDM 1, N8HBF 1. (Nov.) WD8CST 5, (Dec.) WB8FSV 26, WD8CST 6, WB9A 5.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM:K2ZM. STM: WB2EAG. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A. ASM & NWSLTR ED: WB2NHC ASM/PACKET: N2FTR. Net reports for January(QSP): AESN 3, CDN 72 ESS 78, HVN 41 NYP 160 (DEC-299), NYPON 372, NYS/E 150, NYS/L 252, NYS/M 257, SDN 96. CLUB NEWS: WA2MOE presented a slide presentation on his DX-peditions to the Albany ARA on Feb. 10th. They congratulate upgrades KB2FSK KB2GJV KA2OQK. The W2SZ ARC had a slide presentation by WB2IQU/HL9VX of his experiences in the far east. They welcome new members KA2DXY NQ2H KB2FVR N2FNH WA2AIB. The Overlook Mtn. ARC heard W2XL talk about television interference at the January meeting. PEARL is working on plans for their hamfest on May 6th. KY2N discussed packet from the SYSOP's point of view at Schenectady ARA's Feb. 6 meeting. Westchester ARA heard WA2MOE (Stu you really get around) talk about being DX. Saratoga RACES had a talk by K2VV on DXing. Yonkers ARC announces officers for 89: Pres-WA2IES, 1st VP-WB2BNH, 2nd VP KB2AHA, Treas.-N2HGO, Corres. Sec-WG2C, Record Sec-N2FPK, Sgt at arms-WA2VGT. WECA covered last minutes details of their upcoming WECAFEST 89. I just want to express my sincere thanks to K2ZM for all his help during his term as STM. Welcome to WB2EAG as the new STM. Also special thanks go to KU2N for his work as net manager of NYSE/L and good luck to N5MEA new manager of NYS/E and W2YGW new manager of NYS/L. WB2NVR, new EC of Westchester held a planning meeting with RACES on Jan 31st. Jan. PSHR: WB2EAG N5MEA WB2VUK WE2G K2ZVI N2HIF WB1BTJ KB2EPU. Nov. PSHR: N5MEA Jan. Traffic: WB2VUK 148, N5MEA 141, K2ZVI 141, N2HIF 117, WB2EAG 115, K2LYE 88, WA2GYY 65, N2FTR 64, WA2JBO 64, WB1BTJ 60, WB2IIV 45, WD2K 34, KB2EPU 25, WE2G 23, KA2Q 22, W2CJO 18, WB2NVR 16, WF2M 6, K2HNW 5, Nov. Traffic: N5MEA 13.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI— ASM: N2GQR. ASM VE: W2NL. 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 messages during December:

NET	FREQ	TIME	DAY	MGR
BAVHF	145.350/R	2000	DLY	K2YOK
NCVHF	146.745/R	1930	M-F	N2IMP
SCVHF	145.370/R	2000	S-F	KA2JMA
NYPON	3913 kHz	1700	DLY	KA2UBD
NYS/M	3677 kHz	1000	DLY	N2EIA
NYS/E	3677 kHz	1900	DLY	KU2N
NYS/L	3677 kHz	2200	DLY	KU2N
NLT	28450 kHz	2100	WED	N2IMP
ESS*	3590 kHz	1800	DLY	W2WSS
PNS	145.01	24hr	DLY	AI2Q-4

*Independent Net, recognized by NTS, all times are local. 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 516-676-5970; SUFFOLK COUNTY VE TEAM -second Saturday of each month at 9:30 AM at the Suffolk County Community College, Selden- contact George, WA2VNV 516-751-0894; GRUMMAN ARC-second Weds. of each month, until June, at 5 PM at the Bethpage High School, Bethpage- contact Howard W2QUV 516-354-6861; GREAT SOUTH BAY ARC-fourth Sunday each month at 12 Noon at the Babylon Town Hall Annex- contact Walter KA2RGI 516-957-5726; MAARC-last Thursday each month at 8:00 except July, Aug. and Dec, at the Robert Wagner JHS, Manhattan- contact Rubina Asti, KD2IZ 212-838-5995. If your group holds regularly scheduled license exam sessions and/or classes let me know at least three months in advance so they

can be added to this listing. Please remember that the three-month advance notice also includes meeting and club information that you would like to see printed here. I want to take a moment to thank Larry Koenig, WA2NYH, for his assistance as the Section's Technical Coordinator and for the job he has done. As of February 12, Howard Liebman, W2QUV, has taken over the duties of the Technical Coordinator. Welcome on board, Howard. If there is anyone out there interested in becoming an Assistant Technical Coordinator, please let either myself or Howard know and we would be pleased to have you on board. If you are part of a TVI/RFI committee of your local club or group, please consider becoming an ATC. We are not trying to replace local RFI/TVI groups. We just want to develop a list of persons that are ready to assist others with technical information. Be community minded, check into your local ARES Net and support the local ARES operation. The Nassau ARES group meets on Weds at 8:30 PM on 146.805/R and the Suffolk ARES goup meets on Mon. at 9:00 PM on 145.330/R. The Town of Babylon ARES also holds an evening net on Weds. at 7:45 PM following the Westlink report. They also have a daytime ARES Net at 9:00 AM. Thursdays for those that can not make the evening net. Larkfield ARC maintains an emergency preparedness on Thurs. at 7:30 PM. For further information about ARES, check into a net or contact your local ARES Emergency Coordinator.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASMs: NW2L (NE). N2CXX (SE). N2WM (NW). WB2NQV (SW). N2XJ ((Con) and VE). SEC: WB2HBZ. STM: K2VX. OO/AAC: KA2BZS. ACC: K2BJG. SGL: W2KB. TC: K2BLA. BM: WA2UPK and PIO: NW2L. NNJ Ham Radio Info Line 201-680-1585. This line is not a recording. It is answered by NNJ ASM/PIO Rich Moseson, NW2L, who is well informed on the latest information available concerning both national and local ARRL and other matters of concern to amateurs. Appointment endorsements for the next two-year term starting 04/89 are: EC Franklin Lakes, KA2ALS, EC Closter KD2UC, EC Bergenfield, N2EVD, EC Cresskill, WA2BIF and EC River Edge, WA2INW. OESs: KA2ALS, KD2UC, N2BSG, N2EVD, W2TML, WA2BIF, WA2EXX, WA2GYK, WA2INW, WB2WYS, and WD2AHD. ORSs: K4HGW, KA2INE, KB2QO, KB2WI, N2CXX, W2NPT, W2UH, WA2EPI, WA2HPD, WA2PAC, WA2ZNT, WB2VUF and WD2AHD. On April 15th, all NJ State OEM, County OEM and communities receiving federal aid for OEM are required to participate in a statewide drill. All ARES personnel are encouraged to get acquainted with their municipal and county OEM officials and volunteer to get involved. Congratulations to the following who were newly licensed or upgraded during January sessions conducted by: Raritan Bay ARC (9/5), Northeast NJ Testing Asso. (4/3) and NNJ VE Board (24/13). Novice (5): J Carmendi, S Guinta, R Austin, R McShane and R Reinhardt. Technician (11): KB2DCQ, KB2GVN, KA2OLM, KB2FGB, KB2GUL, KB2GVG, KB2GVF, KB2GVR, KB2GXN, G Bruckno and M Simidinger. General (1): N2IEH. Advanced (3): KA2EYV, KB2GDE and KA2UIC. Extra (1): W2CML. Total applicants (37). Total new or upgrade (21). 57%. Traffic Nets and Statistics for January 1989 follow:

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJM	WB2ZJF	3595	1000	Dy	31	151	276
NJPN	W2CC	3950	1800	Dy	36	98	402
NJN/E	W2QNL	3695	1900	Dy/P	31	142	290
NJN/L	WA2OPY	3695	2200	Dy/P	31	60	182
NJSN	KA2INE	3735	1830	Dy	31	29	166
OBTTN	W2RRX	147.12	2000	Dy	31	107	254
NJTTTN	N2DXP	223.88	2100	Dy	31	45	313
NJVN/E	WB2FTX	146.895	1930	Dy/P	31	98	588
NJVN/L	N2FGC	146.49	2230	Dy/P	31	40	217
NNJ/PL	W2QNL	145.01	24 hr via WA2SNA-1				

Packet NTS activity: Total 224, WA2SNA-1 auto forward (87) plus liaison (137) by NZ2T (60), N2HQQ (2), W2QNL (65), W2KB (1), WA2EXX (4), WB2FTX (4) and WA2OGU (1). NNJ Packet NM W2QNL with the concurrence of our STM and other areas in and out of section/division leadership officials has taken the lead in the NNJ section by including packet traffic point credit in SAR/PSHR reports. January 1989 SAR/PSHR: W2RRX 189/107, K2VX 66/74, W2QNL 317/131, W4CYC 14/51, N2XJ 259/98, N2DXP 163/62, KA2INE 72/71, W2FTX 128/62, WC2R 24/71, WA2CLP 8/0, WA2MHA 24/0, KB2BLX 40/0, ND2K 4/0, W2XD 20/0, and W2CC 31/0.

IOWA: SM, Wade Walstrom, WØEJ—ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIIR. TC: KØDAS. Band conditions have been excellent or terrible, depending on what your operating interests are. DXers have been enjoying superb conditions, but daytime conditions have been just short of disastrous for the Iowa 75 Meter Noon Net. Operation of that net has moved, temporarily at least, to 7.240 MHz at the usual time. Also, remember that the Iowa 75 Meter Evening Net will start at 2300 UTC (6 PM CDT) at the transition to Daylight Savings Time. The Cyclone Radio Club will host a VE session in Ames on April 15. Contact Fred Hird, KCØRX at 515-292-4504 for details. The recent Cedar Valley Amateur Radio Club VE session resulted in 10 upgrades including 10 year old KBØDLU to technician. New officers of the Cedar Valley ARC are President: KAØYSQ, Vice President: KØVM, Secretary: NØBJK, and Treasurer: WØGON. Other board members include KD9KX, NØBBM, KFØAB, and WDØEJK. KØEGA has been selected as the Engineer of the Year in the Commercial Avionics Group at the Collins Divisions of Rockwell International. Congratulations, Vern! Station activity reports and club newsletters were in short supply this month. If you have not already done so, please include your SM and ACC on your club newsletter mailing lists. Traffic: WØSS 144, WØYLS 117, KØGP 83, KCØXL 46, KØIPT 40, WBØAVW 35, WBØMCX 18, WBØOKA 10, KAØVBA 1.

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. We add two calls to the list of Silent Keys this month, WØKKS and WAØFWJ. Our prayers together with yours are with their families. Thanks to those reporting this info to us. Net activity for December 1988 as follows: KSBN QNI 1587 QTC 378. KPN QNI 420 QTC 21. KMWN QNI 788 QTC 586. KWN QNI 1198 QTC 798. CSTN 1994 QTC 106. QKS QNI 249 QTC 102. QKS-SS QNI 41 QTC 11. Many TNX again to all those providing liaison to NTS nets, NØALN WØEB WØFE NØFNL KXØI WBØLKA WAØTJU KSØU NBØZ WBØZNY WØOYH NØIDW and KØBXF. Our section Technical Coordinator would still like to hear from all the ATC and others who would like to share in the job of assisting those of us not so inclined to be a wiz at solving our problems with our gear and antenna problems. Frank has been calling the TC net on a weekly basis, with not too many participating. Your comments on this type of net and frequency of operation is needed ASAP. Contact either KAØHEP or KØBXF. The future of the net depends on you. Traffic: WØFRC 682, NZØM 281, KØBXF 230, WØFIR 220, KAØRCH 201, KSØU 166, WØOYH 131, WBØZNY 88, WØFDJ 73, NBØZ 60, WØQMT 54, WAØYXK 33, WØMYM 29, NØBDG 19, WOØE 12, WØNYG 9, WØCHJ 5, WØRBO 5.

MISSOURI: SM, Ben Smith, KØPCK—STM: NDØN. SEC: K9OCU. BM: WBØTEG. OOC: WBØBZP. SGL: KDØUD. ACC/PIO: KT5Y and Tech/RFI Coor. K4CHS. The following clubs have reported their officers for 1989: McDonnell Douglas ARC, Pres, N5MLW, VP and activities coordinator, WGØZ, Treas. KAØYTN/AE, Sec. N8AFD and MAC Councilor, NØLX, CMRA of Columbia, Pres. NØMS, VP NØKD, Cors. Sec. WMØY, Rec. Sec. AEØS, Tres. KAØBS and Board Member at Large WAØR and Rolla Regional ARS, Pres. KAØWGF and elected to the Board of Directors KDØPJ. NØEVM was honored by the Suburban Radio Club of St. Louis, by being presented the Amateur of the Year Trophy. The St. Charles ARC operated a Christmas message center at a local shopping mall December 10. Fifty messages were originated at the booth. KBØBOA was chairman of the event with other operators of KBØBNZ, WBØJET, NØJTG, NØJQM, NØIRQ, NØISZ, WØOGS, NFØQ and WBØRAB. Spring storm season will soon be here. It is time to be alert for storm watches and warnings. If your community has a WX watch be ready to check in, help spot, operate from local EOC, NWS office or do what ever the EC or Net Manager needs in the way of assistance. If you do not know who your EC is, contact the Section EC, K9OCU, and he will be glad to give you that information, and if your county needs an EC and a local ARES program, he would be very happy to help with that project. New Field Appointments: OBS, KCØZ and OO, WØFEV. KØPHI has been appointed HF and VHF awards manager. KØPHI is a member of the Kimberling City ARC. Silent Keys reported WØGS, KØJEQ and KAØJUT.

NET	SES	QNI	QTC	DAY	TIME	FREQ	MGR
MON	62	345	114	D	7/9:45	3.685	AIØO
MOSSB	31	1037	95	D	6	3.963	KØORB
MEOW	31	748	81	D	6:30	3.963	WDØELL
HBN	22	357	22	M-FR	12:05	3.680	KØDSQ
HARC	4	82	5	TH	9	146.94	KAØSXY
LOZBC	---	---	---	M-SA	6:30	146.73	NØHVO
PHD	5	131	7	M	9	146.43	WAØKUH
SWMOSW	5	137	5	T	7	146.91	KDØUD
SLARES	5	524	4	M	8	146.91	KØWEX
ZAEN	5	51	4	T	8	147.24	WDØELL
JCRC	4	138	0	W	8	147.09	WØORI
KCARES	5	73	0	Sa	9:00AM	146.97	KØUAA
LOZFM	---	---	---	F	9	146.73	NØHVO
ELDON	---	---	---	M	8	146.895	NØHIZ
MEXARES	---	---	---	TH	9	147.255	KBØAGC
CMEN	4	62	3	W	9	146.76	KØPCK
SEDARES	5	50	0	T	9	147.03	WØENW
QCWA	4	40	0	Th	8:30	146.97	KØCIQ
CARL	3	23	0	W	8:30	146.46	WBØWLU
HARC	4	82	5	TH	9	146.94	KAØSXY
RRABN	22	181	5	D	9	145.29	KBØANP

Traffic: NØFBW 678, AIØO 206, NDØN 184, WAØYJX 133, WBØO/2 131, WAØHTN 108, KØROB 99, WØOUD 35, KØPCK 32, WB8TVV 20, K9OCU 11, WAØKUH 10, KEØAH 8, KDØAJ 6, NØMU 0.

NEBRASKA: SM, Vern Wirka, WBØGQM—Section Traffic Manager, Jerry Kohn, WDØEGK, is developing a series of articles on Traffic Message format and national traffic system organization for club newsletters. Contact WDØEGK in Lincoln for details. Our STM, WDØEGK, also has an excellent program on the basics of traffic handling for presentation during club meetings. Contact Jerry if your club would like information on the program. The QCWA Omaha monthly luncheon meeting is now on the fourth Thursday of each month at "Anthony's Restaurant," 72nd & F Streets in Omaha. The location of the Omaha QCWA monthly meeting has changed recently after their long-time meeting place was destroyed by fire. Grand Island area amateurs gather for breakfast every Saturday at 9:00 AM at "The Eatery," 3406 Capital Avenue, in Grand Island. The Grand Island Amateur Radio Club has purchased a transceiver to be installed at the Grand Island Red Cross. In addition to being available for emergency communications, the transceiver will be available to those qualified amateurs that do not have a station of their own. Severe weather time is upon us in Nebraska. Contact your local Emergency Coordinator and volunteer for your local Amateur Radio Emergency Service (ARES). If you do not know your local EC, contact the Section Emergency Coordinator, Michael Ruhrdanz, NØFER, in Lincoln. To encourage more people to join in the fun of Amateur Radio, the AK-SAR-BEN club of Omaha offers gift certificates for their Novice classes. Contact Dave Kline, WJØZ, of Omaha for details. The Midwest Amateur Packet Association has installed a digipeater near the Utica exit on Interstate 80 on a tower which belongs to James Dermer, WBØPKY. The digi is WBØPKY-1, Alias UTA. The WØBJQ two to ten meter repeater in Lincoln is once again operational. The repeater features four user selectable ten meter frequencies. The two-meter part of the system is on 144.65/145.25 MHz. The ten-meter frequencies are: 29.6, 29.5, 29.52/62, and 29.54/.64 MHz. Frequencies are selected by DTMF tones. Long-time Fremont Amateur, Art Stevens, KØCXI, became a Silent Key in February at the age of 98. Traffic: KØDKM 204, WØAP 126, WØKK 110, KØMZV 22, WBØGQM 15, WØKBS 14, WAØBOK 7, NOØA 7, WDØEWH 5, WCØO 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—Spring is just about here. Field Day is just around the corner, and many hams are getting ready. Once again I have had the great pleasure to visit more clubs this year, and I am very pleased as to the enthusiasm that the section hams have. Congrats to our traffic people. Our section had 95.2 percent representation on 1RN in January. And thanks to those many traffic handlers that deliver the messages all over. I know many of you have been dialing my number. Congrats to N1FQO for being the first recipient of the ARRL Diamond Jubilee Certificate. Thanks to K1EIC for all her help in getting our CSTN on packet running so well. The Int-State Amateur Repeater Council has an ad. Please make a note of it. TSARC—PO Box 16220, Baybrook Station, West Haven, CT 06516. Congrats to W1FXQ for his recognition as NARL Ham of the Year. Good luck to SCARA's new officers. Nice thought

from WARC to have Santa via Ham Radio with the Waterbury Hospital. That's the way to keep the spirit. Congrats to CARA new officers. The WHARA new PO Box is PO Box 7123, New Haven, CT 06519. Since there is not enough room to acknowledge every individual club that runs Novice or higher classes, I would like to congratulate and thank each and every club that supports and sponsors such programs. It is through this effort that our hobby continues to grow and flourish. 73 for now.

NET	SES	STATIONS	TRAFFIC	NM
CSN	22	106	34	WB1GXZ
CN	62	248	180	WB1GXZ
WESCONN	31	422	137	KA1GWE
	31	438	122	KY1F
	30	265	77	WA1FCA
NVTN	31	629	218	NM1K
TMRCN	5	95		NM1K

PBBS: N1API-4 92, N1DCS-4 90. Traffic: NM1K 503, N1DMV 481, KY1T 283, WB1GXZ 276, W1EFW 268, KY1F 117, KA1JAN 114, K1EIC 104, KA1GWE 99, KA1FVY 80, KA1ROL 49, KB1ZC 46, N1FNN 43, N1GBP 42, N1GFM 35, WA1NLD 25, W1BDN 24, K1HEJ 21, WB1ESJ 15, N1FQO 15, W1WP 14, W1YOL 11, W1QV 9, N1BOW 9, WB2SGI 5, W1CUH 4.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA— STM: WA1TBY. PIO: K1HLZ. BM: KB1AF. OO/AA: AG1F. SGL: K3HI. TC: KA1IU. ACC: Open EMass Ham Info Line/Westlink Report: 617-395-KISS EMass Hotline: 617-437-0111

Net	Mgr	Freq	Time	Day	Sess	QTC QNI
EMRI		N1AJJ	3656	1900/2200	DY	
EMRIPN		WA1FCD	3880	1730	DY	
EM2MN		KA1MDM	53/23	2000	DY	
NEEPN		K1BZD	3945	0830	SUN	
HHTN		NG1A	04/84	2230	DY	
EMRISS		N1CVE	3715	1800/2030	DY	
CITN		KB1AF	745/045	1930	DY	

I would like to express my thanks to Marcia Reynolds, KW1U, who has stepped down as Section Traffic Manager after almost six years of hard work. Jim Hatherly, WA1TBY, will be replacing Marcia as STM. The cruise of the Patriot State will be winding down as this is published. Thanks to all who helped keep the cadets in touch with their families and girl/boy friends. Also, Ham participation in the Armenian Relief effort is winding down. About 80 inquiries were handled. The KISS HAM HOTLINE had a crash, but should be back on the air when this comes out. YES, it will be spring when this comes out!! I just hope we get some precipitation soon, or it will be a long dry summer. The Deerfield flea market will be back at Deerfield NH and before you know it it will be field day again. The Amateur Radio Computer Users Group is coming along. We have had 2 successful meetings. The group meets on the first Tuesday of the month at 7:30 PM at GTE Labs in Waltham, so Come on out!!! The state RACES program is looking for a few good volunteer hams to join them. They meet on the air the first non holiday Monday of each month on various 2 meter repeaters. One other item of note..Boston is getting a new Ham Radio Club!!! It will be sponsored by the Mass Bay Red Cross. I will write further details about this when I know more. Have you done anything to enhance Ham Radio's reputation this month?? Please express your opinion on Amateur Radio issues to you section or division staff. We appreciate your input. Traffic: N1BBT 2310, WA1TBY 1470, KA1BBU 754, KB1AF 530, KW1U 405, W1CE 346, NG1A 279, KA1MDM 266, WA1FCD 202, KA1AMR 146, N1CVE 130, K1GGS 127, K1ABO 119, KA1NOI 117, KA1DJV 106, WA1FNM 106, N1AJJ 105, N1FLO 79, W1TC 70, KA1LIH 69, KA1KCU 51, K1BZD 49, KA1EDY 42, KB1EB 31, KA1RLT 31, N1DUB 13, N1BNG 9, N1FYF 9, WA1CRE 8.

MAINE: SM, Ted Bonesteel, WA2ERT—New Appointments—Walt, KA1ODT for STM, Mel, WB1CBP, for Assistant SEC (Training). Mel's first job is developing an EC supplemental training guide ; for EC Cumberland County, Dan WA1HXF. Staff: SEC KA8UVQ, BM W1JTH, SGL K1NIT, ASM Packet N1AHH, ASM MEMA Liaison N1CBA, TEC Coord KQ1L, OO Coord K1WWT. Ellsworth AWA elections: Pres- Joe K1HQG, VP-Ted WA2ERT, Sec/Treas-Evie KA1BRA, Trustee-Minot AK1W. Union Hamfest July 15th. Carl J. Haney, K0VIY, became a Silent Key. VE Exams: April 1, 9 AM, Harrison Elem. School (KA1REB); April 1, 9 AM, Harrison Elem. School (KA1REB); Apr 8, 9 AM, Rockland (Knox Co Courthouse) KC1CG; Apr 15, 9 AM, Bucksport (Pub Safety Bldg) NT1A; Apr 26, 6:30 PM, Lincoln Academy Newcastle (KA1DAX); May 20, 9 AM, S. Portland SMVTI (KD2EU); May 24, 6:30 PM, Augusta (Cony HS) N1BCF. Sea Gull/K1GUP/26/909/119, Oxford Co RACES W1RWG/5/54/23, Hancock Co/WA2ERT/5/46/1, Kennebec Co ARES/RACES/KA1LPW/5/81/1, Aroostock Emergency/WA1YNZ 5/88/0, Central Maine Emerg/9/142/4, Pine Tree/WA2ERT/31/308/67. Traffic-KA1REB 67, W1JTH 60, KA1JOJ 59, WA2ERT 54, W1KX 51, AK1W 43, W1VEH 38, N1BCF 26, ND1A 27, W1RWG 22, N1BJW 18, W1BMX 17, KA1ODT 11, WA1YNZ 9.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—STM: KB4N. TC: W1JY. Let's begin with everyone's favorite—the schedule for spring and summer fleamarkets in the section! Two are planned for April with the Interstate Repeater Society fleamarket on Saturday, April 15 at the Lions Club building in Hudson. A new addition will be the first fleamarket for the Contoocook Valley club to be held on April 30. Contact WA1ALM for more info. And the big one—the Hosstraders fleamarket will be back at Deerfield this year on Saturday, June 3!! This is our opportunity to eliminate the problems of past years with the application of a little common sense and courtesy and insure that we will be at the Deerfield location for the forseeable future. January was meeting month for the NHARA state organization in Jaffery. We had most clubs in the state represented as well as reps from the Governor's Emergency Management Agency. EMA rep Cal WA1WOK announced the operation of two packet stations at EMA—a SKYWARN BBS on 145.01 and the EMA BBS on 145.07. The Contoocook club announced five new Hams from their recent Novice class and the featured speaker for the meeting was Craig, N1ACH, of Ham Radio magazine who spoke on current issues in the hobby and future plans for the magazine. Around the section, individuals have been active and visible—Bob, W1NH, retired SM and current ASM for contesting and DX has just earned the 80M single-band award #8! Dick, WA1CEH, was featured in an article in the Hudson News with an interview and picture, sharing the fun of the hobby with

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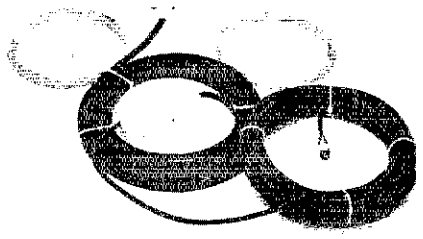

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the reporter. And Dennis, K1YPP, shared his early experiences in the hobby with us in the NARC newsletter. Novice classes are progressing in Derry and Nashua and the Twin State club has a Ham radio demo at the Montshire Museum in Hanover every Saturday. In addition, they will be offering a Novice course at the museum. Mt. Moriah held a VE session in Salem with 14 of 27 applicants successfully upgrading. NARC is trying a new approach to a net on a local repeater with the introduction of a technical net. Check-ins can ask questions of a technical nature and the NCS solicits answers during the net or at a later time if research is needed. NCS AK9B reports 19 checkins the first session with a 1-hour duration—and some good questions! The new slate of officers for the Concord Brasspounders is: Pres: Darrly Borgman, VP: Cory Woodruff, Treas: John Brookfield, Sec: Ted Noyes. The updated ARES Disaster Plan for Cheshire County is out. If you need information or a copy, please contact Alan, W1FYR, EC for Cheshire County. With spring on the horizon, don't forget the upcoming opportunities to provide communications support for various walk-a-thons, bike-a-thons and similar activities around the state. These are good public-service activities (and don't forget the newspaper article) as well as good opportunities to practice tactical net operations and to introduce new Hams to local emergency net procedures before we have to do the real thing! The section had 95.2% rep on 1RN/4 in January—thanks for the support! Traffic: Nets: GSFM 136, GSPN 129, NHN 51, NHTTN 40. Station: W1PEX 1673, KB4N 1593, WA1FHB 634, N1CPX 423, K1TOY 198, W1FYR 141, W1ALE 64, NE1J 59, KA1NXT 54, KK1E 36, N1ALM 35, WB1HBB 33, N1FYD 26, KA1PFS 20, KA1ROH 16, KA1HPO KA1JOU 13, N1BVI 12, KA1LMR 8, WB1EAE 7, KC1AF 6, KI1M 3, KA1KFX 1. BPL: W1PEX, KB4N, WA1FHB. PSHR: N1CPX, W1PEX, KA1NXT, KA1HPO.

RHODE ISLAND: SM, William M. Foss, KA1JXH—Under the direction of N1AKO, W1OP was on the air nightly handling Armenian earthquake traffic as an official representative from the Armenian Relief Society, North America. Traffic was passed by SSB, CW, AMTOR, PACKET. Deerfield is going back to the Deerfield Fair Grounds!! Saturday June 3. See you there. Our new SEC is Mike, N1FKI. PRA new officers are N1BBM Pres, W1EYH VP, W1GS SEC, KZ1K Tres. Dave Landry, KA1CRP, was the only one last year to work Rhode Island certificate for working all counties. Traffic: W1EOF 244, KA1JXH 215 (PSHR 65), KA1KML 182 (PSHR 65), W1OP 75, WA1CRY 32.

VERMONT: SM, Jonathan P. Maguire, N1CQE—ASM (RFI): W1CTM. ASM (Education): WB2MIC. ASM (Packet): K1AUE. SGL: WB1AGJ. STM: KT1Q. TC: W1AIM. PIO: WA1YOY. OOC: WB1BWV. Have you tried the new 17 M band? Lots of fun and DX. ARRL has begun looking at the idea of no-code again. What are your ideas? Jon, WB1BWV, has taken on the job of Official Observer Coordinator, and Greg, KA1FJ, has become an OO. The Bennington Cty. ARES net meets Mondays at 8 PM local on 28.333 MHz and 8:30 PM local on the 145.39 repeater. WB2JSJ reports the following upgrades from the recent exam session: N1GFO, N1GFP, N1GFQ, N1GGV, N1GGW, N1GGX, N1GGY and KA1TBD. Congratulations to all, and welcome aboard! Former Vermonter W1UY, and XYL are in the Peace Corps stationed in the Dominican Republic. The CVARC Annual dinner will be held in April. Contact K1HKI. WB2MIC has been active giving talks to various education groups around the area. A local exam session is scheduled for April 21, 7:30 PM. Contact WB2JSJ. WB1AJG has been busy working with the Legislature on various Amateur-related issues, including the license plate bill. I hope we can get this bill passed this year—call or write your representative NOW and let your feelings be known. The following stations earned PSHR: WA2SPL, KT1Q, WA1JVV, KC1KI and N1DHT. Earning BPL was WA2SPL. Contact any of these Hams about helping with NTS. Vermont had 100% on 1RN/2 and 1RN/3 and 98.4% on 1RN/4. That's quite an accomplishment! March traffic: WA2SPL 1251, KT1Q 442, WA1VXW 372, N1DHT 216, WA1JVV 145, KC1KI 101, W1KRV 10. Net reports: CN 26/568/39, CVFMN 5/114/8, VTN 31/133/141, Twin SFMNEN 5/48/1, TriSFM 4/56/12, VPN 5/88/7, VSSN 13/11/4, GMN 26/532/32.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. If you look carefully, you will see that all five counties are represented in the traffic report. Communications in Western Mass is supporting ARES. During the past months the stations reporting their activities have been increasing. You're making my job easier as the months pass. Would like to see more individual effort being made. Your reports can cover a wide range of ham activities. It's all cannon fodder for my activity report. By the time you read this article, Jean (KA1IFC) will have earned a BPL certificate for twelve consecutive months. That's devotion to the NTS. Congratulations Jean!! The old K9ES BBS is back on the air under the sponsorship of CMARA (W1BIM). It's a great outlet for Southern Worcester County traffic. MARA devoted a good portion of this month's meeting for Field Day preparation. They will be on top of Mt. Wachusett again this year. Some that didn't get to the mountain during Field Day mentioned the 40-meter quad. It will go up again this year. Reminders of HCJB and Clarence Moore. NOBARC reports that the timer on the Greylock repeater has been decreased to 57 seconds. This will make it possible for people to check in if an emergency situation comes up. Traffic: KA1IFC 718, KA1EXJ 146, KA1QFV 100, W1KK 84, WB1TH 70, W1SJV 68, KA1MEW 60, KC2IU 48, WB1HIH 36, KA1LZC 31, KB1KK 31, KA1RVN 28, K1JHC 26, NM1U 19, KC7LW 13, W1ZPB 11, W1GQP 2, KI2L 1, W1UD 178.

NORTHWESTERN DIVISION

ALASKA: SM, Dianne Marshall, AL7FG. KL7AF SEC: KL7VK DEC Interior; KL7JBV Dec Kodiak; KL7VY STM. NL7IY OBS Kodiak. The last weeks of January brought a record cold spell in Alaska with low-temperature and high-pressure records broken all over the state. We used up the best (coldest) part before sending it down to the lower 48. Hams throughout the state stood by to handle emergencies, but Alaskans were well prepared. On January 21, KL7GID, Gene organized an emergency communications capabilities test with the Alaska Division of Emergency Services. The results were phenomenal! A total of 352 check-ins from 102 Alaskan locations and 10 states. The test was such a success that another one is in the works. The Iditarod—everything has finished and the participants are getting ready for next year.

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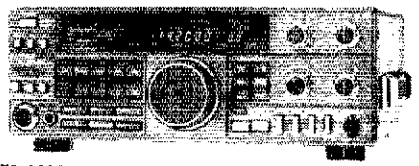

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IDAHO: SM, Don Clower, KA7T—ASM: K7REX. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. PIO: WG7E. The Magic Valley ARC has an ARES net every Wed at 7:30 PM on 146.06/66, check in if you are in the Twin Falls area. N7GUC, the Twin EC has started preparation for the ARES drill. The Eagle Rock ARC is working to put together an Extra Class study group. If interested, contact N7HUM, 524-1084. Tnxs to WB7RUG for my copy of the ERARC newsletter. Traffic: W7GHT 275, KA7QZM, WS7U 43, WB7CYO 1. PSHR: W7GHT 96, WS7U 43. 73s Don

NET:	SESS	QNI	QTC	MNGR
IDA.CD	22	754	14	K7UBC
NWT	31	848	42	N7LMA
FARM	31	2443	148	WA7GSM
IMN	30	253	141	KA7EEE

MONTANA: SM, Ken Kopp, KØPP—Rail car explosion in –35 degree wx tested CCARC (Helena) operators. W7LR honored for 50 yr ARRL membership. LYARS (Glendive) elected W7QZU/P, KA7YYR/VP, WM7D/T, WA7GVT/S. W7JVN & K7RVF SK's in January. KØPP app'td to 6-mbr ARRL committee to study implications of no-code license. Valley & Roosevelt County ECs N7FFA & WB7QDN held joint planning meeting with local DEC officials. QCWA luncheon Apr 15 in Helena. Spokane hamfest April 15/16-has BIG flea market. BARC (Butte) swapfest March 18. Get current VE exam and hamfest info on MSN, 0800 MST Sun's, 3920 kHz. Traffic: W7TGU 331, KA7YYR Dec 390, Jan 165.

NET	SESS	QNI	QTC	MGR
IMN	30	141	253	KA7EEE
MSN	5	82	0	KØPP
MTN	31	2170	80	KF7R

OREGON: SM, Randy Stimson KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. Just a reminder that Field Day is June 24th and 25th. As I have said before I would like to see the public and the news media invited to your Field Day so that they will understand why we do what we do, but more about that next month. I would like to talk a bit about how I feel a person should deal with jammers and hecklers. I think the most accepted way is to not acknowledge them in any way. Deal with them as though they do not exist. Any kind of an acknowledgement and you lose, they win. I know it is very difficult not to say something, but if you do, it just makes things worse. They get their jollies when they know they are bothering you. So if nothing is said it becomes boring for the heckler and they will go away. Don't forget SEA-PAC June 2, 3, 4 1989. Traffic (P) = Packet W7VSE 376, KA7EEE 235, N7BGW 226, WT7A 222, W7LRB 114, KF7KZ 112, WB7EMO 75P, N7CPA 58P, KA7AID 56, W7ODG 43, KA7DEF 42, KV7F 32, KZ7T 23P, W7BDU 6P. Late Dec. WT7A 191.

WASHINGTON: SM, Brad Wells, KR7L (@WØLVJ)—STM: KD7ME (@ WØLVJ). SEC: KA7INX (@ KE7OM). TC: W7BUN. OOC: N7DVR (@ WØLVJ). SGL KD7AG; BM N7CAK (@WØLVJ); PIO N7FKV; ACC/ASM KC7AH; ASM KD7G (@WØLVJ); ASM: KA7CSP. ASM: W7UOF. ASM: K7CLL (@K7IFG). The ARRL Board of Directors voted to approve the division of Washington Section into two new sections: Western Washington Section and Eastern Washington Section. The dividing line between the sections is the Cascade Mountains. Two Sections will provide all League members with a much higher level of direct representation. This is the culmination of a 15-month effort by your Section Staff. A special thanks to Northwestern Division Director Rush Drake, W7RM, for his continuing support of this project. The official change-over took place February 6. I will continue to serve as Section Manager for Western Washington Section. The interim Section Manager for Eastern Washington Section is Tom Plaisance, KC7PH. Tom has been Affiliated Club Coordinator/Assistant Section Manager during the past four years. State Senator Dean Sutherland was the featured guest speaker at the Clark County ARC Annual Banquet. Senator Sutherland was a prime mover in the passage of the amateur repeater bill last year. He was presented certificates of appreciation by Washington Section, Clark County ARES, Lower Columbia ARA, and received a hat from Northwest ELT. K7SUX received an award for outstanding public service based on his many years of participation in NTS. KA7NRA resigned as EC of Thurston County after many years of outstanding service, and is moving to Mason County. Congratulations to Lower Columbia ARA on renewal as a Special Service Club. WWARA changed its Bylaws to extend voting memberships to both users and owners of coordinated repeater systems. New officers for Olympia ARS: NV7J-Pres; N7JSK-VP; KA7KGL-Sec; WB7QEU-Treas. New officers for North Kitsap ARC: Pres-N7GZA; VP-W9ELB; Sect-N7EDA; Treas-KB7AJK. King County ARES members KE7JL, WB7RFL, KA7TCE, KB7BNC, WM7O, N7GDW, W7AZU, and W7JTQ were activated January 1-2 for lost skier search at Snoqualmie Pass. Yakima ARES members KB7AMF, K3GPJ, WA7ZZB, WA7YEN, and KA7KAX provided communications January 9 for rescue effort at White Pass. W7UOF reports the Washington Emergency Net, in 1988, had 105 sessions, 3675 check-ins, and over 45% of net members acted as Net Control Stations. Attention DECs and ECs: KA7INX will be mailing you a copy of the ARRL EC's Training and Certification Course. The Northwest Amateur Packet Radio Association (NAPRA) continues to expand the packet network within our section. They recommend 145.75 MHz as the regional "Direct Connect" frequency for keyboard-to-keyboard operation. This will reduce the load on established LAN frequencies allowing faster operation of the packet network. NV6Z has a DX Packet-cluster running on SEAW (144.99) which provides a wide-variety of DX info and real-time DX spotting. The annual Walla Walla Spring Swapfest is April 2. This one-day event is sponsored by W7DP and will be held at the community hall in Milton-Freewater. Talk-in frequency is 146.52 and 147.28. The 1989 Northwestern Division Convention will be August 19-20 and hosted by the Radio Club of Tacoma (W7DK). The Inland Empire Hamfair will be April 15-16 in Spokane. This year it's located at the Youth Sports Assn. East 2200 Sprague Ave. The ARRL has established a special committee to explore the implications of a no-code license. Send your input to Northwest committee member Ken Kopp, KØPP (Montana SM), and C. Mike Lamb, N7ML, (CEO for AEA, Inc.) A copy of your comments should go to our Division Director, Rush Drake, W7RM. ARES Public

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HAM-COM '89 PRE-REGISTRATION:

The Pre-Registration deadline for Ham-Com '89 is May 26, 1989. If your pre-registration is received by Ham-Com on or before May 26, 1989, you will be eligible to participate in the drawing for the pre-registration prize.

Ham-Com urges you to pre-register early if you want flea market tables as they will surely be sold out before the pre-registration deadline.

If your pre-registration is received in time to be processed by May 26, 1989, your tickets will be sent to you by return mail. Pre-registrations received by May 26, 1989, but not processed will be held for you to pick up at the Ham-Com Registration desk when you arrive at the Arlington Convention Center.

If you require additional information call:

Registration Information:	(214) 423-7636
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Ham-Com has blocked hotel rooms at special convention rates at the hotels listed on the pre-registration form. All reservations will be made by Ham-Com through the Arlington Convention and Visitors Bureau and will be confirmed in writing by the Bureau and the specific hotel. Plenty of rooms are available but register early to be sure you get exactly what and where you want.

HAM-COM 1989
ARRL "DIAMOND JUBILEE" NATIONAL
JUNE 2-4, 1989
PRE-REGISTRATION FORM

PRE-REGISTRATION DEADLINE: MAY 26, 1989

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

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_____	Single Ham-Com Pre-Registration, $7.00 Each	$_____
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_____	Tour #1, Shopping Tour to Dallas Galleria Mall and Olla Podrida Center, $12.00	$_____
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_____	Saturday Morning DX Breakfast, $8.85 Each	$_____
_____	Sunday Morning QCWA Hospitality Continental Breakfast, $3.50 Each	$_____
_____	ARRL Saturday Night Banquet & Program, $16.00 Each	$_____
	I have enclosed my check or money order in the amount of	$_____

Hotel Room Reservations Request Form

TYPE OF ROOM REQUESTED: ____SINGLE, ____DOUBLE, ____QUAD/SUITE. NUMBER OF PERSONS _____

ARRIVAL DATE & TIME: _____ DEPARTURE DATE & TIME: _____

HOTEL PREFERENCE (Indicate your first choice by entering 1 next to your preferred hotel. Number 2nd and 3rd choice also.)

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PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. EBARC's 3rd VP/Membership Chairman *is financing* their membership drive mailings with the proceeds from recycled aluminum and glass collected by the club. A fine way to improve all our environments! They welcomed new member N6HPX. The CCCC membership is nearing 100 with the addition of KI6NY, KB6NAX & N6TUU. Also AA6LU is a new call for one of their up-graded members, Edmond Ng. MDARC's by-laws are being revised and up-dated. They welcome new members N6TMV, N6OPJ, Andrew Franck (who is awaiting his Novice license), and Pat Gansz, an SWL.LARK members participated in a live earthquake drill recently and the following folks responded to provide damage assessment: AD6X/NC8, WB6CFD, KA5PAP, K6USH, N6SCJ, NK6N, KU6F, KF6VU, WA6CDE, N6KFK, KI6UP, KI6OY, W6UPD, N6OPL, WA6TGF, K6TS, K2BIO, WD6J, WA6SYE, W6FAK, N6PFX, KA6DXY, KA6ATV, W6RGH, N6HNN, NF7U, N6MHP, KG6AI, N6HEC, WD6CIM, K3KXJ, KB6YWY, W6GSR & WA6CPX. Fortunately there was no damage, but a fine job by one and all. BARC's long-time EC, KE6IA, has stepped down due to other commitments. Their new EC is N6ERR. VVRC's new Novice class is under the direction of K6HIH & N6QGS. HRC member KB6RKR has received his WAC Award, and is waiting for his DXCC certificate. Jan traffic: WB6DOB 161, W6VOM 136, K6APB 98.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. In Southern Nevada this month, April 15-16, is the 5th Annual Baker to Las Vegas Challenge Cup race, with 75 teams of law enforcement personnel expected. They are looking for a total of 200 volunteers to help provide timing and communication support for the rate. If you are interested in helping, contact W6KUE at (818) 342-6478 or N7KR on 146.88 in L.V. Many mountaintop antennas were bent and otherwise injured during the early February storms. By the time this appears, we will have thawed out enough to repair most of them, I hope. Special thanks to Jay, K7WYC, who is retiring after several years doing a fine job as editor of the SNARS newsletter. VEC exams are scheduled in the L.V. area for early May, August and November. Contact NK7N for details. Remember, when renewing your ARRL membership, to renew it through your ARRL affiliated club; this will help the club through a "rebate program." Please try to get information for QST to the SM, W8IXD, by the first of the month.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—For years, the Pacific Division Convention has been held in San Jose. There is now a move to have Sacramento be the site for 1990. The people that have been putting on the very successful San Jose activity have offered guidance. It will be fun, but takes a lot of work and if you are interested in helping, I'll put you in touch with the right people. The January Section net was one of the best that we have had, in my opinion. Not from the number of check-ins, for we have had more and we certainly missed some of our regulars who didn't make it, but after it was over, I just felt good about it. More of you should let us hear from you. You do not have to a Section appointee to check in although we do ask them to give reports on activities in their fields. The Net is the first Sunday of the month at 8 PM on the Yuba/Sutter repeater, 146.085 MHz, input up .600. Thanks again to the Y/S ARC for allowing the use of their repeater for the net. OO Coordinator John Canaris, WY6O, is looking for more people to help out their fellow hams by being Official Observers. If you have been Technician Class or higher for four years or longer, he would be happy to hear from you. Congratulations to the Yolo Amateur Radio Society, they are being included as an integral part of the Davis Science Center which will give them a permanent location AND give the public an exposure to ham radio. Traffic: WA6WJZ 188, WA6ZUD 126, N6DOJ 78, K6SRF 67, WD6BZQ 38, N6LAM 32, W6RFF 21, W6CQF 13, WB6SRQ 12, K6ODQ 10.

SAN FRANCISCO: SM, Dick Wilson, K6LRN—We note with sorrow the passing of Warren Klinger, WB6RHP, on Jan. 9 just 2 days after his 70th birthday. Frank, W6SVC, had a stroke and is recovering at Kaiser-Vallejo Hosp. Effective 1 May "PL" for K6GWE-147.33/93 will be 203.5. 88.5 will no longer work. There are other "PL's" for auxiliary receivers, contact ACS for further info. Club officers: SFRC: W6VV-Pres. N6UG-VP, KB6KM- Secty and WA6CFC-Treas, Info Box 741, SF, 94101. MARC: W6FCQ-Pres. WB6TKD-VP, KB6LAR-Secty, N6NSH-Treas. Info Box 1231, San Rafael, 94912. SCRA: N6DNB-Pres. W6TLK-VP, N1AL-Secty, N6PTM-Treas. Info-Box 116, Sta. Rosa, 95402. W6JTI carried gear and supplies 3 miles through snow to operate NA Sprint from his contest QTH—did 195 QSOs for a great first effort. W6JEU won an ICOM HT at HRO's ICOM day. Support your local radio club!!

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. Asst. SMs W6TRP and K6YK. W6LIF and WA6OQF are SILENT KEYS. 1989 officers of the Southern Sierra ARS (SSARS) are Pres W6KQI, Sec K6KNB, Treas Caroline Parsons. 1989 officers of the Sonora Pass ARK (SPARK) are Pres N6RGY, VP KB6TLC, Sec KJ6OC, Treas KA6VFO. 1989 officers of the Kern county Central Valley RC are Pres WR6L, 1st VP N6UR, 2nd VP K6APE, Sec N6TWG, Treas WA6BPP. 1989 officers of the Stanislaus ARA (SARA) are Pres WD6FFX, VP N6SAH, Sec N6REB, Treas KB6ECF. 1989 officers of the Calaveras ARS are Pres WA6CYL, VP WQ6H, S/T KE6OZ, Act. Ch. WB6QUI, Net Manager K6TNC. The club will operate a special-event station during the Calaveras County Fair. N6SIX is Advanced. KB6YST and N6TFU are General. KB6WVJ is Tech. N6PDE is KJ6PZ. WB6NON was named WPSS Ham of the Month for December. W6JPU has a PCS 6000. W6DPD has a PK232. The 1989 Fresno Hamfest is May 5-7, 1989, at the Airport Holiday Inn, Fresno. Traffic: WA6YAB 22, W6DPD 10, K6RAU 7.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW. STM: N6JLJ. PIO: WB6OML. ASM:

(continued on page 116)

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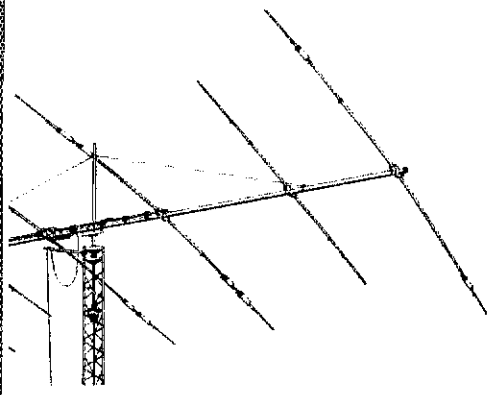

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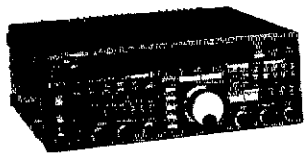

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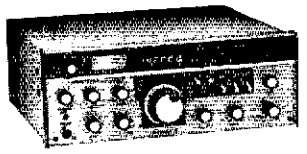

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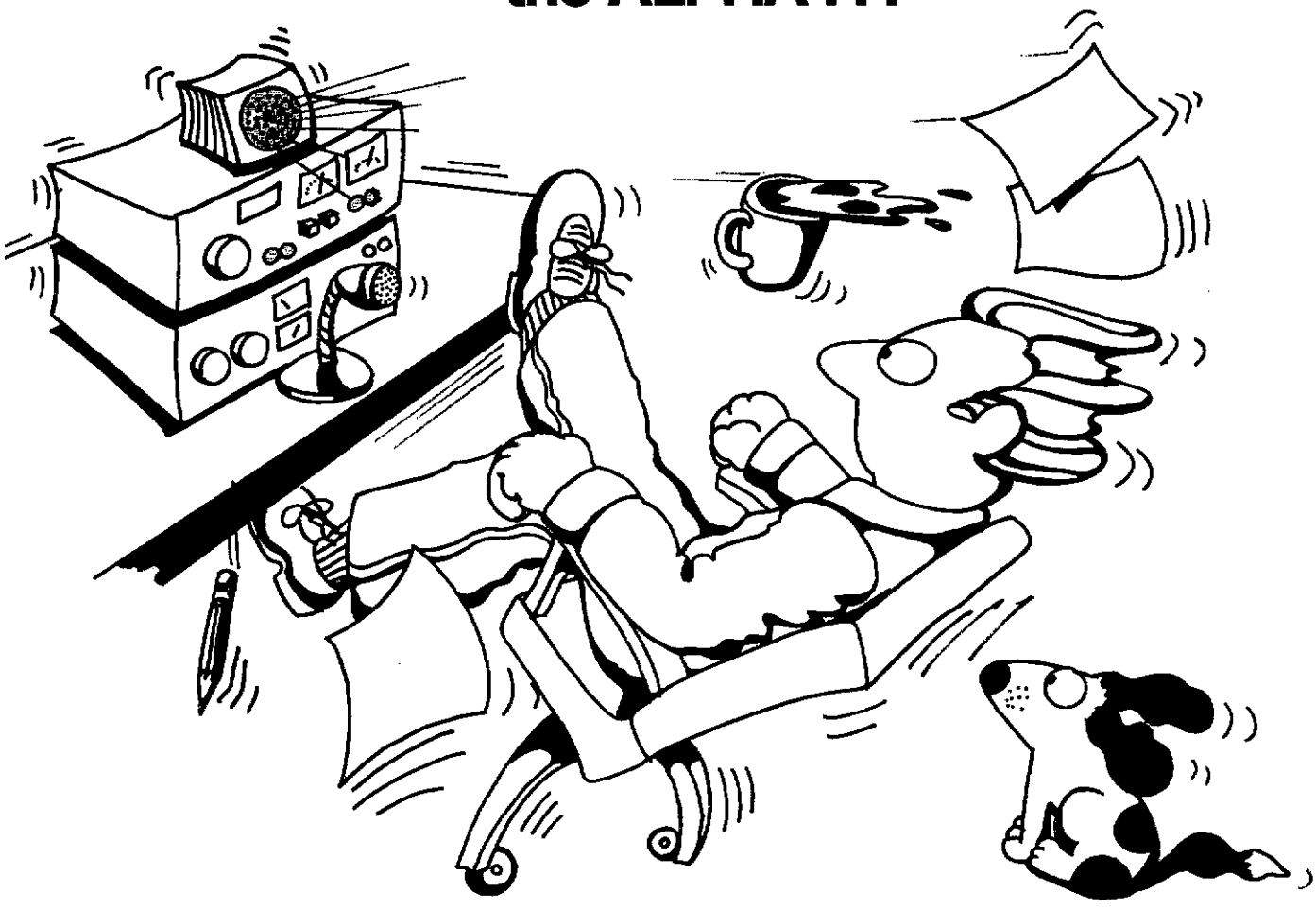

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*Coverage above 21 MHz subject to FCC rules.

N6JQJ. ACC: W6MKM. BM:(vacant) OOC: KA6S. JANUARY - Not many traffic reports received this month. Reporting has slowed down a lot recently. ORS's, are you still out there? Our Section Traffic Manager, N6JLJ, encourages everyone to participate in the regularly scheduled traffic nets for our Section. They occur every night of the year on 145.49- repeater at 7:30 PM, 3630 kHz CW at 7 PM, and 3630 KHz CW (slow speed training session, 10 wpm) at 8:30 PM. The CW nets are a good way to get your code speed up, and all are a good way to participate in amateur public service activities and obtain training useful for emergencies. And traffic handling, and even traffic net checkins, count towards your monthly Public Service Honor Roll score. (See the Public Service column in this QST for information on the PSHR award system.) Just listen in for a couple nights, and once you feel comfortable, try checking in—and if there's traffic for your locale, volunteer to take it for delivery! By the way, our STM has a new packet address: N6JLJ @ K3MC...the Foothill Flea Markets are back again this year, second Saturday of the month, starting in March. As an added attraction, there will be a VHF transmitter hunt starting in the late morning, after the Flea Market. Contact KB6BA for more details...the 3rd annual Emergency Response Institute (ERI) is coming up on May 6-7 at Apple Computer in Cupertino. Registration (for any space that is still available) is $20 (includes BBQ steak dinner) and should be sent to our ASM for Training Dave Larton N6JQJ at 766 ElCerrito Way D, Gilroy, CA 95020 (checks to ERI) The SLAC ARC is looking around for a high level site for their 1.2GHz repeater, and Stanford ARES is active on 1291.5/1261.5 MHz...the PPRC group heard from K3MC on the hardware and uses of high speed (56KBPS to 2MBS) packet radio...FARS and EMARC held their annual Banquet, good food and a good time was had by all...the Silicon Valley Emergency Communications System had their quarterly breakfast...the Ames ARC is working with McNair Intermediate School, which they have adopted, to acquire the shuttle satellit TV downlink. Both the Ames group and the Moffett Field ARS are already gearing up for the AirShow... the San Mateo Club has a lot of projects starting...the Gabilan ARS is already starting to plan for Field Day... Finally, a reminder. There is a telephone number that has information on Amateur Radio License classes, (408) 971-1424. Well...it only has the info that I put on it, and I can only put on it what I know about. PLEASE, let me know about any classes your group or club is sponsoring so that I may include them on the recording. January classes include the West Valley ARA, City of Menlo Park, Santa Clara County ARA, the Naval Post-Graduate School, and the ERI. My phone number is on page 8 of this issue of QST... Traffic (Jan.): NR7E 130 (0). Phone numbers: Amateur Radio Classes (408) 971-1424. License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC).

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: K4ITL. SGL: KE4ML. PIO: AB4FW. Will Harper, K4IWW, has served as Bulletin Manager of our section for the last 5 years. If your local net or BBS is not getting ARRL Bulletins on a regular basis contact Will about an OBS appointment. During an emergency the OBS system keeps the Section updated on the extent of ARES involvement and anticipated needs for assistance. Will is also Manager of the Carolinas Net, our combined NC & SC CW net which meets twice each night on 3.573 MHz. CN has the highest traffic volume of any of our nets. Check in and help handle some traffic; you don't have to be a high speed op and you will certainly be welcomed. He also operates a packet BBS (K4IWW-1, 147.540) and will be Cary ARC Field Day Czar (again) this year. [BT] Approx. 30 hams from throughout the state attended the N.C. Packet Radio Council's meeting Feb. 11 at the State EOC. Traffic handling, interfacing with NTS and the use of a 4.800 bps backbone frequency were discussed. [BT] Ice & snow storm forced postponement of Elkin Hamfest from Feb. 18 to March 12. [BT] Same storm resulted in lots of SKYWARN activity and caused an extensive power outage in Smithfield. The County EM Coordinator contacted recently appointed EC, Dave, KE4EM, who activated Johnston County ARES. Backup communications was provided for a shelter set up in Selma Elem. School while many other hams stood by. Johnston Co. hams can be proud of their response and also the job that former EC Jim, KJ4SW and Dave have been doing. The all important planning and preliminary work have resulted in an excellent working relationship with County government. The County EM Coordinator was even the speaker at the Johnston ARS (JARS) meeting in January. [BT] Raleigh Amateur Radio Society sponsored Raleigh Hamfest scheduled for April 16 will have ARRL forum & ARES-NTS meeting. [BT] Silent Key, W4JCB. [BK] January traffic: K4NLK 381, K4IWW 191, AA4TE 122,KI4YV 118, KA4EYF 117, N9CGD 78, N4RRG-1 68, N4JRE55, KM4BN 54, WB4WII 48, W4EHF 38, WD4MRD 38,WB4DAR 37, WA4MNR 35, WA9NEW 33, KM4BN 32, N4LST 31, KC4GRU 30, W4LWZ 30, WA2EDN 28, AB4EO 24, N4UE 21, KC4FBS 16, WD4LOO 14, N4SVZ 12, AB4W 11, KA4KGZ 10, N4UAJ 10, WD4LSS 10, N6LHE 7. N4NOY 6, W2JDB 5, NT4K 5, N4TCH 3, KC4BJD 3, AJ5F 2. [AR]

SOUTH CAROLINA: SM, Ned Moeller, N4FVU. ASM: WB4UDK, BM: K5CVD, OOC: W4NTO, PIO: AB4ID, SDM: KA4GUT, SEC: K8APF, STM: W4ANK, TC: WA4UNZ, AIRS: W4DRF. ACC & SGL: N4FVU. So. Texas section's loss of K5CVD is our gain. K5CVD has a Section News Bulletin Sta in Aiken. SDM, Rich speeds up delivery of NTS msgs by refilling on to Packet Net. SEC, Gerald encourages all DECs & ECs to complete their EC Exams. We thank STM, Hunter for accepting reappointment after having resigned. He & N4MEJ are our 2 leading NTS tfc handlers & PSHR performers. PIO, Kent will be forwarding PIAs his press releases. OOC, Fritz sends several full-page 00 reports monthly. AIRS, Leland can be depended on for his newsy letters. Net Mngrs are doing an excellent job! I do appreciate the newsletters ARCs forward. To-date we have 13 new appointees, 7 of them are ECs. To all appointees whose terms expired or chosen to resign, we say, job well done! Last but not least, plan to see us at the hamfests. Greenville Hamfest 6-7 May. Lake Hartwell Hamfest 20-21 May. Traffic: W4ANK 122, N4MEJ 96, KA4LRM 47, W4DRF 29.

VIRGINIA: SM, Claude Feigley, W3ATQ—STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. PIO: AA4VP. TC: WX4C. SGL: W4UMC.

VTN	1 PM	3907/7206	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	KK4FV
SVEN	7:15 PM	146.82	N4TS
STARES	9 PM	146.97	KJ4VT
DEC/EC	9:45 (3rd Wed)	3947	KA4NWK

Please note there has been several changes in Net Manager assignments. W4JLS is now manager of VTN and KK4FV is the VLN manager. Thanks to both Wright and Faye for the excellent job they have performed as Net Managers of the VLN and VTN. Our SEC, N4EXQ, announces the following new appointments; WB4PEA as DEC for Southside Virginia District, W4PET, as EC for Prince Edward County. WX4C reports WA4ITY as an ATC. Reported upgrades, N4SMB to Extra and N4RQC to Advanced. N4RQC is the XYL of WB4ZTR. The Tidewater area packet ops have been holding monthly meetings at the home of WBØTAX. At the January meetings, the heavy loading of 145.01, forwarding NTS traffic and the establishment of a 220 MHz link between Tidewater and Richmond were major topics of discussion. Reminder to ALL AFFILIATED CLUBS your 1989 Annual Report forms are due. These reports must be sent to League HQ if your club is to maintain active status. Speaking of clubs, since 1989 is the 75th anniversary of the founding of ARRL this is a great opportunity to stress the League's contribution to Amateur Radio during this time span. I have prepared two programs, one covers the League's participation in the growth of Amateur Radio from 1914 to present day. The other program covers the present day organization and field services provided by ARRL. If your club has interest in these programs, contact me. Some upcoming VE exams; April 8, Williamsburg contact WJ4X. May 6, Portsmouth contact AA4AT. In spite of the dropoff after a banner December traffic load the section count is 7140 with 50 stations submitting reports. Increasing amounts of tfc is appearing on PBBS so it is important that NTS traffic handlers check their local boards for tfc they can deliver either direct or by putting it into NTS Voice or CW nets. With the increasing effect of solar cycle 22 on HF operations, VTN NM W4JLS announces that if condx on 3907 are bad look for the VTN on 7260 plus or minus QRM. Make your plans now to attend the Manassas Hamfest, June 4th. Traffic: WBØTAX 1724, N4GHI 628, N4HOG 544, K4DOR 512, N4EXQ 314, K4MTX 302, W3ATQ 290, AA4AT 285, WB4QOJ 204, KK4NN 201, W4JLS 183, WB4PNY 158, KJ4VT 141, KB4WT 120, N4KSO 114, KK8L 106, WB4D 104, AA4GL 87, WD4MIS 82, WB4ZNB 81, WD4MIZ 80, K4BGZ 71, WB4KSG 71, KK4FV 66, WB4EDB 61, KB4NGO 58, K4JM 51, KI4W 49, N6ANQ 46, KI4BR 43, N4SMB 41, KB4OPR 34, WB4ZTR 33, KB4PW 30, KK4YR 30, W4TZC 25, WB4UHC 24, WB4KIT 21, W4HDW 17, WA4TVS 17, W4HU 16, KI4VU 16, K9MX 13, K4MLC 13, KB4UED 10, K4JST 9, N4FNT 9, W4YE 3, K4GR 2, K4VWK 1.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. TC: K8LG. Rept. Coordinator WB8GDY. ACC: WD8EBH. Bill, WD8EBH, has accepted the appointment as Affiliated Club Coordinator. Thanks to Bill for accepting this important job. Huntington Hamfest will be Oct. 7, at the Civic Center. Contact N8IKP for details. Mark your calendars now for the WV State ARRL Convention at Jackson's Mill. It will be July 1 & 2. Chas. H.F. will be April 15, at the Civic Center. New EC for Mason County is N8HEN. KA8ZGY is acting NM for WVNN. Thanks, Ann.

Net	Freq	Time	QNI	QTC	Sess	Nm
WVFN	3865	6:00	1332	137	31	WD8DHC
WVN	3567	7:00	265	94	31	KZ8Q
WVMD	7235	11:45	868	77	31	WD8V
WVRN	3640	6:30	252	39	31	K8LG
WVNN	3730	7:30	119	3	31	KA8ZGY
HILLBILLY	14290	NOONish	255	14	5	W8YP

Traffic: KA8WNO 447, WD8V 436, W8YP 189, W8FZP 111, N8FXH 83, K8QEW 67, WD8DHC 52, K8KT 34, KD8WX 20, WD8EBH 14, KA8OGF 12, W8JWX 11, NC8G 11, N8JPR 10.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Edie Sheffield, KAØMQA—SEC: WBØTUB. STM: KBØZ. ACC: WBØDUV. PIO: WBØFQB. OOC: KAØCDN/ WØJJR. TC: WØLJF. BM: KAØVKM. SGL: WDØHNQ/WDØHNP. New Section Leaders, WBØFQB moves from SGL to PIO, and is working on Section newsletters, along with building up a tape library & speakers bureau for the Section. The SGL is a Co-coordinator and will be handled by WDØHNQ & WDØHNP. KAØVKM is now Bulletin Manager, if you have an announcement that you would like passed around the nets, let KAØVKM know. The Western Vision ATV Net is meeting on 146.04/64 each Friday evening. There is an ATV beacon, WBØTUB on 426.25 running 6:30 to 8:00 PM & has coverage from Denver to Loveland. For further ATV info, contact WBØTUB. Congrats to NØBQP who just completed his 2000th NCS for CWXN. LARKFEST, a combination Swap & Computer Fest is being sponsored by the Longmont ARC and will be April 2nd at the Boulder County Fairgrounds in Longmont, Co. Contact WBØOSA for info. Hope to see you there. 73. KAØMQA NETS: Col; QNI 1379, QTC 60-161, QNF 1166, 31 Sess. CWN; QNI 65, QTC 41, QNF 305, 28 Sess. CWXN: QNI 1701 QTC 1434, QNF 2790, 31 Sess. HNN: QNI 2010, QTC 109-628 QNF 1016, 31 Sess. NCTN: QNI 117, QTC 58, QNF 219, 25 Sess. SCTN: QNI 231, QTC 32, QNF 271, 31 Sess. Traffic: NØBQP 1800, WØLVI 554, NØHFZ 474, KØYFK 406, NØFCR 290, WDØAUN 228, WBØFFV 75, KBØZ 68, KAØWIE 36, WØNFW 20.

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 110 msgs with 196 checkins. NM Roadrunner Net meets daily, 3939 @ 0100 UTC, handled 92 msgs with 1158 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 163 msgs with 1040 checkins. Yucca 2-mtr Net, 78/18 handled 20 msgs with 605 checkins. Caravan Club 2-mtr Net, 66/06 with 147 checkins. SCAT Net, 66/06 handled 6 msgs with 598 checkins. Info Net 12/72, with 74 checkins. Good newsletters from the Totah ARC in Farmington, the Hamboner from the Eastern NM ARC, the Local Oscillator from the Mesilla Valley ARC, Que Pasa DX from Albuquerque, the New Mexico Scanner from Albuquerque, and the ARES News Letter also from Albuquerque. Traffic: Sunday Noon Packet Net on the Zia Connection, 50 checkins. KN5D 106, KB5UL 31 & W5DAD 24. BEAN FEED, LAS CRUCES, APRIL 28- 30. See you all there.

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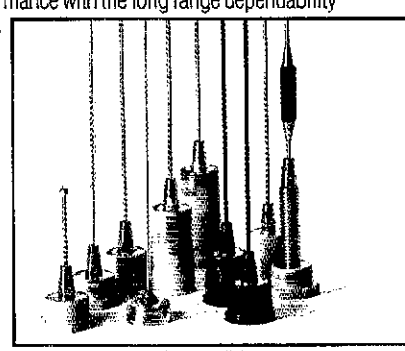

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UTAH: SM/STM: Jim Brown, NA7G—SEC: Rich Fisher, NS7K. New VHF Society Officers: Pres, Steve, NV7V; VP Duane, KA7TLK; S-T. Brent, AC7H; Freq Coord, John, K7JL. New Bridgerland Officers: Pres: John, AE7T; VP Paul, WO7N; Secy, Clayton, AC7O; Treas, Khalil, WA7SHW. The 146.90 rptr in Ogden has an open patch; contact OARC for details. VHF Society mbrs voted for an open patch on the SL 146.94 machine; also, the 146.88 rptr in SL is a calling machine. Contact Kevin, N7IUN, for info on Utah Code Net activities. Packeteers: Let's all pull traffic off the BBS for delivery ASAP—too much of it is slow getting delivered, and reflects on all of us. 73 de NA7G. Traffic: WA7KHE 72, N7IUN 55, WA7MEL 47, N7JLC 33, NS7K 31, N7ASY 18, NA7G 16.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM. Traffic: NN7H 206, W7SQT 108.

NET	FREQ	TIME	QNI	QTC	SES	NM
Cowboy	3923	545pmM-F	945	11	22	KC7AR
Pony Ex.	3923	800amSu	255	5	5	W7MZW
Wx Net	3923	630amM-F	332			WC7S

Heard about HERC, Hams for Emergency Radio Communications? Well, you can now work Cheyenne from Worland on a 2-meter handheld. Interested in expanding into ur area? Contact Larry, KD7BN. I received real great looking newsletters from the SHY-WY and Casper clubs. They are full of information. Contact Dale, WC7S or Rev, WS7W for future issues. Need a used ham rig? Got one to sell? W7TVK runs a great swap shop every Sunday following the Pony Ex. net Tune in..73 cul

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. PIO: WB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: KA4ZXL. The NTS continues to grow in Alabama-we have a new net in cycle one of NTS. The net is the Alabama Day Net (ADN) and meets at 10:00 AM (except 9:15 AM Sundays) daily on 7256 kHz. ADN Manager is Jack, W4PIM. Hats off to the Bibb Co. ARC for sponsoring SKYCAL or Sky Conference Alabama, back in February. This was a well attended severe weather training session for all Alabama amateurs held in Centerville. We look forward to attending SKYCAL for years to come. Silent Key: James Hunter, K4PLG, of Birmingham. The new president of the Muscle Shoals ARC is Bill Rogers, WB4NQH. Packet activity in our section continues to grow-the W4CUE BBS in Birmingham now has an HF port and is handling bigger loads of traffic. A new node is on the air in Birmingham- BHM1 on 145.03 MHz, and in Centerville-CKL is on 145.67 MHz. Congrats to Robin, NE4L, from Auburn, who is the new Chairman of the ARRL Contest Advisory Committee. Randy Smith, N4LZK, has been re-elected as president of the Montgomery ARC. Thanks to the Huntsville ARC for having me as their program at a February meeting. I enjoyed the visit! BPL: WA4JDH. PSHR: WA4JDH, W4PIM, W4CKS, W4ZJY. Traffic: WA4JDH 786, W4PIM 270, W4CKS 209, W4ZJY 161, W4DGH 10, WO4W 10, KB4GFT 8.

GEORGIA: SM, Eddy Kosobucki, K4JNL—SEC: NC4E. STM: WB4WQL. Packet: W4QO. ACC: KM4IH. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. Well, the Ga section HAMFEST season is underway. Kennehoochee at Marietta on Sat. April 8th, then Augusta at the Hippodrome (a new place) on Sat & Sun. April 22 & 23. PSHR honorees for Jan are: WB4DVZ, KJ4NK, WB4WQL, KA4HHE, WA4LLE, WA4TXT, W4RWB, KM4LS & WD4COL. As of this writing, I have no news to pass on to u as far as our HAM TAGS are concerned. When we hear anything, we'll pass it on the air, BBSs etc. TNX once agn to the VEs, INSTRUCTORS & CLUBS who have dedicated themselves to bringing new amateurs into our ranks. Keep up the gud work. Athens ARC elected AA4AI Pres, KC4BDT as Sec, N4GUA Treas & N4ULL Editor. Ga Tech officers are Pres: NR4E, VP: WD4DWN. Sec: N4MLG. Rpt Mgr: WD4FSU. The "Old Goat" continues to reminisce in the Atlanta Ham. If u can borrow a copy, it makes interesting reading, MACON ARC continues to grow & have interesting programs. W4VX tied the knot agn in Americus in Jan. By the way, Jimmy isn't but 83 yrs old. GA POWER officers are Pres: W4RSO, VP: N4RYT, S/T: N4IQR, Rpt Mgr: WA4VBX, Net Controls: K4FMB & K4GKV. ALBANY ARC elected K4PGY as Pres, N4RJG as VP & KK4PJ Sec/Treas. Many tnx to WB4LBM fer the fantastic job done with the TRAFFIC PROGRAM he conducted for the GA SSB Assoc. NC4E, our SEC, informs me that our ARES volunteers approach 1100. When attending a hamfest, pick up one of the forms & fill it out if you hadn't done it before. Most HAMS don't realize how much the ARRL does for AMATEUR RADIO. U who read this column do. Next time u see one of ur ham friends who isn't, tell him we need him. 73 & God bless, Eddy. Traffic: WB4DVZ 146, WB4WQL 99, KA4HHE 92, KC4BHX 82, WD4COL 71, WA4TXT 46, KJ4NK 46, WA4LLE 43, N4UZ 25, N4MWR 19, W4AET 14, K4BAI 13, K4JNL 12, W4RWB 11, WA4YYQ 8, AA4JV 8.

NORTHERN FLORIDA: SM, Roy, N4ADI— ASM: Bill, KB4LB. STM: Rip, AA4HT. BM: Dave, N4GMU. SGL: John, KC4N. PIO: Petey, WA4PUO. OOC: John, AB6I. TC: Ed, W8RAO. SEC: Rudy, WA4PUP. ACC: Roy, N4ADI (Acting). ASM Digital: Al, K4CY. It's possible that by the time this is printed, we will have a new ACC. I have had several contacts concerning the position and will make a decision shortly. Officers for 1989 are reported by the following clubs: TARS has Bill, N4QNF, Pres; Stan, N4KGS, VP; Pat, WA4FAL Tres; Jim, KB4IVH. Sec. HCRA has Pat, WB4EXA Pres; Curt, N4PID VP; Noreen KB4IDV Sec; Donna KB4BFB Treas. Sun Country ARS has Joe KA4WJB Pres; John KA4WJA VP; Mario N4TSV Sec; Jerry, KB4RBB Tres. So far that's about one sixth of all our clubs, so I urge others to advise me by mail or Packet at KB4LB's BBS in Sanford. The Northern Florida Section meeting will be the Orlando Hamcation on April 7, 8 and 9 at the new Orange County Civic Center just off I-4 on International Drive. Parking will be free thanks to special arrangements by OARC with the Convention Center Staff. So please make your plans to be there and look me up and say hello! I'll be at the forums on Saturday and will oversee the FCC exams on Sunday, so please come by and say Hi! Interest in the Amateur Auxiliary of the FCC is still running high, and we hope to be approving some Local Interference Committees as they are formed. 73, till next month. Roy, N4ADI. Traffic: WD4IIO 732, WX4H 667, AA4HT 396, WA4QXT 388, N4UAV 288, KB9LT 278, N4SS 212, WC4D 178, W7YWF 142, AA4FG 117, W4KIX 81, N4GMU 81, K4CY 75, WB3AVZ 71, WA4STZ 68,

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- **45 Watts on 2 m, 35 watts on 70 cm. 25 watts on 1-1/4 m.** Approx. 5 watts low power.
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- **Dual watch function allows VHF and UHF receive simultaneously.**
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- **Frequency (dial) lock.**
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TM-721A shown with optional RC-10.

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WA4EYU 63, N4DY 55, N4JHI 42. KI4CQ 41, N4ADI 40, WB4TZR 36. N4JAQ 33, N4NKI 30, NF4O 27, KB4KFH 25, N2AOX 25, N4UF 24, WB4FJY 18, W4AT 14, N4QYS 9, KJ4HS 9, WB4JJH 8, WA4SXW 8, KA4KAH 6, N4OZD 7, W8IM 6, K4UTY 6. (Dec.) WC2G 314, NF4O 66, W4UEA 32, WB4GHU 28, K4UTY 38.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: N4PBF. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. Packet Mgr: K4CY. Congrats to the Fort Myers ARC who held their City of Palms Hamfest this January—it was excellent. The Traffic Handlers Luncheon and Forum headed up by WA4HDH and KA4FZI was outstanding. This hamfest is becoming well known for its traffic forum. Over fifty percent of the checkins on QFN Saturday night were in attendance as well as W1NJM, the "father" of the National Traffic System. The evening before the hamfest there was a QFN dinner which also was well attended. WA4HDH gave an update on his book, the History of QFN, and also showed a prototype QFN badge which the membership approved. It is with pride and pleasure that I announce that KA4FZI has been nominated for the ARRL Professional Teacher of the Year Award—she has done an outstanding job of combining a reading class with Amateur Radio Novice class instruction at Caloosa Middle School. The Fort Myers ARC is to be commended for their support— they have donated or loaned equipment and several members regularly donate their time as assistants and in presenting demonstrations. Also to be congratulated is WA4HXZ who has been nominated for the Herb S. Brier Instructor of the Year Award by N4TKV. He has been doing an outstanding job of volunteer instruction in Palm Beach County. K4SCL, former SCM of Southern Florida, told me that he was on the 18 MHz band January 31st and was very pleasantly surprised. He heard stations in all parts of the country and Canada—he mainly listened but did make 8 calls on SSB and never failed to make contact. States worked NH, VT, NJ, PA, MI, WA, KS, and MN. He also said the band was still good at 9:30 PM. The Everglades ARC Beam reports the following elected as officers for 1989: WD4MRT President; WD4PWC Vice President, AL7W Secretary and WB4JFA Treasurer. Congrats to the Englewood ARS which is starting their second year of existence. The South Brevard ARC Spark quotes from Worldradio that two weekly amateur radio programs can be found on the shortwave bands: "Ham Radio Today" is on HCJB every Thursday at 0230 UTC on 6.230, 9.720 and 11.775 MHz; also "World of Radio" Fridays 0300 UTC 6.185 MHz, Saturdays 2330 UTC 9.852 MHz, and Sundays 1300 UTC 9.715 MHz—Argonne ARC, WI. K4FQU's Southwest Florida Traffic Net report said that WA4EIC reminded the net on February 2nd that the net was started eleven years ago—so ARL Forty Six to the SWFTN! K4FQU also wrote that he has written a little booklet on how to run a net that resulted in the net having ten standby NCS stations. WB2OUK sent a radiogram indicating that the West Palm Beach ARC operating W4HAW at the South Florida Fair used fifty operators in handling approximately 450 messages. The Martin County ARA Common Emitter reported in the President's message that the education program in 1988 did produce results with Novice and Technicians completing courses to obtain their licenses. Congrats to KD4GR who is the new president of the Motorola ARC. Newsletters also received from the Manasota Repeater Assoc and the Palmetto ARC. WD4KBW reports 79 bulletins received and 139 sent by W4DL 48, WA4EIC 62, WT4F 40, K4IEK 18, WD4KBW 27, WA4NBE 9, and WA9VND 14. WB5YDD reports Florida represented 60% on RN5D cycle 2 by K4CY. K4CY was chairman of an excellent NTS packet forum at the Miami Hamboree. WV5Z reports that Florida was represented 100% on RN5 cycle 4, by WV5Z, WA4PFK, KA4FZI, KB9LT, K4ZK, K4IA, WC4D, WX4H, N4SS and W4KIX. K4EUK, ACC SFL, was in the hospital for eleven days with leg surgery. Many thanks to W4WYR and the Miami Hamborea Committee for the donation of a table for the traffic handlers—not only that but we were next to the Florida Skip table and enjoyed their company and the refreshments W4IYT provided. The ARRL Information Net meets on 3940 kHz each Saturday at 8 AM and is followed by the Florida Packet Net on 7236 at 9 AM. 73 de WA4PFK. Traffic: W3CUL 2829, W3VR 1141, WA9VND 978, AL7IN 604, W4HAW 564, K4SCL 406, WA4PFK 379, W4NFK 282, K4IA 267, AB4EA 236, WA4EIC 228, K4ZK 225, N4HAP 212, KA4FZI 199, WV5Z 178, KB4KXV 146, WB4WYG 146, KD4GR 136, N4ET 128, KJ9L 125, WA4RUE 124, N4MML 117, AA4BN 101, W1NJM 97, W4DL 72, KA4YHS 70, K4FQU 69, WD4KBW 60, N4ORZ 57, AA4ZV 57, KM4LP 56, KY4U 55, N4KFU 52, W3TLV 51, KC4GHT 50, WD4CHO 50, K4EUK 48, W4DWN 46, KB4UIA 43, W4NVU 40, KF4RL 37, WX4J 36, WT4F 36, KC4VK 35, N4QWN 34, WB4GCK 33, WA4NBE 31, KA4SIH 30, W4UIO 28, KA4AJR 25, KA4NXF 22, W4DFP 22, K4JI 21, KB4MON 21, KC4HDJ 19, KF4JA 18, KJ4WJ 17, N4HAS 16, W4VQE 16, KA9AKY 16, KI4ZW 16, K9ALX 15, N2COI 14, KB2UHC 13, WA4VWJ 12, AA4CH 12, W4MPV 11, KAØGYF 10, N1EGN 9, KA2KNZ 9, W4MPD 8, W3IJR 8, NØABC 7, N4RHJ 7, KA4GDU 6, KB4ECH 5, WA4PIL 5, NX5Q 4, WD4AEP 4, K3KT 4, KB4TIU 4, N4PSV 2, W4NSY 1, KB4TQG 1, N4OIA 1.

VIRGIN ISLANDS: SM, Ron Hall, KP2N—ASM: KV4JC. SEC: NP2B. STM: NP2E. NM: VP2VI. Congratulations to the new upgrades at St. Croix ARC January session. KA1SPI & WP2AGF to Tech; N3GHM to Gen; WP2ABF to Adv; and our ASM, KV4JC, to Extra. Also two newcomers passed Novice. W9CKKs ham classes are paying off. Nice work, Merv. New calls on St. Thomas so far: WP2s: AGF, AGG, AGH, AGI, AGJ, AGK & AGL plus NP2CU. This is a result of NP2E ham class. KP2N & W2BMI/VP2V were active on first ARRL RTTY Roundup. Sorry to report that Ron, WP2ADC is a Silent Key. KV4CQ has been very ill at a stateside hospital. Doc James, KV4AQ, has been in hospital on St. Croix. Get well soon, guys. ARES on St. Croix check-in for January—67. KV4JC Maritime Net now on 7237 at 1100 Z. 147.250. Back on air thanks to NP2CM. 73 from land of sun & fun.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NM's: K6LL, K7POF, KI6ZH. WC7R, EC for Yavaipai Co. reports outstanding success in cooperation with the Co. and City Emergency Services officials utilizing the ARES. They so impressed the Co. Emerg. Services Dir. that she decided to become a ham. She passed her Novice exam with flying colors and is now waiting her new call sign and studying for the Tech. exam! Good work, Alan. KHØAG and NZ7D, OOs sent in nice reports. These are two dedicated, hard-working volunteers and deserve real thanks from all of us. I will be renewing most

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Compact all mode transceivers

It's the "New Sound" on the 2 meter band—Kenwood's TR-751A! Automatic mode selection, versatile scanning functions, illuminated multi-function LCD and status lights all contribute to the rig's ease-of-operation. All this and more in a compact package for VHF stations on-the-go!

- Automatic mode selection; plus LSB

144.0 144.1 144.5 145.8 146.0 148.0 MHz

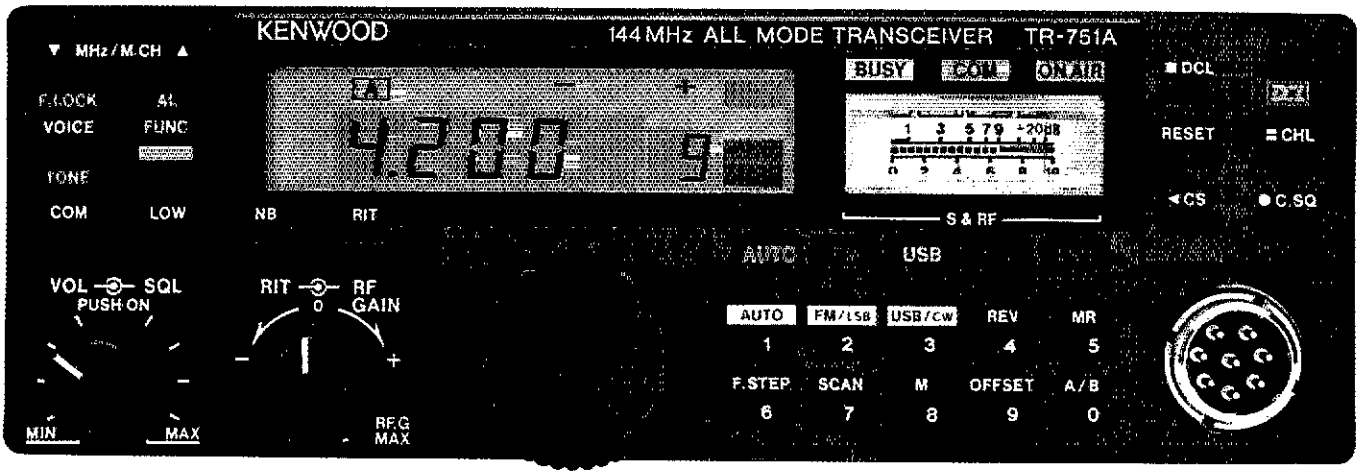
CW	USB	FM	USB	FM

- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option
- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter

- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone and microphone hook included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

Optional accessories:

- **CD-10** call sign display
- **PS-430, PS-30** DC power supplies
- **SW-100A/B** SWR/power meter
- **SW-200A/B** SWR/power meter
- **SWT-1** 2 m antenna tuner
- **SWT-2** 70 cm antenna tuner
- **TU-7** 38-tone CTCSS encoder
- **MU-1** modem unit for DCL system
- **VS-1** voice synthesizer
- **MB-10** extra mobile mount
- **SP-40, SP-50B** mobile speakers
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** deluxe base station mics.
- **MC-43S** UP/DOWN mic.
- **MC-55** (8-pin) mobile mic.
- **MA-4000** dual band antenna with duplexer



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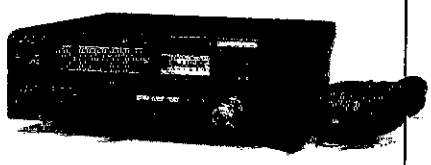
- 25 W high power/5 W adjustable low
- MC-43S UP/DWN mic. and mic. hook included



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Station Appointments come May 1st. If you want yours renewed and haven't sent in a report lately, please let me hear from you. N7INK reports the CARA will have their annual "Spring Fest" May 5-7 at their club site in Sierra Vista. OPRC already planning their 1989 Field Day with W7GV operating from N7BPH's summer home near Show Low. W1FJI, our busy BM, still sending out ARRL bulletins and NTS traffic on a state-wide packet radio net. Art and Budd, N7EOJ put out a FB map and call sign listing of "Western US Amateur Packet Radio Networks." Send SASE to N7EOJ for a copy. Tucson had two Silent Keys in Jan. K7JS and WB7CKX. Our condolences to their families. W7GAQ traded in his call sign for new Extra Class call, WW7P. Congrats. CADXA members are distributing DX info on packet radio (147.32) in Phx area. K5VT and N7BG reported on their CQ WW DX test operations from YB0 at the Feb. meeting. Am Radio Explorer Post 599, Phx putting out FB quarterly newsletter "Hard Copy Times" both print and braille. They report KA7SDI, a post committee member as a Silent Key. Rich, NN7D, maintaining contacts with RA9YD relative to the Russian youth team who will conduct river rafting trip thru the Grand Canyon next August. The idea is for the Russian group to communicate to their families back in Siberia from the bottom of the canyon. Many arrangements must be worked out including a third-party agreement as well as the relays and signal paths to be used. Members of the Coconino ARC will provide the communications. More later. They will also be supporting the Flagstaff Special Winter Olympics again this year. NN7D worked all W200 states, plus DC. Congrats. Scottsdale ARC reports new officers. KY7F, Pres., N7KEA, VP, WU7S, Sec. and WB7VSH, Treas. GVRC going strong again with N6CHY as Pres., and N6DDR Sec. West Valley ARC reports long-time member W6SAM as a Silent Key. W7KNA gave a talk to Catalina RC about his ham radio adventures above the Arctic Circle last summer. W7DQS sent in traffic report after being inactive for a while. Welcome back, Marshall. New officers at Coconino ARC are: W8FBY, Pres., KA7PZL, VP, and N7FU, Sec/Treas. Don't forget Ft. Tuthill July 28-30. W6PAN ARRL Controller will be our guest. 73 Jim.

NET Abbrev	QNI	TRAFFIC	SESS	LIAISONS
SouthWest Net SWN	-	-	-	TWN
Arizona Cactus ACN NET (HF)	533	68	31	TWN
Arizona Cactus ACN NET (VHF)	221	52	31	ACN (HF)
Arizona Tfc & ATEN Emerg Net	1148	184	31	TWN

Traffic: W7EP 291, W1FJI 288, W7AMM 207, K7VVC 82, W7LVB 80, WW7P 75, W7OIF 61, W7KXE 28, K7POF 25, N7ETP 24, W7DQS 4. (Dec.) WE7G 112.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—New CHP phone numbers are now released to Amateur Radio Organizations only. These are strictly for reporting freeway accidents or problems. These number may incur a toll charge, but you will not be put on HOLD, (213) 756-3369 for the LA AREA & (714) 547-8318 for ORANGE COUNTY. LA County (our Section) now has over 4,600 ARRL members & over 8.4 million population. LA County remains the #1 County in the USA. We may have the most of everything, some things we don't need or want included but all in all it's a great place.—KB6AXK, Joe Circa (818) 584-9071 is Chairman of HAMCON 89. This ARRL CONVENTION IN LOS ANGELES is scheduled to run August 25 (Fri), 26 (Sat) and 27th (Sun) of 1989, at the LAX Hilton Hotel on Century Blvd. near the LAX Airport. WA6ZEF, Ken Walston (714) 626-8571 is scheduling one fantastic array of prizes for this ARRL SOUTHWESTERN CONVENTION. Your early registration will be greatly appreciated. Consideration is being seriously considered to exclude W6GC from all prize drawings since he has already won enough prizes to require a personal PRIZE MANAGER. The Roman Rule (according to the W6SD Carrier): The one who says it can't be done should never interrupt the one who is doing it! According to the Hughes ARC Bulletin and author Chuck, KN6H: The warranty on a new color TV set had just expired and the set failed. The service man told the owner that she needed repair insurance. She was told that if she signed the contract for repair insurance that there would be no charge for the present call. The lady didn't want to commit herself yet; she hadn't studied the plan and its cost closely enough. She said that she wanted to think it over. "Well, madam," said the service man resignedly, "IF YOU WANT FREE SERVICE, DON'T FORGET, YOU HAVE TO PAY FOR IT."—The Los Angeles ARRL Awards Mgr. is in the San Fernando Valley— KI6BU, Henry Kastrozza. Henry can certify your cards HF WAS, call him at (818) 993-7736 or meet him at the Club for an appointment and save sending in your cards to ARRL Headquarters. (Not DXCC, these must be blessed by the HQ staff)—6T2MG, Capt. S. Malik Gizouli, Box 49, Khartoum north, SUDAN, has been active on the ET DX net at about 2200 UTC with a 5/8 signal in LA. Photos and QSL cards indicate very important information regarding antenna restrictions in LA. Please call Marty at (818) 360 N6VI or write for more information. Congratulations to N6AHV, Tex, the new President of the So. Cal DX Club and his great crew of officers for 1989. N6BIC, Bob Edwards VP, WB6PSY, Gary Pesselt, Sec & Editor, W6MFC, Hugh Allen, Treas. KB6HW, Ester Wolf, Membership Chairpeson, N6OU, Edgar Brown, Dir. N6AHU, Joe Merdler, Dir. NK6A, Don Minkoff, Dir. and K7EG Jim Denneny. Repeater Chairman. STM News: Bob, AJ6F, has been very active on Packet with good total. It's good to have these packet reports come in as welike to have the reports. Silent Key: K6AV passed away Jan 31. He was very active for many years as a DX operator. Traffic: K6UYK 739, W6INH 57, AJ6F 262, W6TH 106, N7CZF 127, WB6SAN 66, W6NKE 24.

SAN DIEGO: SM, Arthur R. Smith, W6INI—STM: N6GW. PIO: N6PKY. TC: N6JZE. SEC: W6INI. Visitors are welcome at CONVAIR ARC's club station open house, monthly on second Wed from 1900 to 2100, with KA7JFX as host opr. W6PNT edits the club bulletin. Upgrades: to Extra K6ICG, to Tech KC6BJM. PALOMAR ARC sponsors the following nets on their 146.73 (-) rptr (W6NWG): N County Tfc Net (NTS), daily at 2000 except 1st Wed; ARES Sun at 0830; Microwave Net Mon at 2100, NCS N6IZW; Packet Voice Net Tues at 2100, except

(continued on page 126)

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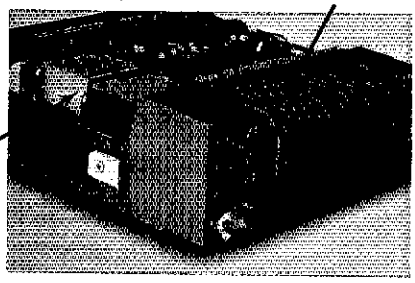
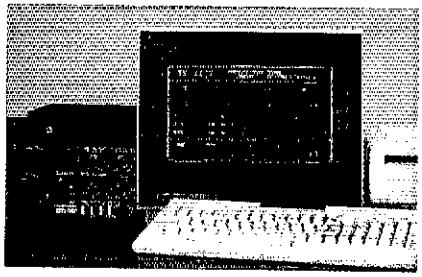
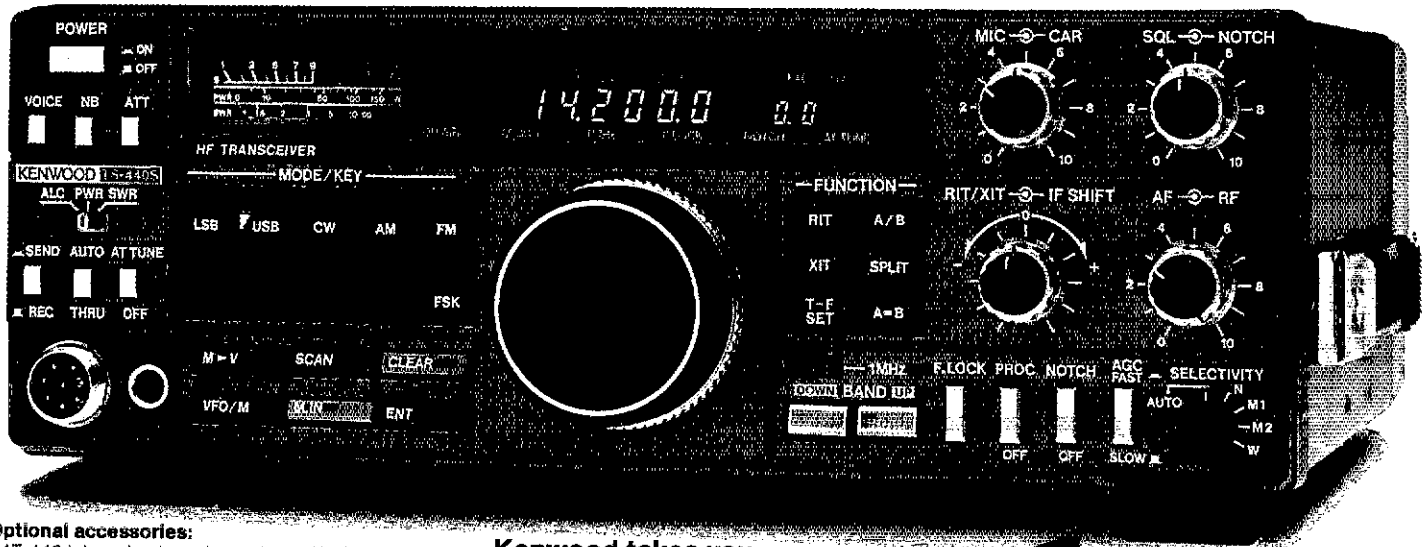
Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **Covers All Amateur bands**
  General coverage receiver tunes from 100 kHz–30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)



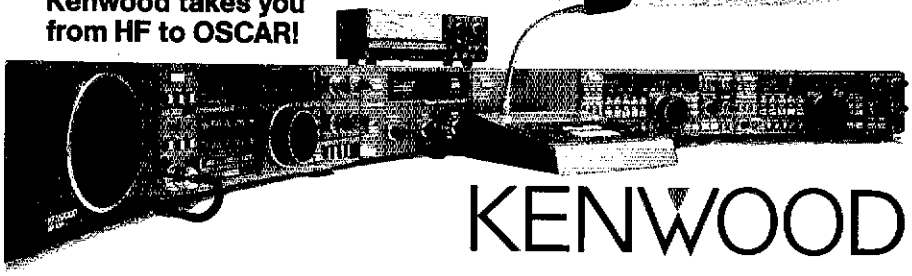


- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-43S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**



Optional accessories:
• AT-440 internal auto. antenna tuner (80 m–10 m) • AT-250 external auto. tuner (160 m–10 m) • AT-130 compact mobile antenna tuner (160 m–10 m) • IF-232C/IC-10 level translator and modem kit • PS-50 heavy duty power supply • PS-430/PS-30 DC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • YK-88C/88CN 500 Hz/270 Hz CW filters • YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters • MC-60A/80/85 desk microphones • MC-55 (8P) mobile microphone • HS-5/6/7 headphones • SP-40/50B mobile speakers • MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount • TL-922A 2 kw PEP linear amplifier • SM-220 station monitor • VS-1 voice synthesizer • SW-100A/200A/2000 SWR/power meters • TU-8 CTCSS tone unit • PG-2S extra DC cable.

Kenwood takes you from HF to OSCAR!



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The PARAGON, Performance Plus...

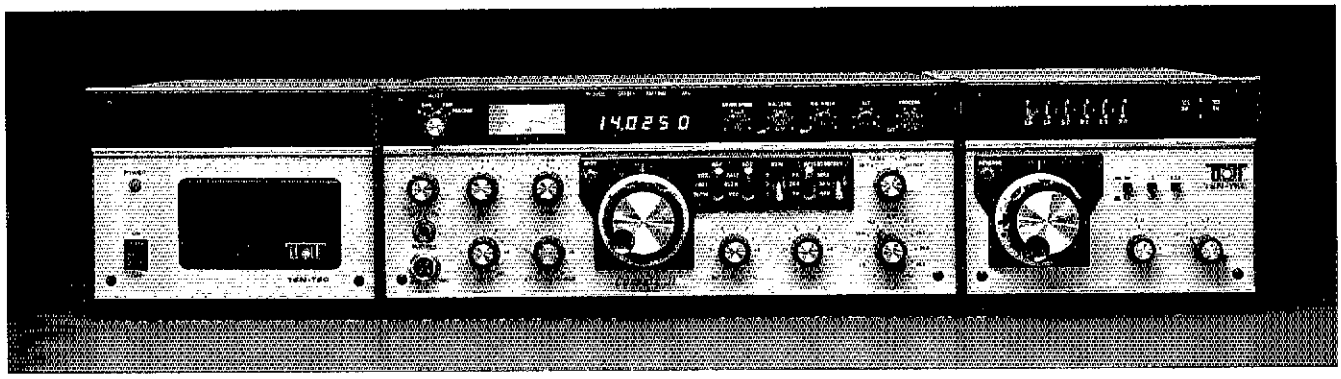
All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.



The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50 + dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

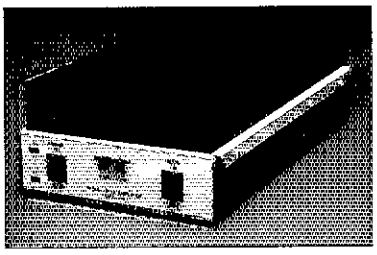
If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

Add Satellite Communications To Your HF Station

Model 2510 B

The Model 2510 B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410

TITAN: A Gallon And A Half Out! (5.68 Liters)

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

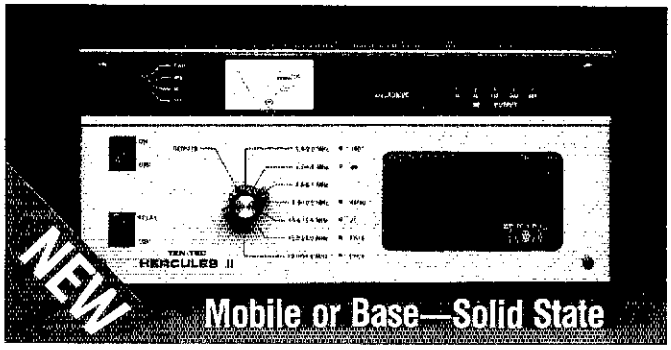
The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

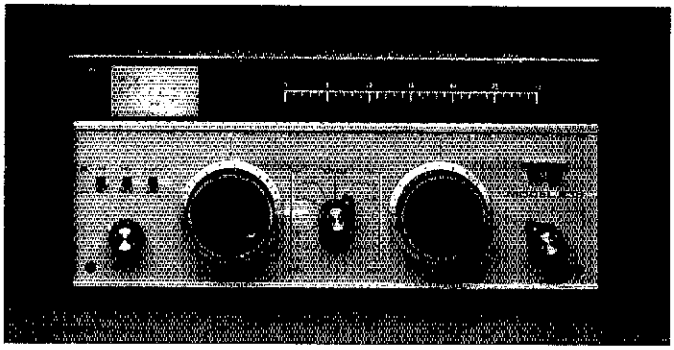
Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.





Hercules II No Tune 550 Watt HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.

Two KW Antenna Tuner

The latest version of the highly regarded Ten-Tec antenna tuner is now the Model 238. The 238 has been re-styled to match our transceivers and looks great in your shack, whether your layout is "look alike" or "mix and match." This tuner adds a great deal of versatility. It will load virtually any unbalanced (coax fed or long wire) antenna. The high power balun is built in as standard which allows the use of balanced feeders also. Full coverage from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without false load problems. The lighted slide rule dial and calibrated tuning knob skirts make it possible to log settings and quickly QSY to the same frequency and antenna, without going through the tuning process again. Lighted multi-meter reads power in two ranges, plus SWR. A great way to operate all bands, including WARC and MARS, with something less than a world-class antenna farm.

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2nd Tue, NCS KB5MU; Pers Computer Net 2100 Wed except 1st Wed, NCS KI6TG. Correction: Palomar ARC & No Shores ARC officers in my Dec report were for 1989—sorry. 1989 club officers: So Bay ARS Pres KB6TPQ, VP K6QM, Sec W6YVY, Treas KB6DHV; ARC of El Cajon Pres KG6VP, VP KA6RLX, Sec N6KHO, Treas W6ULU. ARC of El Cajon has new meeting place at Buck Knives, 1900 Weld Blvd, El Cajon. Still meets second Thur at 1930. The club's Ham of the Year for 1988 is WV6K. ARES windbreakers, T- shirts, caps are available thru KA6RLX, 449-1282. NCTN: 30 sessions, 91 msgs, 481 ck-ins. ARES CW: 5 sessions, 10 ck-ins. Traffic: KI6ZH 512, N6GW 37, KI6ZM 32, N6RVO 16.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA— ASMs N6MA/W8AKF/WB6BYU. ACC: KB5AH. BM: KI6XG. STM: N6WP. OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DECs: WB6RVA/KA6KGF/KI6XG/WB6IIY. December 1988 report: As I mentioned last month, I had the privilege of presenting the Ventura County ARC with a plaque commemorating fifty years of affiliation with ARRL. There have, to date, been only 105 clubs that can make that claim. The following brief profile of the club comes to us courtesy of club Secretary Mac Shroyer, K6VMN, who has probably held every office in the club by now. The VCARC is a general interest amateur radio club that meets on the second Friday of every month at the Oxnard Community Center. According to area "Old Timers" the club was the first in Ventura County, first meeting in 1938 in Oxnard in the old Driffill School building. "A long-wire antenna was draped across the roof of the school and the radios were kept in a closet. The first president of the VCARC was Jack Strobel, W6CEV." Eventually the meeting place was changed to the old Oxnard Police Station on 5th street (now the Paramont bootery) - a move which must have helped maintain close relations between the Police and the local ham community. In those early days VCARC was the only ham club in Ventura County, the nearest others being in Santa Barbara or LA. Mac reminds us that "In ... the late 30s and early 40s hams were still building regenerative receivers and one tube transmitters (by then the spark-gap era had progressed to Lee Deforest's 'Vacuum Valves')... Of course when WW-II came along the hams were not allowed to operate at all from 1942 to 1946, but the war requirements had developed some neat ham equipment," some of which is still around and operating today. As the troops came back from the war the VCARC was again activated for bigger and better activities. "In the early 50s a new Police station was built on 'B' Street between 2nd and 3rd, and the club continued to meet in the squad room of that building. (The building has been expanded several times and 'B' Street is the parking lot for the station now.)" The mid 50s through the mid 70s were prosperous years for VCARC. Membership grew to more than 80 and included lots of unique talent. Several members were still in the service, stationed at the CBC base at Point Mugu or Camarillo AFB. Others were engineers or technicians at the bases. One was even President of the Oxnard Chamber of Commerce. "VCARC had active nets on 10 and 75 meters organized for emergency communications with roll call three nights a week. There was even a 2 meter net that exploded with all kinds of members and check-ins when the Heathkit 'Lunch Box' two-ers hit the scene." In 1956 VCARC President Les Gay, K6OFO, got the club its callsign, K6MEP, so that it could be used for club activities like Field Day, phone patches to servicemen overseas and RACES. "Les was the first E/C organizer in the club and had things rolling along until Jimmy Demineau, K6UOT, came along. Jimmy got the 10 meter net organized and declared every check-in a RACES member. He also installed a complete ham station in the Police Station for emergency comm." By 1959 the now incorporated club met in the back room of the CBC Base PX. To raise money to outfit a surplus Army ambulance for emergency communications President Bob Tremaine, W6KCD, held a raffle for a case of Southern Comfort - the tickets sold like hot cakes, with the result that SBAR Section had its first E/C van "and the club treasury has never been in the red since." That was also "the year that Capt. Ralph Crossman, K6HAV, got permission from the Gov't to hold Field Day at Laguna Peak ...the only stipulation being that the Mugu ham club call, K6CST, had to be used, so the Division Record is recorded under that call by K6MEP operators." In the 1970s club members and avid VHFers Wayne Overbeck, N6NB, Bob Cerasuolo, WA6IJZ, Mac McCalton, K6ARK, and others, "convinced the members that there is nothing more enjoyable than 'mountain-topping' for the contests! There is a drawer full of ARRL awards to prove the prowess of K6MEP over the next few years. Most of the awards are for first place in Division," and others for first in Section. "K6MEP has become a familiar call-sign during all the VHF/UHF contests." Over the years VCARC has logged many accomplishments and achievements, but most significantly the club has always held true to the objectives stated in its by-laws: "To strengthen, promote and encourage the Amateur Radio Service and to provide a common meeting ground for the exchange of fellowship and ideas." We're confident that this will be as true in 2038 when VCARC receives their 100 year affiliation plaque. January report: Last December Frank Gibson, KI6XG, indicated that ARES and other pressures made it impossible for him to continue as Bulletin Manager. Frank has been doing an outstanding job at all his Field Organization assignments, and we thank him for his efforts. The new BM for the Section will be Jorge Vela, N6TNG, who has been Net Manager of the OBS Net for quite some time and has made significant contributions to the system. Jorge and the other OBS stations have been hard at work trying to improve the Bulletin System for us all. More Official Bulletin Stations are always needed, and some areas are not getting ANY coverage. If you can help Jorge and the Section by being an OBS please contact me or Jorge Vela, N6TNG, 308 W. Taft St., Santa Maria 93454, or check into the OBS Net on Wednesdays following the Section NTS net on 145.18/144.58 MHz. New officers elected at the Lompoc ARC in December are: Pres.- WA6UQZ, VP-AH6ES, Sec/Treas. -WA6UAX. Trustee of the club repeater remains WA6VPL. Congratulations to all. Testing successes in late November, December and January: SMRA VE Session (ARRL) 10 Dec; TO ADVANCED: N6LFI, KA6YLQ, N6TQM, N6TPO; TO GENERAL: N6TFC, Brian Reynolds/Unl. (Westlake Village), KB6PJD; TO TECHNICIAN: Tom Milaszewicz/Nov. Pending, Tom Sheehy/Nov. Pending, KB6ZKY, KC6AQD, Mary Vincent/Unl. (Newbury Park); TO NOVICE: Bruce Menick (Oxnard). VEs: N6SR, K6JTJ, AA6ES, W6HW, KA6KTU, WB6CNO, AA6BD, W6MUL. Estero Bay ARC VE Session (ARRL) 3 December: TO GENERAL: KB6UFV; TO TECHNICIAN: KB6UZY, KB6ZWK; TO NOVICE: Kevin J. Westover. VEs: N6MUJ, AA6CT, W7AZF, W6MSW, W6JU. Satellite ARC

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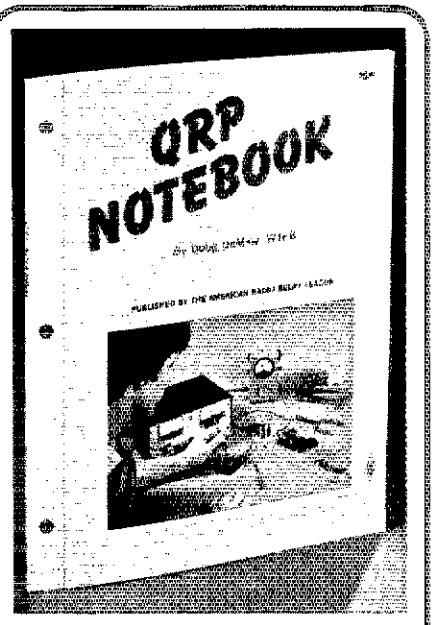

Doug DeMaw's QRP Notebook!

Doug DeMaw, W1FB, has been writing articles about QRP operating and equipment construction for many years. In this ARRL publication, Doug presents construction projects for the QRP operator, from a simple one-watt crystal-controlled transmitter to more complex transceiver designs. Rather than simply presenting a collection of completed units, Doug guides you through the project "building-block" style. This way, you gain an understanding of how the circuits operate and learn how the building blocks might be put together in other configurations.

Experimentation and low-power operating go hand in hand. Construction of a complete modern transceiver is a major undertaking, but some of the circuits in this book can be put together in an evening or a weekend from a few dollars' worth of parts. Once built, the equipment can be tested and improved as your understanding and skill grow. Many of the simpler circuits can be used later as parts of the more complex projects.

The QRP Notebook contains 80 pages. #0348, copyright 1986, $5.00, plus $2.50 postage and handling ($3.50 for UPS).

VE Session (GLAARG): TO EXTRA: N6PKK; TO ADVANCED: N6TXD; TO GENERAL: KB6MKG; TO TECHNICIAN: KC6AHV, KC6BAX; KC6BAY, KC6BEQ. VEs: WB6IIY, N6IR, WB6ZZY, NM6W, W6ELH, N6UE, W2KVA. Novice: Alan Smethurst (Los Osos) KC6BHT. It is with deep regret that we note the passing of the following Santa Barbara Section amateurs: Col. Jean Ardman, AJ8Y (USA, Ret.) Former member of the Santa Barbara ARC and editor of Key Klix. Member of the Satellite ARC. Columnist for Key Klix and the Satellite ORBIT. Satellite ARC Novice class instructor. ARRL Field Org. PIO. Jean's infectious good humor, enthusiasm and energy will be sorely missed by us all. We join his wife Joyce, KA6OGA, in her sorrow. Gina C. Baker, K6OAD. Santa Barbaran and member of SBARC, Gina was licensed since 1955 and active in SB area amateur affairs. Our condolences to her husband Kenny, W6JPP. Charles E. "Jack" Rose, KA6UUZ. Santa Barbaran since 1975 and member of SBARC, Jack was active in volunteer service at Cottage Hospital. Walker A. "Tommy" Tompkins, K6ATX. Author of 65 books, including the famous Tommy Rockford, K6ATX, series of ham radio related stories. Among Tommy's many credits are his daily broadcasts of Santa Barbara Yesterdays, his founding of the SBARC journal Key Klix. James D. McCollum, WB6RGJ. An active member and supporter of SBARC, Jim moved to Goleta in 1970 where he worked as an anthropologist and human factors engineer for 21 years. Jim was also an instructor at Santa Barbara City College and a member of the Human Factors Society. With all these activities he still made time to be an active participant in the Coast Guard Reserve (Communications) and a valued instructor of SBARC amateur radio classes. Robert J. Johns, WA6WYD. Bob was an active supporter and member of the Ventura Co. Amateur Radio Club, and Editor of "The KEYER" for more than ten years. In recent times his health didn't allow him to attend meetings, but he was on the K6MEP net frequency of 145.8 MHz. almost nightly. Bob had friends all over the Section as a result of his two meter operations, and was often heard on the Santa Maria 146.34/.94 repeater - working it "direct" from his Port Hueneme home in the early 80s. Bob's outgoing manner and friendly disposition will be missed. Our condolences to the families of all these valued hams. We share your sense of loss. That's all the room for this month. Next month watch for info on new packet systems in the Lompoc and Santa Ynez Valleys, new repeaters for SBARC/K6TZ and more. 73 for now.

WEST GULF DIVISION

OKLAHOMA: SM, Joe Lynch, N6CL—The new STM is Steve, N5FEM. He succeeds Sam, KV5X, who asked to be relieved of the position due to increased responsibilities as Vice Director. Tnx for all the years of FB service, Sam. Pete, KF5RD, succeeds Steve as the NM for STN. Several NE Okla clubs have started a joint newsletter entitled NEON ARC. Contact Joel, WA6HNO @ 918-251-5490 if your club is interested in affiliating with a fine newsletter. KA5WAV is the new EC for Logan County. KA5YOM is the new EC for Stephens County. The Oklahoma Central District has been expanded to include the counties of Kingfisher, Logan, Cleveland, Oklahoma, Canadian, Grady, McClain and Lincoln. The EC for Lincoln is KD5VQ; Canadian, WA5VTH; Cleveland, KA5EFJ; Oklahoma, NF5M (acting); the remaining counties are looking for a good EC and volunteers aplenty are needed in all counties for ARES and other positions. Your SM is still looking for a good BM and a good PIO. See you at Mooreland Hamfest, Apr 1-2 and Lawton Hamfest, Apr 8-9. Traffic: WA5OUV 114, N5IKN 113, K5GBN 102, W5RB 72, K5CXP 52, WB5OHK 48, KF5RD 45, WA5OGC 34, W5VLW 28, KV5X 27, W5VOR 25, WA5ZOO 20, AA5GI 19, K5CPZ 5, N5MPG 4.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR— STM: WD5GKH. BM: WA5WCY. SEC: K5DG. OOC: K5SBU. ACC: WB5YDD. PIO: WA5UZB. TC: NZ5U. SGL: K5KJN. ASM, all of above plus N5TC. Welcome two newly appointed Section Leaders: WD5GKH as STM and ASM; WA5WCY as BM and ASM; they take over from two very competent workers - WR5O and K5CVD; thanks Stan and Jay for all your help; STM WD5GKH wants to reactivate Houston Area Traffic Net and give better service. PIA NZ5J, Seguin, rprts N5NAV is Advanced; WD5X planning Lytton Springs 220 rptr; N5HOB had hospitality table at SARC swapfest; EC NQ5E has 440 machine running at Wimberley; Hays County ARES net is operational, 6:30 PM 2nd Wed on NQ5E/R; NZ5J and WR5X gave Novice exam to visiting missionary; he has operated club station 9L1SI. in Sierra Leone; CTTN, local NTS net San Antonio Austin corridor running double digit QNI with 2 MARS stns adding local traffic, 6:45pm on NQ5E/R. NM K5UPN rprts CAND passed 510 msgs in 31 January sessions; DRN5 represented 100%; STX stations were WB5EPA, WB5FQU, KD5KQ, W5KLV, NX5V, WB5YDD, KE5ZV. PIA N5FIX, Northwest ARS, Houston, rprts NARS awards banquet in Jan made KE5IC Member of the Year, KA5DNP Op of the Year for Satellite, AD5Q Op of the Year for CW, DX Contests, KF5OO Op of the Year for Multimode; Public Svc Award went to N5KEU; N5NEF is Most Progressive Ham. PIA KG5HQ, Houston ECHO Soc, rprts January test session: N5LFB upgraded to Extra; of 9 unlicensed, 3 went to Tech, 5 to Novice, 1 passed Element 1C; KB5HSP passed 3A; KB5HXC passed 4A. Newly-elected TTN SM, K5UPN, wants to publish a quarterly TTN newsletter, so pitch in with donations. 7290 Traffic Net Secy NF5T rprts net passed 388 msgs in 48 Jan sessions, 3576 QNI; NTS liaison 2 per session; NM W5YQZ. Brazosport ARC News rprts officers for 1989: K5KHX, Pres; N5KAE, VP; KA5COA, secy; WB5I, Treas. OBS W5KLV rprts 5 propagation fests, 8 bulletins given 33 readings on 7 nets. WA2VJL rprts San Benito ARC Novice class produced 6 new Hams; Good Show! NM K5UPN rprts TTN passed 154 msgs in 31 Jan sessions. KA5UVY has been accepted as an entering freshman at U TX. NM WB5YDD rprts 569 msgs in 50 Jan sessions; STX represented 100% by KD5KQ, W5KLV, W5CTZ, WB5HZQ, WA5ZJY, KE5ZV, WB5EPA, WB5FQU, WB5YDD. PIA KA5EEQ, Brenham ARC, rprts the club will operate a special event station Mar 2-5 to commemorate the 153rd anniversary of the signing of the Texas Declaration of Independence from Mexico; all frequencies to be used; stns will use SSB, CW, FM and Packet, plus a stn in the Novice band; Special QSL cards will be sent to stns which send SASE with request. C.H.A.R.R.O., Brownsville, rprts 1989 officers: KA5RTV, Pres; KA5LOO, VP; KA5PXS, Secy/Treas. Traffic: WB5J 356, WB5YDD 234, W5CTZ 162, WD5GKH 148, WB5FQU 79, AC5Z 53, W5BGE 35, K5RG 23, NZ5J 22, W5KLV 6.

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TECH TALK from ICOM

ICOM: Opening a New Dimension in QRP

The world of QRP is as old as amateur radio itself, yet its popularity increases during years of increased sunspot activity. Our present era of outstanding Cycle 22 propagation is favorably supporting these low power communications right now, and this time around, they have an exciting high tech twist. Rather than working against unnecessary odds with crystal-controlled transmitters, inefficient receivers and makeshift dipoles, today's QRP'ers are using highly effective antennas and modern deluxe-featured transceivers reset for five watts output. The combined results are a QRP'ers delight, and all licensed amateurs can join the fun.

Some of the most notable aspects of this modern QRP technology are greater frequency agility, reduced harmonic output, and significantly improved receiver performance. Transceivers with tunable memories are real gems because they can be used like a multi-VFO rig to move around and work stations on clear frequencies rather than waiting for someone to call CQ on your crystal's frequency. Low harmonic output is especially beneficial, as all output power is concentrated on your main operating frequency instead of being shared with undesired radiations. High receiver sensitivity and panel-adjustable filter selectivity are also vital, as they assure you hear the "weak ones"...and those are often the best stations to work while running QRP.

It is thus not surprising ICOM's compact and mid-size model transceivers are favored by QRP enthusiasts worldwide. They feature extraordinary performance in a small go-anywhere package, and their front panel "RF PWR" control puts QRP or QRO selection right at your fingertips. A one-time internal adjustment is required, however, to properly reset their front panel "RF PWR" control so exactly five watts output is produced at a fully counterclockwise position. Please note this change does not alter the control's fully clockwise setting of 100 watts. It simply recalibrates the control so you have instant QRP or QRO selection with one superb transceiver.

Before discussing each model of transceiver, ICOM has a few tips for your assistance. First, remove any rings or watches when working inside any equipment. Although ICOM transceivers do not employ dangerous vacuum tube-type high voltages, metal objects can unknowingly create shorts in any unit. Be sure you have plenty of light to see what you are doing and, if necessary, use a pocket magnifier for reading component numbers on circuit boards. Also, avoid moving wires or cables that can become pinched after replacing rig covers. Follow ICOM's suggestions and technical adjustments will be a breeze.

ICOM's ever-popular IC-735 is easily reset for five watts minimum output on all modes as follows. Place the IC-735 upside down on a soft towel with its front panel and knobs facing you. Remove the eight (8) screws from the bottom cover and lift it off to expose the main circuit board. Look in the upper right corner, and you will see four small potentiometers in an "L"-shaped pattern. Locate R-267 near the bottom of that "L": it sets the span of the front panel's "RF PWR" control. Plug an accurate wattmeter connected to your antenna or dummy load into the IC-735's rear socket, switch the transceiver on, and adjust its front panel "RF PWR" control to minimum. Select CW operation and key the rig only long enough to read the wattmeter. Power output will typically be 10 watts. Place an insulated screwdriver in R-267 and again key the IC-735. While watching the wattmeter, turn R-267 clockwise until the RF output drops to five watts. If more than 30 seconds are required for precise adjustment, switch the transceiver back to receive for 30 seconds before repeating (remember its air flow is restricted by the desk and towel). Rotate the front "RF PWR" control to maximum, note full output, return to minimum and double check five watts output, then switch off and reassemble your QRP-ready IC-735!

A similar readjustment procedure also applies to ICOM's **time-proven IC-751** transceiver. In this case, internal potentiometer R-46 is reset so the front panel "RF PWR" control yields five watts at minimum. R-46 is located under the IC-751's top cover and in the center of the main circuit board. It is to the left of the large, shiny shield in the board's exact middle.

ICOM's IC-751A and IC-761 do not include internal power adjustments for CW QRP, but reductions from ten to five watts minimum output on SSB simply involve decreasing their "RF PWR" control to minimum. ICOM's **pacesetting IC-781** is QRP-ready via its front panel controls. Rotate the "RF PWR" to minimum, then decrease the "DRIVE" control until five watts is indicated on the wattmeter.

Resetting **ICOM's exciting new IC-725** for five watts minimum output is also a cinch. Set its front "RF PWR" control to minimum, then adjust R-208's setting until your wattmeter indicates five watts. When the IC-725 is upside down and its knobs are facing you, R-208 is located in the main circuit board's top right quadrant (near the UI-7 FM option's area). Write ICOM or call our service hotline for QRP guidance on other units.

Whether your interests are QRP, QRO or everything in between, ICOM equipment and customer support are your ticket to full-time enjoyment all the way! Don't settle for less!

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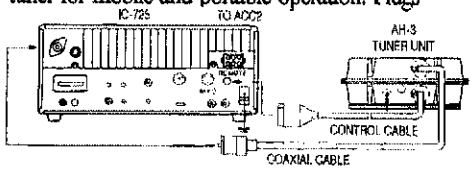
Full Featured Operation! 26 tunable memories with Band Stacking Registers which enable you to store a frequency, switch bands, and return to the stored frequency • 10Hz digital frequency display • Three tuning rates • Three scan modes • Highly effective Noise Blanker • RIT • Semi-QSK CW • Optional narrow CW filter • Built-in AH-3 controller • IC-725 measures only 9.0 x 3.7 x 9.4 inches (H, W, D).

Optional AH-3 automatic and remote antenna tuner for mobile and portable operation. Plugs directly into the IC-725. Wide impedance matching range. Mating whip unit (AH2-B) bolts to auto's frame, works 80-10 meters.



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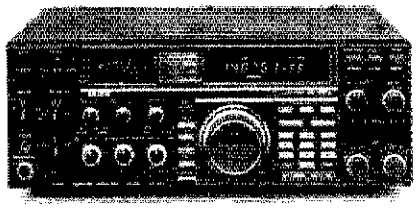
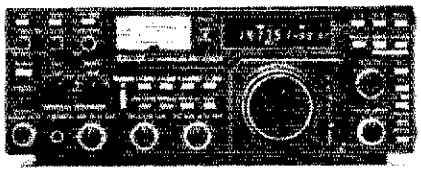
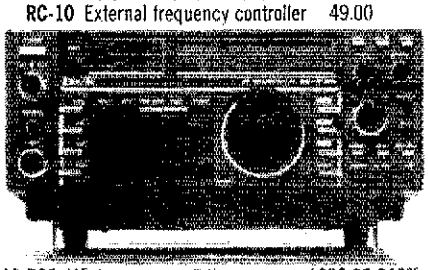
HF Equipment	Regular	SALE
IC-781 Xcvr/Rcvr/ps/tuner/scope ...	5995.00	Call



IC-761 Xcvr/Rcvr/ps/tuner	2699.00	2369
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter ..	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer.....	59.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1469
PS-35 Internal power supply	219.00	199.95
FL-32A 500 Hz CW filter (1st IF)....	69.00	
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	1099.00	949.95
PS-55 External power supply.....	219.00	199.95
AT-150 Automatic antenna tuner	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	849.95

Other Accessories	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
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	
SM-10 Compressor/graph EQ, 8 pin mic	149.00	139.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	589.00	519.95
AH-2 8-band tuner w/mount & whip	659.00	589.95
AH-2A Antenna tuner system, only....	519.00	449.95
GC-5 World clock.....	91.95	79.95

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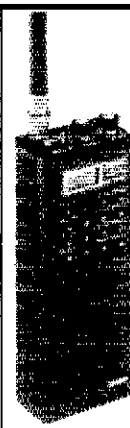
VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1069
IC-275H 100W 2m FM/SSB/CW	1399.00	1129
IC-375A 25W 220 FM/SSB/CW (c/o)	1399.00	899.95
IC-475A 25W 440 FM/SSB/CW w/ps	1399.00	1099
IC-475H 75W 440 FM/SSB/CW.....	1599.00	1289
IC-575A 25W 6/10m xcvr w/ps	1399.00	1129
IC-575H 100W 6/10m xcvr.....	1699.00	1499
IC-471H 75W 430-450MHz base (c/o)	1399.00	989.95
PS-35 Internal power supply	219.00	199.95
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	9.95
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder....	59.95	
UT-15 Encoder/decoder interface...	34.00	
UT-15S UT-15S w/TS-32 installed.....	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic... (c/o)	499.00	349.95
IC-47A 25w 440 FM/TTP mic... (c/o)	549.00	399.95
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	469.00	409.95
IC-28H 45W 2m FM, TTP mic	499.00	439.95
IC-38A 25W 220 FM, TTP mic	489.00	349.95
IC-48A 25W 440-450 FM, regular mic	459.00	369.95
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	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic...	509.00	449.95
IC-228H 45W 2m FM/TTP scan mic...	539.00	479.95
UT-40 Pocket beep function.....	45.00	
IC-900A Transceiver controller.....	639.00	569.95

★ Package Special ...
IC-900A Transceiver controller with UX-29H 2m/45W and UX-39A 220/25W band units.
$969.95

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	289.95
UX-49A 440MHz 25W band unit....	349.00	319.95
UX-59A 6m 10W unit	349.00	319.95
UX-129A 1.2GHz 10W band unit ...	549.00	499.95
IC-1200A 10W 1.2GHz FM Mobile.....	699.00	549.95
IC-3200A 25W 2m/440 FM/TTP (c/o)	695.00	499.95
UT-23 Voice synthesizer.....	34.99	
IC-3210A 25w 2m/440 FM/TTP	739.00	649.95
AH-32 2m/440 Dual Band antenna ...	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount....	22.00	
Larsen PO-MM Magnetic mount....	22.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	1349
RP-2210 220MHz 25W repeater.....	1649.00	1469
RP-3010 440MHz 10W FM repeater...	1299.00	1149

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.



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Hand-helds	Regular	SALE
IC-2A 2 meters.....	289.00	259.95
IC-2AT with TTP.....	319.00	279.95
IC-3AT 220/TTP(c/o)	349.00	269.95
IC-4AT 440 MHz, TTP	349.00	299.95
IC-02AT/High Power	409.00	349.95
IC-03AT for 220 MHz	449.00	289.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2AT for 2m w/TTP	329.00	289.95
IC-u4AT 440 MHz, TTP	369.00	299.95
IC-2GAT for 2m, TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
IC-32AT 2m/440MHz	629.00	559.95

Closeout Special ...
IC-120 1.2GHz FM mobile xcvr
Reg. $579 - **Closeout $399.95**

IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	369.95
IC-12GAT Dlx 1/7W 1.2GHz FM HT/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	569.95

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
CA-5 5/8-wave telescoping 2m antenna	19.95
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
RB-1 Vinyl waterproof radio bag.....	35.95
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
SS-32SMP Commspec 32-tone encoder	27.95

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 to 2GHz scan rcvr	1199.00	1049
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	

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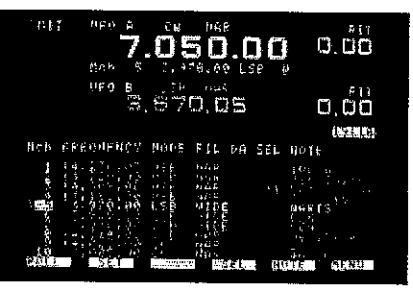
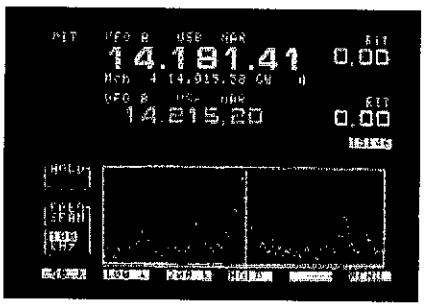
Once in a lifetime, a transceiver is introduced that's so extraordinary and innovative that it opens a totally new era in HF communications. ICOM's pacesetting IC-781 proudly exhibits that hallmark achievement with futuristic designs and features of true legendary proportions. Whether DX'ing, contesting, pioneering new interests or enjoying unquestionable top-of-the-line performance, the IC-781 is indeed today's standard of excellence!

Multi-Function Five Inch CRT. Displays frequencies, modes, memory contents, operating notes, RIT, two menu screens, plus a panoramic view of all signals in a selected range. A portion of the screen also serves as a display for data modes like RTTY, AMTOR, and PACKET.



Unique Spectrum Scope. Continuously indicates all signal activities and DX pileups with your operating frequency in the center. Selectable horizontal frequency spans of 50, 100, and 200KHz for each side of the frequency you're listening to. Vertical range indicates relative signal strengths. A contester's dream!



Dual Width Noise Blanker includes MCF filter plus **level and width controls** to eliminate pulse and woodpecker noise with minimum adjacent-signal interference.

Incomparable Filter Flexibility. Independent selection of wide and narrow SSB filters plus CW filters. Second and third CW IF filters are independently selectable!

Dual Watch. Simultaneously **receives two frequencies in the same band!** Balance control adjusts VFO A/B receive strength levels. You can check additional band activity, even tune in your next contact, while in QSO without missing a single word!

DX Rated! 150 watts of exceptionally clean RF output. Easily drives big amplifiers to maximum power.

Twin Passband Tuning with **separate controls for second and third IF stages!** Increases selectivity and narrows bandwidth, independently varies low and high frequency response, or functions as IF shift. **It's DX'ing Dynamite!**

A Total Communications System! Includes built-in 100% duty AC supply, high speed automatic antenna tuner, iambic keyer, semi-automatic or full QSK CW break-in to 60 wpm, Audio Peaking Filter (APF), RF speech processor, multiscanning, 105dB dynamic range, all-band/all-mode receiver with general coverage, and much more!

ICOM Dependability. The phenomenal IC-781 is built for action and backed with the most extensive warranty in the industry.

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IC-765

FOR TODAY'S ACTIVE AMATEUR

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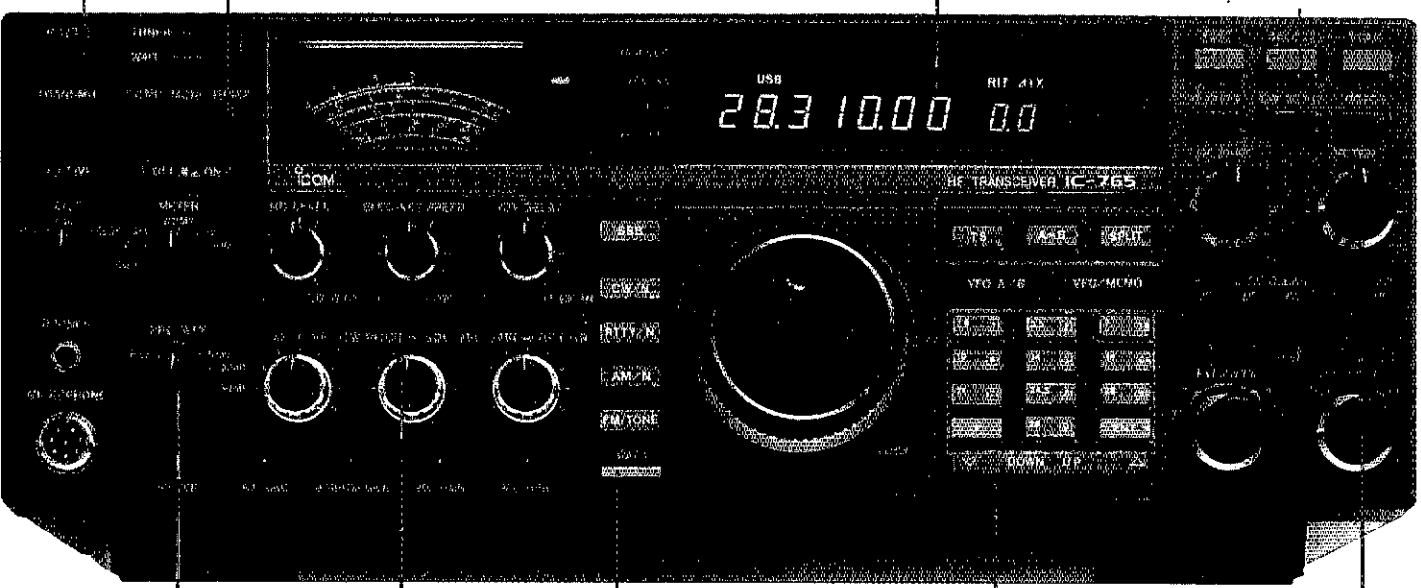
BUILT-IN AC SUPPLY
100 percent duty cycle rated for cool operation and superb long term performance on all modes!

FULLY AUTOMATIC ANTENNA TUNER
With built-in CPU and memory for extremely fast tuning and one-touch operation. Wide tuning range.

10Hz READOUT
Perfect on-the-dot frequency selection for nets, DX skeds and data communication modes. Large, easy-to-read display.

NARROW 500Hz CW FILTERS INCLUDED
ICOM's FL-32A and FL-52A deliver razor sharp selectivity. A serious DX'ers delight! 250Hz FL-53A and FL-101 optional.



MAXIMUM OPERATING FLEXIBILITY
Three step attenuator cuts multi-station overloads. RF preamp pulls weak signals right out of the mud!

CW PITCH CONTROL
Total operating comfort and convenience for successful contesting and DX'ing. An iambic keyer with adjustable speed and weight is also built into the IC-765!

DIRECT DIGITAL SYNTHESIZER
Assures ultra-fast PLL switching and lock-in for excellent PACKET, AMTOR and CW QSK operations.

BAND STACKING REGISTERS
Each band's VFO's retain their last selected frequency, mode and filter choice. Produces the equivalent of 20 VFO's; two per band. Great for multiband DX'ing!

99 FULLY TUNABLE MEMORIES
Store frequency, mode and filter selections. Each one can be retuned and/or reprogrammed independent of VFO operations. Memories 90-99 also store split Tx/Rx frequencies.

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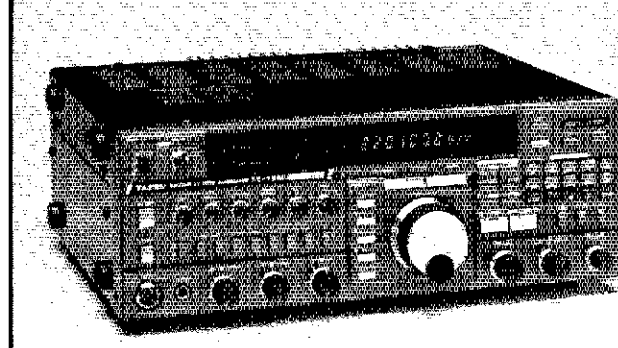

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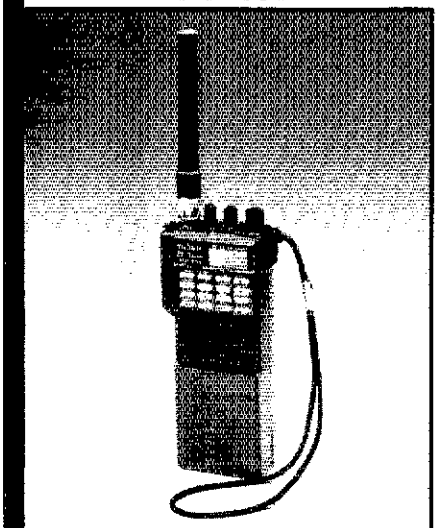

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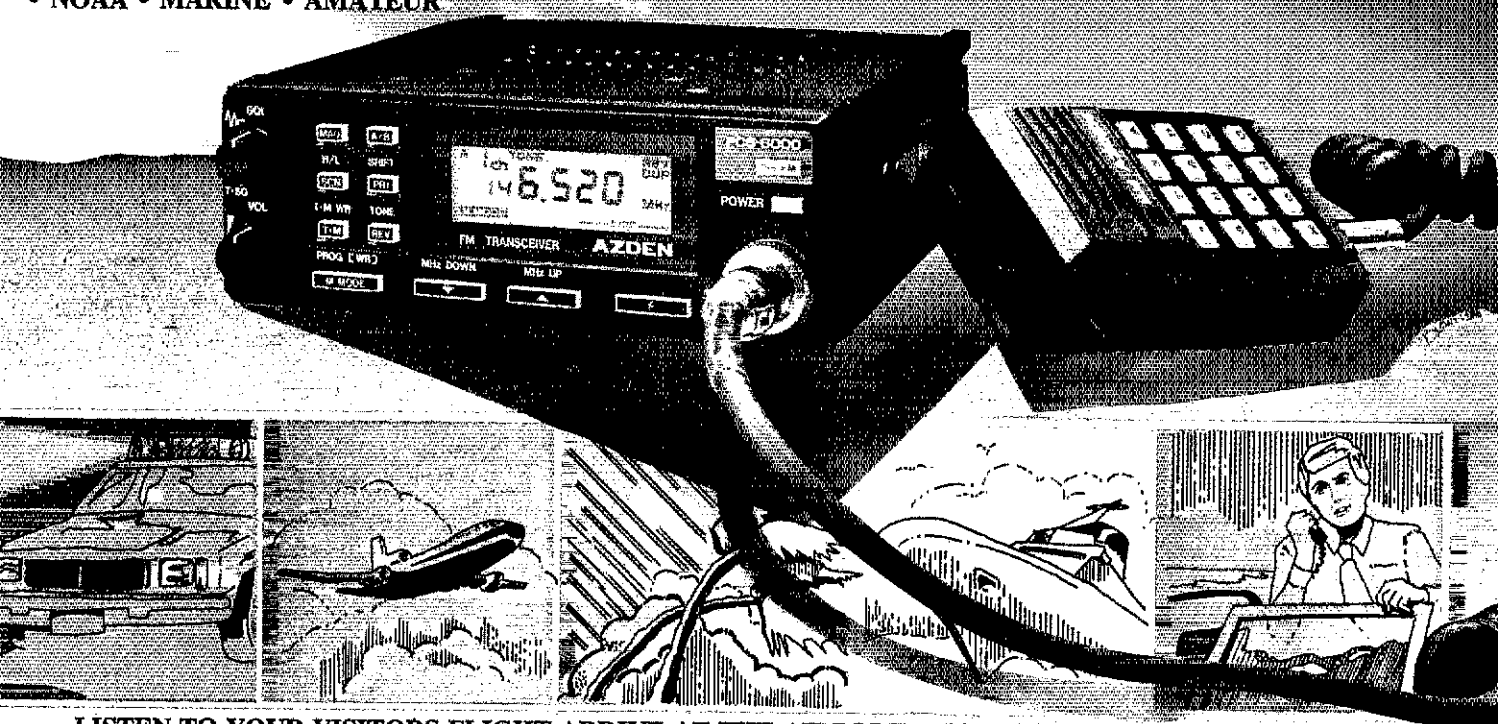

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MODELS: PCS-6000/PCS-6000H (25W/45W). *Also coming soon PCS-6200 220MHZ, PCS-6300 70CM and PC-10 10 Meter FM Handheld.* **CMOS AND ADVANCED SURFACE MOUNT TECHNOLOGY PROVIDE UNPRECEDENTED COMMERCIAL QUALITY AND RELIABILITY.**

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.

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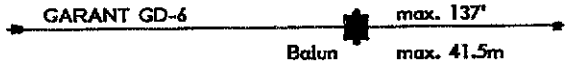
ONE GARANT ANTENNA TO WORK ALL 9 HF BANDS

If properly installed, our GARANT WINDOM ANTENNAS GD-6 to GD-9 don't need a matchbox, as the SWR on all bands is very low - less than 1.5:1. The GD-WINDOM is not a dummy-load antenna, but a modified windom which uses a special balun. No, Murphy, it ain't a 4:1. Our GD-BALUN matches the low-impedance (50Ω) feedline to the high-impedance windom antenna design. GARANT GD-WINDOM ANTENNAS are available for 500W PEP or 2KW PEP. ALL GARANT GD-WINDOMS ARE SOLD WITH A 10-DAY MONEY-BACK GUARANTEE AND A 3-YEAR WARRANTY. Who else does that?



GD-6/500W; GD-6/2KW: 80-40-20-17-12-10M BANDS
GD-8/500W; GD-8/2KW: 80-40-30-20-17-15-12-10M BANDS
GD-7/500W; GD-7/2KW: 160-80-40-20-17-12-10M BANDS
GD-9/500W; GD-9/2KW: 160-80-40-30-20-17-15-12-10M

NOTE: The GD-8 and GD-9 work all new WARC bands.

FREE DATA Report

Write or phone for our free data report on all our GARANT GD-WINDOM ANTENNAS with technical data, actual SWR curves, scores of customer comments from the USA and Canada, and our low factory direct prices. We ship worldwide and accept VISA AND MASTERCARD credit cards by phone.

The owner of GARANT ENTERPRISES is selling amateur radio merchandise for 25 years by mail. Give us a call and ask for Ed - VE3LML; Ine - VE3OTV; or Al VE3OPF. Business hours: MO - FR 9AM - 5PM EST.

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YES, THEY REALLY WORK! READ WHAT OUR CUSTOMERS WROTE US:

K9MAH Fritz on his GD-9/2KW: "It works great. ... including DX." THE CANADIAN AMATEUR (similar to QST) after testing the GD-6/500W: "I would recommend the GD-6 to anyone who needs a general purpose antenna. My salient impression is a delightful freedom from adjusting an ATU (antenna tuner) on changing bands." The Canadian National Institute for the Blind after testing three wire antennas: "... We recommend the GARANT WINDOM (GD-6/GD-8) as first choice ... It can be installed either as a horizontal or inverted vee. ... Model GD-6 should be used if 15 and 30 meters are not required, or model GD-8 if all bands are required (functional on all 8 bands)." VE4MY Tom on his first GD-6: "GD-6 antenna works well. It brought 80M signal up over 10dB compared to the G5RV." Tom bought a 2nd for camp a year later. VE1CCL Peter on his GD-9: "Great results using this antenna especially on 10M. ... It is my main antenna on 80M. ... On the other bands the antenna also works well." VE4ALY Wilbur: "I have been operating the GARANT GD-6 for over a year and am very pleased with its operation. SWR is as advertised 1.5:1 and lower on all bands. Really great for QSY-ing." VE1ANY William: "I have installed the GD-8 antenna and I have found it to perform well. I am pleased to have an ALL-BAND antenna with no traps and no tuning required." VE7JN James on the GD-6/500W: "The performance is quite outstanding. ... this antenna does an extraordinary job on these bands (80 and 40) with very low SWR across both bands. I have used it on 20M with almost as good reports as with the TA-33 beam and better SWR across the band." VE3HGS Paul on his GD-8: "... under certain propogation conditions my GD-8 outperforms a beam antenna on DX contacts." VE3OYM Michael on his GD-6: "Upon the first test transmission, it was found to perform exactly as claimed. ... I was able to maintain a SWR of 1.5:1 and a sufficient bandwidth. ... I am very happy with the service provided by Garant and would not hesitate to recommend you." VE3BFV James on his GD-6: "I can recommend the GD-6 to anyone who desires an allband antenna." VE7BGS Geoffrey wrote: "The GD-9/500W has been operating on all bands and the performance has been quite satisfactory." VE2GGN Alan on his GD-8/500W: "It performs well. I have contacted hams in ten countries since installation (1 month ago)." VE7BKU Rob on his GD-8/500W: "A great antenna. Excellent bandwidth. No radials to worry about." VE7GT William wrote: "I bought a GD-8/500W and it does everything you claim." VE1ALZ James on his GD-8/500W: "Your service is very first class. Works like a dream. FB antenna. FB on DX." The originals of these and countless other letters are on file in our offices for your inspection. They are real!

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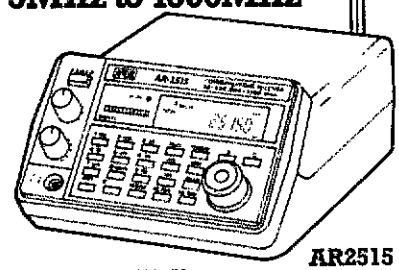

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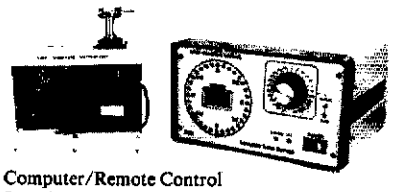

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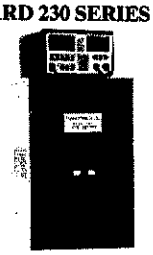

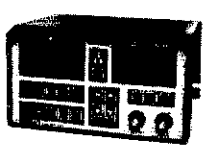

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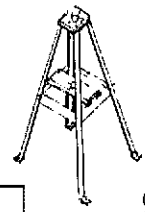
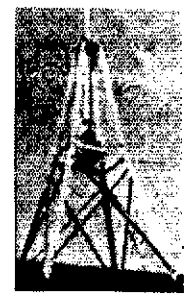


CR-18

CR-30



CR-45

ALINCO ROOF TOWERS

Model No Specifications	ETS-210
Spacing Between Legs At Roof	210"
Actual Height	68"
Max. Vertical Load	350 Lbs.
Max. Rotational Torque	135 Foot Lb
Max. Mast Length-from Rotor Plate	58"
Roof Mounting Pads	Adjustable For Roof Pitch
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roof towers require guy wires for safety.

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MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5'10"	21 @ 90 MPH	31-1/3"	440	28	129.00
CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	224.00
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CK46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2½"					52.00

*GUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

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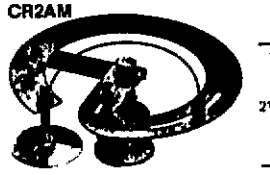

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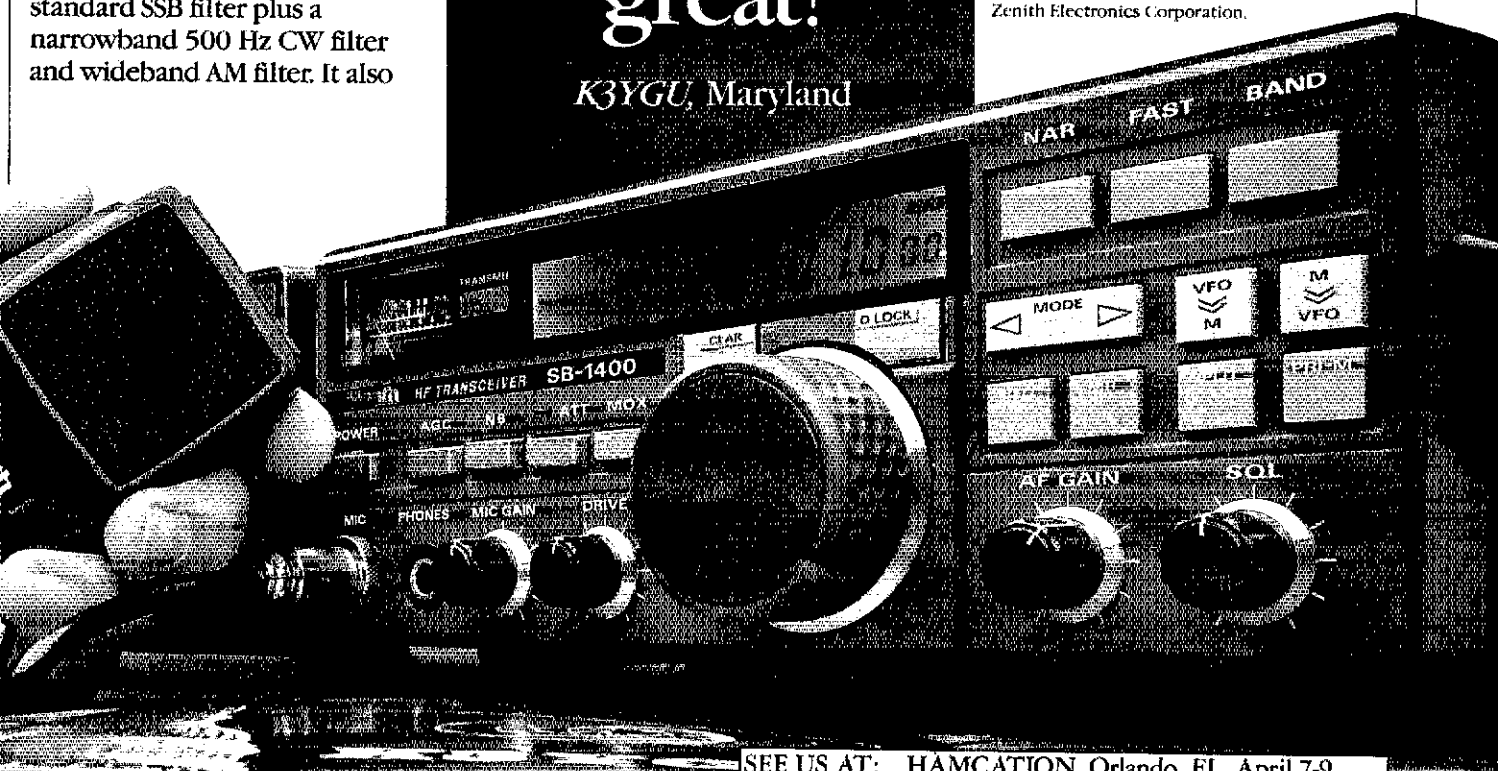

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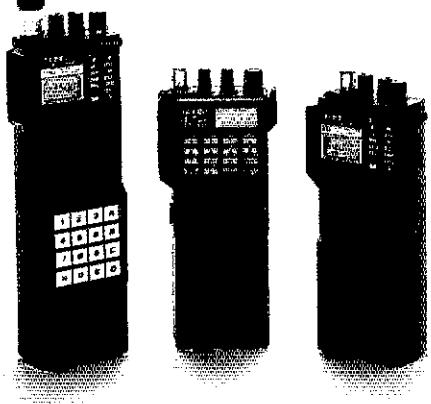
Sixteen Ways To Start A Great Conversation.



1 Maximum singleband HT performance. Yaesu's compact, 2-meter FT-411 gives "sophisticated HT operation" a whole new meaning. With 49 memories. Dual VFOs. Keyboard frequency entry. Automatic repeater shift. DTMF autodialer (10 memories, 15 digits each). Built-in PL encode/decode. Extended receive. "Do-re-mi" audible command verification. Backlit display and keypad. Battery saver. Automatic power-off feature. Rotary channel selector. 2.5-watt battery pack (optional 5-watt pack available). Much more.

2 Mini HT packs big performance. Choose Yaesu's miniature FT-23R Series for serious pocket-size performance. 2-meter, 220-MHz, and 440-MHz models. Includes 10 memories (7 store odd splits). Memory scan at 2 frequencies per second. High/low power switch. LCD power output and "S"-meter display. Lots of PL features. Auto battery saver. Aluminum-alloy case. Water-resistant seals. Variety of battery packs available, from 2 to 5 watts. More.

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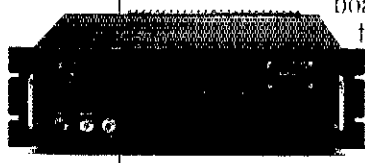
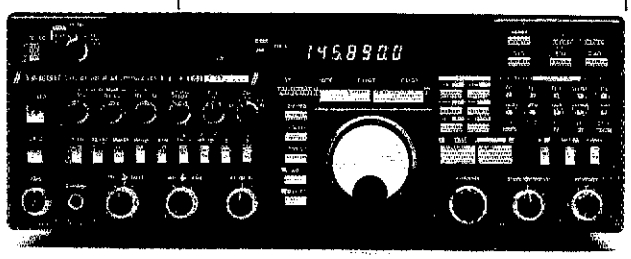
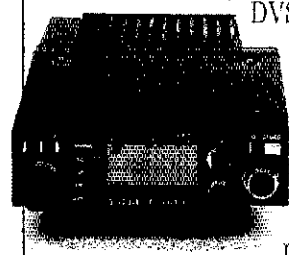
4 FM Repeaters. Looking for a repeater? Look no further. Our 2-meter and 440-MHz models feature 10 watts output. Glass-epoxy circuit boards. Plus they're FCC type accepted and ready for 19" rack mounting. Yaesu repeaters are the perfect building block for a complete repeater station.



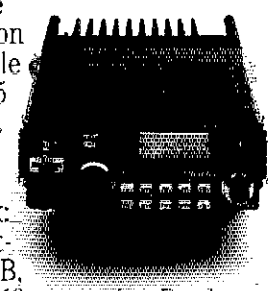
5 Space Station. Work satellites, moonbounce, troposphere, aurora, and meteor scatter with our FT-736R VHF/UHF base station. SSB, CW, and FM on 2 meters and 70 cm (430-450 MHz!) standard. Slots for optional 50-MHz, 220-MHz, or 1.2 GHz modules. Crossband full duplex capability. Satellite frequency tracking function. 25 watts on 2 meters, 220 MHz, and 70 cm (10 watts on 6 meters and 1.2 GHz). 100 memories. RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Much more.



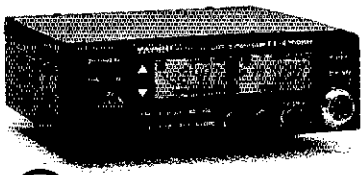
6 Mobiles that double as answering machines. Our FT-212R Series mobiles take messages just like an answering machine (with DVS-1 option)! 2-meter and 440-MHz models. 45 watts output (35 on 440-MHz). Auto-dialer DTMF mic with 10 memories (22-digit memory each). 18 memories. Multiple scanning routines. "Do-re-mi" audible command verification. High/low power switch. Oversize amber display. Much more.



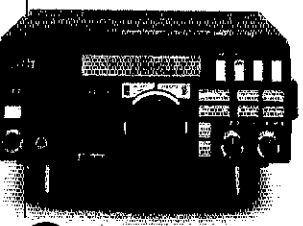
7 Mobiles you can take on foot. Our FT-290R Mark II Series (2-meter, 430-450 MHz, and 6-meter models) come standard as mobiles. But remove the heat sink and snap-on the optional battery pack, and you're ready to take your operation on foot! Mobile operation: 25 watts output (10 watts, 6 meters). Battery pack: 2.5 watts output. With SSB, CW and FM. 10 memories. Dual VFOs. LCD display. Offset tuning. Relative power-output/S meter. More.



Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc. Specifications guaranteed only within amateur bands.



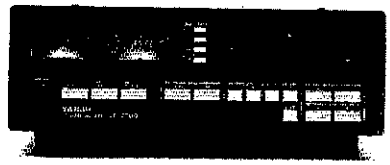
8 **Dual-band mobile with remote control head.** The FT-4700RH mounts almost anywhere—the "brains" on your dash, visor, or door, the "muscle" under your seat. 50 watts output on 2 meters, 40 watts on 70 cm. Full crossband duplex. Simultaneous monitoring of each band. Volume balance control for dual receive operation. 9 memories (each band). Extended receive coverage. Reverse repeater shift. Bright dual-band display. 10 memory autodialer mic (option). More.



9 **HF price/performer.** Don't let the FT-747GX's affordable price fool you. This rig really works the DX! 100 watts RF output on 160 to 10 meters. Continuous receive from 100 kHz to 30 MHz. LSB, USB, CW, and AM. Slot for optional FM unit. 20 memories. Split-frequency operation. CW and AM filters. Plus one-touch noise blanker. All-mode squelch. RIT. 20-dB attenuator. Great receiver with superb overload protection. More.

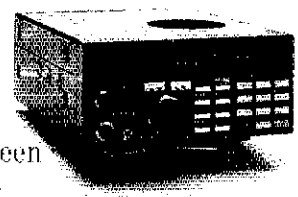
10 **HF field-day favorite.** Contesters appreciate the portability and performance of Yaesu's FT-757GX Mark II. 100-watt output. 10 memories. Dual VFOs. Slow/fast tuning selection. IF notch filter. Iambic keyer. 600-Hz CW filter. AF speech processor. 500 kHz to 30 MHz receive. 10 to 160 meters transmit, including WARC bands. All-mode coverage. QSK operation. Continuous RTTY operation up to 30 minutes. More.

11 **Flex your RF muscle.** Cut through pile-ups with our FL-7000 power amplifier. 160 to 15 meter coverage. Built-in power supply. Automatic tuner. Fast turnaround for break-in (QSK) CW, HF packet, and AMTOR. 70 watts excitation for full output, 1200 watts PEP input. More.



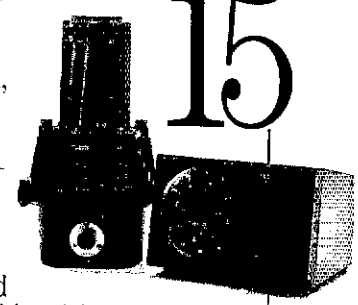
12 **World's first HF/VHF/UHF base station.** Talk about complete. The FT-767GX gives you 160 to 10-meter transmit standard. Optional plug-in modules for 6-meter, 2-meter and 70-cm operation. 100 kHz to 30 MHz receive. AM, FM, SSB, CW, AFSK modes built in. 10 memories for frequency, mode, and CTCSS info. Dual VFOs. VFO tracking. Digital display in 10 Hz steps. Slow/fast main dial tuning. Synthesizer step programming at up to 99.99 kHz per step. Digital RF power/SWR meter. Built-in RF preamplifier. And these are just a few highlights!

13 **Serious VHF/UHF Receiver.** Our FRG-9600 is a smart way to monitor. 60 to 905 MHz coverage. USB, LSB, CW, AM, FM wide and narrow. Optional NTSC video module. Scanning steps of 5, 10, 12½, 25 and 100 KHz. 99 memories store frequency and mode. Memory scan (also scans between memories). Keyboard frequency entry. 24 hour clock. Multiplexed output. Fluorescent readout. Signal strength graph. AC power adapter. Much, much more.



14 **World-class HF receiver.** The FRG-8800's perfect for keeping up with the world. Continuous coverage from 150 KHz to 30 MHz. Expanded coverage with optional 118-174 MHz VHF converter. USB, LSB, CW wide/narrow, AM wide/narrow, FM. 12 memories. Also programmable scanning routines. Keyboard frequency entry. LCD display. SINPO signal graph. Computer interface capability. Two 24-hour clocks. Recording functions. Much more.

15 **Antenna rotators for your application.** Our G-1000DX, G-800SDX/G-800S, and G-400RC models feature 360° "radio compass" control heads, and are compatible with most tower-plate configurations. Plus G-1000SDX and G-800SDX models feature 450° rotation and presets.



16 **AZ-EL rotators for space applications.** Into OSCAR or moonbounce? Choose our G-5400B or heavy-duty G-5600B AZ-EL rotator. Each is compatible with many vendors' tracking software. And for stand-alone elevation control, choose our G-500A elevation rotator.

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NEC V40 dual speed (4.77 MHz/8 MHz) CPU, 512K RAM, 360K double-sided disk drive.

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Clearcut, illustrated texts build your understanding of computers step by step.

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Including MS-DOS, GW BASIC, word processing, database and spreadsheet programs.

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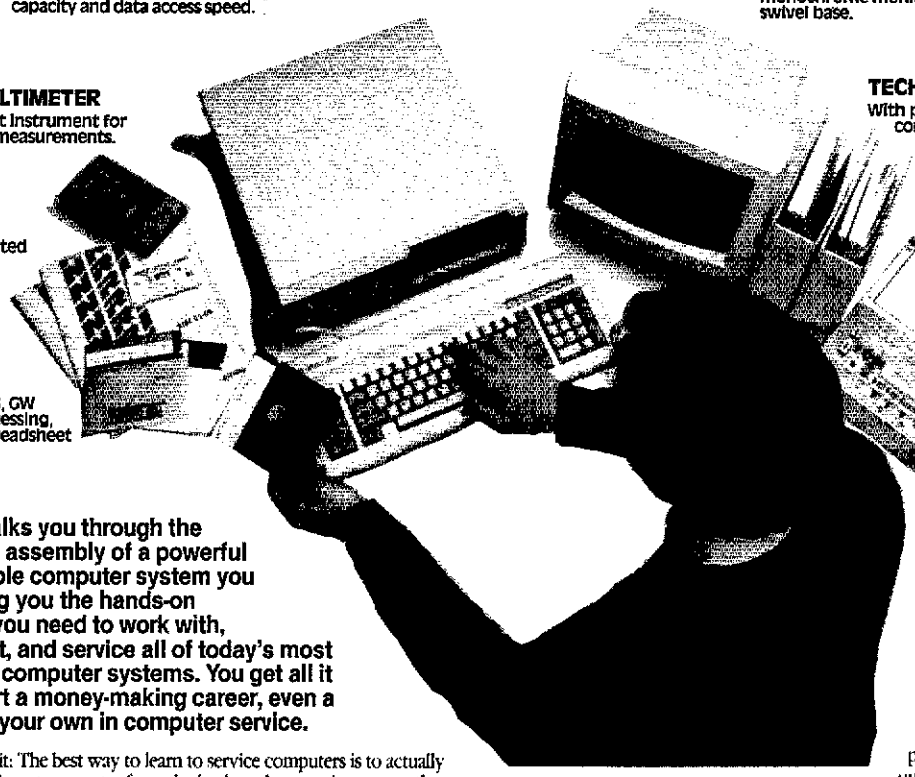
Simplifies analyzing digital circuit operation.



Only NRI walks you through the step-by-step assembly of a powerful XT-compatible computer system you keep—giving you the hands-on experience you need to work with, troubleshoot, and service all of today's most widely used computer systems. You get all it takes to start a money-making career, even a business of your own in computer service.

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Only NRI—the leader in career-building, at-home electronics training for 75 years—gives you such practical, real-world computer servicing experience. Indeed, no other training—in school, on the job, *anywhere*— shows you how to trouble-shoot and service computers like NRI.

You get in-demand computer servicing skills as you train with your own XT-compatible system—now with 20 meg hard drive

With NRI's exclusive hands-on training, you actually build and keep the powerful new Packard Bell VX88 PC/XT compatible computer, complete with 512K RAM and 20 meg hard disk drive.

You start by assembling and testing the "intelligent" keyboard, move on to test the circuitry on the main logic board, install the power supply and 5¼" disk drive, then interface your high-resolution monitor. But that's not all.

Only NRI gives you a top-rated micro with complete training built into the assembly process

Your NRI hands-on training continues as you install the powerful 20 megabyte hard disk drive—today's most wanted computer peripheral—included in your course to dramatically increase your computer's storage capacity while giving you lightning-quick data access.

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In no time at all, you have the confidence and the know-how to work with, troubleshoot, and service every computer on the market today. Indeed you have what it takes to step into a full-time, money-making career as an industry technician, even start a computer service business of your own.

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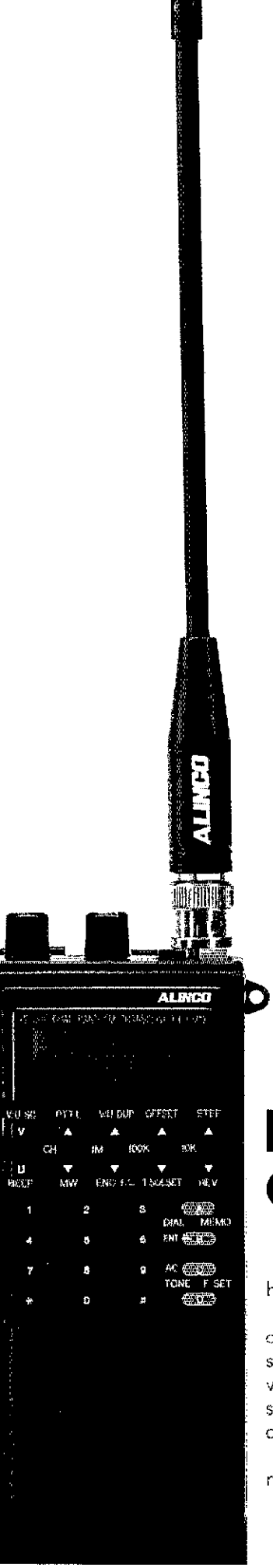

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Like 6.5 watts with the optional 12 volt battery. Or our standard 3.5 watts VHF and 3 watts UHF with a local power setting of .5 watts. No other HT delivers such power.

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It's the only HT with a 37 tone encoder/decoder as standard equipment. You get cross band/full duplex operation. Twenty memory channels (10 apiece on VHF and UHF). Programmable offsets. A single memory 16 digit auto dialer and modifiable CAP/MARS capabilities*.

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Alinco's new DJ-500T hand held dual bander. Mega power. Mega performance.

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*Permit required.

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Uniden Corporation of America has purchased the consumer products line of Regency Electronics Inc. for $12,000,000. To celebrate this purchase, we're having our largest scanner sale in history! Use the coupon in this ad for big savings. Hurry...offer ends September 30, 1989.

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Get special savings on the scanners listed in this coupon. This coupon must be included with your prepaid order. Credit cards, personal checks and quantity discounts are excluded from this offer. Offer valid only on prepaid orders mailed directly to Communications Electronics Inc., P.O. Box 1045 – Dept. UNI6, Ann Arbor, Michigan 48106-1045 U.S.A. Coupon expires September 30, 1989. Coupon may not be used in conjunction with any other offer from CEI. Coupon may be photocopied. Add $11.00 for shipping in the continental U.S.A.

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Regency UC102-T $109.95
Regency RH606B-T.....$419.95
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Bearcat 800XLT-T $249.95
Uniden HR2510-T $229.95
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Bearcat® 760XLT-T

List price $499.95/CE price $244.95/SPECIAL
12-Band, 100 Channel • Crystalless • AC/DC
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The *Bearcat* 760XLT has 100 programmable channels organized as five channel banks for easy use, and 12 bands of coverage including the 800 MHz. band. The *Bearcat* 760XLT mounts neatly under the dash and connects directly to fuse block or battery. The unit also has an AC adaptor, flip down stand and telescopic antenna for desk top use. 6-5/16" W x 1⅝" H x 7⅜" D. Model **BC 590XLT-T** is a similar version without the 800 MHz. band for only $194.95. Order your scanner from CEI today.

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List price $799.95/CE price $299.95/SPECIAL
16 Channel • 25 Watt Transceiver • Priority
The *Regency* RH256B is a sixteen-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to 16 frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH256 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A 60 Watt VHF 150-162 MHz. version called the **RH606B-T** is available for $429.95. A UHF 15 watt, 16 channel version of this radio called the **RU156B-T** is also available and covers 450-482 MHz. but the cost is $454.95.

★★★ Uniden CB Radios ★★★

The *Uniden* line of Citizens Band Radio transceivers is styled to compliment other mobile audio equipment. Uniden CB radios are so reliable that they have a two year limited warranty. From the feature packed PRO 810E to the 310E handheld, there is no better Citizens Band radio on the market today.

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PRO330E-T *Uniden* 40 Ch. Remote mount CB....$104.95
PRO500D-T *Uniden* 40 Channel CB Mobile $38.95
KARATE-T *Uniden* 40 channel rescue radio $53.95
GRANT-T *Uniden* 40 channel SSB CB mobile....$166.95
MADISON-T *Uniden* 40 channel SSB CB base...$244.95
PC122-T *Uniden* 40 channel SSB CB mobile.....$119.95
PRO510XL-T *Uniden* 40 channel CB Mobile.....$38.95
PRO520XL-T *Uniden* 40 channel CB Mobile.....$56.95
PRO530XL-T *Uniden* 40 channel CB Mobile.....$79.95
PRO540E-T *Uniden* 40 channel CB Mobile.....$97.95
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Bearcat® 200XLT-T

List price $509.95/CE price $254.95/SPECIAL
12-Band, 200 Channel • 800 MHz. Handheld Search • Limit • Hold • Priority • Lockout
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The *Bearcat* 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz. band and 100 channels, order the **BC 100XLT-T** for only $189.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

Bearcat® 800XLT-T

List price $549.95/CE price $259.95/SPECIAL
12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz.
The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½." If you do not need the 800 MHz. band, a similar model called the **BC 210XLT-T** is available for $178.95.

Bearcat® 145XL-T

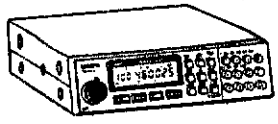
List price $189.95/CE price $94.95/SPECIAL
10-Band, 16 Channel • No-crystal scanner Priority control • Weather search • AC/DC
Bands: 29-54, 136-174, 406-512 MHz.
The *Bearcat* 145XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions. A mobile version called the **BC 560XLT-T** featuring priority, weather search, channel lockout and more is available for $94.95. CEI's package price includes mobile mounting bracket and mobile power cord.

President® HR2510-T

List price $499.95/CE price $239.95/SPECIAL
10 Meter Mobile Transceiver • Digital VFO Full Band Coverage • All-Mode Operation Backlit liquid crystal display • Auto Squelch RIT • Preprogrammed 10 KHz. Channels
Frequency Coverage: 28.0000 MHz. to 29.6999 MHz.
The *President* HR2510 Mobile 10 Meter Transceiver made by Uniden, has everything you need for amateur radio communications. Up to 25 Watt PEP USB/LSB and 25 Watt CW mode. Noise Blanker. PA mode. Digital VFO. Built-in S/RF/MOD/SWR meter. Channel switch on the microphone, and much more! The HR2510 lets you operate AM, FM, USB, LSB or CW. The digitally synthesized frequency control gives you maximum stability and you may choose either pre-programmed 10 KHz. channel steps, or use the built-in VFO for steps down to 100 Hz. There's also RIT (Receiver Incremental Tuning) to give you perfectly tuned signals. With receive scanning, you can scan 50 channels in any one of four band segments to find out where the action is. Order your HR2510 from CEI today.

NEW! President® HR2600-T

List price $599.95/CE price $299.95/SPECIAL
10 Meter Mobile Transceiver • New Features
Delivery for this new product is scheduled for June, 1989.
The new *President* HR2600 Mobile 10 Meter Transceiver is similar to the *Uniden* HR2510 but now has repeater offsets (100 KHz.) and CTCSS encode.



BC760XLT
800 MHz. mobile scanner SPECIAL!

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XE750-T *Uniden* Cordless Phone with speaker $99.95
XE550-T *Uniden* Cordless Phone.....$79.95
XE300-T *Uniden* Cordless Phone.....$69.95

★★★ Extended Service Contract ★★★

If you purchase a scanner, CB, radar detector or cordless phone from any store in the U.S. or Canada within the last 30 days, you can get up to three years of extended service contract from Warrantech. This service extension plan begins *after* the manufacturer's warranty expires. Warrantech will perform all necessary labor and will not charge for return shipping. Extended service contracts are not refundable and apply only to the original purchaser. A two year extended contract on a mobile or base scanner is $29.99 and three years is $39.99. For handheld scanners, 2 years is $59.99 and 3 years is $79.99. For radar detectors, two years is $29.99. For CB radios, 2 years is $39.99. For cordless phones, 3 years is $34.99. Order your extended service contract today.

OTHER RADIOS AND ACCESSORIES

BC55XLT-T *Bearcat* 10 channel scanner $114.95
BC70XLT-T *Bearcat* 20 channel scanner.....$159.95
BC175XLT-T *Bearcat* 16 channel scanner $156.95
R2060-T *Regency* 60 channel scanner.....$149.95
TS2-T *Regency* 75 channel scanner.....$269.95
UC102-T *Regency* VHF 2 ch. 1 Watt transceiver...$114.95
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BP205-T Ni-Cad batt. pack for BC200/BC100XLT...$49.95
B6-T 1.2 V AA Ni-Cad batteries (set of eight).....$17.95
FBE-T Frequency Directory for Eastern U.S.A.....$14.95
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RFD1-T Great Lakes Frequency Directory.....$14.95
RFD2-T New England Frequency Directory.....$14.95
RFD3-T Mid Atlantic Frequency Directory $14.95
RFD4-T Southeast Frequency Directory.....$14.95
RFD5-T N.W & Northern Plains Frequency Dir. $14.95
ASD-T Airplane Scanner Directory.....$14.95
SRF-T Survival Radio Frequency Directory $14.95
TSG-T "Top Secret" Registry of U.S. Govt. Freq. ...$14.95
TTC-T Tune in on telephone calls.....$14.95
CBH-T Big CB Handbook/AM/FM/Freeband.....$14.95
TIC-T Techniques for Intercepting Communications ...$14.95
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A60-T Magnet mount mobile scanner antenna.....$35.95
A70-T Base station scanner antenna $35.95
A1300-T 25 MHz.-1.3 GHz Discone antenna.....$109.95
USAMM-T Mag mount VHF ant. w/ 12' cable $39.95
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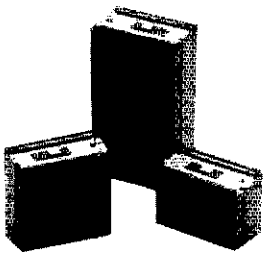

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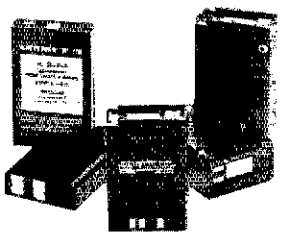

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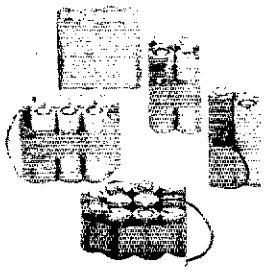

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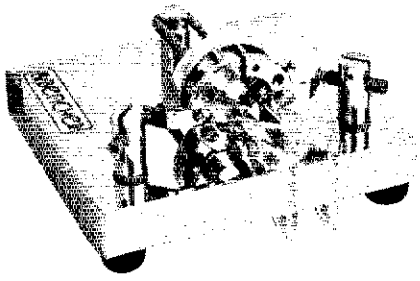

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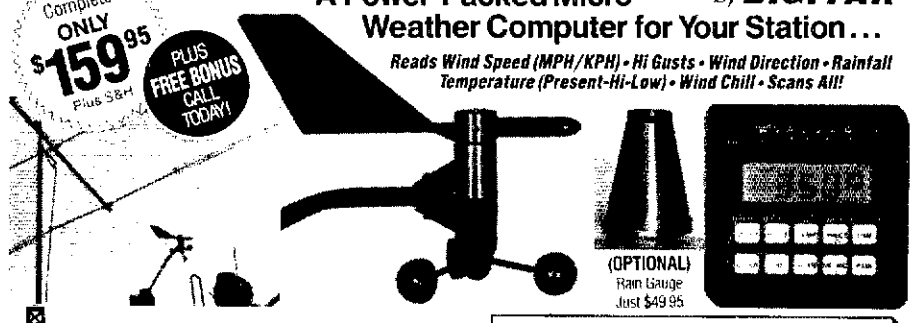

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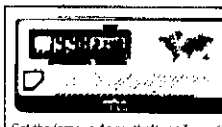

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Plus . . . printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack, key paddle jack, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1½x9½ in. 12 VDC or 110 VAC.

Get yours today and join the fun crowd!

New Firmware Update

A new KISS/AMTOR/Navtex Firmware update is available to MFJ-1278 owners.

MFJ's powerful update is the most reasonably priced mulit-mode upgrade by any manufacturer. Contact your dealer or MFJ for yours today!

MFJ Packet Radio

MFJ-1274 **$149.95**

MFJ-1270B **$129.95**

MFJ-1270B super clone of TAPR's TNC-2 give you more features than *any* other packet controller -- for $129.95.

You can double your fun by operating both VHF *and* HF packet 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 or Macintosh computer with an MFJ Starter Pack.

A new **KISS** interface lets you run **TCP/IP.** They also come **NET ROM** compatible -- ***no modification needed!***

You also get 32K RAM, a one-year *unconditional* guarantee and you can use 12 VDC or the included 110 VAC power supply.

For dependable HF packet tuning, the **MFJ-1274** gives you a high resolution tuning indicator that's accurate to within 10 Hz -- and it's only $20.00 more. Add $5 each shipping/handling.

MFJ

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Box 494, Miss. State, MS 39762
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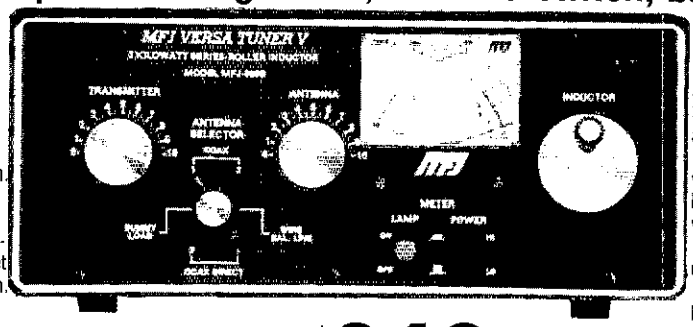
MFJ TUNERS

Here is the finest 3 KW PEP Tuner money can buy with roller inductor, dummy load, *new* peak reading meter, antenna switch, balun and more ...

The MFJ-989C is not for everyone. **However,** if you do make the investment you get the finest 3 KW PEP tuner money can buy - one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

The MFJ-989C is a compact 3 KW PEP roller inductor tuner with a new **peak** reading Cross-Needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With **three continuously** variable components - two massive 6 KV capacitors and a high inductance roller inductor - you get precise control over SWR **and** the widest matching range possible from 1.8-30 MHz.



MFJ-989C **$349.95**

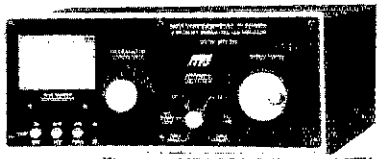
You get a **new** lighted **peak** and average reading Cross-Needle SWR/Wattmeter with a **new** more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced lines and a 6-position antenna switch with extra heavy switch contacts.

Its compact 10¾x4½x15 inch cabinet fits right into your station.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy viewing and a 3-digit turns counter plus a spinner knob for exact inductance control. Add $10 s/h.

2-knob *Differential-T*™ Tuner



MFJ-986 **$269.95** The **new** MFJ-986 Differential-T™ 3 KW PEP 2 knob Tuner has a differential capacitor to make tuning foolproof and easier than ever. It ends constant retuning with broadband coverage and gives you minimum SWR at only **one** best setting. Covers 1.8-30 MHz.

The roller inductor lets you tune your SWR down to absolute minimum. A 3-digits turns counter lets you quickly return to your favorite frequency.

You get MFJ's **new** peak and average reading Cross-Needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp is front panel switched and requires MFJ-1312, $9.95.

A **new** current balun for balanced lines reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced for a more concentrated, stronger signal. Add $10.00 s/h.

MFJ's *Fastest Selling* Tuner

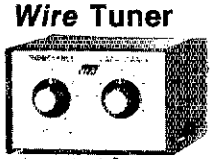
MFJ-941D **$109.95** **The MFJ-941D is MFJ's fastest selling 300 watt PEP antenna tuner. Why? Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.**

It matches dipoles, vees, verticals, mobile whips, random wires, banlanced and coax lines.

SWR/Wattmeter reads foward/reflected power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines, direct or through tuner, random wire, balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. Has 4:1 balun. 1000 V capacitors. 10x3x7 inches.

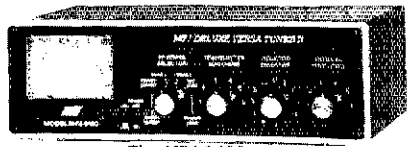
MFJ's *Random Wire* Tuner

MFJ-16010 **$39.95**



You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Install a wire anywhere! Tunes 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 in.

MFJ's *Best 300 Watt* Tuner



MFJ-949C **$149.95** The MFJ-949C gives you more precise matches than any tuner that uses two tapped inductors. Why? Because you get two **continuously** variable capacitors that give you infinitely more positions than the **limited** number on switched coils.

This gives you the precise control you need to get your SWR down to a minimum. After all, isn't that why you need a tuner? Covers 1.8-30 MHz.

You also get MFJ's lighted 2-color Cross Needle SWR/Wattmeter, 6-position antenna switch, 50 ohm 300 watt dummy load and a built-in balun - all in a compact 10x3x7 inch cabinet that fits right into your station. Meter light requires MFJ-1312, $9.95.

With MFJ's **best** 300 watt PEP tuner you get an MFJ tuner that has earned a reputation for being able to match just about anything - one that is highly perfected and has years of **proven** reliability.

MFJ's *Mobile* Tuner

MFJ-945C **$89.95**

Don't leave home without this **mobile** tuner! Have an uninterrupted trip as the MFJ-945C **extends your antenna bandwidth** and eliminates the need to stop, go out and adjust your mobile whip.

You can **operate anywhere in a band and get low SWR.** You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. **SWR/ Wattmeter and convenient placement of controls make tuning fast and easy while in motion.** 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, $3.00.

144/220 MHz VHF Tuners

MFJ-921 **$69.95**

MFJ's new VHF tuners cover both 2 Meters and the 220 MHz bands. They handle 300 watts PEP and match a wide range of impedances for coax fed antennas. SWR/Wattmeter. 8x2½x3 in. **MFJ-920, $49.95.** No meter. 4½x2½x3 inches.

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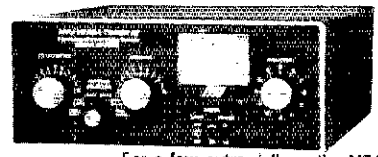
MFJ's *Artificial* RF Ground

$79.95 MFJ-931

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. The 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.

Barefoot/1.5 KW Linear 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. Covers 1.8-30 MHz.

You get two husky **continuously** variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

You get MFJ's **new** peak and average reading Cross-Needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp is front panel switched and requires MFJ-1312, $9.95.

Has 6-position antenna switch and a teflon wound balun with ceramic feedthru insulators for balanced lines. 10¾x4½x14 7/8 inches. Add $10.00 s/h.

MFJ's *smallest* Versa Tuner

MFJ-901B **$59.95**

The MFJ-901B is our smallest - 5x2x6 inches -- (and most affordable) 200 watt PEP tuner --when both space **and** your budget is limited. Good for matching solid state rigs to linears.

It matches whips, dipoles, vees, random wires, verticals, beams, balanced and coax lines from 1.8-30 MHz. Efficient airwound inductor, 4:1 balun.

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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 April 14 through May 13 will appear in July *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.

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PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 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. Pteuler, 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.

ARCO: 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., 20933 Brant Avenue, Long Beach, CA 90810.

LITTLE Big Horn Nets Sundays: 14.057-2200Z, 21.150-2230Z. Native American Indians and Others Welcome. Info WA2DAC.

PUT THE "MAGIC" back into Amateur Radio! Join the thousands of Amateurs who have, through "free" membership in the Society for the Promotion of Amplitude Modulation. Write: S.P.A.M., WB6TRQ, P.O. Box 27, Potrero, CA 92063 or call 619-478-9347. (LSASE please.)

NEW MEXICO: Mesilla Valley Radio Club, Las Cruces, will hold its 25th Annual Hamfest, Zia Hamfest and Beanfeed April 29 & 30 at Dona Ana Fairgrounds. Great Food, Forums, VE Exam, RV Parking, Exhibits, Flea Mart and More. Admission $5. Contact Joe Herring, WI5E, P.O.B. 234, Organ, NM 88052, 505-382-5629. Talkin 146.64/04.

THE 11TH Annual TSRAC Wheeling Hamfest/Computer Fair, Sunday, July 17, Wheeling Park, 8 AM to 3 PM. WV's largest hamfest. Dealers welcome 35,000 square feet under roof; 6 acres free flea market, admission only. Family Hamfest: women free, children 14 under free. Admission $3 in advance-$4 at door. To reserve space contact: Sandi Williams, WC8P, 9 East High Street, Flushing, OH 43977, 614-968-3652; for tickets, TSRAC, Box 240, RD 1, Adena, OH 43901, 614-546-3930.

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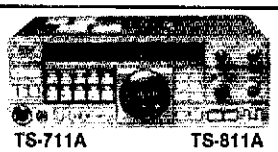

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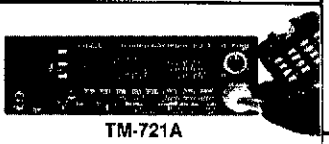

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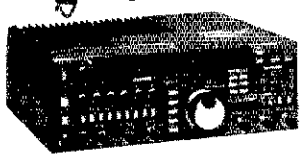

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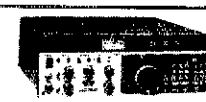

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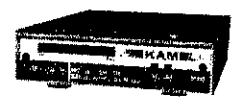

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DON'T Buy QSL Cards until you see my free samples. Also I specialize in custom cards and QSL business cards. Write or call for Free Samples and custom card ordering information. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

QSLS Samples—SASE. Eric, WA6FOS, Box 2275, Culver City, CA 90231.

FREE Logbook with first order. QSL samples cost 3 stamps. Gazebo Press, 4148 Mimosa Lane, La Plata, MD 20646.

RAISED Printed QSLs. Very unique. You can feel the type! Our new laser technology produces exotic callsign type effects. Super high quality. Standard designs or use your own artwork/computer graphics to create a really personal QSL. We now offer state outlines in 3-D. $1 for samples & information. Dennis, WA5QMM, Network QSLs, P.O.B. 13200, Alexandria, LA 71315-3200, 318-443-7261, FAX: 318-445-9940.

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CAR WINDOW Call Sign. . . . 2 inch x 8 inch plastic! Suction cup mountings! Transfer car to car! Call lettering is white. Choose black, blue or red background. Magnetic signs available. Select black, blue or red lettering on white background. $8.50 each. Two for $15 ppd. Club Discounts! Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566.

DAYTON **Hamvention**®

April 28, 29, 30, 1989

Early Reservation Information

• General Chairman, Bill McNabb, WD8SAY

• Asst. General Chairman, Ed Hillman, N8ALN

Giant 3 day flea market • Exhibits
License exams • Free bus service
CW proficiency test • Door prizes

ea market tickets and grand banquet tickets are nited. Place your reservations early, please.

ea Market Tickets
maximum of 3 spaces per person (non-transferable). ckets (valid all 3 days) will be sold IN ADVANCE NLY. No spaces sold at gate. Vendors MUST order gistration ticket when ordering flea market spaces.

pecial Awards
ominations are requested for "Radio Amateur of e Year," "Special Achievement" and "Technical chievement" awards. Contact: Hamvention Awards hairman, Box 964, Dayton, OH 45401.

cense Exams
ovice thru Extra exams scheduled Saturday and unday by appointment only. Send FCC form 610 ug. 1985 or later) - with requested elements own at top of form, copy of present license and heck for prevailing ARRL rates (payable to RRL/VEC) to: Exam Registration, 8830 Windbluff oint, Dayton, OH 45458

1989 Deadlines
Award Nominations: March 15
Lodging: April 7
License Exams: March 26
Advance Registration and banquet:
USA - April 4 Canada - March 31
Flea Market Space:
Spaces will be allocated by the Hamvention committee from all orders recieved prior to February 1. Express Mail *NOT* be necessary! Notification of space assignment will be mailed by March 15, 1989.

Information
General Information: (513) 433-7720
or, Box 2205, Dayton, OH 45401
Lodging Information: (513) 223-2612
(No Reservations By Phone)

Lodging
Please write to **Lodging, Dayton Hamvention, Chamber Plaza, 5th & Main Streets, Dayton, OH 45402** or refer to our 1988 Hamvention program for lodging information which includes a listing of hotel/motels located in the surrounding areas of Dayton. Reservations for the surrounding area will then become the responsibility of the individual.

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

dvance Registration Form

ayton Hamvention 1989
eservation Deadline – USA-April 4, Canada-March 31
ea Market Reservation Deadline: February 1

nclose check or money order for amount indicated nd send a self addressed stamped envelope.

ease Type or Print your Name and Address clearly.

	How Many		
Admission (valid all 3 days)	_____	@ $10.00*	$_____
Grand Banquet	_____	@ $20.00**	$_____
Women's Luncheon (Saturday)	_____	@ $7.00	$_____
(Sunday)	_____	@ $7.00	$_____
Flea Market (Max. 3 spaces)	_____	$25/1 space $50/2 adjacent $150/3 adjacent	$_____
Admission ticket must be ordered with flea market tickets		**Total**	$_____

* $12.00 at door ** $22.00 at door, if available

Name _____

Address _____

City _____ State _____ Zip _____

Make checks payable to – **Dayton HAMVENTION**

Mail to – **Dayton Hamvention**
Box 2205
Dayton, OH 45401

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NORTHWEST IMAGERY QSL'S. Distinctive quality, affordable prices. #10 SASE with 45 cents postage for samples. N7HJM/WO7Y, 11969 Tioga Street, Boise, ID 83709.

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WANTED: Old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Avenue, Milw., WI 53204.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8981.

WANTED: *QST* VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI, 02895-0001.

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WANTED Books: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton Street, Elma, NY 14059, 716-681-3186.

WANTED: Pre-WW2 Pan American Airways aircraft transmitters/receivers and schematics/manuals for same; Pre-WW2 Speed-X bugs. Conly, 819 Henrietta Avenue, Sunnyvale, CA 94086.

WANTED: Old Hi-Fi Gear, Manuals, Literature, Etc. For my collection. Life ARRL Member. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53220-0803, 414-545-5237.

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WANTED: Telegraph Keys and Bugs that are old or unusual, other early telegraph instruments, telegraph signs, related items. Telegraph collector will pay premium prices for rare items. Larry Nutting, WD6DTC, 4025 Slate Court, Santa Rosa, CA 95405, 707-539-1883.

WANTED: Old CW Keys. Jon, 814-226-9565.

E.F. JOHNSON Transmitters, Literature and Accessories wanted for my station. Will pickup. Len Crispino, Box 702, Hudson Falls, NY 12839, 518-638-8199.

WANTED: Pre-1930 *QSTs*. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

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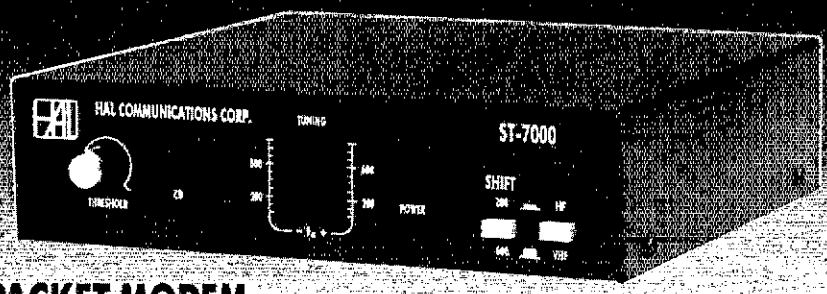

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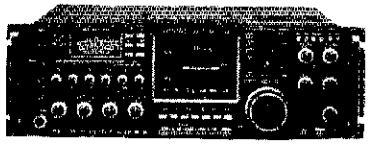
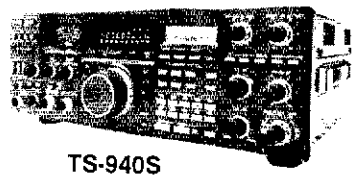


HF Equipment — IC-781	List	Juns
IC-781 Super Deluxe HF Rig	$5995.00	Call $
IC-765 New, Loaded with Features	TBA	Call $
IC-761 Loaded With Extras	2699.00	Call $
IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-725 New Ultra-Compact Xcvr	949.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A New 25w Mobile	509.00	Call $
IC-228H New 45w Mobile	539.00	Call $
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2GAT, New 7w HT	429.95	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-900 Six Band Mobile	639.00	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-475H All Mode 75w	1599.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4GAT, New 6w HT	449.95	Call $
IC-4AT FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-448A, 25w Mobile	TBA	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
IC-32AT Dual Band Handheld	629.95	Call $
IC-3210 Dual Band Mobile	739.00	Call $
220 MHZ		
IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-12GAT Super HT	529.95	Call $
IC-1271A All Mode 10w	1269.00	Call $



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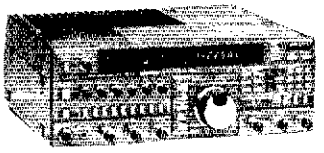
TS-940S/AT Gen. Cvg Xcvr	$2499.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1449.95	Call $
TS-140S Compact, Gen. Cvg Xcvr	949.95	Call $
TS-680S HF Plus 6m Xcvr	1149.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	1049.95	Call $
R-2000 150 kHz-30 MHz	799.95	Call $
RZ-1 Compact Scanning Recv.	599.95	Call $
VHF		
TS-711A All Mode Base 25w	1059.95	Call $
TR-751A All Mode Mobile 25w	669.95	Call $
TM-221A Compact FM 45w	459.95	Call $
TH-215A, 2m HT Has It All	399.95	Call $
TH-25AT 5w Pocket HT NEW	369.95	Call $
TM-721A 2m/70cm, FM, Mobile	729.95	Call $
TM-621 2m/220, FM, Mobile	729.95	Call $
UHF		
TS-811A All Mode Base 25w	1,265.95	Call $
TR-851A 25w SSB/FM	721.95	Call $
TM-421A Compact FM 35w	469.95	Call $
TH-415A 2.5w 440 HT	419.95	Call $
TH-45AT 5w Pocket HT NEW	389.95	Call $
TH-55 AT 1.2 GHz HT	524.95	Call $
TM-521A Compact 1.2 GHz Mobile	599.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	519.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	469.95	Call $
TH-315A Full Featured 2.5w HT	419.95	Call $



FT-767GX

HF Equipment	List	Juns
FT-747 GX New Economical Performer	$889.95	Call $
FT-757 GX II Gen. Cvg Xcvr	1129.95	Call $
FT-767 4 Band New	1929.00	Call $
FL-7000 15m-160m Solid State Amp	1995.00	Call $
Receivers		
FRG-8800 150 kHz - 30 MHz	759.95	Call $
FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-411 New 2m "Loaded" HT	399.95	Call $
FT-212RH New 2m, 45w mobile	459.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-2311R 10w, 1.2 GHz FM	559.95	Call $
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FEX-736-220 220 MHz, 25w Module	279.95	Call $
FEX-736-1 2 1.2 GHz, 10w Module	539.95	Call $
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FT-4700RH, 2m/440 Mobile	889.00	Call $
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FT-312 RM, Mobile	TBA	Call $
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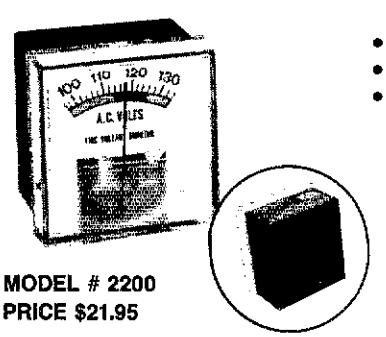

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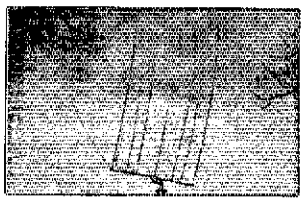
NICADS new AA 500 MAH Quick Charge. Ten for $12 plus $1.80 shipping. Twenty for $23 plus $2.45 shipping. Raymond Richard, 5113 Town Ridge, Middletown, CT 06457.

DELTA LOOP ANTENNAS



DL-TRI "Big Horn"

- "Open and Close the Band" with our Delta design, full wave DX performance mono-band, duoband and triband antennas
- High Quality construction using 6061-T6 Aluminum and Stainless Steel hardware
- Heavy duty design • "Quiet" DX reception
- Excellent Gain, FB Ratio and SWR
- 50 ohm gamma feed • 2 kw power
- DL 202: 2 el. 20 meter, 9' boom $397.
  DL 152: 2 el. 15 meter, 6' boom $329.
  DL 103: 3 el. 10 meter, 9' boom $397.
  DL 102: 2 el. 10 meter, 5' boom $297.
- DL 1015: 4 el. duobander $489.
  2 el. 10m.-2 el. 15m. 7' boom
- DL-TRI: 7 el. tribander $897.
  3 el. 10m.-2 el. 15m.-2 el. 20m.
  13.5' boom-wt. 81#-12.7 sq. ft.
- See our Product Review in June 1988 CQ Magazine by Lew McCoy, W1ICP

DELTA LOOP ANTENNAS, INC.
12 BRUSH DR., P.O. BOX 8063
NEW FAIRFIELD, CT 06812
(203) 746-6368

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Start copying words instead of letter-by-letter.
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Each set contains two, high-quality 60-min. tapes and complete written instructions.

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HBX-48	48'self supporting [10 sq.ft.]	$338.90
HBX-56	56'self supporting [10 sq.ft.]	$432.00
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HDBX-48	48'self supporting [18 sq.ft.]	$423.50
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3/16EHS	500' galvanized 7 strand	$40.00
1/4EHS	500' galvanized 7 strand	$60.00

HYGAIN- TELEX ANTENNAS & ROTORS CALL FOR PRICES

CUSHCRAFT ANTENNAS		
AOP-1	complete Oscar Link system	$169.00
APB	8band ¼wave vertical	$152.00
A3	3 element triband beam	$246.00
A743	7 & 10 MHz add on kit for A3	$81.00
A744	7 & 10 MHz add on kit for A4	$81.00
4218XL	18 element 2 mtr, 28 8' boomer	$125.00
R4	10,12,15,20 meter vertical	$209.90
A4S	4 element triband beam	$344.00
AV4	40-10 mtr vertical	$94.50
AV5	80-10 mtr vertical	$111.00
ARX2B	2 mtr, "Ringo Ranger"	$39.25
ARX450B	450 MHz, "Ringo Ranger"	$39.25
A144-11	144 MHz 11 ele VHF	$50.50
A147-11	11 element 146-148 MHz beam	$50.50
A147-22	22 element "Power Packer"	$141.75
A144-10T	10 element 2 mtr. "Oscar"	$54.00
A144-20T	20 element 2 mtr. "Oscar"	$77.50
215WB	15 element 2 mtr "Boomer"	$81.00
220B	17 element FM "Boomer"	$101.25
230WB	144-148MHz, 30 element	$216.00
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10-3CD	3 element 10 meter "Skywalker"	$115.00
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1108	RG8U Mini 8 low loss foam per foot	$0.22
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TENNA PHASE III POWER SUPPLIES

PS4 . . . . . **$19.90**
Fully regulated, 13.8 VDC - 4 amps constant with surge protection, overload protection w/instant auto reset

PS7 . . . . . **$24.90**
Fully regulated, 7 amp constant,10 amp surge capacity.

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Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset

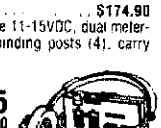
PS20 . . . . . **$64.90**
Fully regulated, 25 amp surge capacity, 13.8 VDC, 17 amp constant, with meter

PS25 . . . . . **$79.90**
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, instant auto reset dual meter for current & voltage.

PS35 . . . . . **$99.90**
Same as above except, 35 amp constant, 37 amp surge, adjustable from 10 to 15 volts.

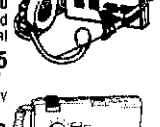
PS50 . . . . . **$174.90**
Fully regulated 50 amp, adjustable voltage 11-15VDC, dual metering, short circuit protection, multiple binding posts (4), carry handles.

MAXON . . $26.95
Model 49SA - 49 MHz, FM 2-WAY RADIO
hands free operation, voice activated transmit up to ½ mile. Batteries optional



model 49B **$34.95**
same features as 49SA except uses "AA" nicad batteries and comes with battery charger

model 49F5 . . . . . **$49.90**
5 Ch FM 2-way, with Earphone mic, offers hands free voice activated or push-to-talk TX, VOX activated by Hi-Med-Lo mic sensitivity switch, 5¼x2¾x1.

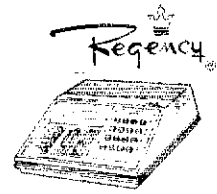


uniden

BC100XLT
$199.90
100 Ch 11 band, Ch lockout, scan delay, auto search, programmable, track tuning, direct Ch access, built-in nicad battery pack with AC/DC adapter charger & carry case

BC800XLT $219.90
WHILE THEY LAST! The units that receive CELLULAR telephone, 40 Ch 12 band, 800MHz, instant weather, priority, track tuning, auto search, direct Ch access, lockout memory backup, AC/DC

BC55XLT	10 Ch 10 Band hand held	**$114.90**
BC70XLT	20 Ch 10 band hand held	**$159.90**
BC200XLT	200 Ch 12 band hand held 800 MHz	**$269.90**
BC145XL	16 Ch 10 band, weather	**$92.90**
BC175XL	16 Ch 11 band aircraft AC/DC	**$149.90**
BC210XLT	40 Ch 11 band aircraft & weather	**$179.90**
BC560XLT	16 Ch 10 mobile, weather	**$99.90**
BC590XLT	100 Ch 11 band mobile weather	**$209.90**
BC760XLT	100 Ch 12 band aircraft & 800 MHz	**$279.90**



R1070 . . . . $74.90
10 Channel 6 band, programmable, permanent memory packup, dual level digital display, channel lockout, step control, AC only

R2060 . . . . . **$109.90**
60 Ch 7 band, Turbo scan, instant weather, bank scanning, priority, delay, AC only.

INF5 . . . . . $74.90
AC powered Turbo Scan™, preprogrammed by state to receive any type of police transmission plus fire & weather, scans at 50 channels per second, digital display, instant weather

R1090 . . . . . **$99.90**
45 Ch 6 band, programmable, Ch lockout, dual scan speed, AC

RADAR DETECTORS

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976 . . . . . **$164.90**
Tri band Vector 3, sequential LED's, muting, volume control, with 2 power cords and travel case. 3x4½x1

847 . . . . . **$134.90**
Express remote, X & K band superhet, audible & visual alarm, compact, 2-way filter switch.

MAXON

RD25 . . . . . **$74.90**
Delexe mini, X & K band, dual conversion superhet, sequential LED's, audible alarm, 2¾x4½x1

RD2A **$45.90**
Dual conversion superhet, X & K band, audible & visual alarm, 3½x4¾x1½

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RD9 . . . . . **$114.90**
MINI, dual conversion superhet, sequential LED's, audible alarm with volume control, w/2 power cords & carry case.

TALKER **$129.90**
Record your own message, sequential LED's, audible alarm, superhet, X & K band, city/hwy, with 2 cords and carry case

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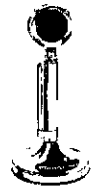
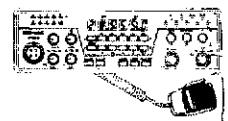


D104 Silver Eagle **$69.90**
Chrome plated base station amateur microphone, factory wired to be easily converted to electronic or relay operation. Adjustable gain for optimum modulation

ETS D104 SE **$84.90**
Same as above with end of transmission Roger Beep

RANGER



10 meter transceiver, 25 watt, can be programmed to split transceive, SSB, CW, AM, FM programmable scanning, fully automatic noise blanker, 2½H, 7¼W, 11D

AR3500 . . . **$319.90**

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25 WATT 10 Meter Transceiver, all mode operation, backlit multi function LCD meter, frequency lock, auto squelch, NB, RF gain, PA, external speaker jack, 7¼Wx9¼Dx2½H

HR2510 . . . **$249.90**

HR2600 . . . **$299.90**
Available for April delivery

'N-TENNA Quad Kits, Boomless Tribanders, $64.50. Box 5332, Hickory, NC 28603.

KWM-380/HF-380 Repairs. Kirby, K7WOC, 713-320-2324.

TUBES WANTED: I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 McArthur Blvd., Oakland, CA 94602, 415-530-8840.

QRP CW Xmtr Kits and Components. SASE brings catalog. W1FB, Box 250, Luther, MI 49656.

HAM PROGRAMS for Commodore, IBM-PC, Apple, TI99/4A. Send legal size SASE: EPO Software, 7805 NE 147th Avenue, Vancouver, WA 98682.

ELECTRON TUBES. All sizes and types. Transmitting, Receiving, Microwave—large inventory. Same day shipment. Ask about our 3-500Z special. Daily Electronics, P.O. Box 5029, Compton, CA 90224, 800-345-6667.

APARTMENT Dwellers/Portable Antenna System. For HF. SASE for information. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 312-482-9310.

BIRDS on your antenna? Try our Decoy Owl, $19.95. They really work! Ham Radio Outlet, 1-800-854-6046.

CIPHERING Equipment (M-209, M-94, others) Wanted. Books, Manuals, anything related to secret writing. WB2EZK, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

LIMITED Space Dipoles....Tri-Bander 160/80/40....$75; Dualband 160/80, 160/40, 80/40....$59.50; 80/20....$49.50; 40/10....$47.50. All coax fed, low VSWR, no tuning required, maximum power. G5RV....$35; G5RV junior....$32. UPS prepaid. SASE. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

VACATION—Ham high in Colorado Rockies. Furnished Mt. Chalet with 205B @ 85' and Collins station. By week. WØLSD, 719-395-6547 nights.

NOSTALGIC OM looking for Hallicrafters SX-62 and HT-31 plus Johnson Viking Mobile TX. Also a WRL Globe King 500A, B or C Transmitter. Even if not working, unit should be cosmetically mint or near mint or else I get thrown out of the house along with "all that dirty junk." Will pay fair price. Contact WA1YIW, 3245 Heather Hill Lane, Tallahassee, FL 32308, 904-893-3936 after 9 PM.

COMPUTERIZE with the "Amateur Radio Operating System." This MS/DOS based software features auto-logging, QSL management, award summaries, contesting, and more! Base System $39.95, demo disk $10 (credited). SASE brings details. WA4PYF, Fundamental Services, 1546 Peaceful Lane, Clearwater, FL 34616.

ATLAS RADIOS Wanted—working or not. RF Parts Co., 619-744-0720, 800-854-1927.

DXpedition to Montserrat for only $300/week, radio included. Complete details for SASE or call: Box 50, Fulton, CA 95439, 707-823-1001.

WANTED: SB220/1 or equiv., TH6, TH6 to TH7 Kit, T2X Rotator, Heath CW Keybd., Heath Iambic Keyer, Bencher Iambic Key. W2UGM, 66 Columbus Avenue, Closter, NJ 07624, 201-767-0123.

WANTED: K4LIB QSL. K4NBN, "No Bad News."

HAM HOLIDAY in VP5. Join cycle 22 fun from rare DX QTH, Turks & Caicos Islands. We supply transceiver, antenna, process license and offer accomodations as low as 7 nights $380 each; double occupancy in private bungalow. Direct Pan Am service, 80 minutes Miami. Details VP5D, P.O. Box 100858, Ft. Lauderdale, FL 33310.

NEW—811A's $16.95 each. Add $3.75 for shipping and handling. 6164B's, $11.95 each. Wanted; we pay cash or trade for all types of transmitting or special purpose tubes, Eimac, RCA, ITT, Westinghouse, etc. M & S Communications Engineering, 160 S. Auburn Street, Suite 200, Grass Valley, CA 95945, 916-272-5500.

TELETYPEWRITER Parts Bought, Sold. Want Tubes, MS Connectors, Air Trimmers. Typetronics, Box 8873, Ft. Lauderdale, FL 33310.

CALL SIGNS professionally made for auto window or desk. Only $3 ppd. CBS, 2203 Park Avenue, Cheyenne, WY 82007.

1989 CALLBOOKS. North American $26. International $29. Both $52. Personal check. Insured UPS paid. Immediate shipment. Avatar/W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217.

HPG-382A, Wanted, Variable Attenuator. Ham lab project. Need several pieces. Will consider any condition. K6GOX, P.O. Box 10, O'Neals, CA 93645, 209-868-3548 collect.

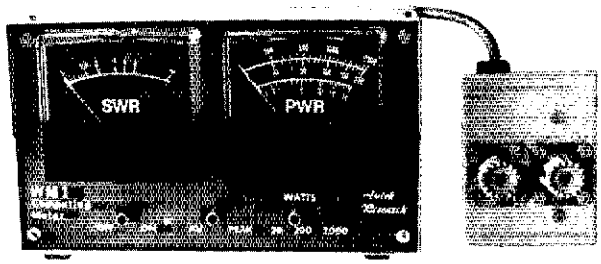
SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrak compatibility, extensive instructions, and strong user support. Send SASE for details. Super VR85: $35 ppd. (CA residents add 6% sales tax.) RLD Research, McCloud, CA 96057. W6AMW owner.

MIL-SPEC Communications: New and used equipment sales and repair, Collins our specialty. Box 461, Wakefield, RI 02880, 401-783-7106.

KITS & ASSEMBLIES for frequency synthesizer, spectrum analyzers, wefax, C-64 packet radio, talking frequency display, keyers, QRP, battery chargers, power supplies, DTMF select call, HF counter, memory voicer and more. For catalog send SASE (45 cents) to A & A Engineering, 2521 W. La Palma, #K, Anaheim, CA 92801.

HAM MUG beautifully hand-crafted pottery mug with your name and call imprinted into the clay. Earthtone colors and 16 oz. capacity will make it a welcome addition to your radio station. $14.95 plus $2 postage and handling. Satisfaction guaranteed. JC Cramer, 650 Cascade, Shelton, WA 98584.

COMPUTING SWR & WATTMETER



NEW! Model WM1 $99.00 (Includes AC Supply)

- **AUTOMATICALLY COMPUTES SWR.** No adjustments needed!
- **READS SWR DIRECTLY.** Even when you're talking on SSB!
- **GREATLY SIMPLIFIES TUNER ADJUSTMENT.** SWR reading not affected by forward power. No confusing readings.
- **REMOTE RF HEAD.** A must! Up to four feet from meter. Coax can't pull meter off table.
- **AVERAGE & PEP READING.** Allows compliance with latest FCC rules.
- **THREE RANGE SCALES.** 2000, 200, 20 watts. Usable to less than 1 watt.
- **TWO TOP-QUALITY METERS.** Large 2⅜" meters.

1.5-30 MHz 5% F.S. Accuracy. Uses 8-18 VDC or 115 VAC. 5¼"x3½"x2¾". Attractive light/dark grey styling.

WHY PUT UP WITH AN INFERIOR METER OURS DOES IT ALL — AUTOMATICALLY!

THE AUTEK "QRM ELIMINATOR"

Also reduces errors in computer CW/RTTY copy!

Model QF-1A For SSB/CW/AM $89.00

115 VAC supply built-in. Filter by-passed when off. | **Auxiliary Notch rejects 60 to 11,000 Hz! Covers signals other notches can't touch.** | **Four main filter modes for any QRM situation.** | **Continuously variable main selectivity (to an incredible 20 Hz!)** | **Continuously variable main frequency. (250 to 2500 Hz)**

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will due to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp. Built-in 115 VAC supply. 6½x5x2½. Two-tone grey styling.

Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig--Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works! If it can't pull him out, nothing can.

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- ★ 12 VDC Operation or 120 VAC with adapter provided
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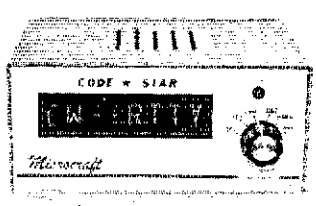

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More Features Per Dollar Than Anything Else! Copies code from your receiver! Improves your code speed too! Large LEDs. Easy to connect and operate. Compact. 2lbs. Connect computer like VIC-20/printer with optional ASCII output port.

CODE ★ STAR™ Kit . . . CS-K $129.00 — CODE ★ STAR Wired . . . CSF $169.00
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SATELLITE Tracking Programs for C64, Amiga, IBM, VIC, Timex. Fastest, easiest to use programs available. Provides real time tracking on world map display. Instant switching of satellites, dates, times plus sheduling and printer output. Hundreds sold. VIC, Timex $18. C64, Amiga, IBM $24. Antenna aiming boards available for VIC and C64 $129.95. Neil Hill, K7NH, N H Enterprises, 22104 66th Avenue West, Mountlake Terrace, WA 98043.

WANTED: The newly formed Skyline Middle School Amateur Radio Club, a non-profit organization formed to enhance the education of our students, needs tax-deductible financial support and/or usable amateur equipment. Contact us at 302-454-3410 or write to: 2900 Skyline Drive, Wilmington, DE 19808.

WANTED: YL 35-50 to share life, ham radio, in new mountaintop home with WM widower, 52. WD4CPF.

CHIMNEY Wanted for 3-1000Z (SK-516). K6WZ, 913-258-3829.

IS MY ATLAS RADIO STOLEN? NYC supplier of "Atlas" radios shipped me a DD-6 Digital Display. Doesn't work. If it's yours and you can prove it call Don, 203-274-8625 after 6 PM.

COMTEK ACB-4 Phased Array Switch. For your 2 or 4 element phased vertical arrays. Comes complete with remote switch-box containing quadrature 90 degree hybrids, 180 degree phase reversals and relay matrix plus attractive inside console control box and directions. Get gain and directivity at the throw of a switch! Top quality throughout! Compete with the big boys. Only $295 US + $12 S&H. (Foreign add 10%.) Com-Tek, P.O. Box 202, Hopkinton, MA 01748, phone 508-529-6330.

BEAUTIFUL Rubber Jacketed, Silver Coated Control Cable Used in Missile Silos. 16 Conductor $.92/ft. 32 Conductor $1.75/ft. W0MNK, P.O. Box 8, Nortonville, KS 66060, 913-886-3235.

14 KARAT Gold Callsign Jewelry. Lapel pins, necklaces, more. Information: KB2MB, H&M Jewelry, 26 Edgecomb, Binghamton, NY 13905.

MICROWAVE Modules MMT 144/28-R deluxe linear transverter. Currently fully wired for ICOM 735. Easily wired for most transceivers. Factory modified to cover the entire 2 meter band. $300 includes UPS shipping. KF5NB, 512-272-8233 after 6 PM Central time.

FREQUENCY Directories: Press, Maritime, Aero, Military, Spy, SW/MW/FM Broadcast, Utes, Police, Federal Agencies, all modes, 10 KHz to 900 MHz. Free catalog. CRB Research, Box 56-QS, Commack, NY 11725.

WANTED: Remote VFO for Kenwood TS-120S. KB1RZ, 207-353-6360.

LINEMAN Safety Belt $80. (State waist size.) Adjustable strap with snaps $45. Pair Gorilla Hooks $104. UPS paid. Personal check. Free info. Avatar/W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217.

PRINTED Circuit Boards for projects in *QST*, Ham Radio and 73's. SASE for list. FAR Circuits, 18N640 Field Court, Dundee, IL 60118.

KILOWATT Amplifier Ten Tec Hercules 444, Solid State, 160 thru 10 Meters, $750. Legal Limit Tuner Ten Tec 229, Factory Wired, $100. Both in new condition. Frank, W7IS, 1-206-426-0515.

WANTED: Knobs for Heathkit HR-10 Receiver. N2BDU, 38 Chapin Street, Canandaigua, NY 14424.

WANTED: Azden PCS4500 or Yaesu FT627RA 6M FM Radios. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

HAM SOFTWARE IBM/Compatibles 10 disks $26.95. MC/Visa/Discover. N5ABV, EAPCO, Keller, TX 76248-0014, 817-498-4242.

"Q" PRODUCTS: 6877 QRO VHF Amplifier Kits. 50 MHz, 144 MHz, 220 MHz. HV power supplies, coaxial antenna relays. SASE for brochure. "Q" Products, Larry Price, N7BNJ, 10412 36th Street E., Puyallup, WA 98372, 206-841-7465 evenings.

SELL: Hallicrafters SX-96 and 12" Speaker. Good shape. You ship, $100. K7ABV, 406-727-7032.

WANTED: ST-6 RTTY or Equivalent Terminal Unit. W2PDT.

FOR SALE: KWM2 and PM2 Power Supply. Plus over $200 worth of Tubes. KWM2 needs K2 Relay. All for $350. John A. Warren, 2908 Jamison Blvd., Mt. Vernon, IL 62864, 618-242-7189 call after 5 PM.

SELL: Yaesu FT-757GX Transceiver. Excellent condition and never used mobile. $650 firm. KE4CB, 817-568-1890.

ICOM 04AT 440 MHz HT. 5W 500 Mah and BP4 alkaline battery packs. Audio and frequency modifications, $250. Call Frank, WD8SDX, 517-631-4038 8 PM to midnight EDT.

LOOKING 4 a 525 Model QRP Ten Tec and like to hear from owners of Swan MX (low band). Ken Mahoney, HS1AGO, K6OPG, 2036 Revere Avenue, San Francisco, CA 94124.

HARDLINE, ½ and ¾ inch, 75 ohm, lengths up to 700 feet, 20 cents a foot, can deliver. K1BW, 508-797-4190, 413-323-4088.

FOR SALE: Collins 204H-1 Auto Tune, HF, SSB, Linear Amplifier. Gary, 206-838-9868.

ARIZONA Ham QTH, Northwest Phoenix. Close to shopping, entertainment, golf, etc. Beautiful 3 bedroom, 2 bath block home. Sunken living room, family room, fireplace, covered patio, swimming pool and many extras. Tower and antennas included. WB2WEO, 201-938-2433.

HW-8 mint $150, Gonset Comm-IV, Motorola Monitor Radio 30/50 MHz 152/174 MHz, FR4/U Freq. Meter mint, Boonton MOD-80 2/400 MHz, HR-212 Regency, Dycomm 2-Mtr. Amp mint, KIM P-1 Computer. Best offer. Will split shipping cost. K8OXI, 9910 Shore Drive, Pigeon, MI 48755, 517-856-2738.

KWM / HF-380 *COLLINS* TRANSCEIVER PARTS

— INVENTORY REDUCTION SALE —

Military quality antennas and accessories for HF frequencies

AC-2810 **2 to 30 MHz 16' base station vertical.** Three section vertical includes base insulator, guy ring and nonconductive rope. Price $145

AC-2811 **1.6 to 30 MHz 36' base station vertical.** This seven section vertical includes base insulator, two guy rings and nonconductive rope. The AC-2810 and AC-2811 can be used with a matching network. Price $225.

AC-2812 **1.6 to 30 MHz dipole kit** includes 300' 14 AWG stranded copperweld, a center feed insulator and two ceramic end insulators. Dipole must be cut for operating frequency. Price $45

AC-2813 **3.2 to 30 MHz dipole kit** includes 150' 14 AWG stranded copperweld, a center feed insulator and two ceramic end insulators. Dipole must be cut for operating frequency. Price $32

AC-2818 **Lightning arrestor.** This highly efficient *COLLINS* (minimum insertion loss up to 300 MHz) arrestor has SO-239 connectors, a 2" square mounting plate and a 1.25" x 2.875" body. The AC-2818 discharges to ground high voltage current surges on the inner conductor of attached coax cables. Such surges can be produced by direct or nearby lightning strikes. Price $89.

AC-2819 **Grounding kit.** Includes three 6' copper clad ground rods (to be installed 10' apart in a triangle), clamps, 40' wire and hardware. This kit can be used with antennas or lightning arrestor listed above. Price $45.

AC-2828 **Foot switch.** This 20 amp.rated, heavy duty foot switch can provide hands free keying of the transmitter. Price $39.

AC-2830 **Headphones.** This lightweight comfort-designed headset with 500Ω impedance works well with the KWM-380. Price $49.

MM-280 **Mobile microphone.** A handheld dynamic omni-directional microphone Low impedance, PTT and black in color. Price $35.

SM-281 **Desktop microphone.** Dynamic omni-directional microphone with low impedance, noise canceling characteristic and cardioid sound pattern. PTT and black in color. Price $69.

AC-3802 **Speech processor** for the KWM-380. Price $299.

AC-3810 **360 Hz CW filter** for KWM-380. Price $199.
AC-3811 **140 Hz CW filter** for KWM-380. Price $249.
AC-3812 **1.7 KHz SSB or RTTY filter** for KWM-380. Price $199.
293-1337-010 **2.1 KHz SSB filter** for KWM-380. Price $166.
AC-3813 **6.0 KHz AM filter** for KWM-380. Great replacement for wider 8 KHz filter used in many rigs. Price $129.

AC-3809 **Adapter control interface.** Plugs into 25 pin D on rear (control interface) and provides standardized 25 pin output for coupler control, plus 15 pin output for key-pad connection. Price $65.

638-6910-001 **Control interface** provides 25 pin D connector on KWM-380. Complete and ready to install. Price $75.

AC-3802 **ROM Modification Kit** is used to provide transmitter coverage of MARS and new Amateur bands for the KWM-380. Price $18.

351-8870-060 **ROM used in HF-380** which provides full transmit coverage. A3 filter board must be installed to use this ROM. Price $49.

638-6904-001 **A3 Low-Pass Filter** board allows proper filtering when transmitting outside Amateur bands. Necessary addition to a KWM-380 when changing ROM. Complete and calibrated price $299

638-6918-001 **Oscillator / Oven** used in HF-380 for ultra stable operation. Can be added to the KWM-380. Complete and calibrated price $275.

638-6929-00 **Control Board.** Complete (less U2 & U17). Price $125.

638-6775-001 **PA Board,** 80% complete HF amplifier. Price $45
Final Transistors, Matched pair. Price $110
Driver Transistors, Matched pair. Price $21.95

AC-2821 **DC power cable** for 12 volt operation. Price $45.

365-0068-010 **Power plug,** plug for AC or DC use. Price $12.95

266-5424-010 **AC power switch,** 20 amp toggle. Price $12.95

281-0659-xxx **Spare Knob Set** includes all 13 knobs on the KWM-380. Limited supply. Complete set for $95.

662-0650-020 **Power transformer,** two 18 volt @ 15 amp windings. Multi-tap primary (105,115,125,210,220,230,240,250 vac). Price $95.
183-1511-010 **Power supply capacitor,** 72,000µF @ 25vdc. Price $18
183-1511-020 **Power supply capacitor,** 12,000µF @ 25vdc. Price $ 9

450-0158-020 **KWM-380 Panel meter.** Price $75.
229-9702-010 **Frequency encoder** for main tuning control. Price $75

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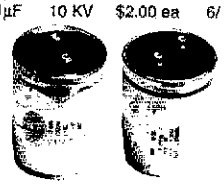
3-500Z (EIMAC) $135 each **(Import)** $120 each
811A. Finally an 811A that operates horizontally. $24 ea. 4/$8
6146B for use in Collins, Kenwood, etc.$15 ea. $38/ matched pr

COLLINS VINTAGE S-LINE and KWM2-A REPLACEMENT PARTS

PANEL METERS All new. We stock meters for all Collins equipment. Your choice, any meter $85
PAINT, Fresh in 12 oz cans. #126 trimring, #180 cabinet, #250 front panel, $270 St. James Gray. $12
Crystals, All regular frequencies in stock!! $8 each, 5 or more $7 each BFOs(453.650,456.350,455.8 KHz only $15
Plug-in Relays for KWM2. 970-2439-010 (X96) or 970-2439-020 (X97) $49.95 each. Replace your old.....
Open frame relays with our modification kit which includes both relays, mount bracket & sockets only $125
500 Hz CW Filter brand new plug in type! 526-9494-00 filter for S-Line receiver. Factory fresh! $259
Oak AC on/off switch 10070-4 used for repairs on KWM2 and S-Line gear. Stock up for future use! $15
Trim Ring for small power supply and monitor cabinets (609-1254-001). Dress it up! Limited quantity $29
30L-1 Power rocker switch by original manufacturer. Brand new item to our inventory. $19

HIGH VOLT DISC CAPACITORS

.001µF	1 KV	$0.15 ea	50/ $5
.001µF	6 KV	$1.10 ea	11/ $10
.001µF	10 KV	$1.50 ea	8/ $10
.0014µF	10 KV	$1.20 ea	10/ $10
.0015µF	1.4 KV	$0.50 ea	12/ $5
.0015µF	4 KV	$1.10 ea	11/ $10
.002µF	1 KV	$0.25 ea	24/ $5
.0025µF	6 KV	$1.50 ea	8/ $10
.0033µF	2 KV	$0.50 ea	12/ $5
.008µF	4 KV	$1.20 ea	10/ $10
.01µF	500 V	$0.25 ea	24/ $5
.01µF	1 KV	$0.50 ea	12/ $5
.01µF	3 KV	$1.00 ea	12/ $10
.01µF	10 KV	$2.00 ea	6/ $10



Sangamo CE71C472R M39018/04-1184

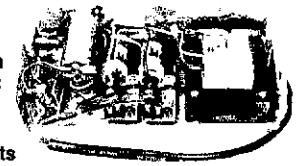
ELECTROLYTIC CAPACITORS

100µF	450 vdc	Sprague 1718	1"x3.1"	axial	$7.25 ea	6/ $40
200µF	250 vdc	Sprague 39D	1"x2.5"	axial	$1.95 ea	6/ $9
120µF	300 vdc	Sprague 36D	1.2"x2.2"	radial	$1.95 ea	6/ $9
3,000µF	75 vdc	Sprague 673D	1"x3.5"	radial	$2.95 ea	4/ $9
4,700µF	100 vdc	Sangamo CE	3"x4.5"	radial	$5.95 ea	4/ $20
6,600µF	75 vdc	Sprague 80D	3"x4.5"	radial	$5.95 ea	4/ $20
9,500µF	75 vdc	M39018/04	3"x4.5"	radial	$6.95 ea	4/ $22
10,000µF	25 vdc	Sprague 80D	1"x2"	radial	$1.95 ea	6/ $9
12,000µF	25 vdc	Sprague	1.25"x 4"	radial	$9.00 ea	3/ $24
72,000µF	25 vdc	Sprague	3" x 4.2"	radial	$18 ea	3/ $45

AC motor start CAPACITORS

16 - 22µF	250 vac	GE 35F280	1.5"x2.7"	$5 ea	4/ $17
72 - 88µF	250 vac	Mepco 3535	1.5"x3.5"	$10 ea	3/ $26
270 - 324µF	125 vac	Mepco	1.5"x3.5"	$15 ea	3/ $40

DELTRON LINEAR POWER SUPPLY

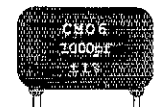


- √ **Triple Output**
- √ **Rugged Design**
- √ **Two 12-15 VDC 2.5 amp & One 5VDC @ 8 amp seperate circuits**

Easily converted to variable 7-30 VDC supplies! Uses popular 723 type regulator for each seperate supply that includes a current limiting circuit. Multi-tap primary allows several voltage configurations between 100-250 VAC! Compact unit measures 2.5" x 5" x 11". New in the box.
Part# 10656X $49.95 each • 3 or more $45

ATTENTION BROADCASTERS: We have a fresh supply of oil , ceramic doorknob & vacuum capacitors on hand . Give us a try for your hard-to-find parts!

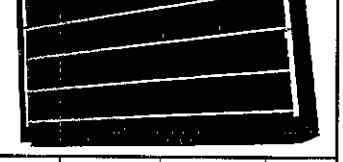
DIPPED SILVER MICA CAPACITORS



10 pF	300 vdc	10%	30¢ ea	20/ $ 5
12 pF	100 vdc	20%	30¢ ea	20/ $ 5
22 pF	100 vdc	10%	25¢ ea	20/ $ 4
24 pF	500 vdc	5%	45¢ ea	20/ $ 7
27 pF	100 vdc	20%	30¢ ea	20/ $ 5
41 pF	300 vdc	5%	40¢ ea	20/ $ 6
58 pF	300 vdc	5%	40¢ ea	20/ $ 6
72 pF	300 vdc	10%	30¢ ea	20/ $ 5
174 pF	300 vdc	5%	40¢ ea	20/ $ 6
185 pF	300 vdc	5%	40¢ ea	20/ $ 6
200 pF	100 vdc	5%	50¢ ea	20/ $ 8
210 pF	300 vdc	1%	60¢ ea	20/ $10
295 pF	300 vdc	2%	50¢ ea	20/ $ 8
300 pF	100 vdc	5%	50¢ ea	20/ $ 8
330 pF	1000 vdc	5%	95¢ ea	12/ $10
370 pF	100 vdc	5%	50¢ ea	20/ $ 8
411 pF	100 vdc	5%	50¢ ea	20/ $ 8
1200 pF	100 vdc	5%	50¢ ea	20/ $ 8

ARCO SOLAR PANELS

M25



ARCO Model	Output Watts	Output Current	Voltage (Loaded)	Dimension Overall	Limited Warranty	Self Regulating	Cost Each
M65	42	2.9 amps	14.5 vdc	1.4" x 13" x 42.5"	10 years	yes	$425
M22	22	1.5 amps	14.6 vdc	1.4" x 13" x 22.4	10 years	yes	$245
G100	5.0	.35 amps	14.5 vdc	.5" x 13.1" x 13.7"	3 years	no	$ 89
G50	2.5	.17 amps	14.5 vdc	.41 x 13.1" x 13.7"	3 years	no	$ 59
G25	1.0	.075 amps	14.5 vdc	.38 x 7.1" x 7.8	3 years	no	$ 47

SELL: 2M HB KW Amp with pair 4CX250B's. Has low voltage supply, only needs your 3000V supply $250. WB4WXE, 3207 Orion, Rome, NY 13440, 315-337-6311.

HEATHKIT HW101. Very clean in good operating condition. Power supply, extension speaker, hand mike and manual. $225 shipped anywhere within contiguous states. WB2LAX, 716-396-1137.

ICOM IC U2AT w/BC-50 Quick Charger and Extra Heavy Duty BP-24 Battery $260. ICOM 2AT w/BC-30 Charger, BP-5 Battery $160. Both in good condition. Call KD4AJ after 7 PM 404-396-0276.

FOR SALE—40 ft. Rohn Tower with new base $250, 4-element triband beam $150, 2-meter vertical $30, Shure 444D Microphone $40. Jeff Nettleton, KE9BV, 211 Oxford Avenue, Fairview Heights, IL 62208, 618-398-1853.

HW202 w/scanner installed. 9 sets xtals, mic, HWA202 pwr sup, HD1250 dip meter, all w/manuals. First $125 MO prepaid UPS cont. USA. No phone. KØWOA, Rt. 2, Box 289, Ava, MO 65608.

28 FOOT DS Kennedy Dish, late serial number. It has the extra support structures used in Texas Tower (120 mph off-shore oil drilling) tropo applications. Two center sections (all 8 pieces are the same size). I personally lowered it from a 130 foot tower-the expanded aluminum reflector screening is in perfect condition. The fiberglass feed support poles are in good condition, the stainless steel feed ring is like-new. Price $7,500. Dick Knadle, K2RIW, 316 Vanderbilt Pkwy., Dix Hills, NY 11746, (H) 516-423-1963, (W) 516-595-5357, (secretary) 516-595-3711.

YAESU FT-101ZD, 10-160 meters, operating manual, digital, VOX, CW filter & mike, san, $650 neg. Electronic MFJ keyer, new, $80. Scott, 303-686-5855.

IC251A 2mtr, all mode, mint, $350. US Robotics 2400 modem card, new, $135. Hygain TH6DX tribander, $220. N1FNB, 203-775-6738.

ANTENNA Tower, three 10' sections with hinged baseplate and mast, $125. N2BLQ, 1 Harrison Lane, Princeton Junction, NJ 08550, 609-799-0917.

NICAD Battery Pacs. Gordon West Tapes. Florida Nicad Specialties, 1-800-666-4223.

RETIRING? Englewood, Florida, three bedroom, three bath home, solar heated pool, dock and davits, minutes to Gulf Mexico. Wilson Telescoping Tower, Beam, Dipoles, $129,900. K8ONV, 813-474-6360.

SWAN 500CX Digital Outboard Readout, Fan; D104, Swan Power Supply, Speaker, Manual; 4 new 6CL6 Finals, real good $275. C.M. Pruett, K4BHV, 4988 Flamingo Drive NW, St. James City, FL 33956.

FOR SALE—Ten-Tec 544 Digital P/S, mint, $450. Tom, W1BAL, 508-875-4230.

SELL—Heath HW-101 (needs repair) with HD-23 Power Supply $125. Gonset Communicator III Two Meter Band excellent condition with instruction manual $50. Pick-up only. W2MCD, 718-383-6654.

SHACK CLEANOUT. Clegg Venus 6M SSB/AM Xcvr. 40W out with PS $125; Vic-20 and Kantronics CW/RTTY Interface $120; Regency HR-2 2M FM with 145.01 for Packet $100; Hammarlund HQ110A Rcvr. $75. T. Lukas, WA3MGE, 5025 Hillsboro Road #24-B, Nashville, TN 37215, 615-385-9785.

ADOPTION. I have listened in the night and have heard, low against the ground the cry of lonely, orphaned, and forgotten Telegraph Keys and Bugs. Times past, they were loved, and used daily, nay hourly, but now languish, almost unknown in many a dusty box or drawer. If you happen to find any of these unfortunates, please give them our address or telephone number and we would be overjoyed to pay the adoption fee and give them regular attention, care and use. Thank you. Reno Telegraph Key Orphan Home, W7SK Headmaster c/o Box 7415, Reno, NV 89510-7415, 702-356-0615 collect.

WANTED—Yaesu FT-301 Series Transceiver. Must be mint-no mods. Prefer New England sale. KX1C, 28 Wildwood, Stow, MA 01775, 508-562-3137.

2 4CX 1000A Tubes, SK800 Socket with Chimney. Want Power Supply, Tektronic 551 Scope. W6RFB, 916-695-2715.

WANTED to buy Bird Wattmeter. Bill, NJ6T, 900 Encanto Drive, Arcadia, CA 91006, 619-446-0732.

MACKET: Macintosh packet program, $42.45. This acclaimed software is used around the world! Supports most TNCs-with host mode support for PK-232 and TNC-2 clones. Contact S. Fine Software, P.O.B. 6037, State College, PA 16801.

FOR SALE: ICOM IC-04AT 440 MHz Handheld. Complete with manual, battery and charger. Excellent condition, $250. W2SVS, 3900 Canterbury Road, New Bern, NC 28562, 919-633-4315.

FOR SALE—Best Offer: Hallicrafters HT-32, RX-101; Gonset GSB-100 Transmitter & Linear; Heath RX-1 Receiver & HW100; National-NCX 500 Matchbox-Johnson & B&W Oscilloscope-Elco & Tektronix Power Supply-Heath & Electro Bell & Howell Electronics Course. WB2JDC, evenings 516-599-5745.

COLLINS 32S3 with PS and 75S3, mint, both transistorized plus spare set vac tubes, $600. W6IHH, 619-741-1974.

HEATH Marauder HX-10 Xmtr, Mosley CM-1 Rcvr, excellent condition. Make offer. Fred, W8JZF, 1417 Dicken Drive, Ann Arbor, MI 48103, 313-663-0627.

WANTED: Plug In Units and Manual for Tektronix 661 Scope and High Voltage Transformer For Tektronix 535. Bob, 404-977-5701.

SALE: Yaesu FT-101ZD MKII with VFO, FV-101Z all manuals and shop manual all absolute mint. $600 or best offer. Sell Yaesu FT-225RD 2 meter all mode 25 hours use. Only great for packet with optional memory board. $425 or best offer or swap all for best offer. Call Steve, 207-453-7292.

IBM-PC SOFTWARE for PK-232! New CompRtty II/PK is the complete communications program for the PK-232/HK-232. Uses host mode of PK-232 for complete control. Text entry via built-in screen editor! Adjustable split screen display, including optional Triple Split(TM) in Packet mode. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages, mailbox facility. Ideal for MARS and traffic handling. Requires 256k PC compatible. $65. Non-PK-232 version still available. Send call letters (including MARS) with order. David A. Rice, KC2HO, 144 N. Putt Corners Road, New Paltz, NY 12561.

MAKE OFFER: Several 1964 Amateur Radio 5 cent stamps. Also first day covers dated December 1965. W2PDT.

DRAKE TR4-C, 34PNB, AC-4, RV-4C, mint. You ship, $375. K7ABV, 406-727-7032.

FOR SALE: Collins KWM-380. All mods factory installed. Factory cartoon, $2000. Prospect Park, PA 19076

RF OSCILLATOR in effect a frequency synthesizer can be used as secondary frequency standard 300 kc to 26000 kc best offer. Rumble, 912-994-8845

POOR MAN'S Alpha—Compact desktop 8877 amplifier with heavy duty power supply. 80-10 meters. $800. Can deliver to Dayton Hamvention. AG9V, 513-435-0878.

SUPERFAST MORSE Code Supereasy. Subliminal cassette. $10. Learn Morse Code In 1 Hour. Amazing new supereasy technique. $10. Both $17. Moneyback guarantee. Free catalog: SASE. Bahr, 2535-G4 Marietta, Palmbay, FL 32905.

ALPHA 76CA, Hypersil, 3 Tube, 10M, very low hours, will ship $2000. Wanted: Drake MN-2000 or MN-2700. Gary, K5RE, or phone 1-214-769-3231 after 6 PM.

WANTED: Zenith Transistor "Oceanic," Literature or Parts Set. Also Tube Set with Boat or Airplane on Front. Wade, 657 14th Avenue, Prospect Park, PA 19076.

FOR SALE: Collins KWM-380. All mods factory installed. Factory carton, $2000. Call W1FDH, 302-734-0175 weekends.

1989 CALLBOOKS: Until 4/15; North American, $24; International, $27. Both, $48. Any four or more, $22. DXCCers Special: 1989 International and 1988 North American, both $32. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1555, 714-687-5910.

R-390A RECEIVER Parts: Info SASE. CPRC-26 Military Manpack Radio, 6 Meter FM, with Antenna, Crystal, Handset: $22.50, $42.50/pair. CPRC-26 Radio-only: $9.50. Add $4.50/piece shipping, $9 maximum. Baytronics, Box 591, Sandusky, OH 44870.

WANTED: Ham Equipment or Other Property. The Radio Club Of Junior High School 22 NYC Inc. is a nonprofit organization, granted 501(c)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. In Dayton meet The Crew From 22 and relax at our flea market tables, check in on 144.30 simplex. Please write us at: P.O. Box 1052, New York, NY 10002. Or call our round the clock hotline: 516-674-4072. Thank you!

LOVE IT, but want to move up! Like new; 64 countries in approx. 136 min. air time, log avail., ICOM 730, $375, accessories newer, SM5 desk mic. $25; SP3 spkr. $35; Astron RS-20M $60; Autek QF1A $55. W4PPY, 804-745-3445.

FOR SALE: Kenwood TS530S Transceiver, A1 condition, original carton, $395. W4PRP, 919-392-1242.

HEATH SB104A Transceiver, SB644A Remote VFO, HP1144PS, SB604 Speaker, Shure Mic. $475. KE2DJ, 2108 Thomas View Road, Reston, VA 22091, 703-860-1305.

SELL: Heath SB-401 Transmitter, excellent, $100. Larry, WA7O, P.O.B. 716, Kirkland, WA 98083.

AMIGA, ATARI XL/XE/ST, Macintosh Amateur Radio public domain software for $4 disk. SASE for catalog. Specify computer! Kinetic Designs Hamsoft, Box 1646, Orange Park, FL 32067-1646.

FOR SALE: Collins S-Line - 75S-3B Receiver, 32S-3 Transmitter, 30L-1 Linear, 312B-4 Station Control, 516F-2 Power Supply, 399B-4 Novice Adapter, & SM-2 Microphone. Equipment is in like-new condition in factory containers. Send inquiries or reasonable offers for complete package to: Robert P. Jarrett, P.O. Box 36, Canyon, TX 79015.

DIODES IN5408, 3 Amps, 1000 PRV, 100 for $30. Jesse Savage, KM4BF, 223 White Avenue, Wilmington, NC 28403, 919-791-0063.

FOR SALE: Advanced Receiver Research Preamplifiers, SP432VDA "N" Connectors $30. P144VDG "BNC" Connectors $25. Ham-M Rotor $95. New Brake Housing and Wedge for Ham-M $20. Drake MN-7 250 Watt 1.8 to 30 MHz Antenna Tuner $50. George Chambers, KØBEJ, 302 S. Glendale, Coffeyville, KS 67337, phone 316-251-5318.

WANTED: Gem Quad Ant. N4OHB.

FAX-Modem 2400-4800 Baud with Scramble. From White House $75. Tektronix Oscilloscopes 551 $50. 16x6x6 Computer Power Supplies 2-35 Volts $40. WA3JHA, 7 Wainwright Avenue, Annapolis, MD 21403, 301-267-9245.

KENWOOD R-1000 General Coverage Receiver. Excellent condition $275. W2RLG, 919-638-2715.

MINI-SCRIBE 3212 10-Meg Hard Drive $95. Regency MX-3000 Scanner $100. Both items in good operating condition. Prices UPS-COD. Call 612-420-5000 evenings or write Rich Pomerleau, KE9AE, 9152 Lanewood Lane, Maple Grove, MN 55369.

WANTED: DG-1 digital display unit for Kenwood TS-820. Cecil Kelley, N4TSK, 704-687-2722 evenings.

FOR SALE: Telrex 4 years old ST4BM/3 4 bander excellent condx. Priced to sell. Call W8QP, 419-422-1264, Findlay, OH 45840.

48 FOOT 25AG Fold Over Tower, TA33 Junior Beam, Ham II Rotator, 11 Element, 2 Meter Beam, Ringo Ranger Antenna, FL2100B Amplifier, 80 thru 10. W8RRR, 313-724-3626. Pick-up only.

SALE: HAL DS3100 ASR Terminal, ST6000 Modem Unit, Amp 1 88G Printer $850 or offer. WA2WLU Estate, 798 Mallery Street, St. Simons Island, GA 31522, 912-638-0700.

MICROLOG Air-1 Interface for Vic-20 Computer Copies and Sends Code and RTTY. Pete Wright, 704-488-2097.

LATE Model Mint Condx. Kenwood HF Gear For Sale. I may have what you need. WB9JKO, day 219-865-3051, eve 219-924-7559.

PK-64A, AEA with HF Modem and Long Cable. Original price $400, asking $200. Perfect condition. Randy, 304-645-4753.

WRITTEN EXAMS Supereasy. Memory aids from psychologist/engineer cut studytime 50%. Novice, Tech, Gen: $7 each. Advanced, Extra: $12 each. Moneyback guarantee. Bahr, 2535-G4 Marietta, Palmbay, FL 32905.

SIDEBAND/RTTY Station—R-390A with SSB and FSK converters, spectrum display, TMC SBE-3 independent sideband exciter with master oscillator and FSK unit all in rack. Good condition with all manuals, $400. Pick up from Dayton, Ohio only. AG9V, 513-435-0807.

ROSS' $$$$ New April Specials: Kenwood TL-922A $1395.90, TM-221A $387.90, TM-721A $617.90, TS-140S $789.90, TW-4100A $464.90, Dentron GLA-1000C $389.90, ICOM 2KL $1689.90, 725 $819.90, IC-3200A $469.90, 4AT $269.90, Amp Supply AL-80A $889.90, AL-84 $459.90, LA-1000NT $619.90, LK-450 $849.90, LK-650NTC $2059.90, LK-800NTX $3150, Ten-Tec 425E $2459.90, Magnus MA-1000B $819.90, Yaesu FL-7000 $1724. All LTO (limited time offer). Looking for something not listed?? Call or write. Over 8780 ham-related items in stock for immediate shipment. MENTION AD. Prices cash, FOB Preston. We close at 2:00 PM Mondays & all day Saturday. Ross Distributing Company, 78 South State, P.O. Box 234, Preston, ID 83263, 208-852-0830.

ICOM IC751 PS35 Filters $975. R71A FM Board Filters $585. Daiwa CNW419 Antenna Tuner $155. Trac TE144 Keyer $70. All low hours. Woody, K1OQG, 203-376-5561.

NCX-1000 National Transceiver For Sale. Very clean and in good operating condition but may need new final tube. Fred Stone, W1SQK, 203-349-1242 evenings or weekends.

SALE—Henry 2000A (2 Meter) Kilowatt Amplifier, 4 years old, mint condition, $1395 new, now $900 plus shipping or pick-up. K2KLP, 716-924-3166.

ATRONIC Code Digital Read Out For Sale. Code in-digital display out. Excellent condition, $75. WAØKKC, 7139 Hardy, Overland Park, KS 66204.

KENWOOD TS711A 2M All Mode. Used very little, $725. KB1EJ, 203-651-8407.

NEED Replacement Meter Dentron Clipperton-L. W5LLU, 7814 Skyline, Houston, TX 77063.

R4C with .5 and .25 CW Filters and NB. T4XC and MS4 speaker/supply. Includes 160, WWV, other xtals. 30 spare tubes including two extra sets finals. Look and work great-$625. DX-Engineering speech processor for T4XC-$50. Ron, N4AH, 615-586-9696 (D), 615-587-6858 (N).

PARAGON, all filters, PS-961, mic. Excellent. Best offer. Schultz, AmEmbassy (VOAR), APO NY 09255-0006.

LA CASITA Azul, QTH, Texas Hill Country, best climate, 1½ acres, river access, 2 story, 3/2½ home. $89,500. 70 mi. NW San Antonio. Agent, Crocker, 512-238-4747.

SELL: 5KW Professionally Built Linear. 5KW, Pair of 1000-T's, 160-20, $1500, OBO; 100 Foot Pneumatic Mast On Trailer, $1500, Trade, OBO; Collins KW-1 Prototype, $1500; Globe King 500-A, $350; Globe Chief, $50; 450TH, $45; Swan 600 R and 600T, $375; Swan Speaker-Patch, $45; Swan 500CX, 117XC, $350; Antique Vibroplex, Carrying Case, $150; Want To Buy, UG204CU Coax N-Type Fittings, RG14, 217 and 17 Coax Telrex Mast, Rotor Cable. K8CCV, 216-427-2303 6-9 PM EST Weeknights.

SELL: Ameritron Linear AL-84. Like new. Price $365. No shipping. K3YKM, 215-687-1687.

YAESU FT-757GX CAT system low band 10-160 meters, tech & operating manuals included, used very little mint cond. $795. Cam TNC all mode controller for packet with many extra accessories & programs $285 one month own. Autek QS1I SSB CW AM Filter $60. Heathkit hybrid mode HD15 $25. Write or call. Call after 6 PM Eastern time. P. Laspina, WA2ERD, 33 Gloria Ann Smith Drive, Bricktown, NJ 08723, 201-920-0273 after 6 PM EST.

STAINLESS Steel U-Bolts, Turnbuckles, Eye Bolts, Screw Eyes, Bolts, Screws. Small Quantities. Free Catalog. Elwick, Dept. 731, 230 Woods Lane, Somerdale, NJ 08083.

ANTENNA Tuners: Nye Viking MBV, perfect, $350. Johnson Viking Kilowatt, $165. Ameco PT3, $35. Autek QF-1A, $30. Butternut HF6VX, $70. Hustler G7 144, new, $85. Paul, KB5BFU, 601-264-4983.

WIRE ANTENNA Headquarters—Wire, Coax, Rope, Connectors-Discount Prices. Why pay more? Silver/Teflon(r) PL-259, $12.95; Factory Fresh, MilSpec RG-213 $30/100'; 95% RG-8x $14/100'; 9086 (9913 equivalent) $40/100'. Ladder Line $10/100'. #14 stranded, Hard-drawn $7/100', copperclad $8/100'. Real Dacron(r) support line, UV, abrasion resistant: 3/16" black, double-braid, 770#, $10/100' or Genuine MilSpec 3/169 green, 700#, $9.95/200'.#1 rated 80-10 antennas: Carolina Windom, $69.95 (December 73, July World Radio reviews); SuperLoop, $75: 12% S&H ($4 minimum). Virginians add tax. MC/Visa. Mention ad, receive 56 page Catalog. Radio Works, Box 6159, Portsmouth, VA 23703, 804-484-0140.

COLLINS New Tubes Sets—75S3ABC-$60, 75A4-$80, KWM2-$85, 32S3-$50 without finals, add $30 for 6146B's, $3 shipping. WE2T, 65 Aleta, Rochester, NY 14623, 716-334-1103.

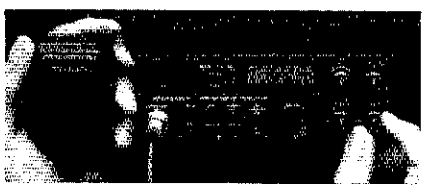
WANTED For Parts. RCA Tube Type Receivers. AN/FRR-21, 22, 23. AN/MRR-1, 2, 3. AN/SRR-11, 12, 13. Must be complete, need not be in operating condition. Rick Richoz, W4AOQ, 14 Milton Road, Pensacola, FL 32507, 904-455-4881.

America's Communications Leader Presents Its All-New 10-Meter SSB/CW Mobile Transceiver

Realistic, America's premier brand of scanners, CB radios and satellite TV systems, introduces the HTX-100. It's the perfect first rig for a beginning Ham and a superb 10-meter mobile radio for any amateur. Compact, yet loaded with "big rig" features you want.

Pushbutton Memory Tuning

An easy-to-program memory stores 10 favorite frequencies and mike-mounted pushbuttons permit safe and easy up/down frequency selection while you drive. A front-panel lock control prevents accidental frequency changes. You can fine-tune reception with the ±1.5 kHz RIT control. Coverage is 28.0 to 29.6999 MHz, USB or CW. Convenient semi break-in keying and CW sidetone are built in.



Ultracompact and includes everything you need for underdash installation

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You can select 25-watt or 5-watt QRP power output from the front panel. The HTX-100 has a backlit LCD frequency display with mode and tuning-step indicators. You also get a 5-step LED signal/RF power meter, noise blanker, hefty 3-watt audio output, high-quality built-in speaker, front-panel headphone jack and a rear-panel jack for adding an external speaker.

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WANTED: Heath SB-110, Preferably With Power Supply. N2BYM, 716-896-0545.

SELLING—Ham M-3 Rotator. Professionally rebuilt. Works like new and looks like it, $185. W4YHB, 407-732-1673.

HAVE that old Heath radio gear reconditioned, aligned, calibrated. SASE for quote. RTO Electronics, 4166 Maple Street, Berrien Springs, MI 49103.

ROSS' $$$$ Used April Specials: Kenwood TR-9500 $399.90, TS-530S $619.90, TH-31BT $189.90, TM-401A/TU-3 $279.90, Atlas 215X $269.90, 220-CS $129.90, ICOM 701-PS $109.90, IC-27H $299.90, RP-3010 W/Cabinet $949.90, RC-11 $46.90, Yaesu FT-726R/W21 MHz Mod. $695.90, FP-707 $109.90, Ten-Tec 251-M $89.90, 252MO $99.90, 255 $129.90. Looking for something not listed? Call or write. We have over 225 used items in stock. MENTION AD. Prices cash, FOB Preston. We close at 2:00 PM Mondays & all day Saturday. Ross Distributing Company, 78 South State, P.O. Box 234, Preston, ID 83263, 208-852-0830.

WANTED: Collins KWM-380, 30S1, 30L1, Parts and Accessories. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

COLLINS 51J-4 Receiver $150. Commodore 128 Computer, Zenith 12" green screen monitor, plus software DX edge, etc. software cost over $180, package $200. Custom built six meter linear 0-10 watts drive 300 out, self-contained with power supply, etc. $400. Henry 2KD-5 desk top kilowatt linear $750. Drake TR-6 six meter transceiver, 9-NB noise blanker, optional filters and crystals, MS-4 speaker, AC-4 power supply $450. Kenwood SM220 station monitor, BS-8 panadaptor $350. ICOM IC28H transceiver $300. Custom built two meter kilowatt linear 0-10 watts drive with power supply $500. All plus shipping. N6KUQ, 209-564-3960.

MINT Condition Sale: ICOM R-7000 Receiver $745; Kenwood R-5000 Receiver $565; Vibroplex Keyer $50; MFJ Keyer Bencher Paddle $80; AEA PK-232 Modem IBM PC Program $225; Code Star Reader $80; AR-601 Terminal and Keyer $135; Kenwood HS-5 Phones $40. Art Mees, 106 Dunedin Court, Cary, NC 27511, 919-481-1755 evenings.

KENWOOD TS-830S like new, recent alignment, CW filters, MC-50, oper/serv manuals, cartons, 4 year newsletters, $750 shipped. N3CRN, 412-731-2055.

WORLDTIMER Also Displays Temperature in C° or F°. Small Solar Panels Chargers. Send SASE. B.E.A.M. Solar & Electronics, N2ZY, 6205 11th Avenue, Brooklyn, NY 11219.

INTERESTED In Amateur Television? I'm selling a deluxe color video camera $275. Also, 2 meter beam antenna $30. Enhanced 101 key (XT/AT) computer keyboard $50. Call Jeff, WW6U at 707-839-0796.

WANTED: TCS, SBE-34, R-390 (pick-up tnx), BC348, 75S1, T4X, Genave Aircraft SSB. WA5AAO, Box 335, La Grange, TX 78945.

FOR SALE: Wefax Downconverter. Microcomm Model RX-1691. 1691 MHz in, 137.5 MHz out, low noise figure, outstanding stability. No extra preamps required. Noise free images with 30-inch dish. Dish can be placed in attic. Includes comprehensive service and operational manual. Brand new condition. $400. Immediate UPS blue label shipment. Bob, KA0AFG, 712-336-1342.

COLLINS 75A4 Receiver & Central Electronics 100V Transmitter. Sell as package only. $500. Very clean & operational, all manuals. H.W. Hitchen, 3931 Brentwood Circle, Anchorage, AK 99502, phone 907-248-3308.

IC-745, FM Board, HM-7, $695. IC-AT100, $250. Yaesu FT-202R, $60. FOB K1LEC, 802-886-8121.

ALPHA 78 purchased new, mint condition $2250. Yaesu FT ONE mint condition $2000. N3CNY, Box 306, New Castle, PA 16103, 412-654-4782.

KENWOOD YK-88C-1 & YG-455C-1 CW Filters. Heath HM-9 Wattmeter, HD-1422 Antenna Noise Bridge, Kantronics Interface and Hamsoft II for Vic-20, TS-130 Mobile Mounting Bracket. Richard Powell, NF5Z, 409-384-5006.

WANTED: Henry 2 or 3 K Ultra, Alpha 70V, Singer SSB 50, 3-1000Z, Linear Parts. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

JOHNSON Viking Desk Kilowatt $1300, Large Prop Pitch Motor $150, Wilson Duoband Beam (15 & 20M) $200, KLM 10-30 MHz Log Periodic $400, Collins KWM-1 and AC Supply $250. Pick up only. W7KPA, 4748 E. Quail Creek Drive, Tucson, AZ 85718.

WANTED: Hallicrafter HT6 Transmitter, Howard 430 435, Stancor Transmitter, Ten-Tec RX10 Receiver, QRP Transceivers. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

WANTED: Ten-Tec Model 243 VFO. WV5K, 409-259-9624.

COMPLETE Drake Station Estate Sale: L-4B, B-4PS, MN-2000, R-4B, T-4XB, MS-4, mint! Original cartons, manuals. Full set spare tubes including 3 new 3-500Z. Three complete antenna systems, phone patch, KW dummy antenna, test equipment, lots of extras. $1,275 plus shipping. Richard Olson, 916-487-0898 or 208-343-2848.

C64-128 SOFTWARE: 1000's of programs for ham, education, utilities, games. $3.50 to $5 per disk. SASE for catalog. Manna Software, 15426 Yukon Avenue, Lawndale, CA 90260.

TEN-TEC, new boxed latest 1989 production models. USA made, 561 Corsair II, 562 Omni V, 585 Paragon Transceivers, 425 Titan 1.5 KW and 420 Hercules II, 1 KW Linear Amplifiers, 238 Antenna Tuner 2 KW, 2510B Satellite Station, 2410 100 Watt 430-450 Amplifier, Mobile HF Antennas, Keyers, and Accessories. Take clean, working ham gear in trade. Visa/MC or check. For best deal, write or phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

WANTED: Spectronics DD-1T Digital Display for Tempo-One; inexpensive 6M or 220 Gear; Ham Software for Atari ST Computer. Jim, N6RNG, 1773 Rainier Court, Anaheim, CA 92804.

FOR SALE: new in carton Kenwood TS-530SP $650. MFJ 949C Antenna Tuner new in carton $120. Vibroplex Bug and Antique Straight Key both $45. All for $800. W4PBN, 1-602-977-1530.

WANTED: 2 Meter Repeater Complete, President of SPAR (Society for the Promotion of Amateur Radio). Al Viduka, NR9F, 518 30th Street, South Bend, IN 46615.

BUY, SELL, TRADE. Use the new Communications Exchange Sheets. Samples $1. CES, 2224 Cooper Avenue, Sheboygan, WI 53083.

ICOM 730, power supply, cw-filter, mikes, etc., excellent shape, $550. Amp Supply small amp, no tune, $300. David Flynn, AA4MN, 1575 Woodmont Blvd., Nashville, TN 37215, 615-297-3739.

SELLING: Amp Supply Amplifier LK500-ZC Twin 3-500Z Tubes. Hypersil Transformer. Vacuum Relay QSK. 12 and 10 Meter Bands. Excellent working condition. $995. W4YHB, 407-732-1673.

WANTED: Yaesu FL-2100Z (3-500Z) Amplifier, ICOM PS-15 Power Supply, SP-3 Speaker, Astron 35 or 50 Amp Metered Power Supply; Sell: mint Alpha 76A 2KW Amplifier, $1195; original SSB Filter for Yaesu FT-901DM, $12. Ron, WK8N, 614-774-2233 evenings.

CRYSTALS—See page 184 January *QST*. C-W Crystals, Marshfield, MO 65706.

DRAKE TR-6 AC-4 DC-4 300 Watt 6M Rig $350. Drake TC-2 SC-2 TV 100 Watt 2M Rig CPS-1 PS CC-1 Console $250. Drake TR-7 AUX-7 PS-7 4 Filters $575. Drake UV-3 220 TX & RCV Boards Drake UV-3 440 TX & RCV Boards $130. Yaesu FT-767GX 160 thru 10 M plus 2 M & 440 Modules $1460. Yaesu 726 R All Band VHF & UHF 50/144/432/SAT Modules $850. ICOM PS 20 PS $120. Henry/Tempo Desk-Top 2 KW Amp for 6 & 2 Meters $1250. 4CX1000A 2 KW 6 Meter RF Deck $450. Willard, 513-875-2992 after 7:00 EST.

RADIO SHACK Dealer—lowest prices nationwide-on all R.S. equipment. Special new HTX 100 10 M Transceiver reg. $259.95 sale $254. No tax out of Florida. Special Pro 2004 Scanner reg. $419.95 sale $399.95. Pro 34 reg. $329.95 sale $299.95. DX 440 Digital SW reg $199 sale $185.95. Save big on power supplies in all sizes. Also antennas and accessories. Order tollfree 800-848-3004 or 407-286-3040 for other info. Cotronics Inc., 2200 S.E. Federal Hwy., Stuart, FL 34994.

HEATH SB-200 Amplifier with manual in excellent condition, original owner. $350 will ship UPS collect. Hal Gero, W5VFK, 12609 Dessau Road, Austin, TX 78753, 512-251-3006.

WANTED: Heath HW-99. Prefer original kit but would consider good used unit with manual. P. Bayne, P.O. Box 71071, Milwaukee, WI 53211.

"CW SENDIN' Machine" Model 2048: Electronic keyer with iambic paddle (Brown Bros). Eight 256-bit or four 512-bit memories. Speed control, sidetone, auto reset, AC power, cables, manual. Works great, $50. N1AHR, 603-539-2762.

KENWOOD TS440S/AT w/500 Hz CW Filter, 2.4 KHz SSB Filter, Voice Synthesizer, Computer Interface, PS-50 Power Supply, External Speaker and MC-60A Microphone. Heath HD 1418 Audio Filter, HM2140A Wattmeter. HD1420 Converter, and HN31A Cantenna. 2 years old, never used. $1150 takes all. Bill Miller, N6JPH, 5405 Tannerwood, Reno, NV 89511, 702-849-1011.

WANTED: HW-101 and HP-23B with or without CW filter with manuals for newcomer to amateur radio. W4MPL, 7502 Oakmont Drive, Richmond, VA 23228, 804-266-5286.

FOR SALE: Yaesu FT-101B Transceiver, SSB, AM, CW. Excellent condition, $400. MFJ-941D Tuner, good for up to 300 watts, $70. N2BQA, 203-378-9889.

HUGE ANTENNA Rotator with Indicator by Granger Products (weighs 300 lbs.) $1200, 250 Feet Heavy Duty Guyed Tower $1000, Mosley 2 el. 40 M Beam $200, Mosley CL-36 Tribander $190, B&W 5100B Xmtr. and 515B SSB Adapter $150. Pick up only. W7KPA, 4748 E. Quail Creek Drive, Tucson, AZ 85718.

GROUND Radial Wire For Verticals Or Slopers: Improves performance, new #16 bare solid copper. Lowest cost, 1000 foot spool, $38 includes shipping. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

ATLAS 210X w/PS Console, Speaker, Trade For: 50MC Hi-Power Amp, HF-KW Linear, 6M or 2M SSB Gear, FT101 B-E, VHF-UHF Receiver Or? No junk. QSL Steve Joachim, KL7OF, P.O.B. 77, TumTum, WA 99034, 509-276-6660.

HOSS-TRADER ED says, "Shop around for the best price, then telephone the Hoss last for the best deal." Wm Nye 3KW MB-5 Antenna Tuner $675 cash price $569; new ICOM 735 Transceiver regular $1099 cash $935; newest ICOM 725 Transceiver regular $949 cash $825; call for lowest price in USA on newest model ICOM 765 Transceiver; used Collins S-Line complete mint condition $695; new Azden PCS-6000, $349; new ICOM 2-AT, $268; used Collins KWM-2A with AC Supply, $695; new Amp Supply LK-500-ZC 1500 Watt Linear regular $1595 cash $1335; sale on MFJ Products: some below cost. Visa/Master Card Accepted! Moory Electronics Co., P.O. Box 506, Dewitt, AR 72042, tel. 501-946-2820.

KENWOOD TS-520S with CW Filter $399, DG-5 Digital Display $125, VFO-520S Outboard VFO $99, all in great condition. Complete set-up $575 shipping included. Fred, KS2X, 901-755-2563.

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SuperSCAF is a versatile switched-capacitor filter for eliminating interference and noise on CW, SSB, RTTY, AMTOR, PACKET and other narrow band modes. Extremely steep filter skirts remove adjacent clutter and noise to enhance weak signal reception and greatly increase intelligibility and listening comfort.

SuperSCAF incorporates a switched-capacitor bandpass filter, an economical implementation of digital filter technology. Extreme sharpness, stability, accuracy and complete freedom from ringing characterize this design approach. Bandwidth is adjustable from a minimum of 40 Hz to a maximum of 5700 Hz, allowing optimum passband tailoring under widely varying conditions. Skirt slope is 150 dB per octave (about twice as steep as a good crystal filter) and stopband attenuation is at least 51 dB. SuperSCAF is connected via the receiver's speaker or headphone output and provides 1.5 Watts to drive a 3.2 to 8 Ohm speaker. SuperSCAF operates from 105 to 130 VAC.

SuperSCAF is available in kit form for $139.95 or assembled for $179.95. Please include $7.00 for shipping and handling. Order from: Aftronics, Inc., PO Box 785, Longwood, FL 32752-0785. Florida residents should include state sales tax.

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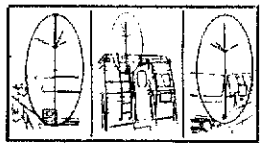

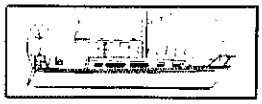

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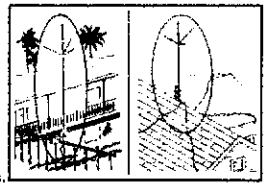

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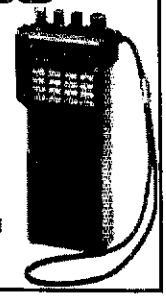

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• RS7A $50.00	• RS35M . . $165.00
• RS12A $76.00	• VS35M . . $179.00
• RS20A $92.00	• RS50A . . . $210.00
• RS20M . . $113.00	• RS50M . . $232.00
• VS20M . . $129.00	• RM50M . . $249.00
• RS35A . . . $147.00	• VS50M . . $239.00

unlden SCANNERS

BC-210	$179.00
BC-100	$185.00
BC-590 XLT	$199.00
BC-760 XLT	$269.00
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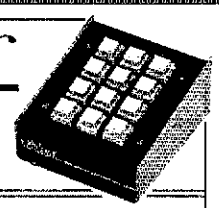
QSYer

The Most Used Accessory in Any Station



The QSYer's effortless, lightning-fast frequency selection opens up your rig to its full potential. Whether you're contesting, DXing, ragchewing, or mobiling—you'll do it better, faster, and easier—and have more fun—with a QSYer.

Order the **KW-QSYer** for the Kenwood 940, 440, 140, 680, 711 and 811; the **757 QSYer** for the FT-757GX; the **757-II QSYer** for the FT-757GXII; the **767 QSYer** for the FT-767GX; the **747 QSYer** for the FT-747GX; or the **735 QSYer** for the IC-735. (Kenwood rigs must have the appropriate Kenwood IC-10 or IF-10 interface installed.)

$99.50 plus $2.50 S&H (Visa/MC accepted) from:

Stone Mountain Engineering Company
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MINIPROP™

with Mode Searching

Version 3 of popular HF propagation prediction program finds strongest ionospheric mode each half hour on 7 frequencies. Includes effects of DEF layers. Predicts MUFs (superior to MINIMUF), signal levels, radiation angles, mode availabilities, mode configurations. DX Compass, beam headings, path length, sunrise/set times, grayline directions, atlas with all DXCC countries, more. Printed manual. Version 2 used by NOAA to schedule communications with ozone hole measurement team in Antarctic. See reviews CQ 10/87 p88, NCJ 7/88 p23. For IBM, compatibles with 320K RAM, DOS 2.11 or greater. 8087/287/387 strongly recommended but not required. Specify 5-1/4" or 3-1/2" disk. $49.95 ppd in US and Canada. Add $5 elsewhere for air mail. CA please add 6.5% tax. US checks only.

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11058 Queensland Street, Los Angeles, CA 90034-3029

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ANTENNA/TOWER SALE!

hy-gain

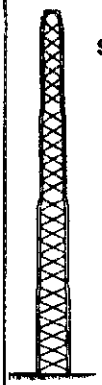
CRANKUP SALE!

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

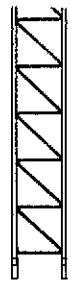
- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$419
HBX48	48 ft	10 sq ft	303	$539
HBX56	56 ft	10 sq ft	385	$629
HDBX40	40 ft	16 sq ft	281	$519
HDBX48	48 ft	16 sq ft	363	$619

*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, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices 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'	$769	$1379	$1779
60'	849	1539	1989
70'	1029	1719	2199
80'	1099	2019	2559
90'	1189	2169	2759
100'	1399	2349	2969
110'	1489	2719	3159
120'	1559	2879	3399

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
TX455	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

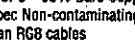
**Note-towers rated at 50 mph to EIA specifications*

RG-213U

$.36/ft $349/1000 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!

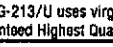
RG-8X



$.22/ft $209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

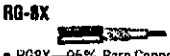
9086



$.42/ft $409/1000 ft.

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/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	.6	.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
¾" 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

COAX CONNECTORS

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

CUSHCRAFT

A3 3-el Tribander	$259
A4S 4-el Tribander Beam w/S.S. Hdwre	$349
A743 & A744, 30/40 mtr KIT for the A3 & A4	$ 89
R4 20-10 mtr Vertical	$229
AP8 80-10 mtr Vertical	$159
AV5 80-10 mtr Vertical	$119
D40 40 mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$339
A50-5 5-el 6 mtr Beam	$ 98
215 WB NEW 15-el 2 mtr Beam	$ 89
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$129
3219 19-el 2 mtr Beam	$109
424B 24-el 432 MHz Beam	$ 89
ARX2B 2 mtr Vertical	$ 45

hy-gain

CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
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QK710 30/40 mtr. Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
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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	
28DQ 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 $149 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $139 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:

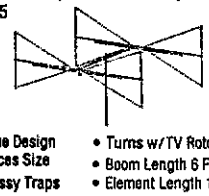
RMK II Roof Mtg. Kit	$55
STR II Stub-Tuned Radials	$35
T8R160 160m Coil Kit	$55
30m Add-on Kit	$35
17/12m Add-on Kit	$35

HF6V

HF2V

FREE UPS on ACCESSORIES when purchased with antenna

HF5B "Butterfly" 20-10m Compact Beam $229.95



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- Boom Length 6 Feet
- Element Length 12.5 Feet

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KT34A 4-el Broad Band Triband Beam	$399.95
KT34XA 6-el Broad Band Triband Beam	$589.95

ROTORS

Alliance HD73 (10.7 sq ft rating)	$119.95
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (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 cord cables $.22/ft. (vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cond cable $.39/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	$49.50	45G	$139.50
25G	$59.50	55G	$179.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$1129
FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699

25G Double Guy Kit	$279.
45G Double Guy Kit	$299.

*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 × 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
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1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle)	$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle)	$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
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500 D Guy Insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
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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
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9902LD Cable End (for 6700 cable)	$11.95
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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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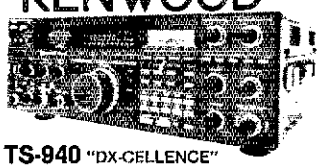
KENWOOD



TS-940 "DX-CELLENCE"
- All Band, All Mode Transceiver
- Direct Keyboard Entry
- Engineered for the DX-Minded and Contesting Ham
- Its Got It All!

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FT-767GX HF/VHF/UHF BASE STATION
- Add Optional 6m, 2m & 70cm Modules
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- Full CW Break-in
- Lots More Features

ICOM NEW!

IC-765 NEW HF TRANSCEIVER
- Built-in Automatic Antenna Tuner and Power Supply
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- 160-10M/General Coverage Receiver
- Band Stacking Registers

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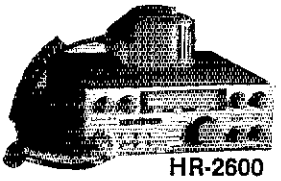


HR-2600
- Mobile 10 Meter Transceiver
- SSB/AM/FM/CW
- 25 Watts PEP
- New FM Offsets & PL

KENWOOD

TS-140S AFFORDABLE DX-ing!
- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

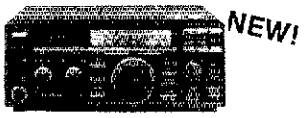
YAESU

NEW!

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

CP-100

Complete Terminal Unit for Morse, Baudot, ASCII, AMTOR

NOW ½ PRICE CLOSEOUT SPECIAL
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Software Available
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KENWOOD

NEW!

TM-231A
2 METER FM MOBILE
- 50 Watts Output
- 20 Multi-Function Memories
- Selectable CTCSS Tone Built-In
- Operate 4 Mobile Rigs with Optional IF-20 Interface and RC-20 Controller

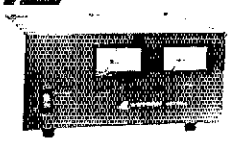
Kantronics

KT-Series Mono-Band Radios
10-15-20-30-40-80M MODELS
SAVE BIG $$
Best Price and Complete Selection Call Today!

ICOM

IC-2GAT
IC-4GAT
2 Meter & 440 Handhelds
- IC-2GAT RX 138-174 MHz TX 140-150 MHz 7 Watts
- IC-4GAT 440-450 MHz 6 Watts

ASTRON



• RS7A $51	• RS35M . . $167
• RS12A . . . $75	• VS35M . . $179
• RS20A . . . $92	• RS50A . . $209
• RS20M . . $112	• RM50M . $235
• VS20M . . $129	• RM50M . $259
• RS35A . . $149	• VS50M . . $245

KENWOOD

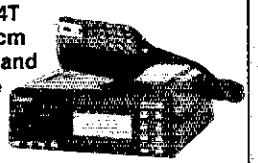
SALE!

TH-25AT POCKET-SIZED AND POWERFUL

- Frequency Coverage: 141-163 MHz (Rx), 144-148 MHz (Tx)
- Front Panel DTMF Pad
- 5 Watts Output
- 14 Memories
- TH-45AT Available for 440 MHz

ALINCO

SUPER SALE
ALD-24T 2m/70cm Dual Band Mobile



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25W, 21 Memories, Dual VFO's
At an Unbeatable Price!

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SUPER DUALBAND FM HANDHELD

- 5 Watts on Both Bands
- Receive 138-174 MHz 440-450 MHz
- Stores Standard and Odd Offsets

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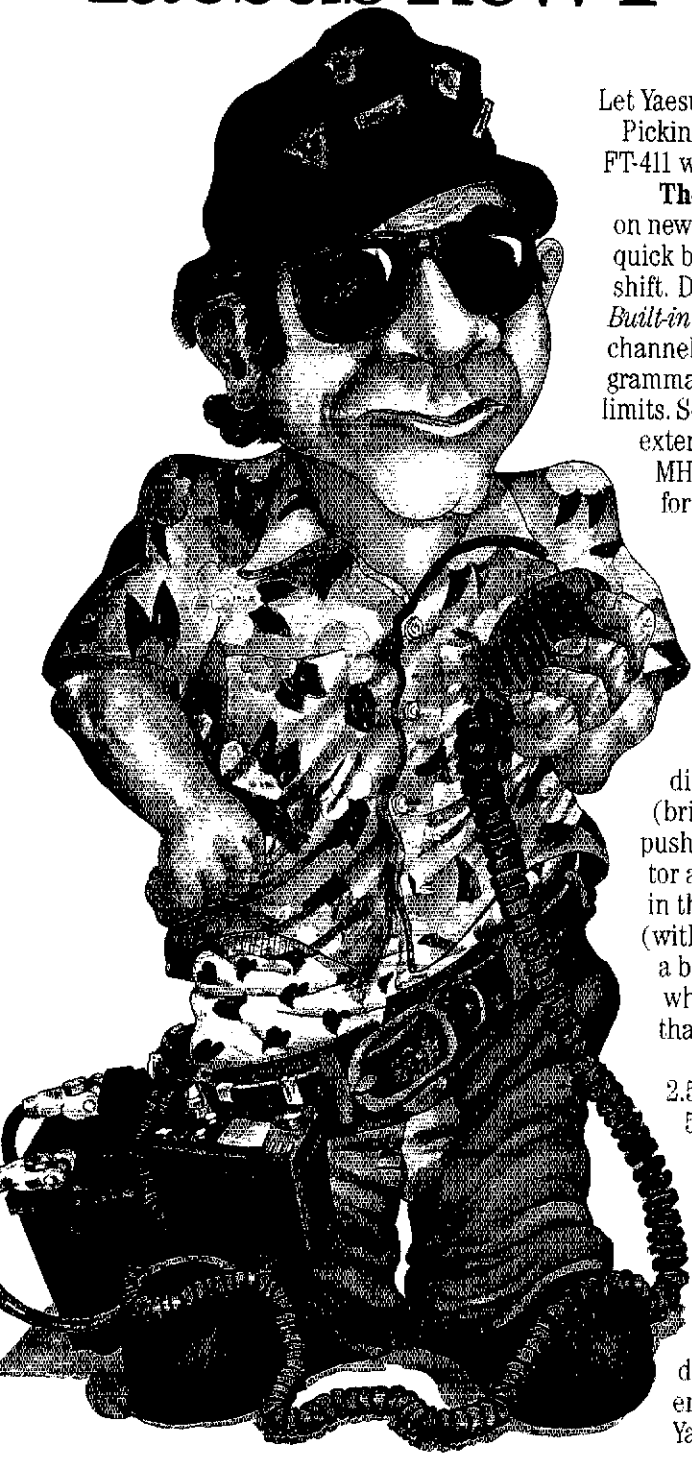
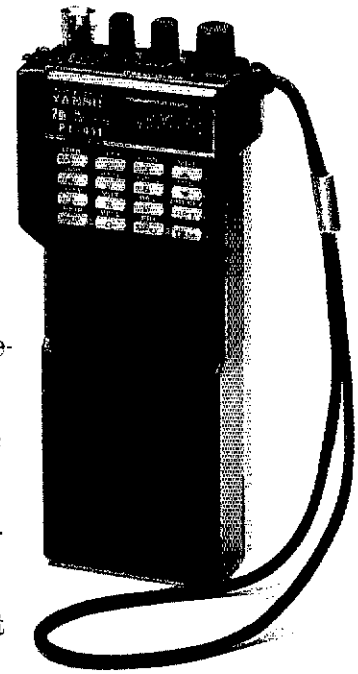
You'll be hard-pressed to beat the performance of Yaesu's new FT-411 handheld.



Let Yaesu's "next generation" handheld lighten your load!

Picking up where our popular FT-209R Series left off, the 2-meter FT-411 will amaze with its astounding array of features!

The brains of a base station. "Sophisticated operation" takes on new meaning in the FT-411. You get 49 memories, plus dual VFOs for quick band-hopping. Keyboard frequency entry. Automatic repeater shift. DTMF autodialer with ten memories of up to 15 digits each. *Built-in CTCSS encode/decode.* Selectable channel steps: 5/10/12.5/20/25 kHz. Programmable band scan with upper/lower limits. Selectable memory scan. And extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz).



Not bad for a handheld measuring just 55(w) x 32(d) x 139(h) mm (the same size as our FT-23R Series HTs)!

Friendly operation. For operating convenience, the FT-411's keypad features a "do-re-mi" audible command verification. Both the display and keypad can be backlit (brightly!) for night operation at the push of a button. A rotary channel selector allows fast manual tuning. Or key in the frequency directly. Operate VOX (with YH-2 headset option). Plus you get a battery saver to conserve power while monitoring. And a (defeatable) automatic power-off feature that shuts down your radio if you forget to turn it off!

High power capability. The FT-411 comes equipped with the 2.5-watt, 600-mAh FNB-10 battery pack. Try our optional FNB-12 5-watt, 500mAh pack or tiny FNB-9 2.5-watt, 200-mAh pack. Or get 6 watts output by applying 13.8-volts DC from an external power supply.

Swap options with Yaesu's FT-23R Series. Our rugged best-seller's chargers, batteries, and microphones are fully compatible with the FT-411. The FT-23R is the perfect companion for the FT-411, and at a great price!

Try out an FT-411 today. Ask for it now at your local Yaesu dealer. Or call 1-800-999-2070 for a free brochure. And experience the legendary Yaesu HT performance!

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847. Prices and specifications subject to change without notice. Specifications guaranteed only within amateur bands.

KENWOOD

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All New!

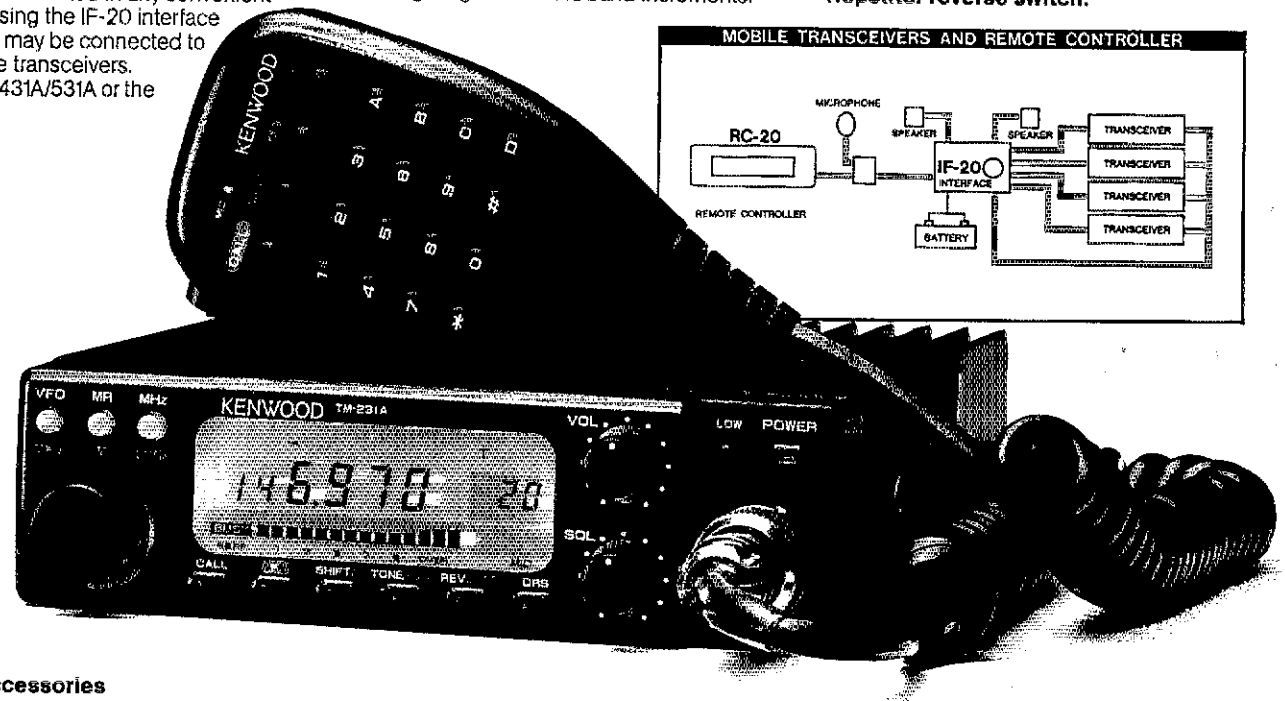
Stacked in Your Favor!

TM-231A/431A/531A

FM Mobile Transceiver

Looking for a compact transceiver for your mobile VHF and UHF operations? KENWOOD has a compact rig for each of the most popular VHF/UHF bands.

- **20 multi-function memory channels.** 20 memory channels allow storage of frequency, repeater offset, CTCSS frequency, frequency step, Tone On/Off status, CTCSS and REV.
- **High performance—high power! 50W (TM-231A), 35W (TM-431A) with a 3 position power switch (high, medium, low).**
- **Optional full-function remote controller (RC-20).** A full-function remote controller using the Kenwood bus line, model RC-20, may be easily connected to the TM-231A/431A/531A and can be mounted in any convenient location. Using the IF-20 interface the RC-20 may be connected to four mobile transceivers. (TM-231A/431A/531A or the TM-701A)
- **Multi-function microphone supplied.** Controls are provided on the microphone for CALL (call channel), VFO, MR (memory recall or change the memory channel) and a programmable key. The programmable key can be used to control one of the following functions on the radio: MHz, T. ALT, TONE, REV, DRS, LOW or MONITOR.
- **Easy-to-operate illuminated keys.** A functionally designed control panel with backlit keys increases the convenience and ease of operation during night-time use.
- **Auto repeater offset on 144 and 220 MHz.**
- **Built-in digital VFO.**
  - **a) Selection of the frequency step (5, 10, 15, 20, 12.5, 25kHz)** *TM-531A: 10, 20, 12.5 25kHz
  - **b) Programmable VFO** The user friendly programmable VFO allows the operator to select and program variable tuning ranges in 1 MHz band increments.
- **Programmable call channel function.** The call channel key allows instant recall of your most commonly used frequency data.
- **Selectable CTCSS tone built-in.**
- **Tone alert system—for true "quiet monitoring"!** When activated this function will cause a distinct beeper tone to be emitted from the transceiver for approximately 10 seconds to signal the presence of an incoming signal.
- **Easy-to-operate multi-mode scanning.** Band scan, Program band scan, Memory scan plus programmable memory channel lock-out, with time operated or carrier operated stop.
- **Priority alert.**
- **DRS (Digital recording system).** The optional DRU-1 can store received and transmitted messages for up to 32 seconds, allowing the operator to quickly check or return any call using the tone alert system.
- **Automatic lock tuning function (TM-531A).**
- **Repeater reverse switch.**



Optional Accessories

- **RC-20** Full-function remote controller
- **RC-10** Multi-function remote controller
- **IF-20** Interface unit handset • **DRU-1** Digital recording unit • **MC-44** Multi-function hand mic. • **MC-44DM** Multi-function hand mic. with auto-patch • **MC-48B** 16-key DTMF hand mic. • **MC-55** 8-pin mobile mic.
- **MC-60A/80/85** Desk-top mics. • **MA-700** Dual band (2m/70cm) mobile antenna (mount not supplied) • **SP-41** Compact mobile speaker • **SP-50B** Mobile speaker • **PS-430** Power supply • **PS-50** Heavy-duty power supply • **MB-201** Mobile mount • **PG-2N** Power cable • **PG-3B** DC line noise filter
- **PG-4H** Interface connecting cable • **PG-4J** Extension cable kit • **TSU-6** CTCSS unit

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

KENWOOD

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